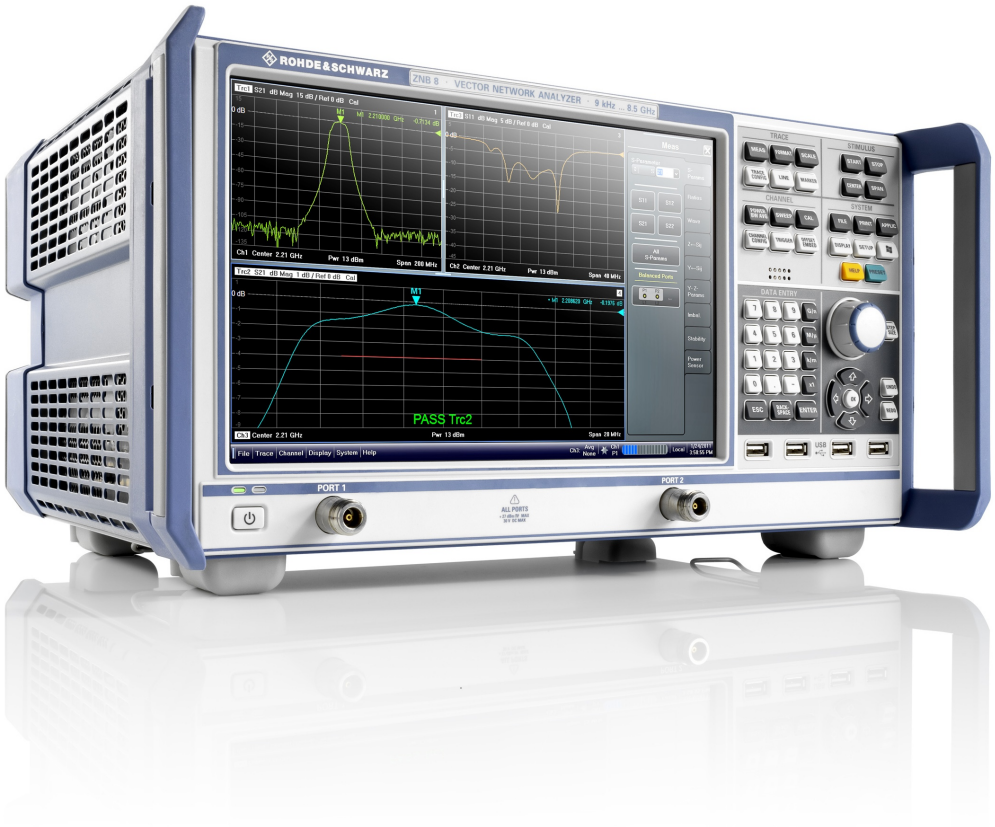
R&S®ZNB
Vector Network Analyzers
Service Manual



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Test & Measurement

Service Manual

ROHDE&SCHWARZ

This manual describes the following vector network analyzer types:

- R&S® ZNB4, order no. 1311.6010.22 (2 test ports)
- R&S® ZNB4, order no. 1311.6010.24 (4 test ports)
- R&S® ZNB8, order no. 1311.6010.42 (2 test ports)
- R&S® ZNB8, order no. 1311.6010.44 (4 test ports)
- R&S® ZNB20, order no. 1311.6010.62 (2 test ports)
- R&S® ZNB20, order no. 1311.6010.64 (4 test ports)
- R&S® ZNB40, order no. 1311.6010.72 (2 test ports)
- R&S® ZNB40, order no. 1311.6010.82 (2 test ports)
- R&S® ZNB40, order no. 1311.6010.84 (4 test ports)

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The following abbreviations are used throughout this guide: R&S® ZNBxx is abbreviated as R&S ZNBxx, R&S® ZNB-xxx as R&S ZNB-xxx

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for any purpose other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

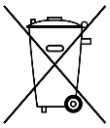
The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and, in some cases, a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories. For product-specific information, see the data sheet and the product documentation.

Safety labels on products

The following safety labels are used on products to warn against risks and dangers.

Symbol	Meaning	Symbol	Meaning
	Notice, general danger location Observe product documentation		ON/OFF Power
	Caution when handling heavy equipment		Standby indication
	Danger of electric shock		Direct current (DC)

Symbol	Meaning	Symbol	Meaning
	Caution ! Hot surface		Alternating current (AC)
	Protective conductor terminal To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth		Direct/alternating current (DC/AC)
	Earth (Ground)		Class II Equipment to identify equipment meeting the safety requirements specified for Class II equipment (device protected by double or reinforced insulation)
	Frame or chassis Ground terminal		EU labeling for batteries and accumulators For additional information, see section "Waste disposal/Environmental protection", item 1.
	Be careful when handling electrostatic sensitive devices		EU labeling for separate collection of electrical and electronic devices For additional information, see section "Waste disposal/Environmental protection", item 2.
	Warning! Laser radiation For additional information, see section "Operation", item 7.		

Signal words and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.

DANGER Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Indicates information considered important, but not hazard-related, e.g. messages relating to property damage.
In the product documentation, the word ATTENTION is used synonymously.

These signal words are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the signal words described here are always used only in connection with the related product documentation and the related product. The use of signal words in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: predefined operating position is always with the housing floor facing down, IP protection 2X, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of ±10 % shall apply to the nominal voltage and ±5 % to the nominal frequency, overvoltage category 2, pollution degree 2.
2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or even death.
3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or even death.

Electrical safety

If the information on electrical safety is not observed either at all or to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the mains-supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with a protective conductor contact and protective conductor.
3. Intentionally breaking the protective conductor either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
4. If there is no power switch for disconnecting the product from the mains, or if the power switch is not suitable for this purpose, use the plug of the connecting cable to disconnect the product from the mains. In such cases, always ensure that the power plug is easily reachable and accessible at all times. For example, if the power plug is the disconnecting device, the length of the connecting cable must not exceed 3 m. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, the disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cables on a regular basis to ensure that they are in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

6. The product may be operated only from TN/TT supply networks fuse-protected with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket provided for this purpose. Otherwise, sparks that result in fire and/or injuries may occur.
8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
9. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fuse protection, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC 60950-1 / EN 60950-1 or IEC 61010-1 / EN 61010-1 standards that apply in each case.
11. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
12. If a product is to be permanently installed, the connection between the protective conductor terminal on site and the product's protective conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.
13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fuse-protected in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.
14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.
16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1). Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

1. Operating the products requires special training and intense concentration. Make sure that persons who use the products are physically, mentally and emotionally fit enough to do so; otherwise, injuries or material damage may occur. It is the responsibility of the employer/operator to select suitable personnel for operating the products.

2. Before you move or transport the product, read and observe the section titled "Transport".
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.
4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal/Environmental protection", item 1.
5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.
6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.
7. Laser products are given warning labels that are standardized according to their laser class. Lasers can cause biological harm due to the properties of their radiation and due to their extremely concentrated electromagnetic power. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).
8. EMC classes (in line with EN 55011/CISPR 11, and analogously with EN 55022/CISPR 22, EN 55032/CISPR 32)
   - Class A equipment:
     Equipment suitable for use in all environments except residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings
     Note: Class A equipment is intended for use in an industrial environment. This equipment may cause radio disturbances in residential environments, due to possible conducted as well as radiated disturbances. In this case, the operator may be required to take appropriate measures to eliminate these disturbances.
   - Class B equipment:
     Equipment suitable for use in residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, protective conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.
2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.
3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.
4. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
5. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.
6. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.
7. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.
8. Follow the transport stipulations of the carrier (IATA-DGR, IMDG-Code, ADR, RID) when returning lithium batteries to Rohde & Schwarz subsidiaries.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.
2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.

3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Waste disposal/Environmental protection

1. Specially marked equipment has a battery or accumulator that must not be disposed of with unsorted municipal waste, but must be collected separately. It may only be disposed of at a suitable collection point or via a Rohde & Schwarz customer service center.
2. Waste electrical and electronic equipment must not be disposed of with unsorted municipal waste, but must be collected separately.
   Rohde & Schwarz GmbH & Co. KG has developed a disposal concept and takes full responsibility for take-back obligations and disposal obligations for manufacturers within the EU. Contact your Rohde & Schwarz customer service center for environmentally responsible disposal of the product.
3. If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
4. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

For additional information about environmental protection, visit the Rohde & Schwarz website.

Instrucciones de seguridad elementales

¡Es imprescindible leer y cumplir las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad de la UE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o sin tener en cuenta las instrucciones del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del mal uso del producto.

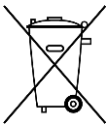
Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios. Los datos específicos del producto figuran en la hoja de datos y en la documentación del producto.

Señalización de seguridad de los productos

Las siguientes señales de seguridad se utilizan en los productos para advertir sobre riesgos y peligros.

Símbolo	Significado	Símbolo	Significado
	Aviso: punto de peligro general Observar la documentación del producto		Tensión de alimentación de PUESTA EN MARCHA / PARADA
	Atención en el manejo de dispositivos de peso elevado		Indicación de estado de espera (standby)
	Peligro de choque eléctrico		Corriente continua (DC)
	Advertencia: superficie caliente		Corriente alterna (AC)
	Conexión a conductor de protección		Corriente continua / Corriente alterna (DC/AC)

Símbolo	Significado	Símbolo	Significado
	Conexión a tierra		El aparato está protegido en su totalidad por un aislamiento doble (reforzado)
	Conexión a masa		Distintivo de la UE para baterías y acumuladores Más información en la sección "Eliminación/protección del medio ambiente", punto 1.
	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)		Distintivo de la UE para la eliminación por separado de dispositivos eléctricos y electrónicos Más información en la sección "Eliminación/protección del medio ambiente", punto 2.
	Advertencia: rayo láser Más información en la sección "Funcionamiento", punto 7.		

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.

	Indica una situación de peligro que, si no se evita, causa lesiones graves o incluso la muerte.
	Indica una situación de peligro que, si no se evita, puede causar lesiones graves o incluso la muerte.
	Indica una situación de peligro que, si no se evita, puede causar lesiones leves o moderadas.
	Indica información que se considera importante, pero no en relación con situaciones de peligro; p. ej., avisos sobre posibles daños materiales. En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación del producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de ±10 % sobre el voltaje nominal y de ±5 % sobre la frecuencia nominal. Categoría de sobrecarga eléctrica 2, índice de suciedad 2.
2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, se pueden causar lesiones o, en determinadas circunstancias, incluso la muerte.
3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.
2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.
3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.
4. Si el producto no está equipado con un interruptor para desconectarlo de la red, o bien si el interruptor existente no resulta apropiado para la desconexión de la red, el enchufe del cable de conexión se deberá considerar como un dispositivo de desconexión.
   El dispositivo de desconexión se debe poder alcanzar fácilmente y debe estar siempre bien accesible. Si, p. ej., el enchufe de conexión a la red es el dispositivo de desconexión, la longitud del cable de conexión no debe superar 3 m).
   Los interruptores selectores o electrónicos no son aptos para el corte de la red eléctrica. Si se

integran productos sin interruptor en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.

5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.
6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).
7. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.
8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.
9. En las mediciones en circuitos de corriente con una tensión U_{eff} > 30 V se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.
11. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar lesiones, fuego o daños en el producto.
12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.
14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.
15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.
16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.

17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.
18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.
2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".
3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados —los llamados alérgenos (p. ej. el níquel)—. Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.
4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación/protección del medio ambiente", punto 1.
5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalizar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.
6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.
7. Los productos con láser están provistos de indicaciones de advertencia normalizadas en función de la clase de láser del que se trate. Los rayos láser pueden provocar daños de tipo biológico a causa de las propiedades de su radiación y debido a su concentración extrema de potencia electromagnética. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).
8. Clases de compatibilidad electromagnética (conforme a EN 55011 / CISPR 11; y en analogía con EN 55022 / CISPR 22, EN 55032 / CISPR 32)
   - Aparato de clase A:
     Aparato adecuado para su uso en todos los entornos excepto en los residenciales y en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.
     Nota: Los aparatos de clase A están destinados al uso en entornos industriales. Estos aparatos

pueden causar perturbaciones radioeléctricas en entornos residenciales debido a posibles perturbaciones guiadas o radiadas. En este caso, se le podrá solicitar al operador que tome las medidas adecuadas para eliminar estas perturbaciones.

- Aparato de clase B:
  Aparato adecuado para su uso en entornos residenciales, así como en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.
2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.
2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.
3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.
4. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.
5. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.
6. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).
7. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

8. En caso de devolver baterías de litio a las filiales de Rohde & Schwarz, debe cumplirse las normativas sobre los modos de transporte (IATA-DGR, código IMDG, ADR, RID).

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.
2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.
3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación/protección del medio ambiente

1. Los dispositivos marcados contienen una batería o un acumulador que no se debe desechar con los residuos domésticos sin clasificar, sino que debe ser recogido por separado. La eliminación se debe efectuar exclusivamente a través de un punto de recogida apropiado o del servicio de atención al cliente de Rohde & Schwarz.
2. Los dispositivos eléctricos usados no se deben desechar con los residuos domésticos sin clasificar, sino que deben ser recogidos por separado.
   Rohde & Schwarz GmbH & Co.KG ha elaborado un concepto de eliminación de residuos y asume plenamente los deberes de recogida y eliminación para los fabricantes dentro de la UE. Para desechar el producto de manera respetuosa con el medio ambiente, diríjase a su servicio de atención al cliente de Rohde & Schwarz.
3. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polvos con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.
4. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

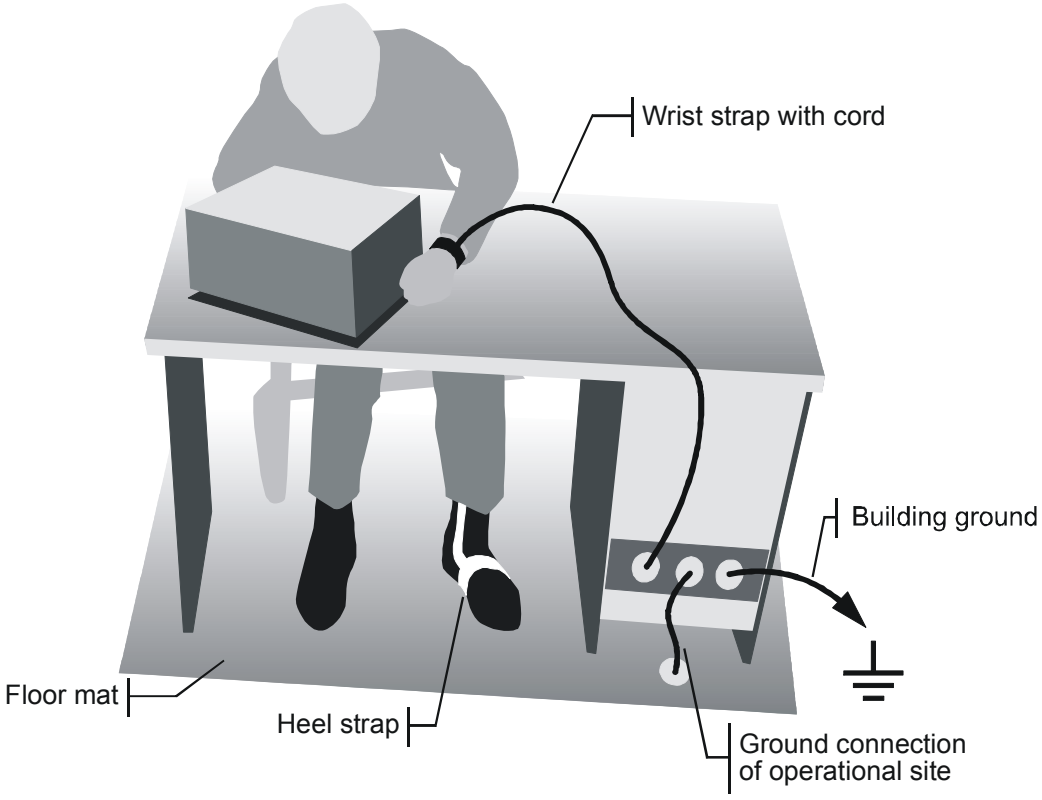
Se puede encontrar más información sobre la protección del medio ambiente en la página web de Rohde & Schwarz.

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:

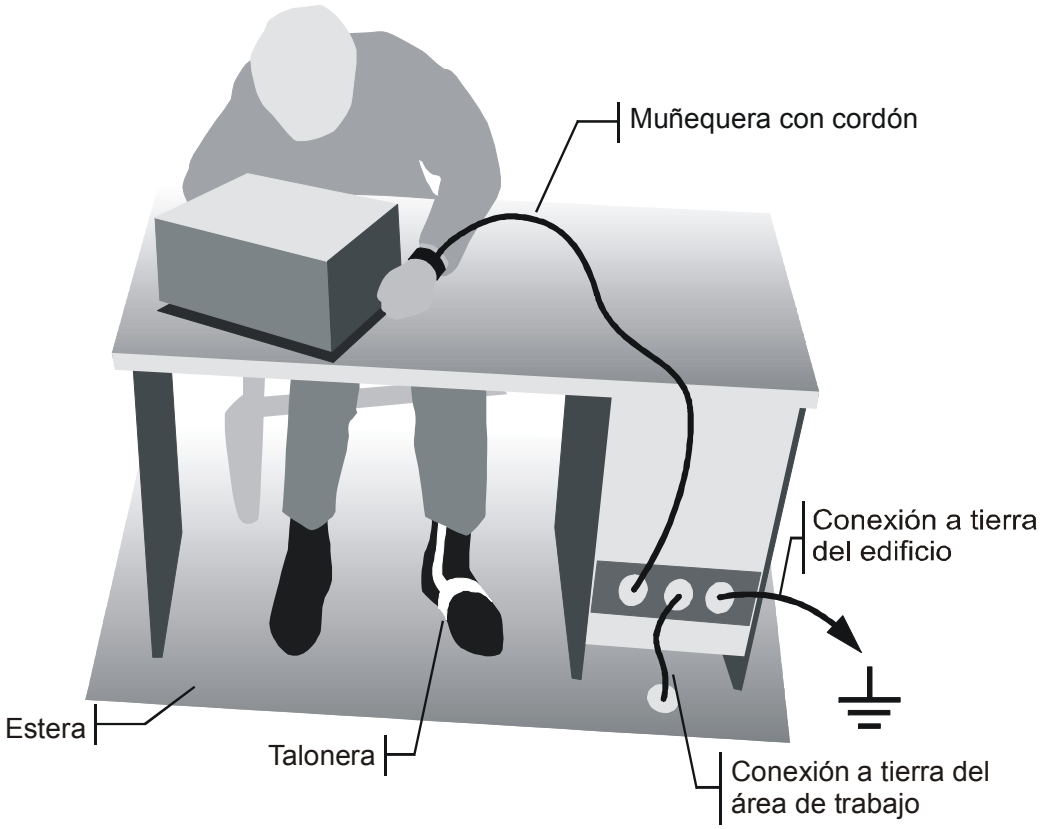
- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

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

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 chapter describes the measuring equipment and the recommended test procedure for checking the R&S ZNB for compliance with the rated specifications.

1.1 Preliminary Remarks

- The required characteristics of the network analyzer are checked after a warm-up time of at least 60 minutes; this ensures that the guaranteed data is met.
- The values stated in the following sections are not guaranteed data; only the specifications in the data sheet are binding.
- The values in the data sheet are guaranteed limits. Because of the measurement errors that arise, these limits must be increased to encompass the tolerances of the measuring equipment used for the performance test.
- Entries for the measurement are represented in the following way:

[<**KEY**>]	Press a front-panel key, e.g. **[SPAN]**
[<SOFTKEY>]	Press a softkey, e.g. [MARKER -> PEAK]
[<**nn unit**>]	Enter a value + terminate the entry with a unit, e.g.**[12 kHz]**
#	Represents the number of the PORT or DC Input under test , e.g. **1** for PORT 1 or DC Input1

Consecutive entries are separated with a [:], e.g. [**Meas Bandwidth** : 1 kHz]

- **The sequence of test measurements must be followed because on some measurements the R&S ZNB under test is used as test equipment. Because of this procedure no spectrum analyzer R&S FSU40, R&S FSU50, or R&S FSU67 is necessary.**

Test measurement	**Successful test provided**
Harmonics	• Accuracy of output power • Power measurement accuracy • Input linearity
Output linearity	• Accuracy of output power • Power measurement accuracy • Input linearity

1.2 Test Equipment

Table 1-1: Recommended Test Equipment

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1.	Spectrum Analyzer	a) Counter mode: Min. resolution: 100 Hz Max. rel. frequency deviation: 10E–6 b) Linearity Max. departure from linearity: 0.06 dB c) Frequency response: 9 KHz to 4 GHz: < 1 dB 4 GHz to 8 GHz: < 1.5 dB 8 GHz to 8.5 GHz: < 2 dB > 8.5 GHz < 2.5 dB	**ZNB 4/8:** FSW 26 **ZNB 20/40:** FSW43	FSW26: 1312.8000K26 FSW43: 1312.8000K43	Frequency uncertainty Harmonics Output linearity Input linearity
2.	Power sensor	**ZNB 4/8:** 9 kHz…8.5 GHz **ZNB 20:** 100 kHz…20 GHz **ZNB 40:** 100 kHz / 10 MHz…40 GHz	**ZNB 4/8:** NRP-Z51 **ZNB 20:** NRP-Z52 **ZNB 40:** NRP-Z55	NRP-Z51: 1138.0005.03 NRP-Z52: 1138.0505.02 NRP-Z55: 1138.2008.03/04	Max. output power Accuracy of output power Power measurement uncertainty
3.	Power meter	Suitable for power sensor	NRP2	1144.1374.02	Max. output power Accuracy of output power Power measurement uncertainty
4.	Calibration kit	**ZNB 4/8:** N 50 Ohm, 9 kHz...8.5 GHz **ZNB 20:** 3.5 mm, 100 kHz...20 GHz **ZNB 40:** 2.92 mm, 100 kHz / 10 MHz...40 GHz	**ZNB 4/8:** ZV-Z170 **ZNB 20:** ZV-Z235 **ZNB 40:**ZV-Z229	ZV-Z170: 1317.7683.02 ZV-Z235: 5011.6542.02 ZV-Z229: 5011.6559.02	Input linearity Uncorr. system performance test
5.	Shorts	For an n-port VNA: n simple shorts with fitting gender for all test ports, need not be characterized. For 2-port VNAs, one may also use the calibration kit and change the gender of the "wrong" short with the help of an adapter	-	-	Dynamic range

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
6.	Signal generator	**ZNB 4/8:** 9 kHz...8.5 GHz **ZNB 20:** 100 kHz...20 GHz **ZNB 40:** 100 kHz / 10 MHz...40 GHz	**ZNB 8:** SMB100A with option SMB-B112L **ZNB 20:** SMB100A with option SMB-B120L **ZNB 40:** SMB100A with option SMB-B140L	SMB100A: 1406.6000.02 SMB-B112L: 1407.2150.02 SMB-B120L: 1407.2250.02 SMB-B140L: 1407.2350.02	Power measurement uncertainty
7.	Power splitter	Suitable for frequency range and connector type of R&S ZNB Γeq < 0.05 Output tracking < 0.2 dB	**ZNB 4/8:** Weinschel 1870A **ZNB 20:** Weinschel 1579 **ZNB 40:** Weinschel 1534		Power measurement uncertainty
8.	Test cable	Suitable for frequency range and connector type of R&S ZNB , spectrum analyzer and signal generator Approx. 1.5 m **ZNB 4/8:** If a SMA or 3.5 mm cable is used, the cable must be adapted to the N 50 Ohm (f) R&S ZNB test ports and if necessary also to the spectrum analyzer / signal generator	**ZNB 4/8, 20:** ZV-Z193 **ZNB 40:** ZV-Z195	ZV-Z193: 1306.4520.60 ZV-Z195: 1306.4536.36	Frequency uncertainty Harmonics Power measurement uncertainty Input linearity Trace Noise unidirectional devices
9.	Test cable	Approx. 0.6 m **only ZNB 20/40:** A f-f through from the cal kit is needed to adapt the male connector of the cable to a male R&S ZNB test port	**ZNB 4/8:** ZV-Z91 **ZNB 20:** ZV-Z93 **ZNB 40:** ZV-Z95	ZV-Z91: 1301.7572.25 ZV-Z93: 1301.7595.25 ZV-Z95: 1301.7608.25	Uncorr. system performance test
10.	Test cable	Approx. 1.5 m BNC (m) – BNC (m)			Transmission of reference frequency within test setup
11.	DC power supply	–12 V to +12 V	NGMO1	0192.1500.21	DC meas inputs
12.	DC voltmeter	MU < 0.2 % Ranges 1 V, 10 V	URE3	0350.5315.03	DC meas inputs
13.	DC cable	BNC (m) – 2 x 4 mm connector		3522.1778.00	DC meas inputs
14.	50 Ω termination	BNC (m)		0244.7677.00	DC meas inputs
15.	Test cable for USER CONTROL connector	Interface cable connected to controlling computer in the test bench, with 25-pin Sub-D-connector on its open end			User Control

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
16.	Test cable for EXT TRIGGER input	Interface cable connected to controlling computer in the test bench, with BNC (m) connector on its open end			Trigger input
17.	Test device for communication via PCIe interface	RF generator	SGS100A	1416.0505.02	B12 PCIe interface
18.	PCIe test cable		PCIE CABLE 1M	3589.2176.00	B12 PCIe interface
19.	Test device for communication via direct control interface	Switch matrix	ZN-Z84	1319.4500.02	B12 Direct Ctrl. interface
20.	Direct control test cable		DIGITAL I/Q CABLE	1402.4990.00	B12 Direct Ctrl. interface
21.	Memory stick	**ZNB4, ZNB8, ZNB20, ZNB40 var72:** USB 2.1 memory stick **ZNB40 var82, var84:** USB 3.0 memory stick			USB Connectors
22.	LAN cable				R&S ZNB remote control
23.	GPIB cable				R&S ZNB remote control
24.	USB 3.0 cable	Type A - Type B			R&S ZNB remote control

1.3 Test Instructions

The following sections describe the performance test sequences in detail. Test report tables appear in Chapter 1.4, "Performance Test Report", on page 51.

Preparatives

The following preparations must be made prior to any of the tests

- Allow for a minimum warm-up time of 30 minutes at ambient temperature.
- Carry out all internal adjustments.
- The values are specified in the data sheet. Additional uncertainties introduced by the measurement equipment must be taken into account when checking the rated values.

Options

The following options are included in the performance test:

- ZNB-B1 Bias Tees. See: Checking the optional R&S ZNB-B1 BIAS
- ZNB-B4 Precision Frequency Reference (OCXO). See: Checking the Static Frequency Accuracy

- ZNB-B10 GPIB Interface. See: Checking the optional R&S ZNB-B10 GPIB Interface
- ZNB-B12 Device Control. See: Checking the ZNB-B12 Device Control Option
- ZN-B14 Handler I/O. See: Checking the optional ZNB-B14 Handler I/O
- ZN-B15 RFFE GPIO. See: Checking R&S ZN-B15 RFFE GPIO
- ZNB4/8/20/40-B22 Extended Power Range for ZNB, 2 ports. See: Checking the Output Level Linearity
- ZNB4/8/20/40-B24 Extended Power Range for ZNB, 4 ports. See: Checking the Output Level Linearity
- ZNB4/8-B31 Receiver Step Attenuator for Port 1. See: Checking the Receiver Step Attenuator
- ZNB4/8-B32 Receiver Step Attenuator for Port 2. See: Checking the Receiver Step Attenuator
- ZNB4/8-B33 Receiver Step Attenuator for Port 3. See: Checking the Receiver Step Attenuator
- ZNB4/8-B34 Receiver Step Attenuator for Port 4. See: Checking the Receiver Step Attenuator
- ZNB4/8-B52 Extended Dynamic Range for ZNB, 2 ports.
- ZNB4/8-B54 Extended Dynamic Range for ZNB, 4 ports.
- ZNB-B81 DC Inputs. See: Checking the optional R&S ZNB-B81 DC Inputs

1.3.1 Checking the Remote Control Interfaces

Test equipment

LAN cable (see Table 1-1), GPIB cable (see Table 1-1)

ZNB40 var82, var84 only: USB 3.0 cable (see Table 1-1)

Test setup

Connect the R&S ZNB to the control computer by means of the LAN cable and the GPIB cable. If GPIB interface option ZNxx-B10 is not installed, install a temporary B10.

ZNB40 var82, var84 only: Connect the R&S ZNB to the control computer via the rear panel USB 3.0 client connector and the USB 3.0 cable.

Measurement

Use both interfaces to run test program and service tool.

1.3.2 Checking the Gauge

Each test port of the Vector Network Analyzer must be gauged prior to its first use. The gauge must be recalibrated whenever the connector adapter is changed and should be checked regularly, using the gauge block, for correct zero between adapter changes.

Connector type	Pin depth / mm	Pos. tolerance / mm	Neg. tolerance / mm
Type N (female)	5.258	+0.000	-0.076
Type 3.5 mm (male)	0	+0.000	-0.02
Type 2.92 mm (male)	0	+0.000	-0.02

1. Ensure the appropriate connector adapter is fitted to the dial gauge.
2. Attach the gauge block to the gauge interface and rotate the dial so that the indication reads zero. Lock the dial in position by tightening the screw on the side of the dial. Disconnect the gauge block
3. Mate the connector to be measured to the gauge and note the indication.
4. The connector is "in gauge" if the indication lies between the limits set by the connector specification (see table above). For precision type N and 3.5 mm connectors, the calibrated zero indication on the dial corresponds to one extreme, the other being -76 µm (-0.003 in) (anti-clockwise on the dial).

   Note: Damage to the connector may occur if the reading is positive.
5. After use, return the gauge set to its box.

1.3.3 Checking the Static Frequency Accuracy

Test equipment

Spectrum analyzer (see Table 1-1), test cable (see Table 1-1)

Test setup

Connect the spectrum analyzer to port 1

Spectrum analyzer settings

1. [**PRESET**]
2. [**FREQ** : **1 GHz**]
3. [**SPAN** : **50 kHz**]
4. [**BW** : RES BW MANUAL : **10 kHz**]
5. [**MARKER** : MARKER MODE : FREQ COUNT]
6. [**AMPT** : REF LEVEL : **10 dBm**]

R&S ZNB settings

1. [**PRESET**]
2. [**SETUP** : Freq.Ref.: Internal]

3. [**MEAS** : Wave Quantities: a1 Source Port 1]
4. [**SWEEP** : Sweep Type : CW Mode]
5. [**CENTER** : CW Frequency : **1 GHz**; Power : **0 dBm**]
6. [**SWEEP** : Sweep Control : Single : Restart Sweep]

Measurement

Read the frequency indicated by the marker of the Spectrum Analyzer.

Calculation

Frequency deviation = marker frequency – 1 GHz.

1.3.4 Checking the Output Harmonics

Test equipment

Spectrum analyzer (see: Table 1-1), test cable (see: Table 1-1)

Test setup

Connect the spectrum analyzer to port # (# : port number; all ports have to be tested)

Synchronize the reference oscillators in the spectrum analyzer and in the R&S ZNB.

Spectrum analyzer settings

1. [**PRESET**]
2. [**SPAN** : ZERO SPAN]
3. [**FREQ** : {f_{GEN}}*]
4. [**BW** : RES BW MANUAL : **1 kHz**]
5. [**SWEEP** : SWEEPTIME MANUAL: **100 ms**]
6. [**MEAS** : TIME DOM POWER : MEAN]
7. [**AMPT** : REF LEVEL : +**10 dBm**]
8. [**AMPT** : RF ATTEN MANUAL : **15 dB**]
9. [**AMPT** : RF INPUT : **DC**]

R&S ZNB settings

1. [**PRESET**]

2. [**MEAS** : Wave Quantities : a# Source Port #]
3. [**SWEEP** : Sweep Type : CW Mode]
4. [**CENTER** : CW Frequency : **{f_{GEN}}***]
5. [**POWER** : Power : **0 dBm** (f_{GEN} <= 15 GHz); **-5 dBm** (f_{GEN} > 15 GHz)]
6. [**SWEEP** : Sweep Control : Single : Restart Sweep]

Measurement

1. Read out Spectrum Analyzer POWER MEAN value: L_{SA_fGEN}
2. Change frequency of Spectrum Analyzer to 2x {f_{GEN}}*
3. Read out Spectrum Analyzer POWER MEAN value: L_{SA_2xfGEN}
4. Change frequency of Spectrum Analyzer to 3x {f_{GEN}}* (only if 3.Harmonics shall be tested)*
5. Read out Spectrum Analyzer POWER MEAN value: L_{SA_3xGEN}
   (only if 3.Harmonics shall be tested)*

Calculation

2.Harmonics [dBc] = (L_{SA_2xfGEN} + cable loss (in dB@2x fGEN)) – (L_{SA_fGEN} + cable loss (in dB@fGEN))

3.Harmonics [dBc] = (L_{SA_3xfGEN} + cable loss (in dB@3x fGEN)) – (L_{SA_fGEN} + cable loss (in dB@fGEN)) (only if 3.Harmonics shall be tested)*

The cable loss corresponds to the loss of the test cable used at the fundamental and the measured harmonic (cable loss is positive) .

* For test frequencies {f_{GEN}}, 2x {f_{GEN}} and 3x {f_{GEN}} see Chapter 1.4.4, "Table: Output Harmonics", on page 52.

1.3.5 Checking the Output Power Linearity

Test equipment

Spectrum analyzer (see: Table 1-1), test cable (see: Table 1-1)

Test setup

Connect spectrum analyzer to port # (# : port number; all ports have to be tested)

Synchronize the reference oscillators in the spectrum analyzer and in the R&S ZNB.

Spectrum analyzer settings

1. [**PRESET**]
2. [**FREQ** : {f_{GEN}}*]
3. [**SPAN** : ZERO SPAN]
4. [**BW** : RES BW MANUAL : **100 Hz**]
5. [**SWEEP** : SWEEPTIME MANUAL: **100 ms**] (for **{l_{GEN}}*** ≥ –55 dBm)
   [**SWEEP** : SWEEPTIME MANUAL: **1 s**] (for **{l_{GEN}}*** < –55 dBm)
6. [**TRACE** : DETECTOR : DETECTOR RMS]
7. [**MEAS** : TIME DOM POWER : MEAN]
8. [**AMPT** : REF LEVEL : **15 dBm**]
9. [**AMPT** : RF ATTEN MANUAL : **15 dB**]
10. [**AMPT** : RF INPUT : **DC**]

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : a# Source Port #]
3. [**SWEEP** : Sweep Type : CW Mode]
4. [**SWEEP** : Sweep Params : Number of Points 2]
5. [**POWER** : Bandwidth : 1 kHz]
6. [**POWER** : Power : -10dBm]
7. [**CENTER** : CW Frequency : {f_{GEN}}*]
8. [**SWEEP** : Sweep Control : Single : Restart Sweep]
9. [**SWEEP** : Sweep Control : Single : Restart Sweep]

Measurement

1. Read out Spectrum Analyzer POWER MEAN value: $L_{SA\text{-}10dBm}$
2. Change R&S ZNB power by {l_{step}}**
3. Read out Spectrum Analyzer POWER MEAN value: L_{SA_lstep}

Calculation

The measured values are referred to the level at the R&S ZNB setting of –10 dBm.

Level deviation [dB] = ($L_{SA\_lstep} – L_{SA–10dBm}$) – {l_{step}}**

* For test frequencies {f_{GEN}}, see Chapter 1.4.5, "Table: Output Power Linearity", on page 57.

** For source power change {l_{step}}, see Chapter 1.4.5, "Table: Output Power Linearity", on page 57.

1.3.5.1 Checking the Reference Channel Linearity

Test equipment

Spectrum analyzer (see: Table 1-1), test cable (see: Table 1-1)

Test setup

Connect the spectrum analyzer to port # (# : port number; all ports have to be tested)

Synchronize the reference oscillators in the spectrum analyzer and in the R&S ZNB.

Spectrum analyzer settings

1. [**PRESET**]
2. [**SPAN** : ZERO SPAN]
3. [**FREQ** : {f_{GEN}}*]
4. [**BW** : RES BW MANUAL : **1 kHz**]
5. [**SWEEP** : SWEEPTIME MANUAL: **100 ms**]
6. [**MEAS** : TIME DOM POWER : MEAN]
7. [**AMPT** : REF LEVEL : **+20 dBm**]
8. [**AMPT** : RF ATTEN MANUAL : **30 dB**]
9. [**AMPT** : RF INPUT : **DC**]

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : a# Source Port #]
3. [**SWEEP** : Sweep Type : CW Mode]
4. [**SWEEP** : Sweep Params : Number of Points 6]
5. [**POWER** : Bandwidth : 100 Hz]
6. [**POWER** : Power : –10 dBm + {l_{step}}]
7. [**CENTER** : CW Frequency : {f_{GEN}}*]
8. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]

9. [**SWEEP** : Sweep Control : Single : Restart Sweep]

Measurement

1. Read out Spectrum Analyzer POWER MEAN value: $L_{SA\text{-}10dBm}$
2. Read out R&S ZNB Statistics Mean values: $L_{ZNx\text{-}10dBm}$
3. Change Output Power of R&S ZNB by $\{l_{step}\}$**
4. Read out Spectrum Analyzer POWER MEAN value: L_{SA_lstep}
5. Read out R&S ZNB Statistics Mean values: L_{ZNx_lstep}

Calculation

Reference Channel Level Deviation [dB]:

$RefDev_{lstep} = (L_{ZNx\_lstep} - L_{ZNx\text{-}10dBm}) - (L_{SA\_lstep} - L_{SA\text{-}10dBm})$

* For test frequencies $\{f_{GEN}\}$ and power change $\{l_{step}\}$, see Chapter 1.4.6, "Table: Input Linearity Reference Channel", on page 69

This measurement is not documented. It is only performed in order to obtain $RefDev_{lstep}$, which is required for Chapter 1.3.10, "Checking the Input Power Linearity (high level)", on page 22.

1.3.6 Checking the Maximum Output Power

Test equipment

Power sensor or Power meter with power sensor (see: Table 1-1)

Test setup

Connect power sensor to port # (# : port number; all ports have to be tested)

Power sensor settings

For measurement frequencies $\{f_{GEN}\}$, see Chapter 1.4.7, "Table: Maximum Output Power", on page 73.

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : a# Source Port #]
3. [**SWEEP** : Sweep Type : CW Mode]
4. [**CENTER** : CW Frequency : **$\{f_{GEN}\}$***; Power : **20 dBm**]

5. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies {f_{GEN}}, see Chapter 1.4.7, "Table: Maximum Output Power", on page 73.

Measurement

Read the level indicated by the power meter [dBm].

1.3.7 Checking the Output Power Accuracy

Test equipment

Power sensor or Power meter with power sensor (see: Table 1-1)

Test setup

Connect power sensor to port # (# : port number; all ports have to be tested)

Power sensor settings

For test frequencies {f_{GEN}}, see Chapter 1.4.8, "Table: Accuracy of Output Power", on page 78.

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : a# Source Port #]
3. [**SWEEP** : Sweep Type : CW Mode]
4. [**POWER** : Bandwidth : 1 kHz]
5. [**POWER** : Power : –10 dBm]
6. [**CENTER** : CW Frequency : **{f_{GEN}}***]
7. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies {f_{GEN}}, see Chapter 1.4.8, "Table: Accuracy of Output Power", on page 78.

Measurement

Read the levels indicated by the power sensor: L_{PS}

Calculation

Level deviation [dB] = L_{PS} – (–10 dBm)

1.3.8 Checking the Input Power Measurement Accuracy

Test equipment

1. Power sensor or Power meter with power sensor (see: Table 1-1)
2. Signal generator (see: Table 1-1)
3. Power splitter (see: Table 1-1)
4. power sensor (see: Table 1-1)
5. test cable (see: Table 1-1)

Test setup

1. Connect the signal generator to the power splitter input using the test cable
2. Connect the power sensor to a power splitter output
3. Connect the other power splitter output to port # using an adapter from the calibration kit (# : port number; all ports have to be tested)
4. The reference oscillators in the signal generator and in the R&S ZNB must be synchronized

Signal Generator settings

1. [**PRESET**]
2. [**FREQ** : **{f_{GEN}}***]
3. [**LEVEL** : **-5 dBm**]

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : b# Source Port 2] (for # = 1)
   [**MEAS** : Wave Quantities : b# Source Port 1] (for # ≠ 1)
3. [**POWER** : Power : RF Off All Channels]
4. [**SWEEP** : Sweep Type : CW Mode]
5. [**SWEEP** : Sweep Params : Number of Points 1001]
6. [**POWER** : Bandwidth : 10 kHz]
7. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]

1. [**CENTER** : CW Frequency : **{f_{GEN}}***]
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies, see Chapter 1.4.9, "Table: Input Power Measurement Accuracy", on page 82.

Measurement and calculation

1. Adjust the signal generator level so that the power meter reads –10 dBm +/– 0.5 dB
2. Determine the signal generator level that gives –10 dBm at the splitter output Store this level as $L(f)_{GEN\_IPMA}$. This level will be used in Chapter Chapter 1.3.9, "Checking the Input Power Linearity (low level)", on page 20
3. Read the power meter display (L_{PS}) and the R&S ZNB Statistics Mean values (L_{ZNx})
4. Deviation = $L_{ZNx} – L_{PS}$

1.3.9 Checking the Input Power Linearity (low level)

Test equipment

1. Signal generator (see: Table 1-1)
2. Spectrum Analyzer (see: Table 1-1)
3. 2x test cable 1.5 m (see: Table 1-1)
4. Power splitter (see: Table 1-1)

Test Setup

1. Connect the signal generator to the power splitter input using the test cable
2. Connect the spectrum analyzer to one power splitter output
3. Connect the other power splitter output to port # (#: port number; all ports have to be tested) using an adapter from the calibration kit
4. The reference oscillators in the signal generator and in the R&S ZNB must be synchronized

Signal Generator settings

1. [**PRESET**]
2. [**FREQ** : 50.001 MHz]
3. [**LEVEL** : **-5 dBm**]

Settings for the Spectrum Analyzer

1. [**PRESET**]
2. [**AMPT** : REF LEVEL : **+10 dBm**]
3. [**AMPT** : RF ATTEN MANUAL : **10 dB**]
4. [**FREQ** : CENTER : 50.001 MHz]
5. [**SPAN** : ZERO SPAN]
6. [**BW** : RES BW MANUAL : **2 kHz**]
7. [**SWEEP** : SWEEPTIME MANUAL: **500 ms**]
8. [**MEAS** : TIME DOM POWER : MEAN]

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : b# Source Port 2 (for # = 1; #: port number; all ports have to be tested)]
   [**MEAS** : Wave Quantities : b# Source Port 1 (for # ≠ 1; #: port number; all ports have to be tested)]
3. [**POWER** : Power : –40 dBm]
4. [**POWER** : Power : RF Off All Channels]
5. [**POWER** : Bandwidth : 100 Hz]
6. [**SWEEP** : Number of points : 6]
7. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
8. [**SWEEP** : Sweep Type : CW Mode]
9. [**CENTER** : CW Frequency : 50.001 MHz]

Measurement

1. Set the signal generator level so that it provides –10 dBm +/– 0.5 dB at the splitter output. Use the value $L(f)_{GEN\_IPMA}$ which is determined in Chapter Chapter 1.3.8, " Checking the Input Power Measurement Accuracy", on page 19
2. Read out Spectrum Analyzer POWER MEAN value: $L_{SA\text{-}10dBm}$
3. Read out R&S ZNB Statistics Mean values: $L_{ZNx\text{-}10dBm}$
4. Reduce signal generator level by $\{I_{step}\}$* dB
   Read out Spectrum Analyzer POWER MEAN value: L_{SA_Istep}
   Read out R&S ZNB Statistics Mean values: $L_{ZNx\text{-}Istep}$
   *for signal generator level decrement $\{I_{step}\}$ dB, see Chapter 1.4.10, "Table: Input Power Linearity (Low Level)", on page 86

Calculation

Receiver Linearity Deviation @{l_{step}}* dB = (L_{ZNx_lstep} – $L_{ZNx\text{-}10dBm}$) – (L_{SA_lstep} – $L_{SA\text{-}10dBm}$)

1.3.10 Checking the Input Power Linearity (high level)

Test equipment

Calibration kit (see: Table 1-1)

Test setup OPEN

Connect OPEN to port # (# : port number; all ports have to be tested)

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : RATIOS : b# / a# DRIVE PORT #]
3. [**POWER** : Bandwidth : 100 Hz]
4. [**SWEEP** : Number of points : 21]
5. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
6. [**SWEEP** : Sweep Type : CW Mode]
7. [**CENTER** : CW Frequency : **{f_{GEN}}***]

* For measurement frequencies {f_{GEN}}, see Chapter 1.4.11, "Table: Input Power Linearity (High Level)", on page 86.

Reference Measurement OPEN

1. [**POWER** : Power : –10 dBm]
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]

Read out Statistics MEAN for indicated Network Analyzer measurement value: R_{-10dBm_OPEN}

Measurement OPEN

1. [**POWER**: Power : **{ -10 dBm + l_{step} }****]
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]

** For power increment {l_{step}}, see Chapter 1.4.11, "Table: Input Power Linearity (High Level)", on page 86.

Read out Statistics MEAN for indicated Network Analyzer measurement value:
R_{Istep_OPEN}

Test setup SHORT

Connect SHORT to port # (# : port number; all ports have to be tested)

Reference Measurement SHORT

1. [**POWER** : Power : –10 dBm]
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]

Read out Statistics MEAN for indicated Network Analyzer measurement value:
R_{-10dBm_SHORT}

Measurement SHORT

1. [**POWER** : Power : **{ -10 dBm + I_{step} }****]
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]

** For power increment {I_{step}}, see Chapter 1.4.11, "Table: Input Power Linearity (High Level)", on page 86.

Read out Statistics MEAN for indicated Network Analyzer measurement value:
R_{Istep_SHORT}

Evaluation

$Deviation_{OPEN}$ @ xx dB = R_{Istep_OPEN} - R_{-10dBm_OPEN} + $RefDev_{Istep}$

$Deviation_{SHORT}$ @ xx dB = R_{Istep_SHORT} - R_{-10dBm_SHORT} + $RefDev_{Istep}$

Deviation of R&S ZNB @ xx dB= Maximum of ($Deviation_{OPEN}$; $Deviation_{SHORT}$)

Remark: Use the stored value of $RefDev_{Istep}$ from: Chapter 1.3.5.1, "Checking the Reference Channel Linearity ", on page 16

Only the evaluation result is documented, not the individual OPEN and SHORT measurements.

1.3.11 Checking the Trace Noise Magnitude

Test equipment

Calibration kit (see: Table 1-1)

Test setup

Connect the OPEN / SHORT (gender fitting to test port) from the calibration kit to Port # (# : port number; all ports have to be tested)

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : S##]
3. [**POWER** : Power : 0 dBm]
4. [**SWEEP** : Sweep Type : CW Mode]
5. [**POWER** : Bandwidth : 1 kHz] (for **{f_{GEN}}*** < 100 kHz)
   [**POWER** : Bandwidth : 10 kHz] (for **{f_{GEN}}*** ≥ 100 kHz)
6. [**CENTER** : CW Frequency : **{f_{GEN}}***]
7. [**SWEEP** : Number of points : 2001]
8. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
9. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies {f_{GEN}}, see Chapter 1.4.12, "Table: Trace Noise Magnitude", on page 90.

Measurement

1. Connect OPEN to Port #
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]
3. [**SWEEP** : Sweep Control : Single : Restart Sweep]
4. Read out R&S ZNB Statistics Std Dev value: SD_{OPEN}
5. Connect SHORT to Port #
6. [**SWEEP** : Sweep Control : Single : Restart Sweep]
7. [**SWEEP** : Sweep Control : Single : Restart Sweep]
8. Read out R&S ZNB Statistics Std Dev value: SD_{SHORT}

Evaluation

Select maximum of SD_{OPEN} and SD_{SHORT}

Only the evaluation result is documented, not the individual OPEN and SHORT measurements.

1.3.12 Checking the Trace Noise Phase

Test equipment

Calibration kit (see: Table 1-1)

Test setup

Connect the OPEN / SHORT (gender fitting to test port) from the calibration kit to Port # (# : port number; all ports have to be tested)

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : S##]
3. [**POWER** : Power : 0 dBm]
4. [**SETUP** : System Config : User Interface : Trailing Digits : Degree : 3]
5. [**FORMAT** : unwr Phase]
6. [**SWEEP** : Sweep Type : CW Mode]
7. [**POWER** : Bandwidth : 1 kHz] (for **{f_{GEN}}*** < 100 kHz)
   [**POWER** : Bandwidth : 10 kHz] (for **{f_{GEN}}*** ≥ 100 kHz)
8. [**CENTER** : CW Frequency : **{f_{GEN}}***]
9. [**SWEEP** : Number of points : 2001]
10. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
11. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies {f_{GEN}}, see Chapter 1.4.13, "Table: Trace Noise Phase", on page 99.

Measurement

1. Connect OPEN to Port #
2. [**SWEEP** : Sweep Control : Single : Restart Sweep]
3. [**SWEEP** : Sweep Control : Single : Restart Sweep]
4. Read out R&S ZNB Statistics Std Dev value: SD_{OPEN}
5. Connect SHORT to Port #
6. [**SWEEP** : Sweep Control : Single : Restart Sweep]
7. [**SWEEP** : Sweep Control : Single : Restart Sweep]
8. Read out R&S ZNB Statistics Std Dev value: SD_{SHORT}

Evaluation

Select maximum of SD_{OPEN} and SD_{SHORT}

Only the evaluation result is documented, not the individual OPEN and SHORT measurements.

1.3.13 Checking the Dynamic Range

Test equipment

Simple SHORTs (see: Table 1-1)

Test setup

Connect SHORTs to all test ports

R&S ZNB settings

1. [**PRESET**]
2. 2-Port ZNB:
   [**MEAS** : S21 (S12)
   4-Port ZNB:
   [**MEAS** : S21 (S31; S41; S12; S32; S42; S13; S23; S43; S14; S24; S34)
3. [**POWER** : Power : 20 dBm]
4. [**POWER** : Bandwidth : 10 Hz]
5. [**MARKER**]
6. [**SWEEP** : Sweep Type : CW Mode]
7. [**CENTER** : CW Frequency : **{f_{GEN}}***]
8. [**SWEEP** : Number of points : 21]
9. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
10. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies {f_{GEN}}, see Chapter 1.4.14, "Table: Dynamic Range", on page 108.

Measurement

Read out R&S ZNB Statistics Mean values: L

Dynamic Range = – L

1.3.14 Checking the Input Noise Level

Test equipment

Calibration kit (see: Table 1-1)

Test setup

Connect the MATCH (gender fitting to test port) from the calibration kit to port # (# : port number;)

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : b# Source Port 2] (for # = 1)
   [**MEAS** : Wave Quantities : b# Source Port 1] (for # ≠ 1)
3. [**POWER** : Power : –20 dBm]
4. [**POWER** : Power : RF Off All Channels]
5. [**POWER** : Bandwidth : 1 kHz]
6. [**SWEEP** : Sweep Type : CW Mode]
7. [**CENTER** : CW Frequency : **{f_{GEN}}***]
8. [**SWEEP** : Number of points : 20]
9. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
10. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For test frequencies {f_{GEN}}, see Chapter 1.4.15, "Table: Input Noise Level", on page 116.

Measurement

Read out R&S ZNB Statistics Mean values: $L_{RBW=1kHz}$

Calculation

Read out mean marker and correct the measurement value by –30 dB for the bandwidth ratio of 1 Hz / 1 kHz. This is done in order to save measurement time. The bandwidth scaling is allowed since both filters are implemented digitally and use the same hardware settings.

$L_{RBW=1\ Hz} = L_{RBW=1kHz} – 30dB$

Example
If the measured noise level is –100 dBm at 1 kHz bandwidth, scaling to 1 Hz provides a level of –130 dBm.

1.3.15 Checking the Uncorrected System Performance

Test equipment

1. Calibration kit (see: Table 1-1)
2. test cable 0.5 m (see: Table 1-1)

R&S ZNB settings

1. [**PRESET**]
2. [**SWEEP** : Sweep Type : Define Segments]
   [Add: Start 9 KHz : Stop 100 kHz : Points 92] (only ZNB 4/8 without ZNB-B1)
   [Add: Start 100 KHz : Stop 100 kHz : Points 1] (only ZNB 4/8 with ZNB-B1 and ZNB 20, ZNB40 var82 and ZNB40 var84)
   [Add: Start 200 KHz : Stop 20 MHz : Points 100]
   [Add: Start 50 MHz : Stop 4.5 GHz : Points 90] (only ZNB 4)
   [Add: Start 50 MHz : Stop 8.5 GHz : Points 170] (only ZNB 8)
   [Add: Start 50 MHz : Stop 20 GHz : Points 400] (only ZNB 20)
   [Add: Start 10 MHz : Stop 20 MHz : Points 51] (only ZNB 40)
   [Add: Start 50 MHz : Stop 40 GHz : Points 800] (only ZNB 40)
   [Add: Start 10 MHz : Stop 20 MHz : Points 51]
   [Add: Start 50 MHz : Stop 6 GHz : Points 120]
   [O.K.]
   Set segmented Frequency sweep active ? [Yes]
3. [**POWER** : Power : –10 dBm]
4. [**POWER** : Bandwidth : 1 kHz]
5. [**CAL** : Start Cal ... (Manual) : Port : P1; P2]
6. [Port : Port 1 active] and [Port : Port 2 active]
7. [Type : UOSM]
8. [Next]
9. Select for both ports [Cal Kit : (available Cal Kit see: Test Equipment)]
10. Select for both ports [Gender : Female] (only ZNB 4/8)
    Select for both ports [Gender : Male] (only ZNB 20/40)
11. [Start]

12. Perform a UOSM calibration on Port 1 <-> Port 2 (Port1 <-> Port 3 and Port1 <-> Port 4) using the cal kit and 0.5 m test cable as unknown reciprocal through. When using ZV-Z93 or ZV-Z95 additional f-f connector form cal kit is necessary.

Evaluation

Read the uncorrected system performance using the service functions.

1. [**System config** : Service function : 0.1.10.X.Y.Z]
2. [**MARKER** : **{f_{GEN}}***]
3. Read out Marker value

* For test frequencies {f_{GEN}}, see Chapter 1.4.16, "Table: Uncorrected System Performance - Directivity", on page 123.

Service function for indicating correction terms of the user calibration

Parameter	Port 1 Service function	Port 2 Service function
Directivity	0.1.10.1.1.1	0.1.10.1.2.2
Reflection Tracking	0.1.10.2.1.1	0.1.10.2.2.2
Source Match	0.1.10.3.1.1	0.1.10.3.2.2
Load Match	0.1.10.4.2.1	0.1.10.4.1.2
Transmission Tracking	0.1.10.5.2.1	0.1.10.5.1.2

Parameter	Port 3 Service function	Port 4 Service function
Directivity	0.1.10.1.3.3	0.1.10.1.4.4
Reflection Tracking	0.1.10.2.3.3	0.1.10.2.4.4
Source Match	0.1.10.3.3.3	0.1.10.3.4.4
Load Match	0.1.10.4.1.3	0.1.10.4.1.4
Transmission Tracking	0.1.10.5.1.3	0.1.10.5.1.4

1.3.16 Checking the USB Controller Connectors

Test equipment

ZNC, ZND, ZNB4, ZNB8, ZNB20, ZNB40 var72 only: USB 2.1 memory stick (see: Table 1-1)

ZNB40 var82, var84 only: USB 3.0 memory stick (see: Table 1-1)

Test setup

Connect memory stick subsequently to all four USB type A connectors on the front and rear panel

Read data file from stick

Write data file to stick

1.3.17 Checking the Display Port (ZNB40 var82, var84 only)

Test equipment

External monitor with Display Port connector (see: Table 1-1)

Test setup

Connect monitor to the Display Port connector on the rear panel

Check whether ZNB GUI is shown

1.3.18 Checking the Reference Output Level

Test equipment

Spectrum analyzer (see: Table 1-1), BNC test cable

Spectrum analyzer settings

1. [**PRESET**]
2. [**AMPT** : REF LEVEL : **20 dBm**]
3. [**FREQ** : **10 MHz**]
4. [**SPAN** : **100 kHz**]
5. [**BW** : RES BW MANUAL : **10 kHz**]
6. [**MARK ->** : PEAK]

Test setup

Connect the spectrum analyzer to Ref Out

R&S ZNB settings

1. [**PRESET**]
2. [**SETUP** : Freq.Ref.: Internal]

Measurement

Spectrum analyzer [**MARK ->** : PEAK]

Read the Level indicated by the marker of Spectrum Analyzer.

1.3.19 Checking the EXT TRIGGER Input

Test equipment

test cable for EXT TRIGGER input (see: Table 1-1)

Test setup

Connect test cable for EXT TRIGGER input to rear panel connector EXT TRIGGER

R&S ZNB settings

1. [**PRESET**]
2. [**SETUP** : Reference : Internal]
3. [**TRIGGER** : External]
4. [**SWEEP** : Sweep Control : Single]

Measurement

Apply rising edge to EXT TRIGGER and observe display

Limits

One sweep must start

1.3.20 Checking the User Control Port

Test equipment

test cable for USER CONTROL connector (see: Table 1-1)

Test Setup

Connect test cable for USER CONTROL connector to rear panel connector USER CONTROL

Test of input EXT TRG (pin2)

R&S ZNB settings

1. *rst

2. :CALCULATE:PARAMETER:MEASURE ‘S11’
3. :TRIGGER1:SEQUENCE:SOURCE EXTERNAL
4. :TRIGGER1:SEQUENCE:SLOPE POSITIVE
5. :INITIATE1:IMMEDIATE

Measurement

Observe display of R&S ZNB, apply rising edge at EXT TRG

Limits

Before rising edge at EXT TRG, no action on R&S ZNB.

With rising edge at EXT TRG, a single sweep must start.

Test of output BUSY (pin 4)

R&S ZNB settings

1. *rst
2. :SENSE:SWEEP:TIME 1 s
3. Measure state 1 of BUSY
4. :INITIATE1:IMMEDIATE
5. Measure state 2 of BUSY (within 1 second)

Measurement

Measure state 1 and state 2 of BUSY as mentioned above.

Limits

- State 1: L
- State 2: H

Test of output READY FOR TRIGGER (pin 6)

R&S ZNB settings

1. *rst:
2. :CALCULATE:PARAMETER:MEASURE ‘S11’
3. :TRIGGER1:SEQUENCE:SOURCE EXTERNAL
4. :TRIGGER1:SEQUENCE:SLOPE POSITIVE
5. :SENSE:SWEEP:TIME 2 s
6. :INITIATE1:IMMEDIATE

Measurement

1. Measure state of READY FOR TRIGGER
2. Apply rising edge at EXT TRG

Limits

- Before application of rising edge at EXT TRG, state = H
- After application of rising edge at EXT TRG, state = L

Test of outputs CHANNEL BIT I (pin 8...11)

R&S ZNB settings

1. *rst
2. :OUTPUT:UPORT:VALUE #B0001
3. :INITIATE1:IMMEDIATE
4. Measure state 1 of channel bits (=CHANNEL BIT 1...4)
5. :OUTPUT:UPORT:VALUE #B0010
6. :INITIATE1:IMMEDIATE
7. Measure state 2 of channel bits
8. :OUTPUT:UPORT:VALUE #B0100
9. :INITIATE1:IMMEDIATE
10. Measure state 3 of channel bits
11. :OUTPUT:UPORT:VALUE #B1000
12. :INITIATE1:IMMEDIATE
13. Measure state 4 of channel bits

Measurement

Measure states of channel bits as mentioned above

Limits

- state 1 = LLLH
- state 2 = LLHL
- state 3 = LHLL
- state 4 = HLLL

Test of outputs PASS I (pin 13, 14)

R&S ZNB settings

1. *rst
2. :CALCULATE:LIMIT:DATA 2,1e9,2e9,-15,-5
3. :CALCULATE:LIMIT:STATE ON
4. :CALCULATE:LIMIT:DISPLAY:STATE ON
5. :INITIATE1:IMMEDIATE
6. :CALCULATE:LIMIT:TTL1 ON
7. :CALCULATE:LIMIT:TTL2 OFF
8. :INITIATE1:IMMEDIATE
9. Measure state 1 of pass / fail bits (= PASS 1, 2)
10. :CALCULATE:LIMIT:TTL2 ON
11. :CALCULATE:LIMIT:TTL1 OFF
12. :INITIATE1:IMMEDIATE
13. Measure state 2 of pass / fail bits

Measurement

Measure states of pass / fail bits as mentioned above

Limits

- state 1 = LH
- state 2 = HL

Test of outputs DRIVE PORT I (pin 16...19)

R&S ZNB settings

1. *rst
2. :CALCULATE:PARAMETER:MEASURE ‘S11’
3. :INITIATE1:IMMEDIATE
4. Measure state 1 of drive port bits (= DRIVE PORT 1...4)
5. :CALCULATE:PARAMETER:MEASURE ‘S22’
6. :INITIATE1:IMMEDIATE
7. Measure state 2 of drive port bits (= DRIVE PORT 1...4)

   Note: The following steps apply only for ZNB with 4 ports

8. :CALCULATE:PARAMETER:MEASURE ‘S33’
9. :INITIATE1:IMMEDIATE
10. Measure state 3 of drive port bits (= DRIVE PORT 1...4)
11. :CALCULATE:PARAMETER:MEASURE’S44’
12. :INITIATE1:IMMEDIATE
13. Measure state 4 of drive port bits (= DRIVE PORT 1...4)

Measurement

Measure states of drive port bits as mentioned above

Limits

- state 1 = LLLH
- state 2 = LLHL
- state 3 = LHLL
- state 4 = HLLL

1.3.21 Checking the optional DC Inputs

Test equipment

1. DC Power Supply NGSM 32/10 (see: Table 1-1)
2. Multimeter R&S URE3 (see: Table 1-1)
3. DC cable (see: Table 1-1)

Test setup to determine input offset at 0V

#: DC MEAS port number; test has to be performed for all DC MEAS ports.

Connect the 50 Ohm load BNC to the input DC MEAS # of the R&S ZNB

Test setup to determine deviation to reference voltage

#: DC MEAS port number; test has to be performed for all DC MEAS ports.

Connect the Power Supply to the Input DC MEAS # of the R&S ZNB using the DC cable

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : DC : DC#; Range DC# : **{U_{DC}}***]
3. [**SWEEP** : Sweep Type : CW Mode]

4. [**SWEEP** : Sweep Params : Number of Points 5001]
5. [**POWER** : Bandwidth : **{ResBw}***]]
6. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]
7. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For input voltage {U_{DC}}, see Chapter 1.4.26, "Table: R&S ZNB-B81 DC Inputs", on page 143.

* For resolution bandwidth {ResBw}, see Chapter 1.4.26, "Table: R&S ZNB-B81 DC Inputs", on page 143.

Measurement

1. Set Power Supply to DC values U_{DC} +/- 10% using Multimeter R&S URE
2. Read out R&S ZNB Statistics Mean values: DC level $U_{DC\ ZNx}$

Calculation

Deviation = $U_{DC} – U_{DC\ ZNx}$

1.3.22 Checking the optional R&S ZNB-B1 BIAS

Test equipment

1. DC Power Supply NGSM 32/10 (see: Table 1-1, Item9)
2. Multimeter R&S URE3 (see: Table 1-1)
3. DC cable (see: Table 1-1)

Test setup for ZNB-B1

Connect URE3 to Port # on the front panel of the R&S ZNB

Connect the Power Supply 10 V to BIAS BNC connector # on the rear panel of the R&S ZNB

Measurement

► Read out voltage on URE3

1.3.23 Checking the Receiver Step Attenuators

Test equipment

1. Power sensor or Power meter with power sensor (see Table 1-1)
2. Signal generator (see: Table 1-1)
3. Power splitter (see: Table 1-1)
4. power sensor (see: Table 1-1)
5. test cable (see: Table 1-1)

Test setup

1. Connect the signal generator to the power splitter input using the test cable
2. Connect the power sensor to a power splitter output
3. Connect the other power splitter output to port # using an adapter from the calibration kit (# : port number; all ports have to be tested)
4. The reference oscillators in the signal generator and in the R&S ZNB must be synchronized

Signal Generator settings

1. [**PRESET**]
2. [**FREQ** : 100 MHz]
3. [**LEVEL** : **-5 dBm**]

R&S ZNB settings

1. [**PRESET**]
2. [**MEAS** : Wave Quantities : b1 Source Port 2] (for # = 1)
   [**MEAS** : Wave Quantities : b# Source Port 1] (for # ≠ 1)
3. [**POWER** : Power : RF Off All Channels]
4. [**SWEEP** : Sweep Type : CW Mode]
5. [**SWEEP** : Sweep Params : Number of Points 1001]
6. [**POWER** : Bandwidth : 10 kHz]
7. [**TRACE CONFIG** : Trace statistics : Mean/Std Dev/RMS]

1. [**CENTER** : CW Frequency : 100 MHz]
2. [**POWER** : Power : b# **{att}***]

3. [**SWEEP** : Sweep Control : Single : Restart Sweep]

* For step attenuation see: Performance Test "Receiver Step Attenuator"

Measurement and calculation

1. Adjust the signal generator level so that the power meter reads –10 dBm +/– 0.5 dB
2. Determine the signal generator level that gives –10 dBm at the splitter output This level is required for the following measurement, “Checking the Input Linearity (low level)”
3. Read the power meter display (L_{PS}) and the R&S ZNB Statistics Mean values (L_{ZNx})
4. Deviation = $L_{ZNx} – L_{PS}$

1.3.24 Checking the B12 Device Control Option

Test equipment

1. Switch matrix with Direct Ctrl. input (see Table 1-1)
2. Direct Ctrl. test cable (see Table 1-1)
3. generator with PCIe input (see Table 1-1)
4. PCIe Cable (see Table 1-1)

Direct Ctrl. Port

1. Connect the R&S ZNB and the switch matrix by means of the Direct Ctrl. test cable. Other connections between the R&S ZNB and the switch matrix must not exist.
2. [**System** : **External Devices** : **Switch Matrix** : **Scan Instruments**]
3. Check that the matrix is beeing displayed in the field **Known Devices** and that it's interface type is "DIRECT CTRL".

PCIe Port

1. Connect the R&S ZNB and the generator by means of the PCIe test cable and turn the generator on. Other connections between the R&S ZNB and the generator must not exist.
2. Restart the R&S ZNB.
3. [**System** : **External Devices** : **Generators** : **Scan Instruments**]

4. Check that the generator is beeing displayed in the field **Known Devices** and that it's interface type is "PCIE".

Test of option R&S ZNB-B12 only in case of repair or new installation.

1.3.25 Checking the optional Handler I/O interface

R&S ZNB settings

► [**SETUP**] : Options
See: Hardware Option Info
Check: ZN-B14 Handler I/O

1.3.26 Checking the optional R&S ZNB-B10 GPIB Interface

Test equipment

1. PC with GPIB Interface
2. GPIB cable

Test setup

Connect R&S ZNB-B10 with PC

R&S ZNB settings

[**PRESET**]

Measurement

1. Send GPIB command (*IDN?) to R&S ZNB
2. Read Answer from R&S ZNB via GPIB connection
Answer contains serial number and options of R&S ZNB

Test of option R&S ZNB-B10 only in case of repair or new installation.

1.3.27 Checking the ZN-B15 RFFE GPIO Option (Var. 02)

[**SETUP**] : Options

See: Hardware Option Info

Check: ZN-B15 RFFE GPIO 1323.9355.02

1.3.28 Checking the ZN-B15 RFFE GPIO with DC-Measurement Option (Var. 03)

[**SETUP**] : Options

See: Hardware Option Info

Check: ZN-B15 RFFE GPIO 1323.9355.03

1.3.28.1 Functional Test of Output Voltage RFFE[1-2]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

```
*RST
INIT:CONT OFF
CONT:RFFE1:TEST:VIO 2V
CONT:RFFE2:TEST:VIO 2V
CONT:RFFE1:TEST:DATA 2V
CONT:RFFE2:TEST:DATA 2V
CONT:RFFE1:TEST:CLOC 2V
CONT:RFFE2:TEST:CLOC 2V
CONT:RFFE:TEST:OUTP
*OPC? Read VNA out
CONT:RFFE:TEST:SENS:TRIG
*OPC? Read VNA out
CONT:RFFE1:TEST:VIO:VOLT? Read VNA out:RFFE1_VIO_Volt
CONT:RFFE2:TEST:VIO:VOLT? Read VNA out:RFFE2_VIO_Volt
CONT:RFFE1:TEST:DATA:VOLT? Read VNA out:RFFE1_DATA_Volt
CONT:RFFE2:TEST:DATA:VOLT? Read VNA out:RFFE2_DATA_Volt
CONT:RFFE1:TEST:CLOC:VOLT? Read VNA out:RFFE1_CLOC_Volt
CONT:RFFE2:TEST:CLOC:VOLT? Read VNA out:RFFE2_CLOC_Volt
```

Limit:

RFFE1_VIO_Volt = 2 V ± 100 mV

RFFE2_VIO_Volt = 2 V ± 100 mV

RFFE1_DATA_Volt = 2 V ± 100 mV

RFFE2_DATA_Volt = 2 V ± 100 mV

RFFE1_CLOC_Volt = 2 V ± 100 mV

RFFE2_CLOC_Volt = 2 V ± 100 mV

1.3.28.2 Functional Test of Output Offset Voltage RFFE[1-2]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

```
*RST
INIT:CONT OFF
CONT:RFFE1:TEST:VIO 0V
CONT:RFFE2:TEST:VIO 0V
CONT:RFFE1:TEST:DATA 0V
CONT:RFFE2:TEST:DATA 0V
CONT:RFFE1:TEST:CLOC 0V
CONT:RFFE2:TEST:CLOC 0V
CONT:RFFE:TEST:OUTP
*OPC? Read VNA out:
CONT:RFFE:TEST:SENS:TRIG
*OPC? Read VNA out:
CONT:RFFE1:TEST:VIO:VOLT? Read VNA out: RFFE1_VIO_Volt
CONT:RFFE2:TEST:VIO:VOLT? Read VNA out: RFFE2_VIO_Volt
CONT:RFFE1:TEST:DATA:VOLT? Read VNA out: RFFE1_DATA_Volt
CONT:RFFE2:TEST:DATA:VOLT? Read VNA out: RFFE2_DATA_Volt
CONT:RFFE1:TEST:CLOC:VOLT? Read VNA out: RFFE1_CLOC_Volt
CONT:RFFE2:TEST:CLOC:VOLT? Read VNA out: RFFE2_CLOC_Volt
```

Limit:

RFFE1_VIO_Volt = 0 V ± 100 mV

RFFE2_VIO_Volt = 0 V ± 100 mV

RFFE1_DATA_Volt = 0 V ± 100 mV

RFFE2_DATA_Volt = 0 V ± 100 mV

RFFE1_CLOC_Volt = 0 V ± 100 mV

RFFE2_CLOC_Volt = 0 V ± 100 mV

1.3.28.3 Functional Test of Output Voltage GPIO[1-10]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

`*RST`

`INIT:CONT OFF`

`CONT:GPIO1:VOLT 8V`

`CONT:GPIO#:VOLT 8V` *(repeat command for suffix #: 2 to 10)*

`CONT:GPIO:VOLT:OUTP`

`*OPC?` *Read VNA out:*

`CONT:GPIO:SENS:TRIG`

`*OPC?` *Read VNA out:*

`CONT:GPIO1:SENS:VOLT?` *Read VNA out:* GPIO1_Volt

`CONT:GPIO#:SENS:VOLT?` *Read VNA out:* GPIO#_Volt

(repeat command for suffix #: 2 to 10)

Limit:

GPIO#_Volt = 8 V ± 400 mV *(for # = 1 to 10)*

1.3.28.4 Functional Test of Output Offset Voltage GPIO[1-10]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

`*RST`

INIT:CONT OFF

CONT:GPIO1:VOLT 0V

CONT:GPIO#:VOLT 0V *(repeat command for suffix #: 2 to 10)*

CONT:GPIO:VOLT:OUTP

*OPC? *Read VNA out:*

CONT:GPIO:SENS:TRIG

*OPC? *Read VNA out:*

CONT:GPIO1:SENS:VOLT? *Read VNA out:* GPIO1_Volt

CONT:GPIO#:SENS:VOLT? *Read VNA out:* GPIO#_Volt

(repeat command for suffix #: 2 to 10)

Limit:

GPIO#_Volt = 0 V ± 400 mV *(for # = 1 to 10)*

1.3.28.5 Test of Current Offset, Range 100 mA, GPIO[9-10]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

*RST

INIT:CONT OFF

CONT:GPIO9:VOLT 8V

CONT:GPIO10:VOLT 8V

CONT:GPIO:VOLT:OUTP

*OPC? *Read VNA out:*

CONT:GPIO:SENS:TRIG

*OPC? *Read VNA out:*

CONT:GPIO9:SENS:CURR? *Read VNA out:* GPIO9_Curr

CONT:GPIO10:SENS:CURR? *Read VNA out:* GPIO10_Curr

Limit:

GPIO9_Curr = ± 2 mA

GPIO10_Curr = ± 2 mA

1.3.28.6 Test of Current Offset, Range 20 mA, RFFE[1-2], GPIO[1-8]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

```
*RST
INIT:CONT OFF
CONT:RFFE1:TEST:VIO 2V
CONT:RFFE2:TEST:VIO 2V
CONT:RFFE1:TEST:DATA 2V
CONT:RFFE2:TEST:DATA 2V
CONT:RFFE1:TEST:CLOC 2V
CONT:RFFE2:TEST:CLOC 2V
CONT:RFFE1:TEST:VIO:RANG 20MA
CONT:RFFE2:TEST:VIO:RANG 20MA
CONT:RFFE1:TEST:DATA:RANG 20MA
CONT:RFFE2:TEST:DATA:RANG 20MA
CONT:RFFE1:TEST:CLOC:RANG 20MA
CONT:RFFE2:TEST:CLOC:RANG 20MA
CONT:GPIO1:VOLT 8V
CONT:GPIO#:VOLT 8V (repeat command for suffix #: 2 to 8)
CONT:GPIO1:RANG 20MA
CONT:GPIO#:RANG 20MA (repeat command for suffix #: 2 to 8)
CONT:RFFE:TEST:OUTP
CONT:GPIO:VOLT:OUTP
*OPC? Read VNA out:
CONT:RFFE:TEST:SENS:TRIG
*OPC? Read VNA out:
CONT:RFFE1:TEST:VIO:CURR? Read VNA out: RFFE1_VIO_Curr
CONT:RFFE2:TEST:VIO:CURR? Read VNA out: RFFE2_VIO_Curr
CONT:RFFE1:TEST:DATA:CURR? Read VNA out: RFFE1_DATA_Curr
CONT:RFFE2:TEST:DATA:CURR? Read VNA out: RFFE2_DATA_Curr
CONT:RFFE1:TEST:CLOC:CURR? Read VNA out: RFFE1_CLOC_Curr
```

`CONT:RFFE2:TEST:CLOC:CURR?` *Read VNA out:* RFFE2_CLOC_Curr

`CONT:GPIO1:SENS:CURR?` *Read VNA out:* GPIO1_Curr

`CONT:GPIO#:SENS:CURR?` *Read VNA out:* GPIO#_Curr

(repeat command for suffix #: 2 to 8)

Limit:

RFFE1_VIO_Curr = ± 200 µA

RFFE2_VIO_Curr = ± 200 µA

RFFE1_DATA_Curr = ± 200 µA

RFFE2_DATA_Curr = ± 200 µA

RFFE1_CLOC_Curr = ± 200 µA

RFFE2_CLOC_Curr = ± 200 µA

GPIO#_Curr = ± 200 µA *(for # = 1 to 8)*

1.3.28.7 Test of Current Offset, Range 2 mA, RFFE[1-2], GPIO[1-8]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

```
*RST
INIT:CONT OFF
CONT:RFFE1:TEST:VIO 2V
CONT:RFFE2:TEST:VIO 2V
CONT:RFFE1:TEST:DATA 2V
CONT:RFFE2:TEST:DATA 2V
CONT:RFFE1:TEST:CLOC 2V
CONT:RFFE2:TEST:CLOC 2V
CONT:RFFE1:TEST:VIO:RANG 2MA
CONT:RFFE2:TEST:VIO:RANG 2MA
CONT:RFFE1:TEST:DATA:RANG 2MA
CONT:RFFE2:TEST:DATA:RANG 2MA
CONT:RFFE1:TEST:CLOC:RANG 2MA
CONT:RFFE2:TEST:CLOC:RANG 2MA
```

CONT:GPIO1:VOLT 8V

CONT:GPIO#:VOLT 8V *(repeat command for suffix #: 2 to 8)*

CONT:GPIO1:RANG 2MA

CONT:GPIO#:RANG 2MA *(repeat command for suffix #: 2 to 8)*

CONT:RFFE:TEST:OUTP

CONT:GPIO:VOLT:OUTP

*OPC? *Read VNA out:*

CONT:RFFE:TEST:SENS:TRIG

*OPC? *Read VNA out:*

CONT:RFFE1:TEST:VIO:CURR? *Read VNA out:* RFFE1_VIO_Curr

CONT:RFFE2:TEST:VIO:CURR? *Read VNA out:* RFFE2_VIO_Curr

CONT:RFFE1:TEST:DATA:CURR? *Read VNA out:* RFFE1_DATA_Curr

CONT:RFFE2:TEST:DATA:CURR? *Read VNA out:* RFFE2_DATA_Curr

CONT:RFFE1:TEST:CLOC:CURR? *Read VNA out:* RFFE1_CLOC_Curr

CONT:RFFE2:TEST:CLOC:CURR? *Read VNA out:* RFFE2_CLOC_Curr

CONT:GPIO1:SENS:CURR? *Read VNA out:* GPIO1_Curr

CONT:GPIO#:SENS:CURR? *Read VNA out:* GPIO#_Curr

(repeat command for suffix #: 2 to 8)

Limit:

RFFE1_VIO_Curr = ± 20 µA

RFFE2_VIO_Curr = ± 20 µA

RFFE1_DATA_Curr = ± 20 µA

RFFE2_DATA_Curr = ± 20 µA

RFFE1_CLOC_Curr = ± 20 µA

RFFE2_CLOC_Curr = ± 20 µA

GPIO#_Curr = ± 20 µA *(for # = 1 to 8)*

1.3.28.8 Test of Current Offset, Range 200 µA, RFFE[1-2], GPIO[1-8]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

```
*RST
INIT:CONT OFF
CONT:RFFE1:TEST:VIO 2V
CONT:RFFE2:TEST:VIO 2V
CONT:RFFE1:TEST:DATA 2V
CONT:RFFE2:TEST:DATA 2V
CONT:RFFE1:TEST:CLOC 2V
CONT:RFFE2:TEST:CLOC 2V
CONT:RFFE1:TEST:VIO:RANG 200UA
CONT:RFFE2:TEST:VIO:RANG 200UA
CONT:RFFE1:TEST:DATA:RANG 200UA
CONT:RFFE2:TEST:DATA:RANG 200UA
CONT:RFFE1:TEST:CLOC:RANG 200UA
CONT:RFFE2:TEST:CLOC:RANG 200UA
CONT:GPIO1:VOLT 8V
CONT:GPIO#:VOLT 8V (repeat command for suffix #: 2 to 8)
CONT:GPIO1:RANG 200UA
CONT:GPIO#:RANG 200UA (repeat command for suffix #: 2 to 8)
CONT:RFFE:TEST:OUTP
CONT:GPIO:VOLT:OUTP
*OPC? Read VNA out:
CONT:RFFE:TEST:SENS:TRIG
*OPC? Read VNA out:
CONT:RFFE1:TEST:VIO:CURR? Read VNA out: RFFE1_VIO_Curr
CONT:RFFE2:TEST:VIO:CURR? Read VNA out: RFFE2_VIO_Curr
CONT:RFFE1:TEST:DATA:CURR? Read VNA out: RFFE1_DATA_Curr
CONT:RFFE2:TEST:DATA:CURR? Read VNA out: RFFE2_DATA_Curr
CONT:RFFE1:TEST:CLOC:CURR? Read VNA out: RFFE1_CLOC_Curr
CONT:RFFE2:TEST:CLOC:CURR? Read VNA out: RFFE2_CLOC_Curr
CONT:GPIO1:SENS:CURR? Read VNA out: GPIO1_Curr
CONT:GPIO#:SENS:CURR? Read VNA out: GPIO#_Curr
(repeat command for suffix #: 2 to 8)
```

Limit:

RFFE1_VIO_Curr = ± 3 µA

RFFE2_VIO_Curr = ± 3 µA

RFFE1_DATA_Curr = ± 3 µA

RFFE2_DATA_Curr = ± 3 µA

RFFE1_CLOC_Curr = ± 3 µA

RFFE2_CLOC_Curr = ± 3 µA

GPIO#_Curr = ± 3 µA *(for # = 1 to 8)*

1.3.28.9 Test of Current Offset, Range 20 µA, RFFE[1-2], GPIO[1-8]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

```
*RST
INIT:CONT OFF
CONT:RFFE1:TEST:VIO 2V
CONT:RFFE2:TEST:VIO 2V
CONT:RFFE1:TEST:DATA 2V
CONT:RFFE2:TEST:DATA 2V
CONT:RFFE1:TEST:CLOC 2V
CONT:RFFE2:TEST:CLOC 2V
CONT:RFFE1:TEST:VIO:RANG 20UA
CONT:RFFE2:TEST:VIO:RANG 20UA
CONT:RFFE1:TEST:DATA:RANG 20UA
CONT:RFFE2:TEST:DATA:RANG 20UA
CONT:RFFE1:TEST:CLOC:RANG 20UA
CONT:RFFE2:TEST:CLOC:RANG 20UA
CONT:GPIO1:VOLT 8V
CONT:GPIO#:VOLT 8V (repeat command for suffix #: 2 to 8)
CONT:GPIO1:RANG 20UA
CONT:GPIO#:RANG 20UA (repeat command for suffix #: 2 to 8)
CONT:RFFE:TEST:OUTP
```

CONT:GPIO:VOLT:OUTP

*OPC? *Read VNA out:*

CONT:RFFE:TEST:SENS:TRIG

*OPC? *Read VNA out:*

CONT:RFFE1:TEST:VIO:CURR? *Read VNA out:* RFFE1_VIO_Curr

CONT:RFFE2:TEST:VIO:CURR? *Read VNA out:* RFFE2_VIO_Curr

CONT:RFFE1:TEST:DATA:CURR? *Read VNA out:* RFFE1_DATA_Curr

CONT:RFFE2:TEST:DATA:CURR? *Read VNA out:* RFFE2_DATA_Curr

CONT:RFFE1:TEST:CLOC:CURR? *Read VNA out:* RFFE1_CLOC_Curr

CONT:RFFE2:TEST:CLOC:CURR? *Read VNA out:* RFFE2_CLOC_Curr

CONT:GPIO1:SENS:CURR? *Read VNA out:* GPIO1_Curr

CONT:GPIO#:SENS:CURR? *Read VNA out:* GPIO#_Curr

(repeat command for suffix #: 2 to 8)

Limit:

RFFE1_VIO_Curr = ± 500 nA

RFFE2_VIO_Curr = ± 500 nA

RFFE1_DATA_Curr = ± 500 nA

RFFE2_DATA_Curr = ± 500 nA

RFFE1_CLOC_Curr = ± 500 nA

RFFE2_CLOC_Curr = ± 500 nA

GPIO#_Curr = ± 500 nA *(for # = 1 to 8)*

1.3.28.10 Test of Current Offset, Range 2 µA, RFFE[1-2], GPIO[1-8]

Test Setup:

No Connection to ZN-B15 RFFE GPIO

ZNB settings:

*RST

INIT:CONT OFF

CONT:RFFE1:TEST:VIO 2V

CONT:RFFE2:TEST:VIO 2V

CONT:RFFE1:TEST:DATA 2V

CONT:RFFE2:TEST:DATA 2V

CONT:RFFE1:TEST:CLOC 2V

CONT:RFFE2:TEST:CLOC 2V

CONT:RFFE1:TEST:VIO:RANG 2UA

CONT:RFFE2:TEST:VIO:RANG 2UA

CONT:RFFE1:TEST:DATA:RANG 2UA

CONT:RFFE2:TEST:DATA:RANG 2UA

CONT:RFFE1:TEST:CLOC:RANG 2UA

CONT:RFFE2:TEST:CLOC:RANG 2UA

CONT:GPIO1:VOLT 8V

CONT:GPIO#:VOLT 8V *(repeat command for suffix #: 2 to 8)*

CONT:GPIO1:RANG 2UA

CONT:GPIO#:RANG 2UA *(repeat command for suffix #: 2 to 8)*

CONT:RFFE:TEST:OUTP

CONT:GPIO:VOLT:OUTP

*OPC? *Read VNA out:*

CONT:RFFE:TEST:SENS:TRIG

*OPC? *Read VNA out:*

CONT:RFFE1:TEST:VIO:CURR? *Read VNA out:* RFFE1_VIO_Curr

CONT:RFFE2:TEST:VIO:CURR? *Read VNA out:* RFFE2_VIO_Curr

CONT:RFFE1:TEST:DATA:CURR? *Read VNA out:* RFFE1_DATA_Curr

CONT:RFFE2:TEST:DATA:CURR? *Read VNA out:* RFFE2_DATA_Curr

CONT:RFFE1:TEST:CLOC:CURR? *Read VNA out:* RFFE1_CLOC_Curr

CONT:RFFE2:TEST:CLOC:CURR? *Read VNA out:* RFFE2_CLOC_Curr

CONT:GPIO1:SENS:CURR? *Read VNA out:* GPIO1_Curr

CONT:GPIO#:SENS:CURR? *Read VNA out:* GPIO#_Curr

(repeat command for suffix #: 2 to 8)

Limit:

RFFE1_VIO_Curr = ± 50 nA

RFFE2_VIO_Curr = ± 50 nA

RFFE1_DATA_Curr = ± 50 nA

RFFE2_DATA_Curr = ± 50 nA

RFFE1_CLOC_Curr = ± 50 nA

RFFE2_CLOC_Curr = ± 50 nA

GPIO#_Curr = ± 50 nA *(for # = 1 to 8)*

1.4 Performance Test Report

ROHDE & SCHWARZ, Performance Test Report R&S ZNB

Model (R&S ZNB4 / R&S ZNB8 / R&S ZNB20 / R&S ZNB40)

Item No: 1311.6010.__

Serial No:

Tested by:

Date:

Signature:

General notes on test report tables

The tables are helpful in case that the performance test is done manually. The automatic test program performs some tests at additional stimulus points.

All tables apply to port 1, values for all other ports are identical.

1.4.1 Table: Remote Control Interfaces

Test sequence description see Chapter 1.3.1, "Checking the Remote Control Interfaces", on page 11	
Remote Control Interface	**Pass / Fail**
LAN	
GPIB	
USB 3.0 (ZNB40 var82, var84 only)	

1.4.2 Table: Gauge

Test sequence description see Chapter 1.3.2, "Checking the Gauge", on page 11					
Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
only ZNB 4/8:					
Port __ Pin Depth	5.182		5.258	mm	according to specification of gauge manufacturer
only ZNB 20:					

Port __ Pin Depth	-25		-10	µm	according to specification of gauge manufacturer
only ZNB 40:					
Port __ Pin Depth	-25		-10	µm	according to specification of gauge manufacturer

1.4.3 Table: Frequency Accuracy

Test sequence description see Chapter 1.3.3, "Checking the Static Frequency Accuracy", on page 12					
Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Frequency uncertainty @ 1 GHz	–1500		+1500	Hz	1 Hz
With Option R&S ZNB–B4	–150		+150	Hz	1 Hz

1.4.4 Table: Output Harmonics

ZNB 4/8					
Test sequence description see Chapter 1.3.4, "Checking the Output Harmonics", on page 13					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[b]
Port __ Harmonics					
Source power 0 dBm					
Fund. freq. //Harmon.					
w/o ZNB-B1:					
20 kHz // 40 kHz			– 20	dBc	0.8 dB
20 kHz // 60 kHz			– 20	dBc	0.8 dB
50 kHz // 100 kHz			– 20	dBc	0.8 dB
50 kHz // 150 kHz			– 20	dBc	0.8 dB
w. and w/o ZNB-B1:					
100 kHz // 200 kHz			– 20	dBc	0.8 dB
100 kHz // 300 kHz			– 20	dBc	0.8 dB
200 kHz // 400 kHz			– 20	dBc	0.8 dB

200 kHz // 600 kHz			– 20	dBc	0.8 dB
500 kHz // 1 MHz			– 20	dBc	0.8 dB
500 kHz // 1.5 MHz			– 20	dBc	0.8 dB
1 MHz // 2 MHz			– 20	dBc	0.8 dB
1 MHz // 3 MHz			– 20	dBc	0.8 dB
2 MHz // 4 MHz			– 20	dBc	0.8 dB
2 MHz // 6 MHz			– 20	dBc	0.8 dB
5 MHz // 10 MHz			– 20	dBc	0.8 dB
5 MHz // 15 MHz			– 20	dBc	0.8 dB
7 MHz // 14 MHz			– 20	dBc	0.8 dB
7 MHz // 21 MHz			– 20	dBc	0.8 dB
10 MHz // 20 MHz			– 20	dBc	0.8 dB
10 MHz // 30 MHz			– 20	dBc	0.8 dB
20 MHz // 40 MHz			– 20	dBc	0.8 dB
20 MHz // 60 MHz			– 20	dBc	0.8 dB
50 MHz // 100 MHz			– 20	dBc	0.8 dB
50 MHz // 150 MHz			– 20	dBc	0.8 dB
100 MHz // 200 MHz			– 25	dBc	0.8 dB
100 MHz // 300 MHz			– 25	dBc	0.8 dB
200 MHz // 400 MHz			– 25	dBc	0.8 dB
200 MHz // 600 MHz			– 25	dBc	0.8 dB
500 MHz // 1000 MHz			– 25	dBc	0.8 dB
500 MHz // 1500 MHz			– 25	dBc	0.8 dB
1 GHz // 2 GHz			– 25	dBc	0.8 dB
1 GHz // 3 GHz			– 25	dBc	0.8 dB
2 GHz // 4 GHz			– 25	dBc	0.8 dB
2 GHz // 6 GHz			– 25	dBc	0.8 dB
2.5 GHz // 5 GHz			– 25	dBc	0.8 dB
2.5 GHz // 7.5 GHz			– 25	dBc	0.8 dB
3 GHz // 6 GHz			– 25	dBc	0.8 dB
3 GHz // 9 GHz			– 25	dBc	0.8 dB

3.5 GHz // 7 GHz			– 25	dBc	0.8 dB
3.5 GHz // 10.5 GHz			– 25	dBc	0.8 dB

4 GHz // 8 GHz			– 25	dBc	0.8 dB
4 GHz // 12 GHz			– 25	dBc	0.8 dB
4.5 GHz // 9 GHz			– 25	dBc	0.8 dB
4.5 GHz // 13.5 GHz			– 25	dBc	0.8 dB
only ZNB 8:					
5 GHz // 10 GHz			– 25	dBc	0.8 dB
5 GHz // 15 GHz			– 25	dBc	0.8 dB
5.5 GHz // 11 GHz			– 25	dBc	0.8 dB
5.5 GHz // 16.5 GHz			– 25	dBc	0.8 dB
6 GHz // 12 GHz			– 25	dBc	0.8 dB
6 GHz // 18 GHz			– 25	dBc	0.8 dB
6.5 GHz // 13 GHz			– 25	dBc	0.8 dB
7 GHz // 14 GHz			– 25	dBc	0.8 dB
8 GHz // 16 GHz			– 25	dBc	0.8 dB
8.5 GHz // 17 GHz			– 25	dBc	0.8 dB

ZNB 20/40 var72					
Test sequence description see Chapter 1.3.4, "Checking the Output Harmonics", on page 13					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[b]
Port __ Harmonics					
Source power 0 dBm					
Fund. freq. //Harmon.					
only ZNB 20:					
100 kHz // 200 kHz			– 15	dBc	0.8 dB
100 kHz // 300 kHz			– 15	dBc	0.8 dB
200 kHz // 400 kHz			– 15	dBc	0.8 dB
200 kHz // 600 kHz			– 15	dBc	0.8 dB
500 kHz // 1 MHz			– 15	dBc	0.8 dB
500 kHz // 1.5 MHz			– 15	dBc	0.8 dB
1 MHz // 2 MHz			– 15	dBc	0.8 dB
1 MHz // 3 MHz			– 15	dBc	0.8 dB
2 MHz // 4 MHz			– 15	dBc	0.8 dB
2 MHz // 6 MHz			– 15	dBc	0.8 dB
5 MHz // 10 MHz			– 15	dBc	0.8 dB

5 MHz // 15 MHz			– 15	dBc	0.8 dB
7 MHz // 14 MHz			– 15	dBc	0.8 dB
7 MHz // 21 MHz			– 15	dBc	0.8 dB
ZNB 20/40 var72:					
10 MHz // 20 MHz			– 20	dBc	0.8 dB
10 MHz // 30 MHz			– 20	dBc	0.8 dB
20 MHz // 40 MHz			– 20	dBc	0.8 dB
20 MHz // 60 MHz			– 20	dBc	0.8 dB
50 MHz // 100 MHz			– 20	dBc	0.8 dB
50 MHz // 150 MHz			– 20	dBc	0.8 dB
100 MHz // 200 MHz			– 25	dBc	0.8 dB
100 MHz // 300 MHz			– 25	dBc	0.8 dB
200 MHz // 400 MHz			– 25	dBc	0.8 dB
200 MHz // 600 MHz			– 25	dBc	0.8 dB
500 MHz // 1000 MHz			– 25	dBc	0.8 dB
500 MHz // 1500 MHz			– 25	dBc	0.8 dB
1 GHz // 2 GHz			– 25	dBc	0.8 dB
1 GHz // 3 GHz			– 25	dBc	0.8 dB
2 GHz // 4 GHz			– 25	dBc	0.8 dB
2 GHz // 6 GHz			– 25	dBc	0.8 dB
3 GHz // 6 GHz			– 25	dBc	0.8 dB
3 GHz // 9 GHz			– 25	dBc	0.8 dB
5 GHz // 10 GHz			– 25	dBc	0.8 dB
5 GHz // 15 GHz			– 25	dBc	0.8 dB
7 GHz // 14 GHz			– 25	dBc	0.8 dB
7 GHz // 21 GHz			– 25	dBc	0.8 dB
10 GHz // 20 GHz			– 25	dBc	0.8 dB
10 GHz // 30 GHz			– 25	dBc	0.8 dB
13 GHz // 26 GHz			– 25	dBc	0.8 dB
13 GHz // 39 GHz			– 25	dBc	0.8 dB
only ZNB 20:					
15 GHz // 30 GHz			– 25	dBc	0.8 dB
17 GHz // 34 GHz			– 20	dBc	0.8 dB
20 GHz // 40 GHz			– 20	dBc	0.8 dB

only ZNB 40 var72:					
15 GHz // 30 GHz			– 15	dBc	0.8 dB
17 GHz // 34 GHz			– 15	dBc	0.8 dB
20 GHz // 40 GHz			– 15	dBc	0.8 dB

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.4, "Checking the Output Harmonics", on page 13					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[b]
Port __ Harmonics					
Source power: **0 dBm (f <= 15 GHz)** **-5 dBm (f > 15 GHz)** Temperature range +18°C... +28°C					
Fund. freq. //Harmon.					
100 kHz // 200 kHz			– 15	dBc	0.8 dB
100 kHz // 300 kHz			– 15	dBc	0.8 dB
200 kHz // 400 kHz			– 15	dBc	0.8 dB
200 kHz // 600 kHz			– 15	dBc	0.8 dB
500 kHz // 1 MHz			– 15	dBc	0.8 dB
500 kHz // 1.5 MHz			– 15	dBc	0.8 dB
1 MHz // 2 MHz			– 15	dBc	0.8 dB
1 MHz // 3 MHz			– 15	dBc	0.8 dB
2 MHz // 4 MHz			– 15	dBc	0.8 dB
2 MHz // 6 MHz			– 15	dBc	0.8 dB
5 MHz // 10 MHz			– 15	dBc	0.8 dB
5 MHz // 15 MHz			– 15	dBc	0.8 dB
7 MHz // 14 MHz			– 15	dBc	0.8 dB
7 MHz // 21 MHz			– 15	dBc	0.8 dB
10 MHz // 20 MHz			– 20	dBc	0.8 dB
10 MHz // 30 MHz			– 20	dBc	0.8 dB
20 MHz // 40 MHz			– 20	dBc	0.8 dB
20 MHz // 60 MHz			– 20	dBc	0.8 dB
50 MHz // 100 MHz			– 20	dBc	0.8 dB
50 MHz // 150 MHz			– 20	dBc	0.8 dB

100 MHz // 200 MHz			– 25	dBc	0.8 dB
100 MHz // 300 MHz			– 25	dBc	0.8 dB
200 MHz // 400 MHz			– 25	dBc	0.8 dB
200 MHz // 600 MHz			– 25	dBc	0.8 dB
500 MHz // 1000 MHz			– 25	dBc	0.8 dB
500 MHz // 1500 MHz			– 25	dBc	0.8 dB
1 GHz // 2 GHz			– 25	dBc	0.8 dB
1 GHz // 3 GHz			– 25	dBc	0.8 dB
2 GHz // 4 GHz			– 25	dBc	0.8 dB
2 GHz // 6 GHz			– 25	dBc	0.8 dB
3 GHz // 6 GHz			– 25	dBc	0.8 dB
3 GHz // 9 GHz			– 25	dBc	0.8 dB
5 GHz // 10 GHz			– 25	dBc	0.8 dB
5 GHz // 15 GHz			– 25	dBc	0.8 dB
7 GHz // 14 GHz			– 25	dBc	0.8 dB
7 GHz // 21 GHz			– 25	dBc	0.8 dB
10 GHz // 20 GHz			– 18	dBc	0.8 dB
10 GHz // 30 GHz			– 18	dBc	0.8 dB
13 GHz // 26 GHz			– 18	dBc	0.8 dB
13 GHz // 39 GHz			– 18	dBc	0.8 dB
15 GHz // 30 GHz			– 18	dBc	0.8 dB
16 GHz // 32 GHz			– 18	dBc	0.8 dB
17 GHz // 34 GHz			– 18	dBc	0.8 dB
18 GHz // 36 GHz			– 15	dBc	0.8 dB
19 GHz // 38 GHz			– 15	dBc	0.8 dB
20 GHz // 40 GHz			– 15	dBc	0.8 dB

only ZNB40 var82, var84: Output Harmonics: "Typ 2" approval measurements: Full temperature range (+5°C ... +40°C) tolerance -12 dB ≥ 18 GHz;

1.4.5 Table: Output Power Linearity

ZNB 4/8
Test sequence description see Chapter 1.3.5, "Checking the Output Power Linearity", on page 14

Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __					
Power linearity					
Ref level –10 dBm					
Temperature range +18°C...+28°C					
Deviation of output power relative to reference, grouped by frequency					
100 kHz					
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
–25 dB	– 1		1	dB	0.1 dB
–30 dB	– 1		1	dB	0.1 dB
–35 dB	– 1		1	dB	0.1 dB
–40 dB	– 1		1	dB	0.1 dB
–45 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–50 dB	– 2		2	dB	0.1 dB
–55 dB	– 2		2	dB	0.1 dB
–60 dB	– 2		2	dB	0.3 dB
–65 dB	– 2		2	dB	0.3 dB
–70 dB	– 2		2	dB	0.3 dB
1 GHz					
w/o. Opt. B52/54: 23 dB	– 1		1	dB	0.1 dB
20 dB	– 1		1	dB	0.1 dB

15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
–25 dB	– 1		1	dB	0.1 dB
–30 dB	– 1		1	dB	0.1 dB
–35 dB	– 1		1	dB	0.1 dB
–40 dB	– 1		1	dB	0.1 dB
–45 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–50 dB	– 2		2	dB	0.1 dB
–55 dB	– 2		2	dB	0.1 dB
–60 dB	– 2		2	dB	0.3 dB
–65 dB	– 2		2	dB	0.3 dB
–70 dB	– 2		2	dB	0.3 dB
3 GHz					
w/o Opt. B52/54: 23 dB	– 1		1	dB	0.1 dB
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
–25 dB	– 1		1	dB	0.1 dB
–30 dB	– 1		1	dB	0.1 dB
–35 dB	– 1		1	dB	0.1 dB
–40 dB	– 1		1	dB	0.1 dB
–45 dB	– 1		1	dB	0.1 dB

w. Opt. B22/B24:					
–50 dB	– 2		2	dB	0.1 dB
–55 dB	– 2		2	dB	0.1 dB
–60 dB	– 2		2	dB	0.3 dB
–65 dB	– 2		2	dB	0.3 dB
–70 dB	– 2		2	dB	0.3 dB
4.5 GHz					
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
–25 dB	– 1		1	dB	0.1 dB
–30 dB	– 1		1	dB	0.1 dB
–35 dB	– 1		1	dB	0.1 dB
–40 dB	– 1		1	dB	0.1 dB
–45 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–50 dB	– 2		2	dB	0.1 dB
–55 dB	– 2		2	dB	0.1 dB
–60 dB	– 2		2	dB	0.3 dB
–65 dB	– 2		2	dB	0.3 dB
–70 dB	– 2		2	dB	0.3 dB
only ZNB 8:	– 1		1	dB	0.1 dB
8.5 GHz					
w/o Opt. B52/54: 18 dB w. Opt. B52/54: 16 dB	– 1		1	dB	0.1 dB
	– 1		1	dB	0.1 dB
	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB

5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
–25 dB	– 1		1	dB	0.1 dB
–30 dB	– 1		1	dB	0.1 dB
–35 dB	– 1		1	dB	0.1 dB
–40 dB	– 1		1	dB	0.1 dB
–45 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–50 dB	– 2		2	dB	0.1 dB
–55 dB	– 2		2	dB	0.1 dB
–60 dB	– 2		2	dB	0.3 dB
–65 dB	– 2		2	dB	0.3 dB
–70 dB	– 2		2	dB	0.3 dB

ZNB 20/40					
Test sequence description see Chapter 1.3.5, "Checking the Output Power Linearity", on page 14					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Power linearity					
Ref level –10 dBm					
Temperature range +18°C...+28°C					
Deviation of output power relative to reference, grouped by frequency					
10 MHz					
only ZNB20: 22 dB	– 1		1	dB	0.1 dB
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB

5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
1 GHz					
only ZNB20: 22 dB	– 1		1	dB	0.1 dB
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
3 GHz					
only ZNB20: 22 dB	– 1		1	dB	0.1 dB

ZNB20, ZNB40 var72: 20 dB ZNB40 var82, var84: 18 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
5 GHz					
only ZNB20: 22 dB	– 1		1	dB	0.1 dB
ZNB20, ZNB40 var72: 20 dB ZNB40 var82, var84: 18 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB

–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
10 GHz					
only ZNB20: 22 dB	– 1		1	dB	0.1 dB
ZNB20, ZNB40 var72: 20 dB ZNB40 var82, var84: 18 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
15 GHz					
only ZNB20, ZNB40 var72: 20 dB only ZNB40 var82, var84: 16 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					

–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
20 GHz					
ZNB20: 18 dB ZNB40 var72: 20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB

only ZNB 40 var72:					
25 GHz					
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB

–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
30 GHz					
20 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
35 GHz					
18 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB

–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB
40 GHz					
18 dB	– 1		1	dB	0.1 dB
15 dB	– 1		1	dB	0.1 dB
10 dB	– 1		1	dB	0.1 dB
5 dB	– 1		1	dB	0.1 dB
–5 dB	– 1		1	dB	0.1 dB
–10 dB	– 1		1	dB	0.1 dB
–15 dB	– 1		1	dB	0.1 dB
–20 dB	– 1		1	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 2		2	dB	0.1 dB
–30 dB	– 2		2	dB	0.1 dB
–35 dB	– 2		2	dB	0.1 dB
–40 dB	– 2		2	dB	0.1 dB
–45 dB	– 2		2	dB	0.1 dB
–50 dB	– 2		2	dB	0.1 dB

only ZNB 40 var 82, 84:					
25 GHz					
12 dB	– 2		2	dB	0.1 dB
10 dB	– 2		2	dB	0.1 dB
5 dB	– 2		2	dB	0.1 dB
–5 dB	– 2		2	dB	0.1 dB
–10 dB	– 2		2	dB	0.1 dB

–15 dB	– 2		2	dB	0.1 dB
–20 dB	– 2		2	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 4		4	dB	0.1 dB
–30 dB	– 4		4	dB	0.1 dB
–35 dB	– 4		4	dB	0.1 dB
–40 dB	– 4		4	dB	0.1 dB
–45 dB	– 4		4	dB	0.1 dB
–50 dB	– 4		4	dB	0.1 dB
30 GHz					
12 dB	– 2		2	dB	0.1 dB
10 dB	– 2		2	dB	0.1 dB
5 dB	– 2		2	dB	0.1 dB
–5 dB	– 2		2	dB	0.1 dB
–10 dB	– 2		2	dB	0.1 dB
–15 dB	– 2		2	dB	0.1 dB
–20 dB	– 2		2	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 4		4	dB	0.1 dB
–30 dB	– 4		4	dB	0.1 dB
–35 dB	– 4		4	dB	0.1 dB
–40 dB	– 4		4	dB	0.1 dB
–45 dB	– 4		4	dB	0.1 dB
–50 dB	– 4		4	dB	0.1 dB
35 GHz					
10 dB	– 2		2	dB	0.1 dB
5 dB	– 2		2	dB	0.1 dB
–5 dB	– 2		2	dB	0.1 dB
–10 dB	– 2		2	dB	0.1 dB
–15 dB	– 2		2	dB	0.1 dB
–20 dB	– 2		2	dB	0.1 dB
w. Opt. B22/B24:					

–25 dB	– 4		4	dB	0.1 dB
–30 dB	– 4		4	dB	0.1 dB
–35 dB	– 4		4	dB	0.1 dB
–40 dB	– 4		4	dB	0.1 dB
–45 dB	– 4		4	dB	0.1 dB
–50 dB	– 4		4	dB	0.1 dB
40 GHz					
10 dB	– 2		2	dB	0.1 dB
5 dB	– 2		2	dB	0.1 dB
–5 dB	– 2		2	dB	0.1 dB
–10 dB	– 2		2	dB	0.1 dB
–15 dB	– 2		2	dB	0.1 dB
–20 dB	– 2		2	dB	0.1 dB
w. Opt. B22/B24:					
–25 dB	– 4		4	dB	0.1 dB
–30 dB	– 4		4	dB	0.1 dB
–35 dB	– 4		4	dB	0.1 dB
–40 dB	– 4		4	dB	0.1 dB
–45 dB	– 4		4	dB	0.1 dB
–50 dB	– 4		4	dB	0.1 dB

1.4.6 Table: Input Linearity Reference Channel

ZNB 4/8					
Test sequence description see Chapter 1.3.5.1, "Checking the Reference Channel Linearity ", on page 16					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of output power referred to reference level, grouped by frequency					
Reference –10 dBm					
1 GHz					

w/o Opt. B52/54: 20 dB w. Opt. B52/54: 18 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

only ZNB 8					
8.5 GHz					
w/o Opt. B52/54: 18 dB w. Opt. B52/54: 16 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

ZNB 20					
Test sequence description see Chapter 1.3.5.1, "Checking the Reference Channel Linearity ", on page 16					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of output power referred to reference level, grouped by frequency					
Reference –10 dBm					
1 GHz					
20 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
10 GHz					
20 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB

10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
20 GHz					
18 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

ZNB 40					
Test sequence description see Chapter 1.3.5.1, "Checking the Reference Channel Linearity ", on page 16					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of output power referred to reference level, grouped by frequency					
Reference –10 dBm					
1 GHz					
ZNB40 var72: 20 dB	– 0.2		0.2	dB	0.02 dB
ZNB40 var82/84: 15 dB	– 0.2		0.2	dB	0.02 dB
ZNB40 var72: 15 dB	– 0.1		0.1	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
10 GHz					
ZNB40 var72: 20 dB	– 0.2		0.2	dB	0.02 dB
ZNB40 var82/84: 15 dB	– 0.2		0.2	dB	0.02 dB
ZNB40 var72: 15 dB	– 0.1		0.1	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

20 GHz					
only ZNB40 var72: 20 dB	– 0.2		0.2	dB	0.02 dB
only ZNB40 var82/84: 15 dB	– 0.2		0.2	dB	0.02 dB
only ZNB40 var72: 15 dB	– 0.1		0.1	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
30 GHz					
only ZNB40 var72: 20 dB	– 0.2		0.2	dB	0.02 dB
only ZNB40 var72: 15 dB	– 0.1		0.1	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
40 GHz					
only ZNB40 var72: 18 dB	– 0.2		0.2	dB	0.02 dB
only ZNB40 var72: 15 dB	– 0.1		0.1	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

This table is only depicted in order to provide the frequencies and power changes that are needed in order to determine $RefDev_{lstep}$. For a DCV calibration it is not necessary to measure the actual linearity deviation of the reference channel.

Input Linearity Reference Channel: The automatic test program measures at additional frequencies:

only ZNB 4/8: 50 MHz, 500 MHz, 2 GHz, 3 GHz, 4.5 GHz, 6.5 GHz; apply the same limits as for 1 GHz

only ZNB 20: 50 MHz, 500 MHz, 2 GHz, 3 GHz, 5 GHz, 15 GHz; apply the same limits as for 10 GHz

only ZNB 40:

50 MHz, 500 MHz, 2 GHz, 3 GHz, 5 GHz; apply the same limits as for 10 GHz

15 GHz; apply the same limits as for 20 GHz

25 GHz; apply the same limits as for 30 GHz

35 GHz; apply the same limits as for 40 GHz

1.4.7 Table: Maximum Output Power

ZNB 4/8					
Test sequence description see Chapter 1.3.6, "Checking the Maximum Output Power", on page 17					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Max. Output power					
Test frequency					
w/o ZNB-B1:					
9 kHz	w/o Opt. B52/B54: 10 w. Opt. B52/B54: 8			dBm	0.2 dB
20 kHz	w/o Opt. B52/B54: 10 w. Opt. B52/B54: 8			dBm	0.2 dB
50 kHz	w/o Opt. B52/B54: 10 w. Opt. B52/B54: 8			dBm	0.2 dB
w. and w/o ZNB-B1:					
100 kHz	10			dBm	0.2 dB
200 kHz	10			dBm	0.2 dB
500 kHz	10			dBm	0.2 dB
1 MHz	10			dBm	0.2 dB
2 MHz	10			dBm	0.2 dB
5 MHz	10			dBm	0.2 dB
10 MHz	10			dBm	0.2 dB

20 MHz	10			dBm	0.2 dB
50 MHz	10			dBm	0.2 dB
100 MHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
200 MHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
500 MHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
1.0 GHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
1.5 GHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
2.0 GHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
2.5 GHz	w/o Opt. B52/54: 13 w. Opt. B52/54: 10			dBm	0.2 dB
3.0 GHz	10			dBm	0.2 dB
3.5 GHz	10			dBm	0.2 dB
4.0 GHz	10			dBm	0.2 dB
4.5 GHz	10			dBm	0.2 dB
only ZNB 8:					
5.0 GHz	10			dBm	0.2 dB
5.5 GHz	10			dBm	0.2 dB
6.0 GHz	10			dBm	0.2 dB
6.5 GHz	10			dBm	0.2 dB
7.0 GHz	w/o Opt. B52/54: 10 w. Opt. B52/54: 8			dBm	0.2 dB
7.5 GHz	w/o Opt. B52/54: 10 w. Opt. B52/54: 8			dBm	0.2 dB
8.0 GHz	w/o Opt. B52/54: 8 w. Opt. B52/54: 6			dBm	0.2 dB
8.5 GHz	w/o Opt. B52/54: 8 w. Opt. B52/54: 6			dBm	0.2 dB

ZNB 20
Test sequence description see Chapter 1.3.6, "Checking the Maximum Output Power", on page 17

Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __					
Max. Output power					
Test frequency					
100 kHz	8			dBm	0.2 dB
200 kHz	8			dBm	0.2 dB
500 kHz	8			dBm	0.2 dB
1 MHz	10			dBm	0.2 dB
2 MHz	10			dBm	0.2 dB
5 MHz	10			dBm	0.2 dB
10 MHz	12			dBm	0.2 dB
20 MHz	12			dBm	0.2 dB
50 MHz	12			dBm	0.2 dB
100 MHz	12			dBm	0.2 dB
200 MHz	12			dBm	0.2 dB
500 MHz	12			dBm	0.2 dB
1 GHz	12			dBm	0.2 dB
2 GHz	12			dBm	0.2 dB
3 GHz	12			dBm	0.2 dB
4 GHz	12			dBm	0.2 dB
5 GHz	12			dBm	0.2 dB
6 GHz	12			dBm	0.2 dB
7 GHz	12			dBm	0.2 dB
8 GHz	12			dBm	0.2 dB
9 GHz	12			dBm	0.2 dB
10 GHz	12			dBm	0.2 dB
11 GHz	10			dBm	0.2 dB
12 GHz	10			dBm	0.2 dB
13 GHz	10			dBm	0.2 dB
14 GHz	10			dBm	0.2 dB
15 GHz	10			dBm	0.2 dB
16 GHz	8			dBm	0.2 dB
17 GHz	8			dBm	0.2 dB

18 GHz	8			dBm	0.2 dB
19 GHz	8			dBm	0.2 dB
20 GHz	8			dBm	0.2 dB

ZNB40 var72					
Test sequence description see Chapter 1.3.6, "Checking the Maximum Output Power", on page 17					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Max. Output power					
Test frequency					
10 MHz	10			dBm	0.2 dB
20 MHz	10			dBm	0.2 dB
50 MHz	10			dBm	0.2 dB
100 MHz	10			dBm	0.2 dB
200 MHz	10			dBm	0.2 dB
500 MHz	10			dBm	0.2 dB
1 GHz	10			dBm	0.2 dB
2 GHz	10			dBm	0.2 dB
3 GHz	10			dBm	0.2 dB
4 GHz	10			dBm	0.2 dB
5 GHz	10			dBm	0.2 dB
6 GHz	10			dBm	0.2 dB
7 GHz	10			dBm	0.2 dB
8 GHz	10			dBm	0.2 dB
9 GHz	10			dBm	0.2 dB
10 GHz	10			dBm	0.2 dB
12 GHz	10			dBm	0.2 dB
14 GHz	10			dBm	0.2 dB
16 GHz	10			dBm	0.2 dB
18 GHz	10			dBm	0.2 dB
20 GHz	10			dBm	0.2 dB
22 GHz	10			dBm	0.2 dB
24 GHz	10			dBm	0.2 dB

26 GHz	10			dBm	0.2 dB
28 GHz	10			dBm	0.2 dB
30 GHz	10			dBm	0.2 dB
32 GHz	8			dBm	0.2 dB
34 GHz	8			dBm	0.2 dB
36 GHz	8			dBm	0.2 dB
38 GHz	8			dBm	0.2 dB
40 GHz	8			dBm	0.2 dB

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.6, "Checking the Maximum Output Power", on page 17					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Max. Output power Temperature range +18°C... +28°C					
Test frequency					
100 kHz	8			dBm	0.2 dB
200 kHz	8			dBm	0.2 dB
300 kHz	10			dBm	0.2 dB
500 kHz	10			dBm	0.2 dB
1 MHz	10			dBm	0.2 dB
2 MHz	10			dBm	0.2 dB
5 MHz	10			dBm	0.2 dB
10 MHz	10			dBm	0.2 dB
20 MHz	10			dBm	0.2 dB
50 MHz	10			dBm	0.2 dB
100 MHz	10			dBm	0.2 dB
200 MHz	10			dBm	0.2 dB
500 MHz	10			dBm	0.2 dB
1 GHz	8			dBm	0.2 dB
2 GHz	8			dBm	0.2 dB
3 GHz	8			dBm	0.2 dB

4 GHz	8			dBm	0.2 dB
5 GHz	8			dBm	0.2 dB
6 GHz	8			dBm	0.2 dB
7 GHz	8			dBm	0.2 dB
8 GHz	8			dBm	0.2 dB
9 GHz	8			dBm	0.2 dB
10 GHz	6			dBm	0.2 dB
12 GHz	6			dBm	0.2 dB
14 GHz	6			dBm	0.2 dB
15 GHz	5			dBm	0.2 dB
16 GHz	5			dBm	0.2 dB
18 GHz	5			dBm	0.2 dB
20 GHz	2			dBm	0.2 dB
22 GHz	2			dBm	0.2 dB
24 GHz	2			dBm	0.2 dB
26 GHz	2			dBm	0.2 dB
28 GHz	2			dBm	0.2 dB
30 GHz	0			dBm	0.2 dB
32 GHz	0			dBm	0.2 dB
34 GHz	0			dBm	0.2 dB
36 GHz	0			dBm	0.2 dB
38 GHz	0			dBm	0.2 dB
40 GHz	0			dBm	0.2 dB

only ZNB40 var82, var84: Maximum Output Power: "Typ 2" approval measurements: Full temperature range (+5°C ... +40°C) tolerance 0 dB ≥ 20 GHz; -2 dB ≥ 30 GHz;

1.4.8 Table: Accuracy of Output Power

ZNB 4/8					
Test sequence description see Chapter 1.3.7, "Checking the Output Power Accuracy", on page 18					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of output power					

Source power **–10 dBm** Temperature range +18°C... +28°C					
Test frequency					

w/o ZNB-B1:					
9 kHz	–3		3	dB	0.2 dB
20 kHz	–3		3	dB	0.2 dB
50 kHz	–2		2	dB	0.2 dB

w. and w/o ZNB-B1:					
100 kHz	–2		2	dB	0.2 dB
200 kHz	–2		2	dB	0.2 dB
500 kHz	–2		2	dB	0.2 dB
1 MHz	–2		2	dB	0.2 dB
2 MHz	–2		2	dB	0.2 dB
5 MHz	–2		2	dB	0.2 dB
10 MHz	–2		2	dB	0.2 dB
20 MHz	–2		2	dB	0.2 dB
50 MHz	–2		2	dB	0.2 dB
100 MHz	–2		2	dB	0.2 dB
200 MHz	–2		2	dB	0.2 dB
500 MHz	–2		2	dB	0.2 dB
1.0 GHz	–2		2	dB	0.2 dB
1.5 GHz	–2		2	dB	0.2 dB
2.0 GHz	–2		2	dB	0.2 dB
2.5 GHz	–2		2	dB	0.2 dB
3.0 GHz	–2		2	dB	0.2 dB

3.5 GHz	–2		2	dB	0.2 dB
4.0 GHz	–2		2	dB	0.2 dB
4.5 GHz	–2		2	dB	0.2 dB
only ZNB 8:					

5.0 GHz	–2		2	dB	0.2 dB
6.0 GHz	–2		2	dB	0.2 dB
6.5 GHz	–2		2	dB	0.2 dB
7.0 GHz	–2		2	dB	0.2 dB
7.5 GHz	–2		2	dB	0.2 dB
8.0 GHz	–2		2	dB	0.2 dB
8.5 GHz	–2		2	dB	0.2 dB

ZNB 20/40					
Test sequence description see Chapter 1.3.7, "Checking the Output Power Accuracy", on page 18					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Accuracy of Output Power					
Source power –10 dBm Temperature range +18°C... +28°C					
Test frequency					
only ZNB 20 and ZNB40 var82, var84:					
100 kHz	– 2		2	dB	0.2 dB
200 kHz	– 2		2	dB	0.2 dB
500 kHz	– 2		2	dB	0.2 dB
1 MHz	– 2		2	dB	0.2 dB
2 MHz	– 2		2	dB	0.2 dB
5 MHz	– 2		2	dB	0.2 dB
ZNB 20/40:					
10 MHz	– 2		2	dB	0.2 dB
20 MHz	– 2		2	dB	0.2 dB
50 MHz	– 2		2	dB	0.2 dB
100 MHz	– 2		2	dB	0.2 dB
200 MHz	– 2		2	dB	0.2 dB
500 MHz	– 2		2	dB	0.2 dB

1.0 GHz	– 2		2	dB	0.2 dB
1.5 GHz	– 2		2	dB	0.2 dB
2.0 GHz	– 2		2	dB	0.2 dB
2.5 GHz	– 2		2	dB	0.2 dB
3.0 GHz	– 2		2	dB	0.2 dB
3.5 GHz	– 2		2	dB	0.2 dB
4.0 GHz	– 2		2	dB	0.2 dB
4.5 GHz	– 2		2	dB	0.2 dB
5.0 GHz	– 2		2	dB	0.2 dB
6.0 GHz	– 2		2	dB	0.2 dB
7.0 GHz	– 2		2	dB	0.2 dB
8.0 GHz	– 2		2	dB	0.2 dB
9.0 GHz	– 2		2	dB	0.2 dB
10.0 GHz	– 2		2	dB	0.2 dB
11.0 GHz	– 2		2	dB	0.2 dB
12.0 GHz	– 2		2	dB	0.2 dB
13.0 GHz	– 2		2	dB	0.2 dB
14.0 GHz	– 2		2	dB	0.2 dB
15.0 GHz	– 2		2	dB	0.2 dB
16.0 GHz	– 2		2	dB	0.2 dB
17.0 GHz	– 2		2	dB	0.2 dB
18.0 GHz	– 2		2	dB	0.2 dB
19.0 GHz	– 2		2	dB	0.2 dB
20.0 GHz	– 2		2	dB	0.2 dB

only ZNB 40:					
21.0 GHz	– 3		3	dB	0.2 dB
22.0 GHz	– 3		3	dB	0.2 dB
23.0 GHz	– 3		3	dB	0.2 dB
24.0 GHz	– 3		3	dB	0.2 dB
25.0 GHz	– 3		3	dB	0.2 dB
26.0 GHz	– 3		3	dB	0.2 dB
27.0 GHz	– 3		3	dB	0.2 dB
28.0 GHz	– 3		3	dB	0.2 dB

29.0 GHz	– 3		3	dB	0.2 dB
30.0 GHz	– 3		3	dB	0.2 dB
31.0 GHz	– 3		3	dB	0.2 dB
32.0 GHz	– 3		3	dB	0.2 dB
33.0 GHz	– 3		3	dB	0.2 dB
34.0 GHz	– 3		3	dB	0.2 dB
35.0 GHz	– 3		3	dB	0.2 dB
36.0 GHz	– 3		3	dB	0.2 dB
37.0 GHz	– 3		3	dB	0.2 dB
38.0 GHz	– 3		3	dB	0.2 dB
39.0 GHz	– 3		3	dB	0.2 dB
40.0 GHz	– 3		3	dB	0.2 dB

1.4.9 Table: Input Power Measurement Accuracy

ZNB 4/8					
Test sequence description see Chapter 1.3.8, " Checking the Input Power Measurement Accuracy", on page 19					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of measured input power					
Test frequency					

w/o ZNB-B1:					
9 kHz	– 2		2	dB	0.2 dB
20 kHz	– 2		2	dB	0.2 dB
50 kHz	– 2		2	dB	0.2 dB

w. and w/o ZNB-B1:					
100 kHz	– 1		1	dB	0.2 dB
200 kHz	– 1		1	dB	0.2 dB
500 kHz	– 1		1	dB	0.2 dB
1 MHz	– 1		1	dB	0.2 dB

2 MHz	– 1		1	dB	0.2 dB
5 MHz	– 1		1	dB	0.2 dB
10 MHz	– 1		1	dB	0.2 dB
20 MHz	– 1		1	dB	0.2 dB
50 MHz	– 1		1	dB	0.2 dB
100 MHz	– 1		1	dB	0.2 dB
200 MHz	– 1		1	dB	0.2 dB
500 MHz	– 1		1	dB	0.2 dB
1 GHz	– 1		1	dB	0.2 dB
1.5 GHz	– 1		1	dB	0.2 dB
2 GHz	– 1		1	dB	0.2 dB
2.5 GHz	– 1		1	dB	0.2 dB
3 GHz	– 1		1	dB	0.2 dB

ZNB 4/8:					
3.5 GHz	– 1		1	dB	0.2 dB
4 GHz	– 1		1	dB	0.2 dB
4.5 GHz	– 1		1	dB	0.2 dB
only ZNB 8:					
5.0 GHz	– 1		1	dB	0.2 dB
5.5 GHz	– 1		1	dB	0.2 dB
6.0 GHz	– 1		1	dB	0.2 dB
6.5 GHz	– 1		1	dB	0.2 dB
7.0 GHz	– 1		1	dB	0.2 dB
7.5 GHz	– 1		1	dB	0.2 dB
8.0 GHz	– 1		1	dB	0.2 dB
8.5 GHz	– 1		1	dB	0.2 dB

ZNB 20/40					
Test sequence description see Chapter 1.3.8, " Checking the Input Power Measurement Accuracy", on page 19					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					

Deviation of measured input power					
Test frequency					
only ZNB20 and ZNB40 var82, var84: ZNB40 temperature range +18°C... +28°C					
100 kHz	– 1		1	dB	0.2 dB
200 kHz	– 1		1	dB	0.2 dB
500 kHz	– 1		1	dB	0.2 dB
1 MHz	– 1		1	dB	0.2 dB
2 MHz	– 1		1	dB	0.2 dB
5 MHz	– 1		1	dB	0.2 dB
ZNB 20/40:					
10 MHz	– 1		1	dB	0.2 dB
20 MHz	– 1		1	dB	0.2 dB
50 MHz	– 1		1	dB	0.2 dB
100 MHz	– 1		1	dB	0.2 dB
200 MHz	– 1		1	dB	0.2 dB
500 MHz	– 1		1	dB	0.2 dB
1 GHz	– 1		1	dB	0.2 dB
1.5 GHz	– 1		1	dB	0.2 dB
2 GHz	– 1		1	dB	0.2 dB
2.5 GHz	– 1		1	dB	0.2 dB
3 GHz	– 1		1	dB	0.2 dB
4 GHz	– 1		1	dB	0.2 dB
5 GHz	– 1		1	dB	0.2 dB
6 GHz	– 1		1	dB	0.2 dB
7 GHz	– 1		1	dB	0.2 dB
8 GHz	– 1		1	dB	0.2 dB
9 GHz	– 1		1	dB	0.2 dB
10 GHz	– 1		1	dB	0.2 dB
11 GHz	– 1		1	dB	0.2 dB
12 GHz	– 1		1	dB	0.2 dB

13 GHz	– 1		1	dB	0.2 dB
14 GHz	– 1		1	dB	0.2 dB
15 GHz	– 1		1	dB	0.2 dB
16 GHz	– 1		1	dB	0.2 dB
17 GHz	– 1		1	dB	0.2 dB
18 GHz	– 1		1	dB	0.2 dB
19 GHz	– 1		1	dB	0.2 dB
20 GHz	– 1		1	dB	0.2 dB

only ZNB 40:					
21 GHz	– 2		2	dB	0.2 dB
22 GHz	– 2		2	dB	0.2 dB
23 GHz	– 2		2	dB	0.2 dB
24 GHz	– 2		2	dB	0.2 dB
25 GHz	– 2		2	dB	0.2 dB
26 GHz	– 2		2	dB	0.2 dB
27 GHz	– 2		2	dB	0.2 dB
28 GHz	– 2		2	dB	0.2 dB
29 GHz	– 2		2	dB	0.2 dB
30 GHz	– 2		2	dB	0.2 dB
31 GHz	– 2		2	dB	0.2 dB
32 GHz	– 2		2	dB	0.2 dB
33 GHz	– 2		2	dB	0.2 dB
34 GHz	– 2		2	dB	0.2 dB
35 GHz	– 2		2	dB	0.2 dB
36 GHz	– 2		2	dB	0.2 dB
37 GHz	– 2		2	dB	0.2 dB
38 GHz	– 2		2	dB	0.2 dB
39 GHz	– 2		2	dB	0.2 dB
40 GHz	– 2		2	dB	0.2 dB

only ZNB40 var82, var84:nput Power Measurement Accuracy: "Typ 2" approval measurements: Full temperature range (+5°C ... +40°C) tolerance± -1.5 dB < 0.2 MHz;

1.4.10 Table: Input Power Linearity (Low Level)

Test sequence description see Chapter 1.3.9, "Checking the Input Power Linearity (low level)", on page 20					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of measured power relative to reference, at indicated frequency					
Reference –10 dBm					
ZNB 4/8: 50.001 MHz **ZNB 20/40: 500.001 MHz**					
0 dB	– 0.1		0.1	dB	0.02 dB
–5 dB	– 0.1		0.1	dB	0.02 dB
–10 dB	– 0.1		0.1	dB	0.02 dB
–15 dB	– 0.1		0.1	dB	0.02 dB
–20 dB	– 0.1		0.1	dB	0.02 dB
–25 dB	– 0.1		0.1	dB	0.02 dB
–30 dB	– 0.1		0.1	dB	0.02 dB
–35 dB	– 0.1		0.1	dB	0.02 dB
–40 dB	– 0.1		0.1	dB	0.02 dB

Input Power Linearity (low level): The automatic test program measures at additional power offsets: -45 dB, -50 dB. Tolerance is +/- 0.15 dB. Protocol data is limited to attenuation levels of 0 to -40 dB.

1.4.11 Table: Input Power Linearity (High Level)

ZNB 4/8					
Test sequence description see Chapter 1.3.10, "Checking the Input Power Linearity (high level)", on page 22					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**

Port __					
Deviation of measured power relative to reference, at indicated frequency					
Reference –10 dBm					
1 GHz					
w/o Opt. B52/54: 20 dB w. Opt. B52/54: 18 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
only ZNB 8:					
8.5 GHz					
w/o Opt. B52/54: 18 dB w. Opt. B52/54: 16 dB	– 0.2		0.2	dB	0.02 dB
15 dB	– 0.2		0.2	dB	0.02 dB
	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

ZNB 20					
Test sequence description see Chapter 1.3.10, "Checking the Input Power Linearity (high level)", on page 22					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of measured power relative to reference, at indicated frequency					
Reference –10 dBm					
1 GHz					
20 dB	– 0.3		0.3	dB	0.02 dB

15 dB	– 0.3		0.3	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
10 GHz					
18 dB	– 0.3		0.3	dB	0.02 dB
15 dB	– 0.3		0.3	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
20 GHz					
15 dB	– 0.3		0.3	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

ZNB 40 model.72

Test sequence description see Chapter 1.3.10, "Checking the Input Power Linearity (high level)", on page 22

Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __					
Deviation of measured power relative to reference, at indicated frequency					
Reference –10 dBm					
1 GHz					
10 dB	– 0.2		0.2	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

10 GHz					
10 dB	– 0.2		0.2	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
20 GHz					
10 dB	– 0.2		0.2	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
30 GHz					
10 dB	– 0.2		0.2	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
40 GHz					
10 dB	– 0.2		0.2	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

ZNB 40 model.82 and 84					
Test sequence description see Chapter 1.3.10, "Checking the Input Power Linearity (high level)", on page 22					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Deviation of measured power relative to reference, at indicated frequency					
Reference –10 dBm					
1 GHz					
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB

5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
10 GHz					
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
20 GHz					
15 dB	– 0.2		0.2	dB	0.02 dB
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
30 GHz					
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB
40 GHz					
10 dB	– 0.1		0.1	dB	0.02 dB
5 dB	– 0.1		0.1	dB	0.02 dB
0 dB	– 0.1		0.1	dB	0.02 dB

1.4.12 Table: Trace Noise Magnitude

ZNB 4/8					
Test sequence description see Chapter 1.3.11, "Checking the Trace Noise Magnitude", on page 23					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm					

RMS value of trace noise magnitude					
Frequency					
w/o ZNB-B1:					
9 kHz	1 kHz		< 0.008	dB	
20 kHz	1 kHz		< 0.004	dB	
50 kHz	1 kHz		< 0.004	dB	
w. and w/o ZNB-B1:					
100 kHz	10 kHz		< 0.004	dB	
200 kHz	10 kHz		< 0.004	dB	
500 kHz	10 kHz		< 0.004	dB	
1 MHz	10 kHz		< 0.004	dB	
2 MHz	10 kHz		< 0.004	dB	
5 MHz	10 kHz		< 0.004	dB	
10 MHz	10 kHz		< 0.004	dB	
20 MHz	10 kHz		< 0.004	dB	
50 MHz	10 kHz		< 0.004	dB	
100 MHz	10 kHz		< 0.004	dB	
500 MHz	10 kHz		< 0.004	dB	
1 GHz	10 kHz		< 0.004	dB	
1.5 GHz	10 kHz		< 0.004	dB	
2 GHz	10 kHz		< 0.004	dB	
2.5 GHz	10 kHz		< 0.004	dB	
3 GHz	10 kHz		< 0.004	dB	
3.5 GHz	10 kHz		< 0.004	dB	
4 GHz	10 kHz		< 0.004	dB	
4.5 GHz	10 kHz		< 0.004	dB	
only ZNB 8:					
5 GHz	10 kHz		< 0.004	dB	
5.5 GHz	10 kHz		< 0.004	dB	
6 GHz	10 kHz		< 0.004	dB	
6.5 GHz	10 kHz		< 0.004	dB	
7 GHz	10 kHz		< 0.004	dB	

7.5 GHz	10 kHz		< 0.004	dB	
8 GHz	10 kHz		< 0.004	dB	
8.5 GHz	10 kHz		< 0.004	dB	

With installed ZNB4/8-B52 or ZNB4/8-B54: Max. value Std. Deviation < 0.005 dB rms for Frequency ≥ 20 kHz

ZNB 20					
Test sequence description see Chapter 1.3.11, "Checking the Trace Noise Magnitude", on page 23					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm					
RMS value of trace noise magnitude					
Frequency					
100 kHz	10 kHz		< 0.008	dB	
200 kHz	10 kHz		< 0.008	dB	
300 kHz	10 kHz		< 0.004	dB	
500 kHz	10 kHz		< 0.004	dB	
1 MHz	10 kHz		< 0.004	dB	
2 MHz	10 kHz		< 0.004	dB	
5 MHz	10 kHz		< 0.004	dB	
10 MHz	10 kHz		< 0.004	dB	
20 MHz	10 kHz		< 0.004	dB	
50 MHz	10 kHz		< 0.004	dB	
100 MHz	10 kHz		< 0.004	dB	
500 MHz	10 kHz		< 0.004	dB	
1 GHz	10 kHz		< 0.004	dB	
1.5 GHz	10 kHz		< 0.004	dB	
2 GHz	10 kHz		< 0.004	dB	
2.5 GHz	10 kHz		< 0.004	dB	
3 GHz	10 kHz		< 0.004	dB	
3.5 GHz	10 kHz		< 0.004	dB	

4 GHz	10 kHz		< 0.004	dB	
4.5 GHz	10 kHz		< 0.004	dB	
5 GHz	10 kHz		< 0.004	dB	
5.5 GHz	10 kHz		< 0.004	dB	
6 GHz	10 kHz		< 0.004	dB	
6.5 GHz	10 kHz		< 0.004	dB	
7 GHz	10 kHz		< 0.004	dB	
7.5 GHz	10 kHz		< 0.004	dB	
8 GHz	10 kHz		< 0.004	dB	
8.5 GHz	10 kHz		< 0.004	dB	
9 GHz	10 kHz		< 0.004	dB	
9.5 GHz	10 kHz		< 0.004	dB	
10 GHz	10 kHz		< 0.004	dB	
10.5 GHz	10 kHz		< 0.004	dB	
11 GHz	10 kHz		< 0.004	dB	
11.5 GHz	10 kHz		< 0.004	dB	
12 GHz	10 kHz		< 0.004	dB	
12.5 GHz	10 kHz		< 0.004	dB	
13 GHz	10 kHz		< 0.004	dB	
13.5 GHz	10 kHz		< 0.004	dB	
14 GHz	10 kHz		< 0.004	dB	
14.5 GHz	10 kHz		< 0.004	dB	
15 GHz	10 kHz		< 0.004	dB	
15.5 GHz	10 kHz		< 0.004	dB	
16 GHz	10 kHz		< 0.004	dB	
16.5 GHz	10 kHz		< 0.004	dB	
17 GHz	10 kHz		< 0.004	dB	
17.5 GHz	10 kHz		< 0.004	dB	
18 GHz	10 kHz		< 0.004	dB	
18.5 GHz	10 kHz		< 0.004	dB	
19 GHz	10 kHz		< 0.004	dB	
19.5 GHz	10 kHz		< 0.004	dB	
20 GHz	10 kHz		< 0.004	dB	

ZNB40 var72					
Test sequence description see Chapter 1.3.11, "Checking the Trace Noise Magnitude", on page 23					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm					
RMS value of trace noise magnitude					
Frequency					
10 MHz	10 kHz		< 0.036	dB	
20 MHz	10 kHz		< 0.036	dB	
50 MHz	10 kHz		< 0.012	dB	
100 MHz	10 kHz		< 0.012	dB	
500 MHz	10 kHz		< 0.004	dB	
1 GHz	10 kHz		< 0.004	dB	
1.5 GHz	10 kHz		< 0.004	dB	
2 GHz	10 kHz		< 0.004	dB	
2.5 GHz	10 kHz		< 0.004	dB	
3 GHz	10 kHz		< 0.004	dB	
3.5 GHz	10 kHz		< 0.004	dB	
4 GHz	10 kHz		< 0.004	dB	
4.5 GHz	10 kHz		< 0.004	dB	
5 GHz	10 kHz		< 0.004	dB	
5.5 GHz	10 kHz		< 0.004	dB	
6 GHz	10 kHz		< 0.004	dB	
6.5 GHz	10 kHz		< 0.004	dB	
7 GHz	10 kHz		< 0.004	dB	
7.5 GHz	10 kHz		< 0.004	dB	
8 GHz	10 kHz		< 0.004	dB	
8.5 GHz	10 kHz		< 0.004	dB	
9 GHz	10 kHz		< 0.004	dB	
9.5 GHz	10 kHz		< 0.004	dB	
10 GHz	10 kHz		< 0.004	dB	
10.5 GHz	10 kHz		< 0.004	dB	

11 GHz	10 kHz		< 0.004	dB	
11.5 GHz	10 kHz		< 0.004	dB	
12 GHz	10 kHz		< 0.004	dB	
12.5 GHz	10 kHz		< 0.004	dB	
13 GHz	10 kHz		< 0.004	dB	
13.5 GHz	10 kHz		< 0.004	dB	
14 GHz	10 kHz		< 0.004	dB	
14.5 GHz	10 kHz		< 0.004	dB	
15 GHz	10 kHz		< 0.004	dB	
15.5 GHz	10 kHz		< 0.004	dB	
16 GHz	10 kHz		< 0.004	dB	
16.5 GHz	10 kHz		< 0.004	dB	
17 GHz	10 kHz		< 0.004	dB	
17.5 GHz	10 kHz		< 0.004	dB	
18 GHz	10 kHz		< 0.004	dB	
18.5 GHz	10 kHz		< 0.004	dB	
19 GHz	10 kHz		< 0.004	dB	
19.5 GHz	10 kHz		< 0.004	dB	
20 GHz	10 kHz		< 0.004	dB	
20.5 GHz	10 kHz		< 0.012	dB	
21 GHz	10 kHz		< 0.012	dB	
21.5 GHz	10 kHz		< 0.012	dB	
22 GHz	10 kHz		< 0.012	dB	
22.5 GHz	10 kHz		< 0.012	dB	
23 GHz	10 kHz		< 0.012	dB	
23.5 GHz	10 kHz		< 0.012	dB	
24 GHz	10 kHz		< 0.012	dB	
24.5 GHz	10 kHz		< 0.012	dB	
25 GHz	10 kHz		< 0.012	dB	
25.5 GHz	10 kHz		< 0.012	dB	
26 GHz	10 kHz		< 0.012	dB	
26.5 GHz	10 kHz		< 0.012	dB	
27 GHz	10 kHz		< 0.012	dB	
27.5 GHz	10 kHz		< 0.012	dB	

28 GHz	10 kHz		< 0.012	dB	
28.5 GHz	10 kHz		< 0.012	dB	
29 GHz	10 kHz		< 0.012	dB	
29.5 GHz	10 kHz		< 0.012	dB	
30 GHz	10 kHz		< 0.012	dB	
30.5 GHz	10 kHz		< 0.02	dB	
31 GHz	10 kHz		< 0.02	dB	
31.5 GHz	10 kHz		< 0.02	dB	
32 GHz	10 kHz		< 0.02	dB	
32.5 GHz	10 kHz		< 0.02	dB	
33 GHz	10 kHz		< 0.02	dB	
33.5 GHz	10 kHz		< 0.02	dB	
34 GHz	10 kHz		< 0.02	dB	
34.5 GHz	10 kHz		< 0.02	dB	
35 GHz	10 kHz		< 0.02	dB	
35.5 GHz	10 kHz		< 0.02	dB	
36 GHz	10 kHz		< 0.02	dB	
36.5 GHz	10 kHz		< 0.02	dB	
37 GHz	10 kHz		< 0.02	dB	
37.5 GHz	10 kHz		< 0.02	dB	
38 GHz	10 kHz		< 0.02	dB	
38.5 GHz	10 kHz		< 0.02	dB	
39 GHz	10 kHz		< 0.02	dB	
39.5 GHz	10 kHz		< 0.02	dB	
40 GHz	10 kHz		< 0.02	dB	

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.11, "Checking the Trace Noise Magnitude", on page 23					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm Temperature range +18°C... +28°C					

RMS value of trace noise magnitude					
Frequency					
100 kHz	10 kHz		< 0.008	dB	
200 kHz	10 kHz		< 0.008	dB	
300 kHz	10 kHz		< 0.004	dB	
500 kHz	10 kHz		< 0.004	dB	
1 MHz	10 kHz		< 0.004	dB	
5 MHz	10 kHz		< 0.004	dB	
10 MHz	10 kHz		< 0.004	dB	
20 MHz	10 kHz		< 0.004	dB	
50 MHz	10 kHz		< 0.004	dB	
100 MHz	10 kHz		< 0.004	dB	
500 MHz	10 kHz		< 0.004	dB	
1 GHz	10 kHz		< 0.004	dB	
1.5 GHz	10 kHz		< 0.004	dB	
2 GHz	10 kHz		< 0.004	dB	
2.5 GHz	10 kHz		< 0.004	dB	
3 GHz	10 kHz		< 0.004	dB	
3.5 GHz	10 kHz		< 0.004	dB	
4 GHz	10 kHz		< 0.004	dB	
4.5 GHz	10 kHz		< 0.004	dB	
5 GHz	10 kHz		< 0.004	dB	
5.5 GHz	10 kHz		< 0.004	dB	
6 GHz	10 kHz		< 0.004	dB	
6.5 GHz	10 kHz		< 0.004	dB	
7 GHz	10 kHz		< 0.004	dB	
7.5 GHz	10 kHz		< 0.004	dB	
8 GHz	10 kHz		< 0.004	dB	
8.5 GHz	10 kHz		< 0.004	dB	
9 GHz	10 kHz		< 0.004	dB	
9.5 GHz	10 kHz		< 0.004	dB	
10 GHz	10 kHz		< 0.004	dB	
10.5 GHz	10 kHz		< 0.004	dB	

11 GHz	10 kHz		< 0.004	dB	
11.5 GHz	10 kHz		< 0.004	dB	
12 GHz	10 kHz		< 0.004	dB	
12.5 GHz	10 kHz		< 0.004	dB	
13 GHz	10 kHz		< 0.004	dB	
13.5 GHz	10 kHz		< 0.004	dB	
14 GHz	10 kHz		< 0.004	dB	
14.5 GHz	10 kHz		< 0.004	dB	
15 GHz	10 kHz		< 0.004	dB	
15.5 GHz	10 kHz		< 0.004	dB	
16 GHz	10 kHz		< 0.004	dB	
16.5 GHz	10 kHz		< 0.004	dB	
17 GHz	10 kHz		< 0.004	dB	
17.5 GHz	10 kHz		< 0.004	dB	
18 GHz	10 kHz		< 0.004	dB	
18.5 GHz	10 kHz		< 0.004	dB	
19 GHz	10 kHz		< 0.004	dB	
19.5 GHz	10 kHz		< 0.004	dB	
20 GHz	10 kHz		< 0.004	dB	
20.5 GHz	10 kHz		< 0.006	dB	
21 GHz	10 kHz		< 0.006	dB	
21.5 GHz	10 kHz		< 0.006	dB	
22 GHz	10 kHz		< 0.006	dB	
22.5 GHz	10 kHz		< 0.006	dB	
23 GHz	10 kHz		< 0.006	dB	
23.5 GHz	10 kHz		< 0.006	dB	
24 GHz	10 kHz		< 0.006	dB	
24.5 GHz	10 kHz		< 0.006	dB	
25 GHz	10 kHz		< 0.006	dB	
25.5 GHz	10 kHz		< 0.006	dB	
26 GHz	10 kHz		< 0.006	dB	
26.5 GHz	10 kHz		< 0.006	dB	
27 GHz	10 kHz		< 0.006	dB	
27.5 GHz	10 kHz		< 0.006	dB	

28 GHz	10 kHz		< 0.006	dB	
28.5 GHz	10 kHz		< 0.006	dB	
29 GHz	10 kHz		< 0.006	dB	
29.5 GHz	10 kHz		< 0.006	dB	
30 GHz	10 kHz		< 0.006	dB	
30.5 GHz	10 kHz		< 0.006	dB	
31 GHz	10 kHz		< 0.006	dB	
31.5 GHz	10 kHz		< 0.006	dB	
32 GHz	10 kHz		< 0.006	dB	
32.5 GHz	10 kHz		< 0.006	dB	
33 GHz	10 kHz		< 0.006	dB	
33.5 GHz	10 kHz		< 0.006	dB	
34 GHz	10 kHz		< 0.006	dB	
34.5 GHz	10 kHz		< 0.006	dB	
35 GHz	10 kHz		< 0.006	dB	
35.5 GHz	10 kHz		< 0.008	dB	
36 GHz	10 kHz		< 0.008	dB	
36.5 GHz	10 kHz		< 0.008	dB	
37 GHz	10 kHz		< 0.008	dB	
37.5 GHz	10 kHz		< 0.008	dB	
38 GHz	10 kHz		< 0.008	dB	
38.5 GHz	10 kHz		< 0.008	dB	
39 GHz	10 kHz		< 0.008	dB	
39.5 GHz	10 kHz		< 0.008	dB	
40 GHz	10 kHz		< 0.008	dB	

1.4.13 Table: Trace Noise Phase

ZNB 4/8					
Test sequence description see Chapter 1.3.12, "Checking the Trace Noise Phase", on page 25					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm					

RMS value of trace noise phase					
Frequency					
w/o ZNB-B1:					
9 kHz	1 kHz		< 0.07	deg	
20 kHz	1 kHz		< 0.035	deg	
50 kHz	1 kHz		< 0.035	deg	
w. and w/o ZNB-B1:					
100 kHz	10 kHz		< 0.035	deg	
200 kHz	10 kHz		< 0.035	deg	
500 kHz	10 kHz		< 0.035	deg	
1 MHz	10 kHz		< 0.035	deg	
2 MHz	10 kHz		< 0.035	deg	
5 MHz	10 kHz		< 0.035	deg	
10 MHz	10 kHz		< 0.035	deg	
20 MHz	10 kHz		< 0.035	deg	
50 MHz	10 kHz		< 0.035	deg	
100 MHz	10 kHz		< 0.035	deg	
500 MHz	10 kHz		< 0.035	deg	
1 GHz	10 kHz		< 0.035	deg	
1.5 GHz	10 kHz		< 0.035	deg	
2 GHz	10 kHz		< 0.035	deg	
2.5 GHz	10 kHz		< 0.035	deg	
3 GHz	10 kHz		< 0.035	deg	
3.5 GHz	10 kHz		< 0.035	deg	
4 GHz	10 kHz		< 0.035	deg	
4.5 GHz	10 kHz		< 0.035	deg	
only ZNB 8:					
5 GHz	10 kHz		< 0.035	deg	
5.5 GHz	10 kHz		< 0.035	deg	
6 GHz	10 kHz		< 0.035	deg	
6.5 GHz	10 kHz		< 0.035	deg	
7 GHz	10 kHz		< 0.035	deg	

7.5 GHz	10 kHz		< 0.035	deg	
8 GHz	10 kHz		< 0.035	deg	
8.5 GHz	10 kHz		< 0.035	deg	

ZNB 20					
Test sequence description see Chapter 1.3.12, "Checking the Trace Noise Phase", on page 25					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm					
RMS value of trace noise phase					
Frequency					
100 kHz	10 kHz		< 0.07	deg	
200 kHz	10 kHz		< 0.07	deg	
300 kHz	10 kHz		< 0.035	deg	
500 kHz	10 kHz		< 0.035	deg	
1 MHz	10 kHz		< 0.035	deg	
2 MHz	10 kHz		< 0.035	deg	
5 MHz	10 kHz		< 0.035	deg	
10 MHz	10 kHz		< 0.035	deg	
20 MHz	10 kHz		< 0.035	deg	
50 MHz	10 kHz		< 0.035	deg	
100 MHz	10 kHz		< 0.035	deg	
500 MHz	10 kHz		< 0.035	deg	
1 GHz	10 kHz		< 0.035	deg	
1.5 GHz	10 kHz		< 0.035	deg	
2 GHz	10 kHz		< 0.035	deg	
2.5 GHz	10 kHz		< 0.035	deg	
3 GHz	10 kHz		< 0.035	deg	
3.5 GHz	10 kHz		< 0.035	deg	
4 GHz	10 kHz		< 0.035	deg	
4.5 GHz	10 kHz		< 0.035	deg	
5 GHz	10 kHz		< 0.035	deg	

5.5 GHz	10 kHz		< 0.035	deg	
6 GHz	10 kHz		< 0.035	deg	
6.5 GHz	10 kHz		< 0.035	deg	
7 GHz	10 kHz		< 0.035	deg	
7.5 GHz	10 kHz		< 0.035	deg	
8 GHz	10 kHz		< 0.035	deg	
8.5 GHz	10 kHz		< 0.035	deg	
9 GHz	10 kHz		< 0.035	deg	
9.5 GHz	10 kHz		< 0.035	deg	
10 GHz	10 kHz		< 0.035	deg	
10.5 GHz	10 kHz		< 0.035	deg	
11 GHz	10 kHz		< 0.035	deg	
11.5 GHz	10 kHz		< 0.035	deg	
12 GHz	10 kHz		< 0.035	deg	
12.5 GHz	10 kHz		< 0.035	deg	
13 GHz	10 kHz		< 0.035	deg	
13.5 GHz	10 kHz		< 0.035	deg	
14 GHz	10 kHz		< 0.035	deg	
14.5 GHz	10 kHz		< 0.035	deg	
15 GHz	10 kHz		< 0.035	deg	
15.5 GHz	10 kHz		< 0.035	deg	
16 GHz	10 kHz		< 0.035	deg	
16.5 GHz	10 kHz		< 0.035	deg	
17 GHz	10 kHz		< 0.035	deg	
17.5 GHz	10 kHz		< 0.035	deg	
18 GHz	10 kHz		< 0.035	deg	
18.5 GHz	10 kHz		< 0.035	deg	
19 GHz	10 kHz		< 0.035	deg	
19.5 GHz	10 kHz		< 0.035	deg	
20 GHz	10 kHz		< 0.035	deg	

ZNB40 var72					
Test sequence description see Chapter 1.3.12, "Checking the Trace Noise Phase", on page 25					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**

Port __					
Source Power: 0 dBm					
RMS value of trace noise phase					
Frequency					
10 MHz	10 kHz		< 0.3	deg	
20 MHz	10 kHz		< 0.3	deg	
50 MHz	10 kHz		< 0.1	deg	
100 MHz	10 kHz		< 0.1	deg	
500 MHz	10 kHz		< 0.035	deg	
1 GHz	10 kHz		< 0.035	deg	
1.5 GHz	10 kHz		< 0.035	deg	
2 GHz	10 kHz		< 0.035	deg	
2.5 GHz	10 kHz		< 0.035	deg	
3 GHz	10 kHz		< 0.035	deg	
3.5 GHz	10 kHz		< 0.035	deg	
4 GHz	10 kHz		< 0.035	deg	
4.5 GHz	10 kHz		< 0.035	deg	
5 GHz	10 kHz		< 0.035	deg	
5.5 GHz	10 kHz		< 0.035	deg	
6 GHz	10 kHz		< 0.035	deg	
6.5 GHz	10 kHz		< 0.035	deg	
7 GHz	10 kHz		< 0.035	deg	
7.5 GHz	10 kHz		< 0.035	deg	
8 GHz	10 kHz		< 0.035	deg	
8.5 GHz	10 kHz		< 0.035	deg	
9 GHz	10 kHz		< 0.035	deg	
9.5 GHz	10 kHz		< 0.035	deg	
10 GHz	10 kHz		< 0.035	deg	
10.5 GHz	10 kHz		< 0.035	deg	
11 GHz	10 kHz		< 0.035	deg	
11.5 GHz	10 kHz		< 0.035	deg	
12 GHz	10 kHz		< 0.035	deg	
12.5 GHz	10 kHz		< 0.035	deg	

13 GHz	10 kHz		< 0.035	deg	
13.5 GHz	10 kHz		< 0.035	deg	
14 GHz	10 kHz		< 0.035	deg	
14.5 GHz	10 kHz		< 0.035	deg	
15 GHz	10 kHz		< 0.035	deg	
15.5 GHz	10 kHz		< 0.035	deg	
16 GHz	10 kHz		< 0.035	deg	
16.5 GHz	10 kHz		< 0.035	deg	
17 GHz	10 kHz		< 0.035	deg	
17.5 GHz	10 kHz		< 0.035	deg	
18 GHz	10 kHz		< 0.035	deg	
18.5 GHz	10 kHz		< 0.035	deg	
19 GHz	10 kHz		< 0.035	deg	
19.5 GHz	10 kHz		< 0.035	deg	
20 GHz	10 kHz		< 0.035	deg	
20.5 GHz	10 kHz		< 0.1	deg	
21 GHz	10 kHz		< 0.1	deg	
21.5 GHz	10 kHz		< 0.1	deg	
22 GHz	10 kHz		< 0.1	deg	
22.5 GHz	10 kHz		< 0.1	deg	
23 GHz	10 kHz		< 0.1	deg	
23.5 GHz	10 kHz		< 0.1	deg	
24 GHz	10 kHz		< 0.1	deg	
24.5 GHz	10 kHz		< 0.1	deg	
25 GHz	10 kHz		< 0.1	deg	
25.5 GHz	10 kHz		< 0.1	deg	
26 GHz	10 kHz		< 0.1	deg	
26.5 GHz	10 kHz		< 0.1	deg	
27 GHz	10 kHz		< 0.1	deg	
27.5 GHz	10 kHz		< 0.1	deg	
28 GHz	10 kHz		< 0.1	deg	
28.5 GHz	10 kHz		< 0.1	deg	
29 GHz	10 kHz		< 0.1	deg	
29.5 GHz	10 kHz		< 0.1	deg	

30 GHz	10 kHz		< 0.1	deg	
30.5 GHz	10 kHz		< 0.2	deg	
31 GHz	10 kHz		< 0.2	deg	
31.5 GHz	10 kHz		< 0.2	deg	
32 GHz	10 kHz		< 0.2	deg	
32.5 GHz	10 kHz		< 0.2	deg	
33 GHz	10 kHz		< 0.2	deg	
33.5 GHz	10 kHz		< 0.2	deg	
34 GHz	10 kHz		< 0.2	deg	
34.5 GHz	10 kHz		< 0.2	deg	
35 GHz	10 kHz		< 0.2	deg	
35.5 GHz	10 kHz		< 0.2	deg	
36 GHz	10 kHz		< 0.2	deg	
36.5 GHz	10 kHz		< 0.2	deg	
37 GHz	10 kHz		< 0.2	deg	
37.5 GHz	10 kHz		< 0.2	deg	
38 GHz	10 kHz		< 0.2	deg	
38.5 GHz	10 kHz		< 0.2	deg	
39 GHz	10 kHz		< 0.2	deg	
39.5 GHz	10 kHz		< 0.2	deg	
40 GHz	10 kHz		< 0.2	deg	

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.12, "Checking the Trace Noise Phase", on page 25					
Parameter	**IF Bandwidth**	**Actual value**	**Max. value Std. Deviation**	**Unit**	**Measurement tolerance**
Port __					
Source Power: 0 dBm Temperature range +18°C... +28°C					
RMS value of trace noise phase					
Frequency					
100 kHz	10 kHz		< 0.07	deg	

200 kHz	10 kHz		< 0.07	deg	
300 kHz	10 kHz		< 0.035	deg	
500 kHz	10 kHz		< 0.035	deg	
1 MHz	10 kHz		< 0.035	deg	
2 MHz	10 kHz		< 0.035	deg	
5 MHz	10 kHz		< 0.035	deg	
10 MHz	10 kHz		< 0.035	deg	
20 MHz	10 kHz		< 0.035	deg	
50 MHz	10 kHz		< 0.035	deg	
100 MHz	10 kHz		< 0.035	deg	
500 MHz	10 kHz		< 0.035	deg	
1 GHz	10 kHz		< 0.035	deg	
1.5 GHz	10 kHz		< 0.035	deg	
2 GHz	10 kHz		< 0.035	deg	
2.5 GHz	10 kHz		< 0.035	deg	
3 GHz	10 kHz		< 0.035	deg	
3.5 GHz	10 kHz		< 0.035	deg	
4 GHz	10 kHz		< 0.035	deg	
4.5 GHz	10 kHz		< 0.035	deg	
5 GHz	10 kHz		< 0.035	deg	
5.5 GHz	10 kHz		< 0.035	deg	
6 GHz	10 kHz		< 0.035	deg	
6.5 GHz	10 kHz		< 0.035	deg	
7 GHz	10 kHz		< 0.035	deg	
7.5 GHz	10 kHz		< 0.035	deg	
8 GHz	10 kHz		< 0.035	deg	
8.5 GHz	10 kHz		< 0.035	deg	
9 GHz	10 kHz		< 0.035	deg	
9.5 GHz	10 kHz		< 0.035	deg	
10 GHz	10 kHz		< 0.035	deg	
10.5 GHz	10 kHz		< 0.035	deg	
11 GHz	10 kHz		< 0.035	deg	
11.5 GHz	10 kHz		< 0.035	deg	
12 GHz	10 kHz		< 0.035	deg	

12.5 GHz	10 kHz		< 0.035	deg	
13 GHz	10 kHz		< 0.035	deg	
13.5 GHz	10 kHz		< 0.035	deg	
14 GHz	10 kHz		< 0.035	deg	
14.5 GHz	10 kHz		< 0.035	deg	
15 GHz	10 kHz		< 0.035	deg	
15.5 GHz	10 kHz		< 0.035	deg	
16 GHz	10 kHz		< 0.035	deg	
16.5 GHz	10 kHz		< 0.035	deg	
17 GHz	10 kHz		< 0.035	deg	
17.5 GHz	10 kHz		< 0.035	deg	
18 GHz	10 kHz		< 0.035	deg	
18.5 GHz	10 kHz		< 0.035	deg	
19 GHz	10 kHz		< 0.035	deg	
19.5 GHz	10 kHz		< 0.035	deg	
20 GHz	10 kHz		< 0.035	deg	
20.5 GHz	10 kHz		< 0.05	deg	
21 GHz	10 kHz		< 0.05	deg	
21.5 GHz	10 kHz		< 0.05	deg	
22 GHz	10 kHz		< 0.05	deg	
22.5 GHz	10 kHz		< 0.05	deg	
23 GHz	10 kHz		< 0.05	deg	
23.5 GHz	10 kHz		< 0.05	deg	
24 GHz	10 kHz		< 0.05	deg	
24.5 GHz	10 kHz		< 0.05	deg	
25 GHz	10 kHz		< 0.05	deg	
25.5 GHz	10 kHz		< 0.05	deg	
26 GHz	10 kHz		< 0.05	deg	
26.5 GHz	10 kHz		< 0.05	deg	
27 GHz	10 kHz		< 0.05	deg	
27.5 GHz	10 kHz		< 0.05	deg	
28 GHz	10 kHz		< 0.05	deg	
28.5 GHz	10 kHz		< 0.05	deg	
29 GHz	10 kHz		< 0.05	deg	

29.5 GHz	10 kHz		< 0.05	deg	
30 GHz	10 kHz		< 0.05	deg	
30.5 GHz	10 kHz		< 0.05	deg	
31 GHz	10 kHz		< 0.05	deg	
31.5 GHz	10 kHz		< 0.05	deg	
32 GHz	10 kHz		< 0.05	deg	
32.5 GHz	10 kHz		< 0.05	deg	
33 GHz	10 kHz		< 0.05	deg	
33.5 GHz	10 kHz		< 0.05	deg	
34 GHz	10 kHz		< 0.05	deg	
34.5 GHz	10 kHz		< 0.05	deg	
35 GHz	10 kHz		< 0.05	deg	
35.5 GHz	10 kHz		< 0.08	deg	
36 GHz	10 kHz		< 0.08	deg	
36.5 GHz	10 kHz		< 0.08	deg	
37 GHz	10 kHz		< 0.08	deg	
37.5 GHz	10 kHz		< 0.08	deg	
38 GHz	10 kHz		< 0.08	deg	
38.5 GHz	10 kHz		< 0.08	deg	
39 GHz	10 kHz		< 0.08	deg	
39.5 GHz	10 kHz		< 0.08	deg	
40 GHz	10 kHz		< 0.08	deg	

1.4.14 Table: Dynamic Range

ZNB 4/8					
Test sequence description see Chapter 1.3.13, "Checking the Dynamic Range", on page 26					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					
Dynamic range					
Test frequency					
w/o ZNB-B1:					
9 kHz	w/o Opt. B52/B54: 100 w. Opt. B52/B54: 120			dB	

20 kHz	w/o Opt. B52/B54: 100 w. Opt. B52/B54: 120			dB	
50 kHz	w/o Opt. B52/B54: 100 w. Opt. B52/B54: 120			dB	
w. and w/o ZNB-B1:					
100 kHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
200 kHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
500 kHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
1 MHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
2 MHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
5 MHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
10 MHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
20 MHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 125			dB	
50 MHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
100 MHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
200 MHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
500 MHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
1 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
1.5 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
2 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
2.5 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	

3 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
3.5 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
4 GHz	w/o Opt. B52/B54: 130 w. Opt. B52/B54: 140			dB	
4.5 GHz	w/o Opt. B52/B54: 125 w. Opt. B52/B54: 140			dB	
only ZNB 8:					
5 GHz	w/o Opt. B52/B54: 125 w. Opt. B52/B54: 140			dB	
5.5 GHz	w/o Opt. B52/B54: 125 w. Opt. B52/B54: 140			dB	
6 GHz	w/o Opt. B52/B54: 125 w. Opt. B52/B54: 140			dB	
6.5 GHz	w/o Opt. B52/B54: 125 w. Opt. B52/B54: 140			dB	
7 GHz	w/o Opt. B52/B54: 125 w. Opt. B52/B54: 130			dB	
7.5 GHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 130			dB	
8 GHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 130			dB	
8.5 GHz	w/o Opt. B52/B54: 120 w. Opt. B52/B54: 130			dB	

ZNB 20					
Test sequence description see Chapter 1.3.13, "Checking the Dynamic Range", on page 26					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					
Dynamic range					
Test frequency					
100 kHz	100			dB	
200 kHz	100			dB	
500 kHz	100			dB	
1 MHz	110			dB	
2 MHz	110			dB	

5 MHz	110			dB	
10 MHz	115			dB	
20 MHz	115			dB	
50 MHz	115			dB	
100 MHz	125			dB	
200 MHz	125			dB	
500 MHz	125			dB	
1 GHz	125			dB	
1.5 GHz	125			dB	
2 GHz	125			dB	
2.5 GHz	125			dB	
3 GHz	125			dB	
3.5 GHz	125			dB	
4 GHz	125			dB	
4.5 GHz	125			dB	
5 GHz	125			dB	
5.5 GHz	125			dB	
6 GHz	125			dB	
6.5 GHz	120			dB	
7 GHz	120			dB	
7.5 GHz	120			dB	
8 GHz	120			dB	
8.5 GHz	120			dB	
9 GHz	120			dB	
10 GHz	120			dB	
11 GHz	120			dB	
12 GHz	120			dB	
13 GHz	120			dB	
14 GHz	120			dB	
15 GHz	120			dB	
16 GHz	120			dB	
17 GHz	120			dB	
18 GHz	120			dB	

19 GHz	120			dB	
20 GHz	120			dB	

ZNB40 var72					
Test sequence description see Chapter 1.3.13, "Checking the Dynamic Range", on page 26					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					
Dynamic range					
Test frequency					
10 MHz	90			dB	
20 MHz	90			dB	
50 MHz	115			dB	
100 MHz	120			dB	
200 MHz	120			dB	
500 MHz	125			dB	
1 GHz	125			dB	
1.5 GHz	125			dB	
2 GHz	125			dB	
2.5 GHz	125			dB	
3 GHz	125			dB	
3.5 GHz	125			dB	
4 GHz	125			dB	
4.5 GHz	125			dB	
5 GHz	125			dB	
5.5 GHz	125			dB	
6 GHz	125			dB	
6.5 GHz	125			dB	
7 GHz	125			dB	
7.5 GHz	125			dB	
8 GHz	125			dB	
8.5 GHz	125			dB	
9 GHz	125			dB	
10 GHz	125			dB	
11 GHz	125			dB	

12 GHz	125			dB	
13 GHz	125			dB	
14 GHz	125			dB	
15 GHz	125			dB	
16 GHz	125			dB	
17 GHz	125			dB	
18 GHz	125			dB	
19 GHz	125			dB	
20 GHz	125			dB	
21 GHz	115			dB	
22 GHz	115			dB	
23 GHz	115			dB	
24 GHz	115			dB	
25 GHz	115			dB	
26 GHz	115			dB	
27 GHz	115			dB	
28 GHz	115			dB	
29 GHz	115			dB	
30 GHz	115			dB	
31 GHz	110			dB	
32 GHz	110			dB	
33 GHz	110			dB	
34 GHz	110			dB	
35 GHz	110			dB	
36 GHz	110			dB	
37 GHz	110			dB	
38 GHz	110			dB	
39 GHz	110			dB	
40 GHz	110			dB	

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.13, "Checking the Dynamic Range", on page 26					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					

Dynamic range					
Test frequency					
100 kHz	105			dB	
200 kHz	105			dB	
500 kHz	105			dB	
1 MHz	110			dB	
2 MHz	110			dB	
5 MHz	110			dB	
10 MHz	120			dB	
20 MHz	120			dB	
50 MHz	120			dB	
100 MHz	120			dB	
200 MHz	120			dB	
500 MHz	120			dB	
1 GHz	120			dB	
1.5 GHz	120			dB	
2 GHz	120			dB	
2.5 GHz	120			dB	
3 GHz	120			dB	
3.5 GHz	120			dB	
4 GHz	120			dB	
4.5 GHz	120			dB	
5 GHz	115			dB	
5.5 GHz	115			dB	
6 GHz	115			dB	
6.5 GHz	115			dB	
7 GHz	115			dB	
7.5 GHz	115			dB	
8 GHz	115			dB	
8.5 GHz	115			dB	
9 GHz	115			dB	
9.5 GHz	115			dB	
10 GHz	110			dB	
11 GHz	110			dB	

12 GHz	110			dB	
13 GHz	110			dB	
14 GHz	110			dB	
15 GHz	110			dB	
16 GHz	110			dB	
17 GHz	110			dB	
18 GHz	110			dB	
19 GHz	110			dB	
20 GHz	110			dB	
21 GHz	110			dB	
22 GHz	110			dB	
23 GHz	110			dB	
24 GHz	110			dB	
25 GHz	110			dB	
26 GHz	110			dB	
27 GHz	110			dB	
28 GHz	110			dB	
29 GHz	110			dB	
30 GHz	105			dB	
31 GHz	105			dB	
32 GHz	105			dB	
33 GHz	105			dB	
34 GHz	105			dB	
35 GHz	100			dB	
36 GHz	100			dB	
37 GHz	100			dB	
38 GHz	95			dB	
39 GHz	95			dB	
40 GHz	95			dB	

Dynamic Range: The automatic test program measures at additional frequencies:
only ZNB 4/8: 100 MHz ... 4.5 GHz or 8.5 GHz, respectively, step size 50 MHz
only ZNB 20/40: 100 MHz ... 20 GHz or 40 GHz, respectively, step size 100 MHz

1.4.15 Table: Input Noise Level

ZNB 4/8					
Test sequence description see Chapter 1.3.14, "Checking the Input Noise Level", on page 27					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measure-ment tolerance**[a]
Port __					
Input noise level					
Test frequency					
w/o ZNB-B1:					
9 kHz			w/o Opt. B52/B54: – 115 w. Opt. B52/B54: – 125	dBm	
20 kHz			w/o Opt. B52/B54: – 115 w. Opt. B52/B54: – 125	dBm	
50 kHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
w. and w/o ZNB-B1:					
100 kHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
200 kHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
500 kHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
1 MHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
2 MHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
5 MHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
10 MHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
20 MHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
50 MHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
100 MHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	

200 MHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
500 MHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
1 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
1.5 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
2 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
2.5 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
3 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
3.5 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
4 GHz			w/o Opt. B52/B54: – 130 w. Opt. B52/B54: – 140	dBm	
4.5 GHz			w/o Opt. B52/B54: – 125 w. Opt. B52/B54: – 140	dBm	
only ZNB 8:					
5 GHz			w/o Opt. B52/B54: – 125 w. Opt. B52/B54: – 140	dBm	
5.5 GHz			w/o Opt. B52/B54: – 125 w. Opt. B52/B54: – 140	dBm	
6 GHz			w/o Opt. B52/B54: – 125 w. Opt. B52/B54: – 140	dBm	
6.5 GHz			w/o Opt. B52/B54: – 125 w. Opt. B52/B54: – 140	dBm	
7 GHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
7.5 GHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
8 GHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	
8.5 GHz			w/o Opt. B52/B54: – 120 w. Opt. B52/B54: – 130	dBm	

ZNB 20					
Test sequence description see Chapter 1.3.14, "Checking the Input Noise Level", on page 27					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					
Input noise level					
Test frequency					
100 kHz			– 105	dBm	
200 kHz			– 105	dBm	
300 kHz			– 110	dBm	
500 kHz			– 110	dBm	
1 MHz			– 115	dBm	
2 MHz			– 115	dBm	
5 MHz			– 115	dBm	
10 MHz			– 120	dBm	
20 MHz			– 120	dBm	
50 MHz			– 120	dBm	
100 MHz			– 125	dBm	
200 MHz			– 125	dBm	
500 MHz			– 125	dBm	
1 GHz			– 125	dBm	
1.5 GHz			– 125	dBm	
2 GHz			– 125	dBm	
2.5 GHz			– 125	dBm	
3 GHz			– 125	dBm	
3.5 GHz			– 125	dBm	
4 GHz			– 125	dBm	
4.5 GHz			– 125	dBm	
5 GHz			– 125	dBm	
5.5 GHz			– 125	dBm	
6 GHz			– 125	dBm	
6.5 GHz			– 125	dBm	
7 GHz			– 125	dBm	
7.5 GHz			– 125	dBm	

8 GHz			– 125	dBm	
8.5 GHz			– 125	dBm	
9 GHz			– 125	dBm	
10 GHz			– 125	dBm	
11 GHz			– 120	dBm	
12 GHz			– 120	dBm	
13 GHz			– 120	dBm	
14 GHz			– 120	dBm	
15 GHz			– 120	dBm	
16 GHz			– 120	dBm	
17 GHz			– 120	dBm	
18 GHz			– 120	dBm	
19 GHz			– 120	dBm	
20 GHz			– 120	dBm	

ZNB40 var72					
Test sequence description see Chapter 1.3.14, "Checking the Input Noise Level", on page 27					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					
Input noise level					
Test frequency					
10 MHz			– 100	dBm	
20 MHz			– 100	dBm	
50 MHz			– 110	dBm	
100 MHz			– 115	dBm	
200 MHz			– 115	dBm	
500 MHz			– 125	dBm	
1 GHz			– 125	dBm	
1.5 GHz			– 125	dBm	
2 GHz			– 125	dBm	
2.5 GHz			– 125	dBm	
3 GHz			– 125	dBm	
3.5 GHz			– 125	dBm	
4 GHz			– 125	dBm	

4.5 GHz			– 125	dBm	
5 GHz			– 125	dBm	
5.5 GHz			– 125	dBm	
6 GHz			– 125	dBm	
6.5 GHz			– 125	dBm	
7 GHz			– 125	dBm	
7.5 GHz			– 125	dBm	
8 GHz			– 125	dBm	
8.5 GHz			– 125	dBm	
9 GHz			– 125	dBm	
10 GHz			– 125	dBm	
11 GHz			– 125	dBm	
12 GHz			– 125	dBm	
13 GHz			– 125	dBm	
14 GHz			– 125	dBm	
15 GHz			– 125	dBm	
16 GHz			– 125	dBm	
17 GHz			– 125	dBm	
18 GHz			– 125	dBm	
19 GHz			– 125	dBm	
20 GHz			– 125	dBm	
21 GHz			– 115	dBm	
22 GHz			– 115	dBm	
23 GHz			– 115	dBm	
24 GHz			– 115	dBm	
25 GHz			– 115	dBm	
26 GHz			– 115	dBm	
27 GHz			– 115	dBm	
28 GHz			– 115	dBm	
29 GHz			– 115	dBm	
30 GHz			– 115	dBm	
31 GHz			– 115	dBm	
32 GHz			– 115	dBm	
33 GHz			– 115	dBm	

34 GHz			– 115	dBm	
35 GHz			– 115	dBm	
36 GHz			– 115	dBm	
37 GHz			– 115	dBm	
38 GHz			– 115	dBm	
39 GHz			– 115	dBm	
40 GHz			– 115	dBm	

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.14, "Checking the Input Noise Level", on page 27					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Port __					
Input noise level					
Test frequency					
100 kHz			– 110	dBm	
200 kHz			– 110	dBm	
300 kHz			– 115	dBm	
500 kHz			– 115	dBm	
1 MHz			– 120	dBm	
2 MHz			– 120	dBm	
5 MHz			– 120	dBm	
10 MHz			– 120	dBm	
20 MHz			– 120	dBm	
50 MHz			– 120	dBm	
100 MHz			– 120	dBm	
200 MHz			– 120	dBm	
500 MHz			– 120	dBm	
1 GHz			– 120	dBm	
1.5 GHz			– 120	dBm	
2 GHz			– 120	dBm	
2.5 GHz			– 120	dBm	
3 GHz			– 120	dBm	
3.5 GHz			– 120	dBm	
4 GHz			– 120	dBm	

4.5 GHz			– 120	dBm	
5 GHz			– 118	dBm	
5.5 GHz			– 118	dBm	
6 GHz			– 118	dBm	
6.5 GHz			– 118	dBm	
7 GHz			– 118	dBm	
7.5 GHz			– 118	dBm	
8 GHz			– 118	dBm	
8.5 GHz			– 118	dBm	
9 GHz			– 118	dBm	
10 GHz			– 118	dBm	
11 GHz			– 118	dBm	
12 GHz			– 118	dBm	
13 GHz			– 118	dBm	
14 GHz			– 118	dBm	
15 GHz			– 118	dBm	
16 GHz			– 118	dBm	
17 GHz			– 118	dBm	
18 GHz			– 118	dBm	
19 GHz			– 118	dBm	
20 GHz			– 115	dBm	
21 GHz			– 115	dBm	
22 GHz			– 115	dBm	
23 GHz			– 115	dBm	
24 GHz			– 115	dBm	
25 GHz			– 115	dBm	
26 GHz			– 115	dBm	
27 GHz			– 115	dBm	
28 GHz			– 115	dBm	
29 GHz			– 115	dBm	
30 GHz			– 115	dBm	
31 GHz			– 115	dBm	
32 GHz			– 115	dBm	
33 GHz			– 115	dBm	

34 GHz			– 115	dBm	
35 GHz			– 105	dBm	
36 GHz			– 105	dBm	
37 GHz			– 105	dBm	
38 GHz			– 105	dBm	
39 GHz			– 105	dBm	
40 GHz			– 105	dBm	

Input noise level: The automatic test program measures at additional frequencies:
only ZNB 4/8: 100 MHz ... 4.5 GHz or 8.5 GHz, respectively, step size 100 MHz
only ZNB 20/40: 100 MHz ... 20 GHz or 40 GHz, respectively, step size 100 MHz

1.4.16 Table: Uncorrected System Performance - Directivity

Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Uncorrected System Performance					
Directivity					
Frequency Range					

only ZNB 4/8, w/o ZNB-B1:					
9 kHz			< - 20	dB	0.12 dB
20 kHz			< - 20	dB	0.12 dB
50 kHz			< - 30	dB	0.12 dB

only ZNB 4/8, w. and w/o ZNB-B1, **ZNB 20:** **ZNB40 var82, var84:** ZNB40 temperature range +18°C... +28°C					
100 kHz			< - 30	dB	0.12 dB
200 kHz			< - 30	dB	0.12 dB
500 kHz			< - 30	dB	0.12 dB
1 MHz			< - 30	dB	0.12 dB
2 MHz			< - 30	dB	0.12 dB
5 MHz			< - 30	dB	0.12 dB
ZNB 4/8/20/40:					
10 MHz			< - 30	dB	0.12 dB
20 MHz			< - 30	dB	0.12 dB
50 MHz			< - 30	dB	0.12 dB
100 MHz			< - 30	dB	0.12 dB
200 MHz			< - 30	dB	0.12 dB
500 MHz			< - 30	dB	0.12 dB
1 GHz			< - 30	dB	0.12 dB
1.5 GHz			< - 30	dB	0.12 dB
2 GHz			< - 30	dB	0.12 dB
2.5 GHz			< - 30	dB	0.12 dB
3 GHz			< - 30	dB	0.12 dB
3.5 GHz			< - 30	dB	0.12 dB
4 GHz			< - 30	dB	0.12 dB
4.5 GHz			< - 30	dB	0.12 dB
only ZNB 8/20/40:					
5 GHz			< - 30	dB	0.12 dB
5.5 GHz			< - 30	dB	0.12 dB
6 GHz			< - 30	dB	0.12 dB
6.5 GHz			< - 30	dB	0.12 dB
7 GHz			< - 30	dB	0.12 dB

7.5 GHz			< - 30	dB	0.12 dB
8 GHz			< - 30	dB	0.12 dB
8.5 GHz			< - 30	dB	0.12 dB

only ZNB 20/40:					
9 GHz			< - 30	dB	0.12 dB
10 GHz			< - 30	dB	0.12 dB
11 GHz			< - 25	dB	0.12 dB
12 GHz			< - 25	dB	0.12 dB
13 GHz			< - 25	dB	0.12 dB
14 GHz			< - 25	dB	0.12 dB
15 GHz			< - 25	dB	0.12 dB
16 GHz			< - 25	dB	0.12 dB
17 GHz			< - 25	dB	0.12 dB
18 GHz			< - 25	dB	0.12 dB
19 GHz			< - 25	dB	0.12 dB
20 GHz			< - 25	dB	0.12 dB

only ZNB 40:					
21 GHz			< - 20	dB	0.12 dB
22 GHz			< - 20	dB	0.12 dB
23 GHz			< - 20	dB	0.12 dB
24 GHz			< - 20	dB	0.12 dB
25 GHz			< - 20	dB	0.12 dB
26 GHz			< - 20	dB	0.12 dB
27 GHz			< - 20	dB	0.12 dB
28 GHz			< - 20	dB	0.12 dB
29 GHz			< - 20	dB	0.12 dB
30 GHz			< - 20	dB	0.12 dB
31 GHz			< - 20	dB	0.12 dB
32 GHz			< - 20	dB	0.12 dB
33 GHz			< - 20	dB	0.12 dB
34 GHz			< - 20	dB	0.12 dB
35 GHz			< - 20	dB	0.12 dB

36 GHz			< - 15	dB	0.12 dB
37 GHz			< - 15	dB	0.12 dB
38 GHz			< - 15	dB	0.12 dB
39 GHz			< - 15	dB	0.12 dB
40 GHz			< - 15	dB	0.12 dB

Directivity: The automatic test program measures at additional frequencies: All that are stated in section Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28.

100 MHz ... 4.5 GHz or 8.5 GHz or 20 GHz or 40 GHz, respectively, step size 50 MHz

only ZNB40 var82, var84: Uncorrected System Performance - Directivity: "Typ 2" approval measurements: Full temperature range (+5°C ... +40°C) tolerance <-25 dB < 1 MHz;

1.4.17 Table: Uncorrected System Performance - Source Match

Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28

Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __					
Uncorrected System Performance					
Source Match					
Frequency Range					
only ZNB4/8, w/o ZNB-B1:					
9 kHz			< - 20	dB	0.1 dB
20 kHz			< - 20	dB	0.1 dB
50 kHz			< - 30	dB	0.1 dB
only ZNB 4/8, w. and w/o ZNB-B1, **ZNB20:** **ZNB40 var82, var84:**					
100 kHz			< - 30	dB	0.1 dB

200 kHz			< - 30	dB	0.1 dB
500 kHz			< - 30	dB	0.1 dB
1 MHz			< - 30	dB	0.1 dB
2 MHz			< - 30	dB	0.1 dB
5 MHz			< - 30	dB	0.1 dB
ZNB 4/8/20/40:					
10 MHz			< - 30	dB	0.1 dB
20 MHz			< - 30	dB	0.1 dB
50 MHz			< - 30	dB	0.1 dB
100 MHz			< - 30	dB	0.1 dB
200 MHz			< - 30	dB	0.1 dB
500 MHz			< - 30	dB	0.1 dB
1 GHz			< - 30	dB	0.1 dB
1.5 GHz			< - 30	dB	0.1 dB
2 GHz			< - 30	dB	0.1 dB
2.5 GHz			< - 30	dB	0.1 dB
3 GHz			< - 30	dB	0.1 dB

3.5 GHz			< - 30	dB	0.1 dB
4 GHz			< - 30	dB	0.1 dB
4.5 GHz			< - 30	dB	0.1 dB
only ZNB 8/20/40:					
5 GHz			< - 30	dB	0.1 dB
5.5 GHz			< - 30	dB	0.1 dB
6 GHz			< - 30	dB	0.1 dB
6.5 GHz			< - 30	dB	0.1 dB
7 GHz			< - 30	dB	0.1 dB
7.5 GHz			< - 30	dB	0.1 dB
8 GHz			< - 30	dB	0.1 dB
8.5 GHz			< - 30	dB	0.1 dB

only ZNB 20/40:					
9 GHz			< - 30	dB	0.1 dB

10 GHz			< - 30	dB	0.1 dB
11 GHz			< - 25	dB	0.1 dB
12 GHz			< - 25	dB	0.1 dB
13 GHz			< - 25	dB	0.1 dB
14 GHz			< - 25	dB	0.1 dB
15 GHz			< - 25	dB	0.1 dB
16 GHz			< - 25	dB	0.1 dB
17 GHz			< - 25	dB	0.1 dB
18 GHz			< - 25	dB	0.1 dB
19 GHz			< - 25	dB	0.1 dB
20 GHz			< - 25	dB	0.1 dB

only ZNB 40:					
21 GHz			< - 20	dB	0.1 dB
22 GHz			< - 20	dB	0.1 dB
23 GHz			< - 20	dB	0.1 dB
24 GHz			< - 20	dB	0.1 dB
25 GHz			< - 20	dB	0.1 dB
26 GHz			< - 20	dB	0.1 dB
27 GHz			< - 20	dB	0.1 dB
28 GHz			< - 20	dB	0.1 dB
29 GHz			< - 20	dB	0.1 dB
30 GHz			< - 20	dB	0.1 dB
31 GHz			< - 20	dB	0.1 dB
32 GHz			< - 20	dB	0.1 dB
33 GHz			< - 20	dB	0.1 dB
34 GHz			< - 20	dB	0.1 dB
35 GHz			< - 20	dB	0.1 dB
36 GHz			< - 15	dB	0.1 dB
37 GHz			< - 15	dB	0.1 dB
38 GHz			< - 15	dB	0.1 dB
39 GHz			< - 15	dB	0.1 dB
40 GHz			< - 15	dB	0.1 dB

Source Match: The automatic test program measures at additional frequencies: All that are stated in section Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28.

100 MHz ... 4.5 GHz or 8.5 GHz or 20 GHz or 40 GHz, respectively, step size 50 MHz

1.4.18 Table: Uncorrected System Performance - Load Match

ZNB 4/8					
Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Uncorrected System Performance					
Load Match					
Frequency Range					
w/o ZNB-B1:					
9 kHz			< - 10	dB	0.1 dB
20 kHz			< - 10	dB	0.1 dB
50 kHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
100 kHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
200 kHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
with ZNB-B1:					
100 kHz			< - 10	dB	0.1 dB
200 kHz			< - 10	dB	0.1 dB
with and w/o ZNB-B1:					
500 kHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
1 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
2 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB

5 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
10 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
20 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
50 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
100 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
200 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
500 MHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
1 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
1.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
2 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
2.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
3 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
3.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
4 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
4.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
only ZNB 8:					0.1 dB
5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
5.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
6 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
6.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB

7 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
7.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
8 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB
8.5 GHz			w/o Opt. B52/B54: < - 20 w. Opt. B52/B54: < - 18	dB	0.1 dB

ZNB 20					
Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measure-ment tolerance**
Port __					
Uncorrected Sys-tem Performance					
Load Match					
Frequency Range					
100 kHz			< - 16	dB	0.1 dB
200 kHz			< - 16	dB	0.1 dB
500 kHz			< - 16	dB	0.1 dB
1 MHz			< - 16	dB	0.1 dB
2 MHz			< - 16	dB	0.1 dB
5 MHz			< - 16	dB	0.1 dB
10 MHz			< - 16	dB	0.1 dB
20 MHz			< - 20	dB	0.1 dB
50 MHz			< - 20	dB	0.1 dB
100 MHz			< - 20	dB	0.1 dB
200 MHz			< - 20	dB	0.1 dB
500 MHz			< - 20	dB	0.1 dB
1 GHz			< - 20	dB	0.1 dB
1.5 GHz			< - 20	dB	0.1 dB
2 GHz			< - 20	dB	0.1 dB
2.5 GHz			< - 16	dB	0.1 dB
3 GHz			< - 16	dB	0.1 dB

3.5 GHz			< - 16	dB	0.1 dB
4 GHz			< - 16	dB	0.1 dB
4.5 GHz			< - 16	dB	0.1 dB
5 GHz			< - 16	dB	0.1 dB
5.5 GHz			< - 16	dB	0.1 dB
6 GHz			< - 16	dB	0.1 dB
6.5 GHz			< - 16	dB	0.1 dB
7 GHz			< - 16	dB	0.1 dB
7.5 GHz			< - 16	dB	0.1 dB
8 GHz			< - 16	dB	0.1 dB
8.5 GHz			< - 16	dB	0.1 dB
9 GHz			< - 16	dB	0.1 dB
10 GHz			< - 16	dB	0.1 dB
11 GHz			< - 16	dB	0.1 dB
12 GHz			< - 16	dB	0.1 dB
13 GHz			< - 16	dB	0.1 dB
14 GHz			< - 16	dB	0.1 dB
15 GHz			< - 16	dB	0.1 dB
16 GHz			< - 16	dB	0.1 dB
17 GHz			< - 16	dB	0.1 dB
18 GHz			< - 16	dB	0.1 dB
19 GHz			< - 16	dB	0.1 dB
20 GHz			< - 16	dB	0.1 dB

ZNB40 var72

Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28

Parameter	Min. value	Actual value	Max. value	Unit	Measure-ment tolerance
Port __					
Uncorrected Sys-tem Performance					
Load Match					
Frequency Range					
10 MHz			< - 15	dB	0.1 dB

20 MHz			< - 15	dB	0.1 dB
50 MHz			< - 15	dB	0.1 dB
100 MHz			< - 20	dB	0.1 dB
200 MHz			< - 20	dB	0.1 dB
500 MHz			< - 20	dB	0.1 dB
1 GHz			< - 20	dB	0.1 dB
1.5 GHz			< - 20	dB	0.1 dB
2 GHz			< - 20	dB	0.1 dB
2.5 GHz			< - 16	dB	0.1 dB
3 GHz			< - 16	dB	0.1 dB
3.5 GHz			< - 16	dB	0.1 dB
4 GHz			< - 16	dB	0.1 dB
4.5 GHz			< - 16	dB	0.1 dB
5 GHz			< - 16	dB	0.1 dB
5.5 GHz			< - 16	dB	0.1 dB
6 GHz			< - 16	dB	0.1 dB
6.5 GHz			< - 12	dB	0.1 dB
7 GHz			< - 12	dB	0.1 dB
7.5 GHz			< - 12	dB	0.1 dB
8 GHz			< - 12	dB	0.1 dB
8.5 GHz			< - 12	dB	0.1 dB
9 GHz			< - 12	dB	0.1 dB
10 GHz			< - 12	dB	0.1 dB
11 GHz			< - 10	dB	0.1 dB
12 GHz			< - 10	dB	0.1 dB
13 GHz			< - 10	dB	0.1 dB
14 GHz			< - 10	dB	0.1 dB
15 GHz			< - 10	dB	0.1 dB
16 GHz			< - 10	dB	0.1 dB
17 GHz			< - 10	dB	0.1 dB
18 GHz			< - 10	dB	0.1 dB
19 GHz			< - 10	dB	0.1 dB
20 GHz			< - 10	dB	0.1 dB
21 GHz			< - 8	dB	0.1 dB

22 GHz			< - 8	dB	0.1 dB
23 GHz			< - 8	dB	0.1 dB
24 GHz			< - 8	dB	0.1 dB
25 GHz			< - 8	dB	0.1 dB
26 GHz			< - 8	dB	0.1 dB
27 GHz			< - 8	dB	0.1 dB
28 GHz			< - 8	dB	0.1 dB
29 GHz			< - 8	dB	0.1 dB
30 GHz			< - 8	dB	0.1 dB
31 GHz			< - 8	dB	0.1 dB
32 GHz			< - 8	dB	0.1 dB
33 GHz			< - 8	dB	0.1 dB
34 GHz			< - 8	dB	0.1 dB
35 GHz			< - 8	dB	0.1 dB
36 GHz			< - 8	dB	0.1 dB
37 GHz			< - 8	dB	0.1 dB
38 GHz			< - 8	dB	0.1 dB
39 GHz			< - 8	dB	0.1 dB
40 GHz			< - 8	dB	0.1 dB

ZNB40 var82, var84					
Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measure-ment tolerance**
Port __					
Uncorrected Sys-tem Performance					
Load Match Temperature range +18°C... +28°C					
Frequency Range					
100 kHz			< - 12	dB	0.1 dB
200 kHz			< - 12	dB	0.1 dB
300 kHz			< - 15	dB	0.1 dB
500 kHz			< - 15	dB	0.1 dB

1 MHz			< - 15	dB	0.1 dB
2 MHz			< - 15	dB	0.1 dB
5 MHz			< - 15	dB	0.1 dB
10 MHz			< - 18	dB	0.1 dB
20 MHz			< - 18	dB	0.1 dB
50 MHz			< - 18	dB	0.1 dB
100 MHz			< - 18	dB	0.1 dB
200 MHz			< - 18	dB	0.1 dB
500 MHz			< - 18	dB	0.1 dB
1 GHz			< - 18	dB	0.1 dB
1.5 GHz			< - 18	dB	0.1 dB
2 GHz			< - 18	dB	0.1 dB
2.5 GHz			< - 18	dB	0.1 dB
3 GHz			< - 18	dB	0.1 dB
3.5 GHz			< - 18	dB	0.1 dB
4 GHz			< - 18	dB	0.1 dB
4.5 GHz			< - 18	dB	0.1 dB
5 GHz			< - 18	dB	0.1 dB
5.5 GHz			< - 18	dB	0.1 dB
6 GHz			< - 18	dB	0.1 dB
6.5 GHz			< - 18	dB	0.1 dB
7 GHz			< - 18	dB	0.1 dB
7.5 GHz			< - 18	dB	0.1 dB
8 GHz			< - 18	dB	0.1 dB
8.5 GHz			< - 18	dB	0.1 dB
9 GHz			< - 18	dB	0.1 dB
10 GHz			< - 18	dB	0.1 dB
11 GHz			< - 18	dB	0.1 dB
12 GHz			< - 18	dB	0.1 dB
13 GHz			< - 18	dB	0.1 dB
14 GHz			< - 18	dB	0.1 dB
15 GHz			< - 18	dB	0.1 dB
16 GHz			< - 18	dB	0.1 dB
17 GHz			< - 18	dB	0.1 dB

18 GHz			< - 18	dB	0.1 dB
19 GHz			< - 18	dB	0.1 dB
20 GHz			< - 15	dB	0.1 dB
21 GHz			< - 15	dB	0.1 dB
22 GHz			< - 15	dB	0.1 dB
23 GHz			< - 15	dB	0.1 dB
24 GHz			< - 15	dB	0.1 dB
25 GHz			< - 15	dB	0.1 dB
26 GHz			< - 15	dB	0.1 dB
27 GHz			< - 15	dB	0.1 dB
28 GHz			< - 15	dB	0.1 dB
29 GHz			< - 15	dB	0.1 dB
30 GHz			< - 15	dB	0.1 dB
31 GHz			< - 15	dB	0.1 dB
32 GHz			< - 15	dB	0.1 dB
33 GHz			< - 15	dB	0.1 dB
34 GHz			< - 15	dB	0.1 dB
35 GHz			< - 15	dB	0.1 dB
36 GHz			< - 15	dB	0.1 dB
37 GHz			< - 15	dB	0.1 dB
38 GHz			< - 15	dB	0.1 dB
39 GHz			< - 15	dB	0.1 dB
40 GHz			< - 15	dB	0.1 dB

Load Match: The automatic test program measures at additional frequencies: All that are stated in section Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28.

100 MHz ... 4.5 GHz or 8.5 GHz or 20 GHz or 40 GHz, respectively, step size 50 MHz

only ZNB40 var82, var84: Uncorrected System Performance - Load Matchr: "Typ 2" approval measurements: Full temperature range (+5°C ... +40°C) tolerance: <-12 dB < 300 kHz; <-15 dB < 1 GHz;

1.4.19 Table: Uncorrected System Performance - Reflection Tracking

Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Uncorrected System Performance					
Reflection Tracking					
Frequency Range					
only ZNB 4/8, w/o ZNB-B1:					
9 kHz	-0.5		+0.5	dB	0.001 dB
20 kHz	-0.5		+0.5	dB	0.001 dB
50 kHz	-0.5		+0.5	dB	0.001 dB
only ZNB 4/8, w. and w/o ZNB-B1, ZNB20 ZNB40 var82, var84					
100 kHz	-0.5		+0.5	dB	0.001 dB
200 kHz	-0.5		+0.5	dB	0.001 dB
500 kHz	-0.5		+0.5	dB	0.001 dB
1 MHz	-0.5		+0.5	dB	0.001 dB
2 MHz	-0.5		+0.5	dB	0.001 dB
5 MHz	-0.5		+0.5	dB	0.001 dB
ZNB 4/8/20/40:					
10 MHz	-0.5		+0.5	dB	0.001 dB
20 MHz	-0.5		+0.5	dB	0.001 dB
50 MHz	-0.5		+0.5	dB	0.001 dB
100 MHz	-0.5		+0.5	dB	0.001 dB
200 MHz	-0.5		+0.5	dB	0.001 dB
500 MHz	-0.5		+0.5	dB	0.001 dB

1 GHz	-0.5		+0.5	dB	0.001 dB
1.5 GHz	-0.5		+0.5	dB	0.001 dB
2 GHz	-0.5		+0.5	dB	0.001 dB
2.5 GHz	-0.5		+0.5	dB	0.001 dB
3 GHz	-0.5		+0.5	dB	0.001 dB

3.5 GHz	-0.5		+0.5	dB	0.001 dB
4 GHz	-0.5		+0.5	dB	0.001 dB
4.5 GHz	-0.5		+0.5	dB	0.001 dB
only ZNB 8/20/40:					
5 GHz	-0.5		+0.5	dB	0.001 dB
5.5 GHz	-0.5		+0.5	dB	0.001 dB
6 GHz	-0.5		+0.5	dB	0.001 dB
6.5 GHz	-0.5		+0.5	dB	0.001 dB
7 GHz	-0.5		+0.5	dB	0.001 dB
7.5 GHz	-0.5		+0.5	dB	0.001 dB
8 GHz	-0.5		+0.5	dB	0.001 dB
8.5 GHz	-0.5		+0.5	dB	0.001 dB

only ZNB 20/40:					
9 GHz	-0.5		+0.5	dB	0.001 dB
10 GHz	-0.5		+0.5	dB	0.001 dB
11 GHz	-0.5		+0.5	dB	0.001 dB
12 GHz	-0.5		+0.5	dB	0.001 dB
13 GHz	-0.5		+0.5	dB	0.001 dB
14 GHz	-0.5		+0.5	dB	0.001 dB
15 GHz	-0.5		+0.5	dB	0.001 dB
16 GHz	-0.5		+0.5	dB	0.001 dB
17 GHz	-0.5		+0.5	dB	0.001 dB
18 GHz	-0.5		+0.5	dB	0.001 dB
19 GHz	-0.5		+0.5	dB	0.001 dB
20 GHz	-0.5		+0.5	dB	0.001 dB

only ZNB 40:					
21 GHz	-0.5		+0.5	dB	0.001 dB
22 GHz	-0.5		+0.5	dB	0.001 dB
23 GHz	-0.5		+0.5	dB	0.001 dB
24 GHz	-0.5		+0.5	dB	0.001 dB
25 GHz	-0.5		+0.5	dB	0.001 dB
26 GHz	-0.5		+0.5	dB	0.001 dB
27 GHz	-0.5		+0.5	dB	0.001 dB
28 GHz	-0.5		+0.5	dB	0.001 dB
29 GHz	-0.5		+0.5	dB	0.001 dB
30 GHz	-0.5		+0.5	dB	0.001 dB
31 GHz	-0.5		+0.5	dB	0.001 dB
32 GHz	-0.5		+0.5	dB	0.001 dB
33 GHz	-0.5		+0.5	dB	0.001 dB
34 GHz	-0.5		+0.5	dB	0.001 dB
35 GHz	-0.5		+0.5	dB	0.001 dB
36 GHz	-0.5		+0.5	dB	0.001 dB
37 GHz	-0.5		+0.5	dB	0.001 dB
38 GHz	-0.5		+0.5	dB	0.001 dB
39 GHz	-0.5		+0.5	dB	0.001 dB
40 GHz	-0.5		+0.5	dB	0.001 dB

Reflection Tracking: The automatic test program measures at additional frequencies: All that are stated in section Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28.

100 MHz ... 4.5 GHz or 8.5 GHz or 20 GHz or 40 GHz, respectively, step size 50 MHz

1.4.20 Table: Uncorrected System Performance - Transmission Tracking

Test sequence description see Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Port __					
Uncorrected System Performance					

Transmission Tracking					
Frequency Range					

only ZNB 4/8, w/o ZNB-B1:					
9 kHz	-0.5		+0.5	dB	0.0011 dB
20 kHz	-0.5		+0.5	dB	0.0011 dB
50 kHz	-0.5		+0.5	dB	0.0011 dB

only ZNB 4/8, w. and w/o ZNB-B1, **ZNB20** **ZNB40 var82, var84**					
100 kHz	-0.5		+0.5	dB	0.0011 dB
200 kHz	-0.5		+0.5	dB	0.0011 dB
500 kHz	-0.5		+0.5	dB	0.0011 dB
1 MHz	-0.5		+0.5	dB	0.0011 dB
2 MHz	-0.5		+0.5	dB	0.0011 dB
5 MHz	-0.5		+0.5	dB	0.0011 dB
ZNB 4/8/20/40:					
10 MHz	-0.5		+0.5	dB	0.0011 dB
20 MHz	-0.5		+0.5	dB	0.0011 dB
50 MHz	-0.5		+0.5	dB	0.0011 dB
100 MHz	-0.5		+0.5	dB	0.0011 dB
200 MHz	-0.5		+0.5	dB	0.0011 dB
500 MHz	-0.5		+0.5	dB	0.0011 dB
1 GHz	-0.5		+0.5	dB	0.0011 dB
1.5 GHz	-0.5		+0.5	dB	0.0011 dB
2 GHz	-0.5		+0.5	dB	0.0011 dB
2.5 GHz	-0.5		+0.5	dB	0.0011 dB
3 GHz	-0.5		+0.5	dB	0.0011 dB

3.5 GHz	-0.5		+0.5	dB	0.0011 dB
4 GHz	-0.5		+0.5	dB	0.0011 dB

4.5 GHz	-0.5		+0.5	dB	0.0011 dB
only ZNB 8/20/40:					
5 GHz	-0.5		+0.5	dB	0.0011 dB
5.5 GHz	-0.5		+0.5	dB	0.0011 dB
6 GHz	-0.5		+0.5	dB	0.0011 dB
6.5 GHz	-0.5		+0.5	dB	0.0011 dB
7 GHz	-0.5		+0.5	dB	0.0011 dB
7.5 GHz	-0.5		+0.5	dB	0.0011 dB
8 GHz	-0.5		+0.5	dB	0.0011 dB
8.5 GHz	-0.5		+0.5	dB	0.0011 dB

only ZNB 20/40:					
9 GHz	-0.5		+0.5	dB	0.0011 dB
10 GHz	-0.5		+0.5	dB	0.0011 dB
11 GHz	-0.5		+0.5	dB	0.0011 dB
12 GHz	-0.5		+0.5	dB	0.0011 dB
13 GHz	-0.5		+0.5	dB	0.0011 dB
14 GHz	-0.5		+0.5	dB	0.0011 dB
15 GHz	-0.5		+0.5	dB	0.0011 dB
16 GHz	-0.5		+0.5	dB	0.0011 dB
17 GHz	-0.5		+0.5	dB	0.0011 dB
18 GHz	-0.5		+0.5	dB	0.0011 dB
19 GHz	-0.5		+0.5	dB	0.0011 dB
20 GHz	-0.5		+0.5	dB	0.0011 dB

only ZNB 40:					
21 GHz	-0.5		+0.5	dB	0.0011 dB
22 GHz	-0.5		+0.5	dB	0.0011 dB
23 GHz	-0.5		+0.5	dB	0.0011 dB
24 GHz	-0.5		+0.5	dB	0.0011 dB
25 GHz	-0.5		+0.5	dB	0.0011 dB
26 GHz	-0.5		+0.5	dB	0.0011 dB
27 GHz	-0.5		+0.5	dB	0.0011 dB

28 GHz	-0.5		+0.5	dB	0.0011 dB
29 GHz	-0.5		+0.5	dB	0.0011 dB
30 GHz	-0.5		+0.5	dB	0.0011 dB
31 GHz	-0.5		+0.5	dB	0.0011 dB
32 GHz	-0.5		+0.5	dB	0.0011 dB
33 GHz	-0.5		+0.5	dB	0.0011 dB
34 GHz	-0.5		+0.5	dB	0.0011 dB
35 GHz	-0.5		+0.5	dB	0.0011 dB
36 GHz	-0.5		+0.5	dB	0.0011 dB
37 GHz	-0.5		+0.5	dB	0.0011 dB
38 GHz	-0.5		+0.5	dB	0.0011 dB
39 GHz	-0.5		+0.5	dB	0.0011 dB
40 GHz	-0.5		+0.5	dB	0.0011 dB

Transmission Tracking: The automatic test program measures at additional frequencies: All that are stated in section Chapter 1.3.15, "Checking the Uncorrected System Performance", on page 28.

100 MHz ... 4.5 GHz or 8.5 GHz or 20 GHz or 40 GHz, respectively, step size 50 MHz

1.4.21 Table: USB Controller Connectors

Test sequence description see Chapter 1.3.16, "Checking the USB Controller Connectors", on page 29	
USB Type A Connector	**Pass / Fail**
Front panel left	
Front panel right	
Rear panel upper	
Rear panel lower	

1.4.22 Table: Display Port (ZNB40 var82, var84 only)

Test sequence description see Chapter 1.3.17, "Checking the Display Port (ZNB40 var82, var84 only)", on page 30	
Connector	**Pass / Fail**
Display Port	

1.4.23 Table: Reference Output Level

Test sequence description see Chapter 1.3.18, "Checking the Reference Output Level", on page 30					
Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Reference frequency output level	+ 5 dBm		+ 13 dBm	dBm	0.3 dB

1.4.24 Table: Ext Trigger Input (Rear Panel BNC)

Test sequence description see Chapter 1.3.19, "Checking the EXT TRIGGER Input", on page 31					
Parameter	Min. value	Actual value	Max. value	Unit	Measure-ment tolerance
Test of input EXT TRG					pass / fail

1.4.25 Table: User Control

Test sequence description see Chapter 1.3.20, "Checking the User Control Port", on page 31					
Parameter	Min. value	Actual value	Max. value	Unit	Measure-ment tolerance
Test of input EXT TRG (pin 2)					pass / fail
Test of output BUSY (pin 4)					pass / fail
Test of output READY FOR TRIGGER (pin 6)					pass / fail
Test of outputs CHANNEL BIT I (pin 8 ... 11)					pass / fail
Test of outputs PASS I (pin 13, 14)					pass / fail
Test of outputs DRIVE PORT I (pin 16 ... 19)					pass / fail

1.4.26 Table: R&S ZNB-B81 DC Inputs

Test sequence description see Chapter 1.3.21, "Checking the optional DC Inputs", on page 35					
Parameter	**Min. value**	**Deviation**	**Max. value**	**Unit**	**Measurement tolerance**
DC __					

Temperature range +18°C... +28°C **Accuracy** **ResBw: 10 kHz**					
Range DC ±20 V					
10 V	-105		105	mV	0.1%
Offset at 0 V	-5		5	mV	
- 10 V	-105		105	mV	0.1%
Range DC ±3 V					
3 V	-40		40	mV	0.1%
Offset at 0 V	-1		1	mV	
- 3 V	-40		40	mV	0.1 %
Range DC ±300mV					
300 mV	-4		4	mV	0.1 %
Offset at 0 V	-1		1	mV	
- 300 mV	- 4		4	mV	0.1 %

1.4.27 Table: ZNB-B1 BIAS

Test sequence description see Chapter 1.3.13, "Checking the Dynamic Range", on page 26					
Parameter	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**[a]
Resistance					
Port 1	9.9		10.1	V	
Port 2	9.9		10.1	V	
Port 3	9.9		10.1	V	
Port 4	9.9		10.1	V	

1.4.28 Table: Receiver Step Attenuator

ZNB 4/8
Test sequence description see Chapter 1.3.23, " Checking the Receiver Step Attenuators", on page 37

Parameter	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __					
Receiver Step Attenuator					
Receiver Step Attenuator = 10dB					
Frequency Range					
100 MHz	-1		+1	dB	0.2 dB
Receiver Step Attenuator = 20dB					
Frequency Range					
100 MHz	-1		+1	dB	0.2 dB
Receiver Step Attenuator = 30dB					
Frequency Range					
100 MHz	-1		+1	dB	0.2 dB

2 Adjustment

The following manual alignments or corrections can be performed on the R&S ZNB:

1. Alignment of the 10-MHz reference oscillator which determines the frequency accuracy of the R&S ZNB
2. Alignment of the DC inputs
3. Alignment of the touch display
4. Recording the correction values for the generators and the receivers which determine the measurement accuracy of the R&S ZNB's absolute values

The alignments must be performed within an ambient temperature range of +22 °C to +24 °C after the appropriate warm-up time.

NOTICE

The steps described in the following shall be performed only by appropriately skilled personnel since any changes made have a profound effect on the measurement accuracy of the instrument.

2.1 Installing the ZNBC Service Tool

Correction data is recorded by means of the ZNBC service tool. An installer for this software can be downloaded from R&S Extranet (GLORIS): Support and Services: Firm-/Software: Software- by type. Search for ZNBC. Download the latest version of the installer. Along with the service tool, an operating manual (ZNC-Service-e.doc) will be saved in the installation directory (Default: C:\Program Files \Rohde&Schwarz \ZNBC-Service). In this manual, the necessary test equipment for the service tool is listed.

If the service tool has already been installed before and the installer is started once more, only the installed version of the service tool will be removed. One will have to start the .exe again to install the new program version.

2.2 Entering the Service Password

Access to the board-alignment functions is password-protected to prevent unintentional changes to settings.

1. [**SETUP** : Service Function...]

2. Enter service password.

2.3 Recording Correction Data and Performing Alignments

The analyzer must be allowed to warm up for at least 30 minutes before correction data can be recorded.

Follow the instructions given in the operating manual of the service tool in order to record power correction data, perform the factory system error calibration, trim the frequency reference and align the DC inputs.

3 Repair

This chapter describes the R&S ZNB's construction, including simple procedures for repairs, troubleshooting and board replacement. A self test that checks the diagnostic voltages of the boards and indicates limit violations is provided for troubleshooting and diagnostics.

Installation of options is described in Chapter 4.3, "Installing Options", on page 173.

3.1 Instrument Design and Function Description

The design of the R&S ZNB is shown schematically by 3D-views, exploded drawings and block diagrams (see corresponding sections in chapter Documents).

The block diagrams illustrate the functionality of the instrument.

3.1.1 Block Diagram

See block diagrams in the annex of Chapter 5, "Documents", on page 175.

3.1.2 Description of the Block Diagram

The R&S ZNB is a family of vector network analyzers covering 9 kHz to 40 GHz, depending on the respective model. All models are available as 2-port or 4-port versions. 2-port versions are equipped with a single Synthesizer board (LS) that contains both source and LO synthesizers. 4-port versions have two synthesizer boards, one with two sources (DS) and one with a single LO source. The second source, however, is only available with option R&S ZNB-B2 or R&S ZNB20-B2. In the microwave models R&S ZNB20 and R&S ZNB40 the Synthesizer signals are frequency-multiplied in the Reflectometers. The receiver path comprises RF downconversion, IF analog processing, A/D conversion and digital downconversion in the network controller FPGA. The raw measured values are further processed in the host PC that comprises a Pentium-PC, I/O interfaces and and a graphics controller. The instrument can be expanded to handle future digital and analog requirements by retrofitting options.

The source signal of the R&S ZNB is generated by the local-source (LS) or double source (DS) Synthesizer. In a reflectometer the source signal is amplified (in microwave RMs also frequency-multiplied) before being passed on to the reference power splitter / bridge assembly. The splitter / bridge separates reference and test waves from each other. The reference wave is then fed to the reference receiver section of the Reflectometer, the test wave to the test receiver.

All internal reference frequencies are generated on the Frequency Reference board. The main reference frequency is 64 MHz, which serves as reference clock for source and LO Synthesizer, A/D converters and digital signal processors (NFCs).

The following sections describe the various boards in more detail.

Reflectometer

The Reflectometer separates the wave quantity incident to the DUT, which is also referred to as "a" or reference wave, from the one that comes from the DUT due to reflection or transmission. The latter one is also called "b" or measured wave. After separation, each wave is downconverted by means of a common LO signal and converted to digital. The digitized samples are then transferred to the NFCs via fast multi-lane serial links.

The Reflectometer (RM9 for R&S ZNB4/8, RM20 for R&S ZNB20, RM40 for R&S ZNB40) consists of three sections: Generator, receiver and bridge (RM9, RM20 and RM40BR) or coupler (RM40).

Generator

- provides an electronic step attenuator as amplitude control element that compensates for frequency response, in combination with the control elements on the DS Synthesizer
- amplifies the source signal that serves as stimulus for the DUT

Receiver

- consists of two channels (measurement and reference channel)
- converts the wave quantities provided by the bridge (RM9, RM20 or RM40BR) or coupler (RM40) to the IF. Old versions of RM9 (CI below 11.00) and RM20/40 are provided with two mixers for low- and high-band, whereas newer versions of RM9 (CI at least 11.00) have only one.
- digitizes the IF

Bridge

- is a resistive coupler
- separates the signal that is incident on the DUT from the one that is reflected or transmitted by the DUT
- provides DC bias to the port (option ZNB-B1)
- With option B54, loss in the receiver path of the bridge is reduced at the expense of increased loss in the source path

Coupler (RM40)

- separates the signal that is incident on the DUT from the one that is reflected or transmitted by the DUT

The following components are also accommodated on the board

- a controller FPGA (RMC) that provides the digital interface between reflectometer and NFC on the mainboard. The RMC also incorporates control registers programmed by the associated NFC and a flash memory for board-specific data
- A/D converters for the sampling of test and reference channel IF

Frequency Reference

The Frequency Reference board generates highly stable and spectrally pure clock signals that are required for synchronous and phase-locked operation of the modules of the R&S ZNB. The core reference is generated by a 128 MHz VCXO that can be locked to either an internal 10 MHz TCXO, an external reference from 1 to 20 MHz or an optional 10 MHz OCXO. The 128 MHz clock serves as reference for a 1.536 GHz VCO. This signal, divided by 4, provides a 384 MHz reference clock for the Synthesizers, and further division by 6 generates a 64 MHz signal that is used as reference for the other boards (except for the rear panel options).

By changing the divisor in the PLL, the VCO can be slightly shifted to 1.544 GHz. This increases the synthesizer reference to 386 MHz and the other reference to 64.333 MHz. Such a reference shift is needed e.g. when the receiver frequency is set to multiples of 64 MHz, in order to avoid spurious reception.

The following components are also accommodated on the board

- a controller FPGA providing the digital interface between Frequency Reference and NFC on the mainboard. This FPGA also incorporates control registers programmed by the NFC and a flash memory for board-specific data
- a D/A converter for VCXO pre-tuning

OCXO Option B4

As an option, the Frequency Reference board can be equipped with an OCXO, which improves the phase noise of the reference signal close to the carrier, short-term stability and long-term stability (the latter by about a factor of 10).

Synthesizers

The stimulus signals at the test ports and the LO signals for the mixers in the reflectometers are generated on a single (2-port ZNBs) Synthesizer board or two separate boards (4-port ZNBs). A Synthesizer board accomodates one or two individual synthesizers. Four different types of Synthesizer boards are used in the R&S ZNB models.

LS Synthesizer (used in 2-port ZNBs)

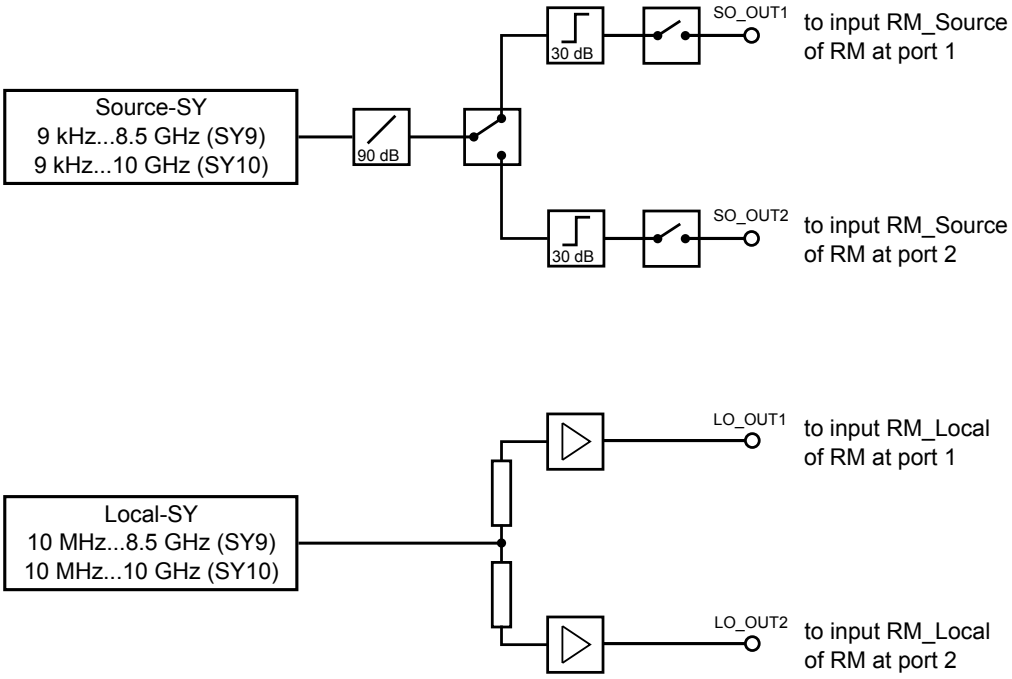


Figure 3-1: Block diagram of LS Synthesizer

DS Synthesizer (used in 4-port ZNBs)

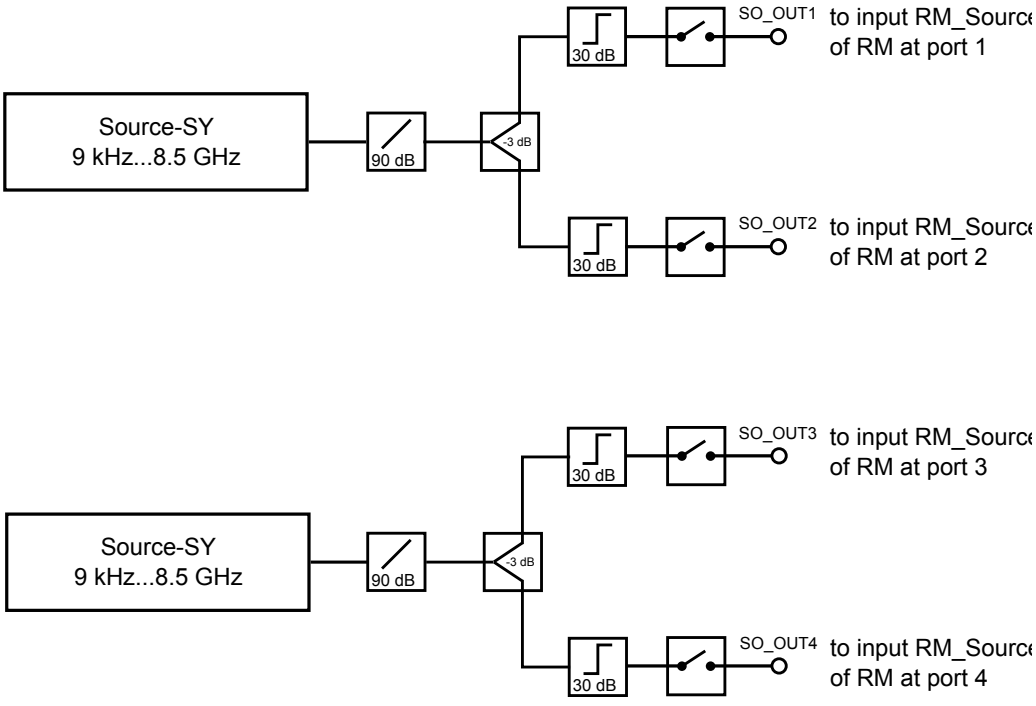


Figure 3-2: Block diagram of SY9 DS Synthesizer

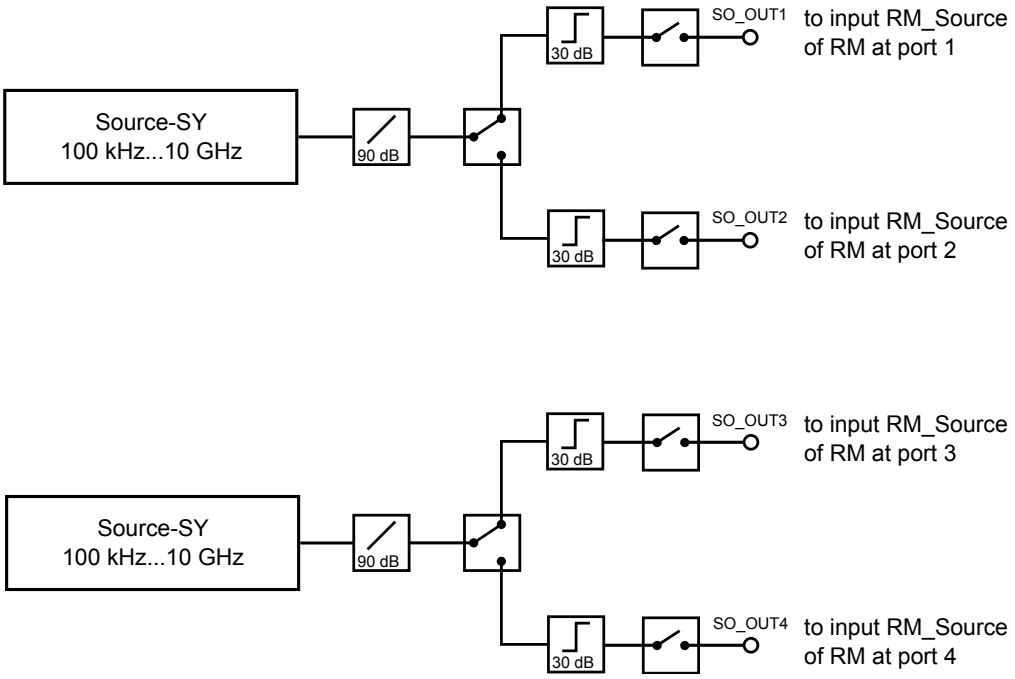


Figure 3-3: Block diagram of SY10 DS Synthesizer

L Synthesizer (4-port analyzers)

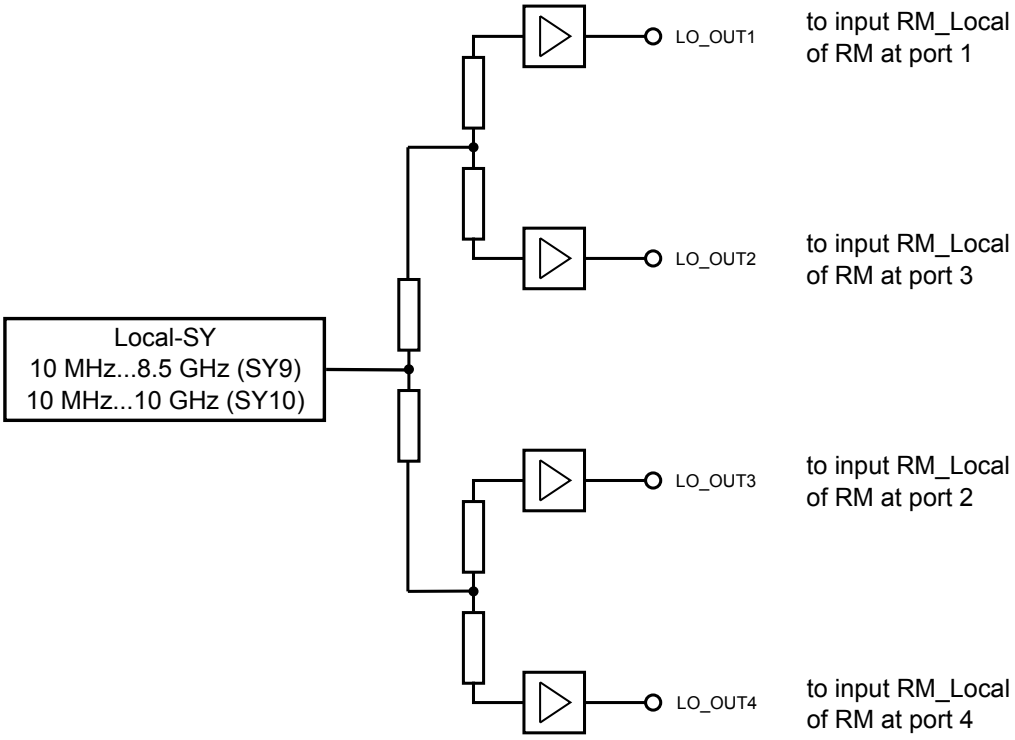


Figure 3-4: Block diagram of L Synthesizer

Front Unit

The Front Unit comprises a mounting plate on which the LCD, the flexible switch board, the key pad, the USB board and the tachogenerator are accommodated.

LC display

All results and setting information required by the user is displayed on the color LCD. The resolution of the 12.1" LCD is 1280 x 800 pixels (WXGA). The display is illuminated by a LED backlight and is provided with a LVDS interface.

Keyboard

The keyboard comprises a flexible switch board and a flexible key pad made from silicon. Whenever a key is pressed, a contact on the flexible switch board is closed. The two standby / on LEDs are also accomodated on the flexible switch board. Key detection and LED control are performed via a foil cable connection on the Front Panel board. They are controlled by means of a matrix method implemented by a special microprocessor on the Controller board; the two LEDs are controlled accordingly. When the instrument is turned off at the mains switch or mains power fails, the status (standby or on) is saved. When the mains switch is turned on again or mains power returns, the VNA will return into the saved state.

Controller

The Controller LPW10 is a all-in-one CPU Board with standard state-of-the-art PC functionality and additional R&S-specific functions. The board includes a CPU, RAM (SIMM modules), internal PCIe interfaces, a lithium battery, a LCD graphics controller, a controller for SATA hard disk and external DVI, LAN and USB interfaces.

All vector network analyzer models except ZNB40 var82 and var84 are fitted with the LPW10 board. The ZNB40 models 82 and 84 are equipped with the LPW11 board which is a cost-optimised follower of the LPW10 with higher computing power. It offers upgradeability to 16 GB of RAM, a DisplayPort socket and USB 3.0

Hard Disk

The removable Hard Disk is screwed to the rear of the vector network analyzer and connected to the Controller via a SATA interface through the Motherboard (MB ZNT, see below).

Power Supply

The Power Supply module provides DC voltages: 12.2 V and 12.5 V standby.

The Power Supply, which is a primary clocked switching one, can be turned on and off via the mains power switch on the rear panel. When mains voltage is applied, standby voltage comes up first. The reaction ot the Controller upon detection of the standby voltage can be set via its BIOS. By default, it enters the state it had been in before being powered down, which can be either "on" or "standby". In on mode, the Controller sets its RS_PS_ON output low, which in turn enables the main output voltage of the Power Supply. When this voltage has settled, the Power Supply sets its Power Good output to high. This starts the power-up sequencer, which is a chain of delayed logic gates supplied by the standby voltage. The power-up sequencer determines the order in which the DC/DC converters on the main board are ramped up. By releasing a lock

(signal INHIBIT_LPW on mainboard / RS_PWRGD_NT on LPW11), the power-up sequencer also enables the Controller to boot.

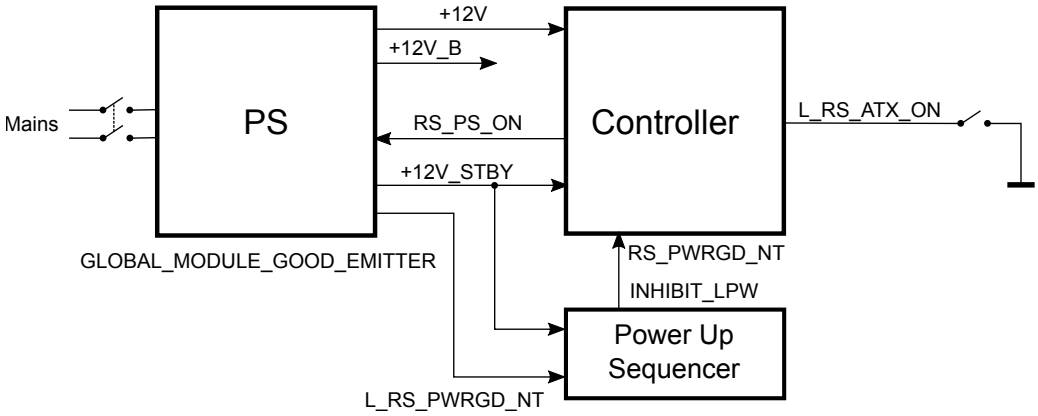


Figure 3-5: Signalling between Power Supply, Controller and power-up sequencer

When the Controller is in standby, pressing the power button on the Front Panel (thus forcing L_RS_ATX_ON to ground) turns it on. This means that RS_PS_ON goes low, and the power-up and boot sequence starts as described above. Pressing the power button in on mode for more than 4 seconds makes the Controller enter standby mode.

In standby state, only Controller, power-up sequencer and (optional) OCXO oven are fed with a supply voltage.

Mainboard

The digitized measurement values of the reflectometers are transferred to the mainboard, which host the digital processing components of the R&S ZNB.

The 12 V supply voltage from the Power Supply is routed directly to the mainboard where the main fuses are located. All necessary voltages for all the boards of the R&S ZNB are generated on the mainboard.

Temperature control is realized on an FPGA on the mainboard. The speed of the fans depends on the temperature of the boards.

The mainboard also provides supply / signalling connectors for Frequency Reference, Synthesizers, Hard Disk, as well as for the options Bias / RFFE interface, Device Control, Handler I/O and GPIB interface.

Board Data Readout upon Startup

Each time when the R&S ZNB is powered up, software evaluates instrument identity data and searches for the boards that are expected according to this information. This process is described in more detail below (Chapter 3.4.4, "Troubleshooting - Boot Error", on page 165).

Most of the boards are provided with non-volatile memory (Flash EEPROM in a FPGA or as a separate chip). This memory contains a zip file that is composed of at least a a configuration file with stock #, serial #, change index and other essential information about the board, and in some cased additional correction data specific to the board or to the R&S ZNB as a whole.

When a board is powered up inside the R&S ZNB for the first time, the contents of its non-volatile memory is read out and written to hard disk. From there it is transferred to Controller RAM. Upon subsequent startups only a check is performed in order to determine whether the data headers in board memory and on hard disk are identical. If yes, data on hard disk is considered as valid and directly transferred to the Controller.

3.2 Board Replacement

For board replacement please also refer to the corresponding drawing(s) in Chapter 5.

WARNING

Shock hazard

Before opening the case, make sure that the instrument is switched off and disconnected from all power supplies. Read all safety instructions at the beginning of this manual carefully!

WARNING

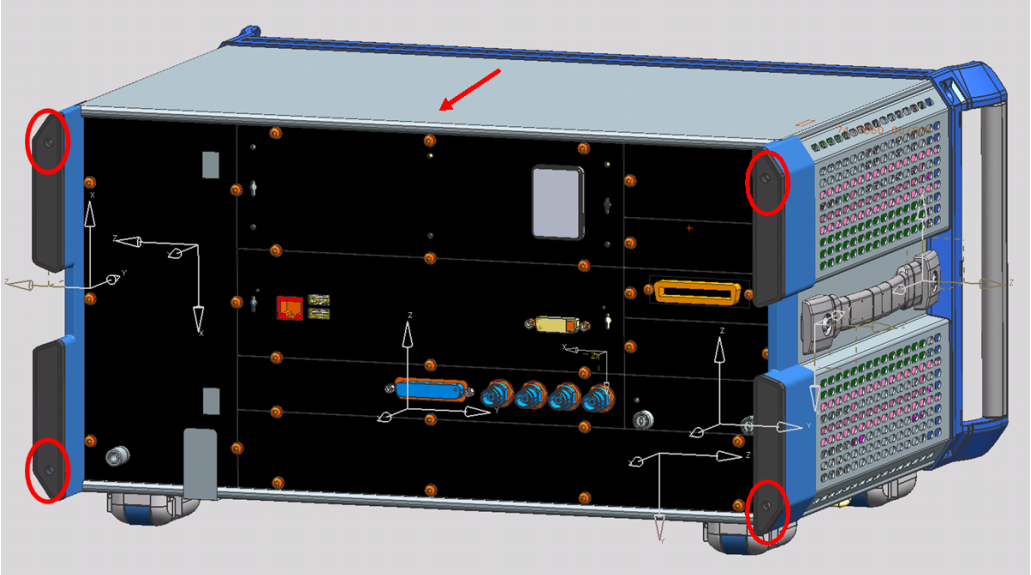
Danger of injury

Any adjustments, replacement of parts, maintenance or repair must be carried out exclusively by technical personnel authorized by Rohde & Schwarz.

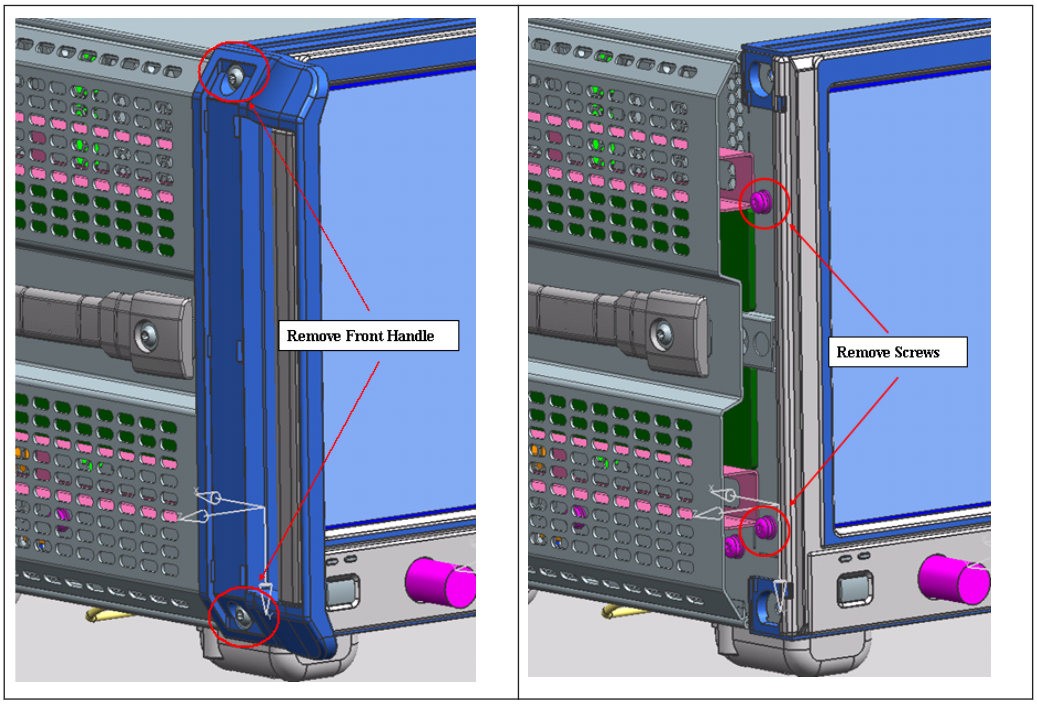
NOTICE

Opening the Instrument

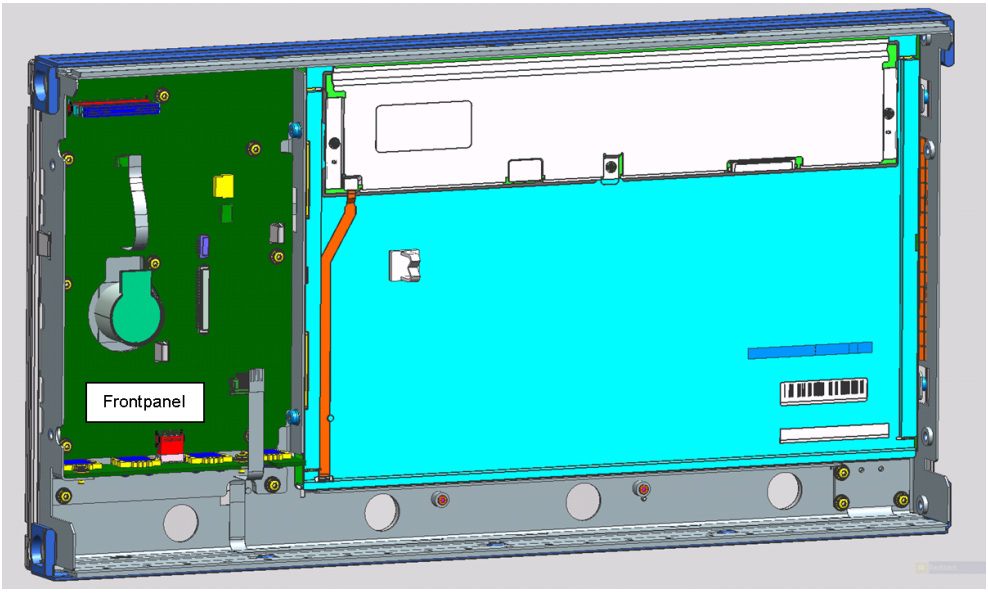
To take off the upper and lower cover, remove the rear feet:

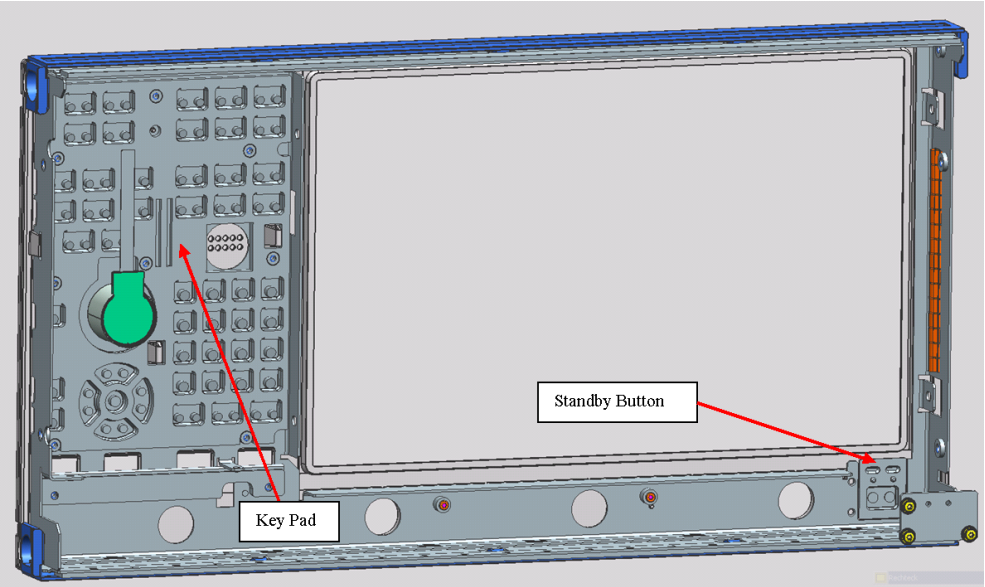


- Frontpanel and Display (POS.60): D 1311.5272.01 D 1; To change the Front Panel or display the Front Unit needs to be disassembled first. Remove the front handles (POS. 700) D 1311.4001.01 D 5 and then the four screws (POS. 650) D 1311.4001.01 D 2 placed on the instrument frame side panels. There is not necessarily the need to remove the upper and lower instrument cover. Unplug the interface cable.



- Key Pad replacement: To replace the key pad and the Standby Button it is necessary to remove the Front Panel, USB Board and Display. The Standby Button is part of the molding of the Key Pad and can simply be detached.

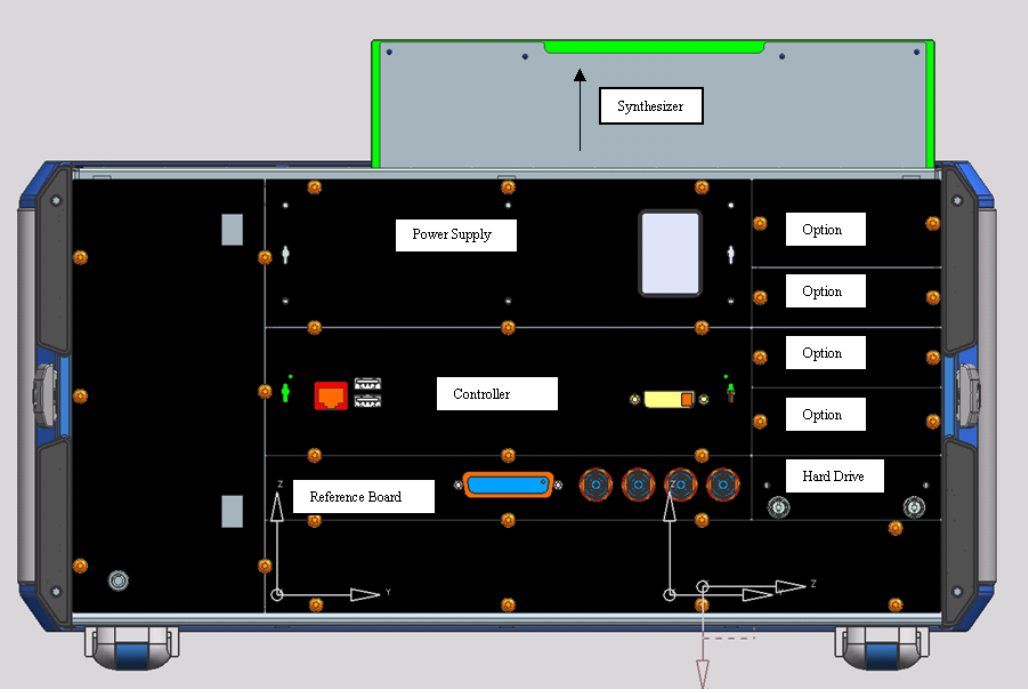




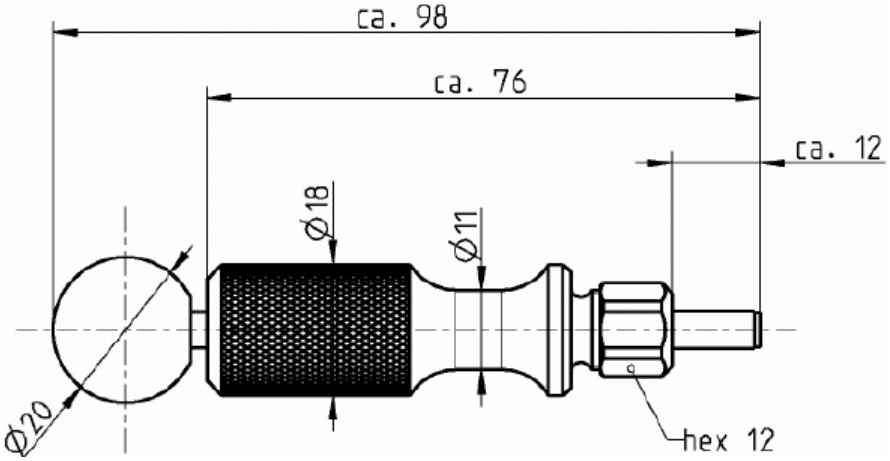
Pull-out Tool for Controller and Power Supply

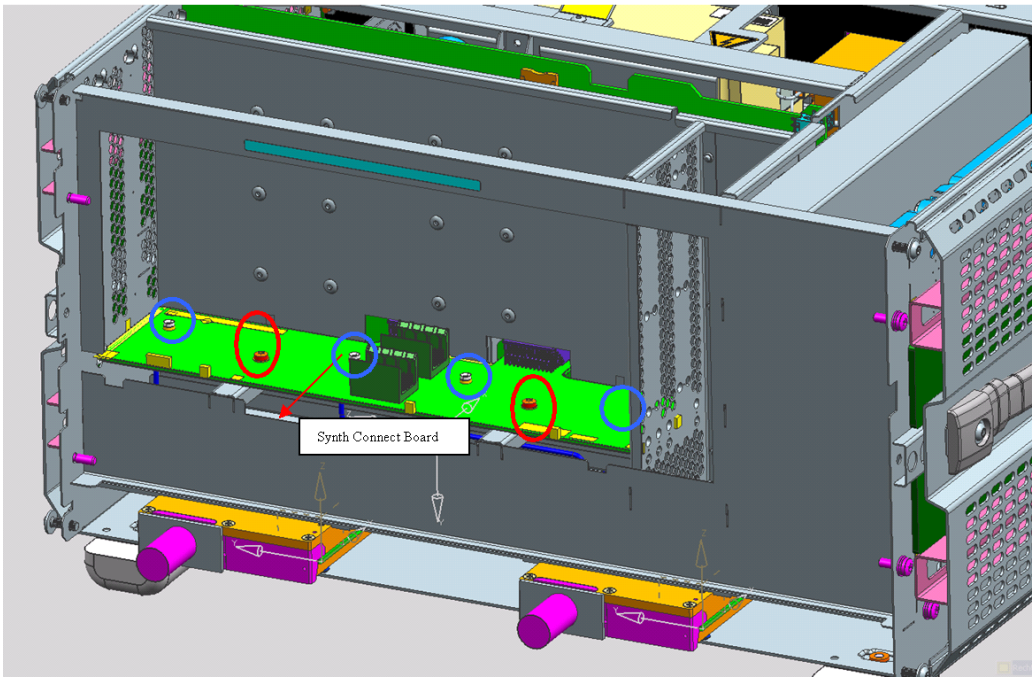
To remove the Controller or Power Supply a special tool (PN: 1174.0301.00) is required.

- Frequency Reference (POS. 260): D 1311.4001.01 D 4: Unscrew 6 back side screws and remove
- Synthesizer (POS. 560): D 1311.4001.01 D 4
- Hard drive (POS. 270): D 1311.4001.01 D 4
- Power Supply (POS. 110):D 1311.4001.01 D 4: Unscrew 7 back side screws and remove
- Controller LPW10 (POS. 210):D 1311.4001.01 D 4: Unscrew 6 back side screws and remove.
- Controller LPW11 (POS. 220):D 1311.4001.01 D 4: Unscrew 6 back side screws and remove.

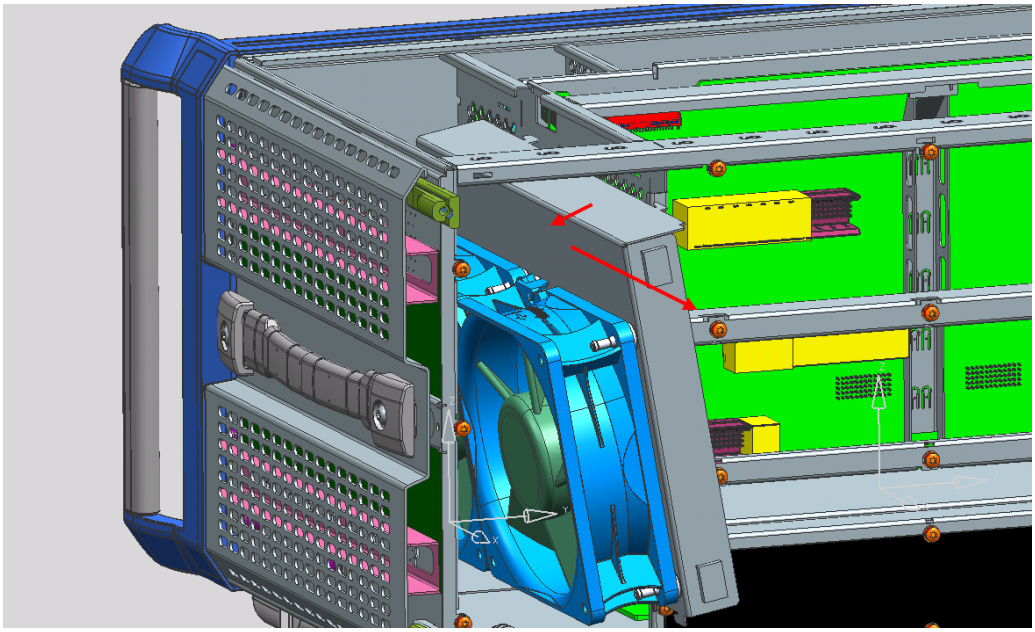


- Synthesizer Connect Board (POS. 360) D 1311.4001.01 D 1: To disassemble the Synthesizer Connect Board remove the Front Unit, Synthesizer, open the screws and press out the solid cables using the recommended special tooling (Rosenberger extraction tool Order No. 11W101-000)



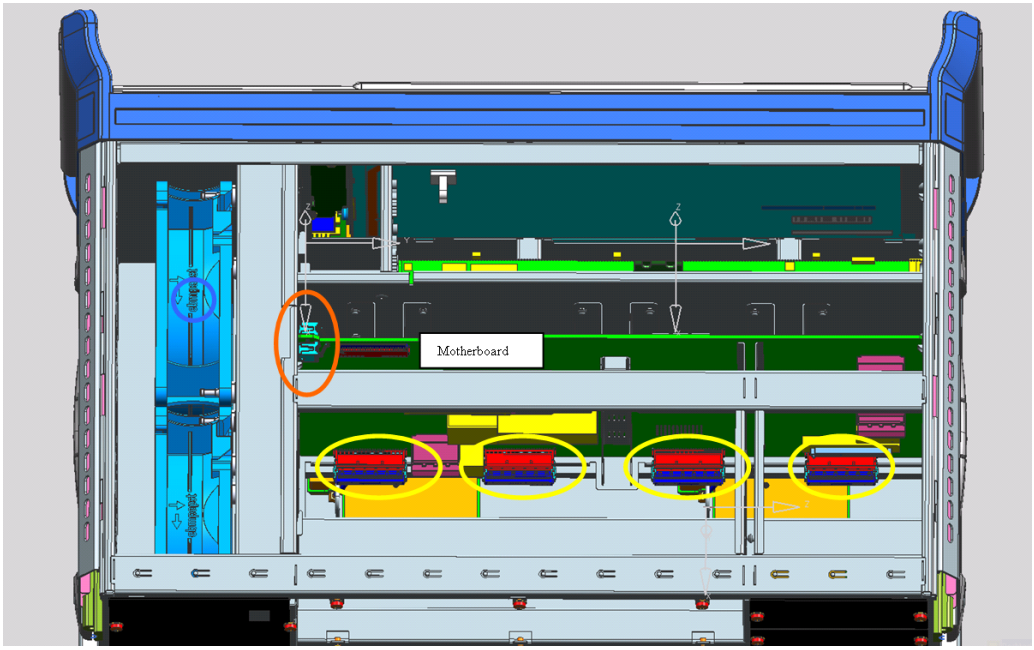


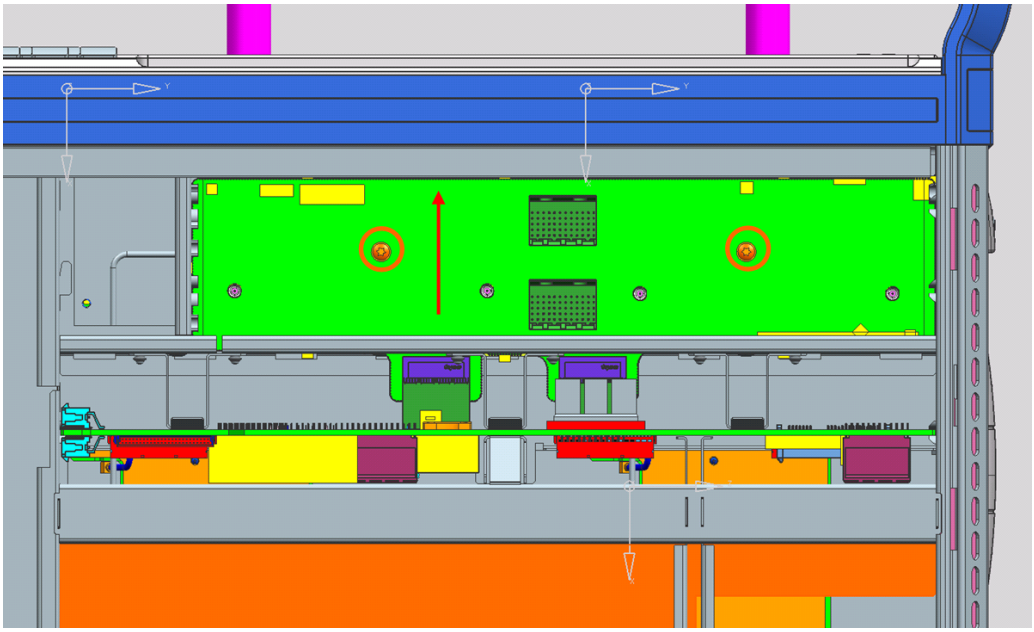
- Fan Unit: To remove the fan unit dismount the rear panel, unplug and move it as shown in the following picture



- Motherboard replacement (POS. 80) D 1311.4001.01 D 1:
  - Remove Power Supply
  - Remove Controller
  - Remove Frequency Reference
  - Remove Hard Drive
  - Remove Optional Units

– Remove Synthesizer
– Unplug Fans and Reflectometer Connectors
– Loosen screws and move Synth Connect Board until its unplugged in direction to the Front Unit. It is not necessary to remove the Front Unit!
– Remove Motherboard, SIM card and fit SIM card to replacement Motherboard.





- Reflectometer replacement: To remove the reflectometer unplug interface cable, detach the solid cables and unscrew. It is not necessarily required to remove the Front Unit!

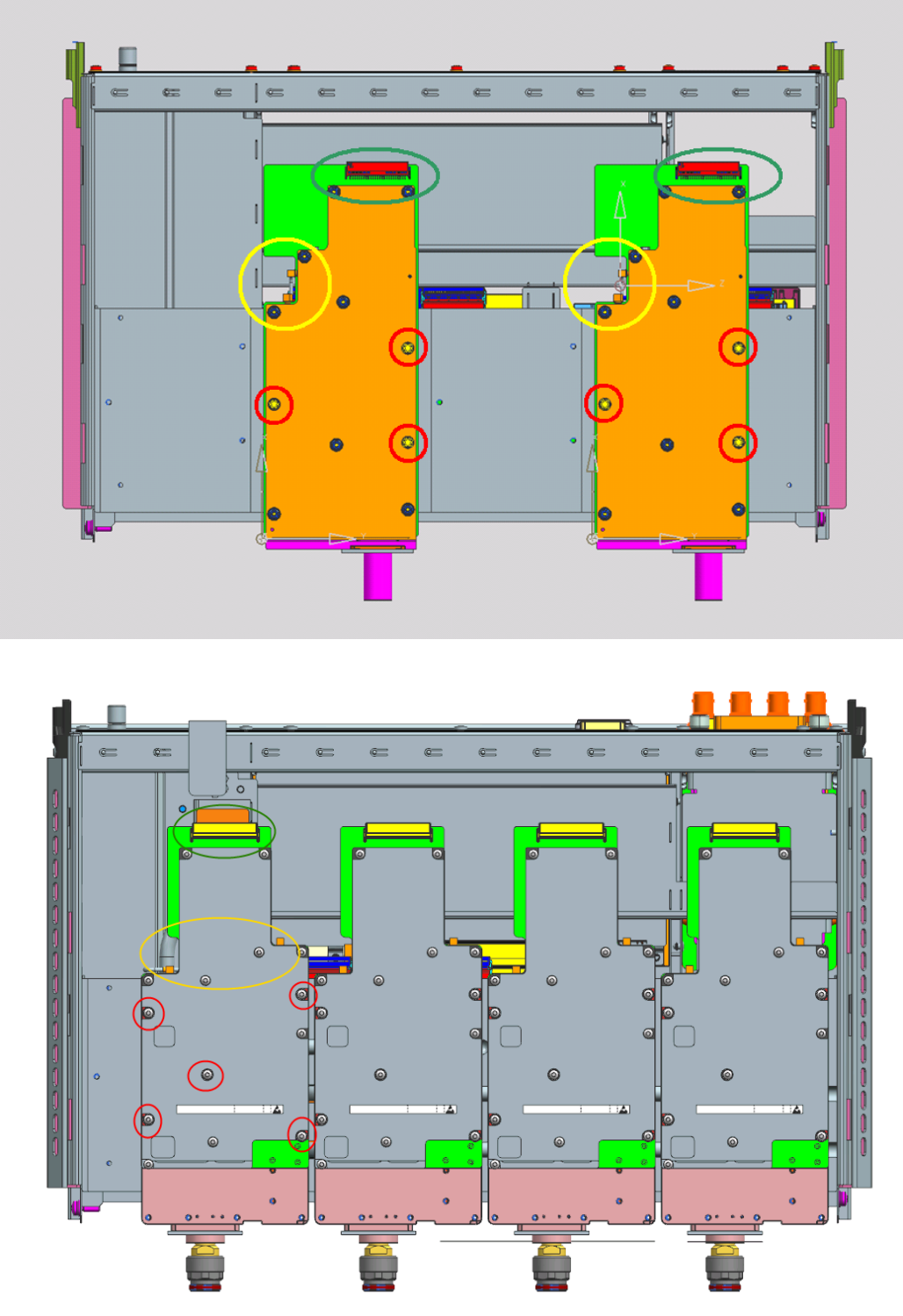


Figure 3-6: Reflectometer for R&S ZNB20 and R&S ZNB40 var82, var84

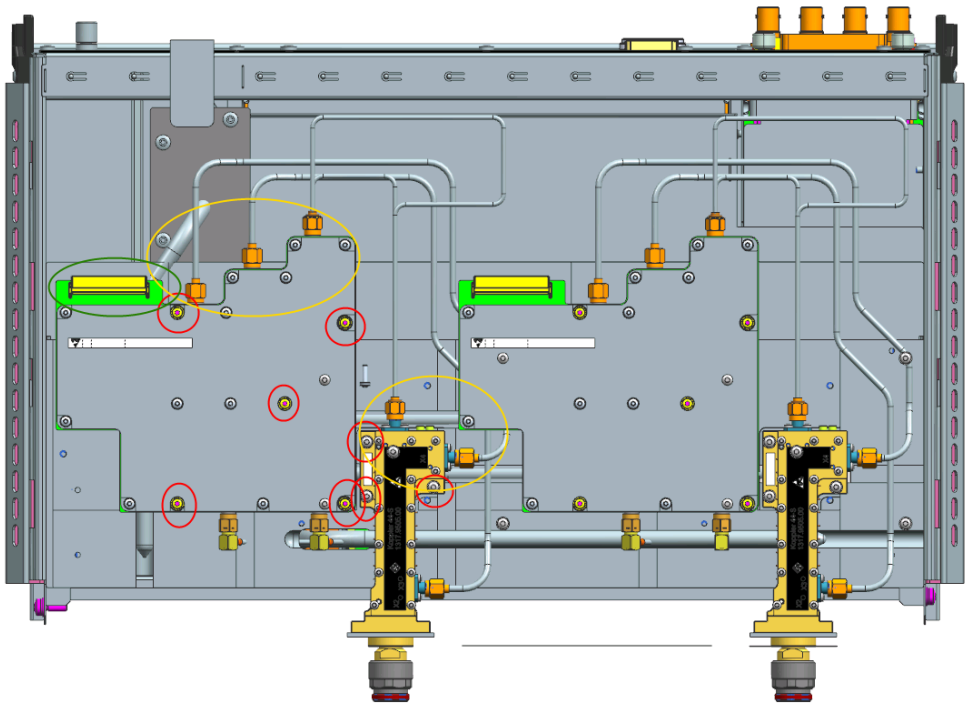


Figure 3-7: Reflectometer for R&S ZNB40

3.3 Action List after Module Replacement

Item	Board / Component	Actions after replacement
1	Controller	Open directory GLORIS / Support&Services / Firm-/Software / Firmware- by type and go to ZNB. Select ZNB Recovery Stick for the Controller in your ZNB. Download the .exe and the .doc file and follow the instructions in the .doc file to create a recovery USB stick from the .exe file. Follow the instructions to update the BIOS with the help of the recovery USB stick. Check error log
2	CMOS backup battery	Enter date and time, check error log
3	Hard Disk	Open directory GLORIS / Support&Services / Firm-/Software / Firmware- by type and go to ZNB. Select the latest Instrument Firmware. Download the .msi file and install the firmware according to the instructions. Check error log
4	Front Unit / LC display	Functional test
5	Key matt / key pad	Functional test
6	Power Supply	Check whether the R&S ZNB boots

Item	Board / Component	Actions after replacement
7	Motherboard	Note that the SIM card from the original board must be fitted to the replacement board (see replacement of Motherboard, above)! ZNBC Service Tool -> align and save all, check error log, selftest
8	Frequency Reference	ZNBC Service Tool -> align and save all, check error log, selftest, check frequency accuracy
9	Synthesizer board	ZNBC Service Tool -> Step 1 to 4, check error log, selftest
10	n.a.	
11	Input connector	ZNBC Service Tool -> Step1 to 4, check error log, selftest
12	Reflectometer	ZNBC Service Tool -> Step1 to 4, check error log, selftest
13	Bias tee or RFFE - GPIO option	Check error log, functional test
14	DC inputs option	ZNBC Service Tool -> align and save all & DC step 1 & DC Step 2, check error log, selftest
15	GPIB card option	Check error log, functional test
16	OCXO option	Check error log, check frequency accuracy

3.4 Troubleshooting

The instructions in this manual describe troubleshooting down to the board level. Any defective boards can then be replaced and the instrument put back into operation. A selftest which checks the board diagnostic voltages and displays limit violations is provided to facilitate troubleshooting and diagnosis.

We recommend that you return your instrument to the technical specialists at an R&S service facility for board replacement and any further repairs that may be needed (see the address list at the beginning of this manual).

⚠ WARNING

Do not insert or remove boards while power is applied.

Avoid causing shorts when measuring voltages.

Facilities to simplify diagnosis

The R&S ZNB has the following facilities to simplify diagnosis

- Selftest
- Service functions

The first thing you should do if you encounter a problem is to check if any electrical connection (cable, adapter etc.) is incorrectly installed or even damaged.

3.4.1 Test Equipment and Accessories

- Test equipment see: Chapter 1.2, "Test Equipment", on page 8
  For repair, the following additional equipment is needed

Table 3-1: Additional Test Equipment

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1.	Test cable	Suitable to connect the REF OUT BNC connector to the input of the spectrum analyzer Approx. 1.5 m			Board test Frequency Reference

3.4.2 Troubleshooting - Power-up Problems

- Fault: It is not possible to turn on the R&S ZNB.

Action	Cause of fault / remedy
Check mains switch on rear panel ⇓	Mains switch OFF: Turn on mains switch
Check if LED lights up in yellow or green ⇓	LED does not light up at all: Measure voltage on Front Panel at XFP.B19: Nom. value: +12.2 V ± 1V Nom. value reached: Fault in Front Panel No voltage: Power Supply defective or 12 V standby shorted.
If LED is lit in yellow: Turn on instrument, check if LED turns green	LED does not turn green: Measure voltage on MB ZNT at XPS1P and XPS2P Voltage << 12 V: Front Panel, Controller, Motherboard or Power Supply defective or short on 12 V supply voltages

- Fault: Fan does not turn

Action	Cause of fault / remedy
Check voltage at connector on MB ZNT: XFAN pin A9 to A12: nom. value 12 V XFAN PS 1 and 2, pin 1: nom. value > 5 V	If no voltage can be measured the Motherboard may be defective

3.4.3 Troubleshooting - Boot Problems

- Fault: R&S ZNB does not start the measurement application

Immediately after power up, the Controller starts its BIOS. After that, Windows 7 starts up. Then the measurement application is loaded as an autostart program.

If there are errors during the boot phase, messages indicate possible defects.

The message “No System Disk or Disk error…” indicates that the Hard Disk is either missing, not correctly fitted in its slot, or that there is a connector problem either between Controller and Motherboard or between Motherboard and Hard Disk. If, for example, the hard disk has frequently been removed and re-inserted, the connectors may be worn out. If this is the case, replace Hard Disk and / or Motherboard.

If the operating system on the Hard Disk has been corrupted and can therefore not been loaded correctly, Windows 7 may output a “blue screen”. Corruption of the operating system may, however, also manifest itself in a different way.

3.4.4 Troubleshooting - Boot Error

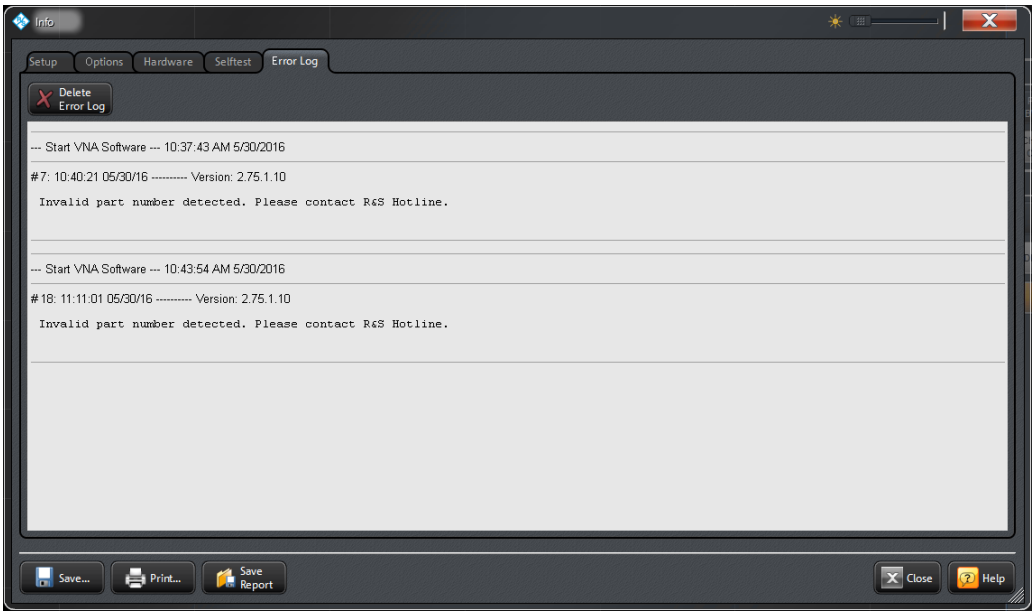
Upon startup, the R&S ZNB software tries to access all boards that it expects to find according to the instrument identity information. Depending on the level of access that can be verified, various board stati are possible. The status of each board can be read from the table in Info: Hardware Info.

1. If no MB Module is found, either due to missing power supply or because the drivers of all the FPGAs on the MB Modules have been disabled in the Windows control panel, a message appears: "Error: Connection to Motherboard driver failed. Try a reboot and/or try to reinstall the software"
2. If column "Name" in the list contains only entries like "NFC<i>", where i is a number between 0 and 5, and the status of these devices is "connected": Check whether the SIM card has been inserted into its fixture on the Motherboard. If in addition a NFC has no power supply (or its driver has been disabled via the Windows control panel), the status of this NFC becomes N.C.
3. If a board is not plugged in, this is detected via a pull-up resistor connected to a contact pin in the connector of the board. In this case, the status is set to "no_BG"
4. If a board is plugged in, but cannot be accessed via the programming bus, its status is set to "no_ProgBus"
5. If a board can be accessed via the programming bus, but its memory data set cannot be read, the status depends on whether a valid copy of the memory content can be found on Hard Disk (see "Board Data Readout upon Startup" on page 154). If yes, the status is set to "no_EEP", if not, to "no_FILE"
6. If everything is ok, the status is set to "exists"

If not all non-optional boards that can queried via the programming bus obtain status "exists", a message appears on the screen when startup has been completed:

Warning: Boot error occurred. For details browse Error Log file.

Optional boards are not included in this test. The cause of the error can be found in the Error Log file.



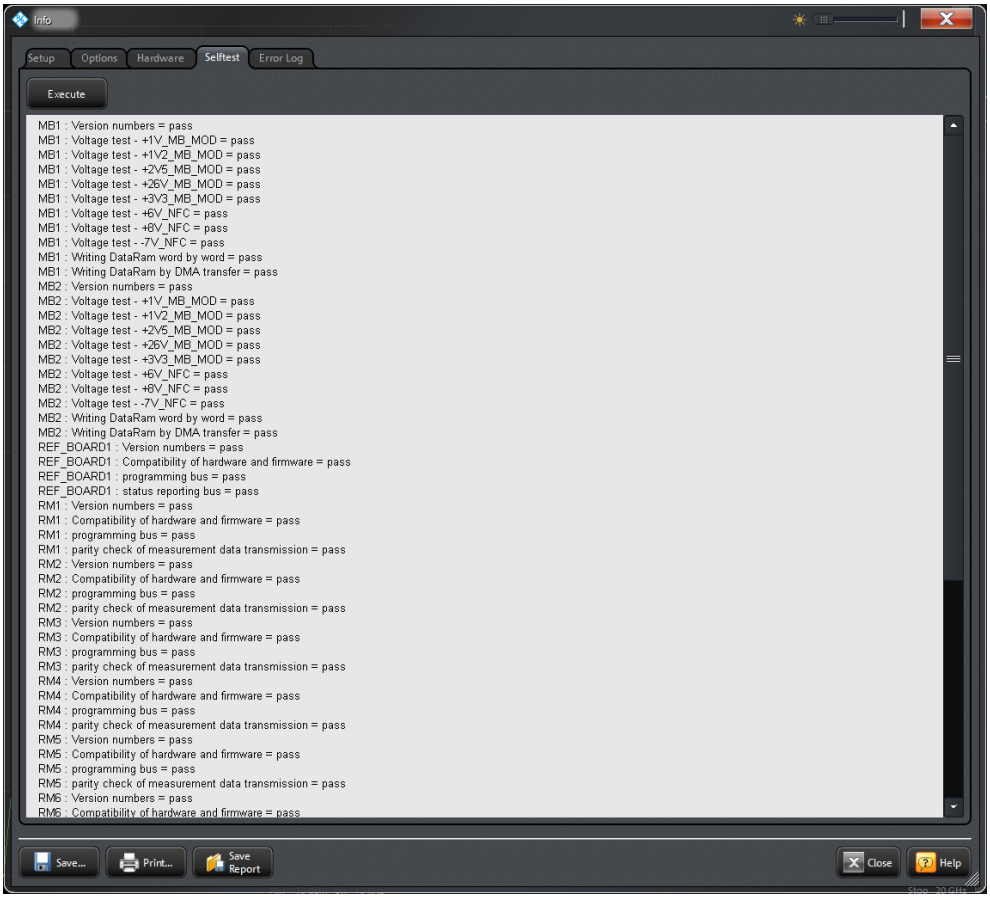
3.4.5 Troubleshooting via Selftest

The selftest automatically performs a sequence of checks that provide some information about the health of the R&S ZNB. These checks can be divided into the following categories:

- Board supply voltages
- Functionality check of memory (only for sequencer RAM on Main Board)
- Functionality check of buses
- Compatibility of boards with current instrument software

Starting the selftest

1. Select Service Level 1 (see Service Functions) – this makes the temperature sensor readings being displayed and tighter voltage tolerances being used.
2. [**SETUP** : Info... : Selftest]



After termination of selftest a report and a final selftest status are displayed.

Interpreting the Results of the Selftest

For each tested board, the selftest report shows board name, tested function and status of the respective test. The report can be printed or saved to a file for further analysis by pressing the respective softkey buttons in the selftest window.

The tested board supply voltages may either be generated on the board itself or on another board (e.g. the supply voltages for the Reflectometers are generated on the Main Board.

The voltages supplied by the Power Supply (+12V, +12V_B and +12V_STBY), however, are not checked directly. In case that one of these voltages fails, the power-up sequencer on the Motherboard will not start, which means that the R&S ZNB will not boot at all (see "Power Supply" on page 153).

Consider also the possibility that one of the four +12 V fuses on the Motherboard may be blown. Then the respective supplied boards will not operate.

Bus test depends on the types of buses through which the respective board communicates with NFC0. Only programming bus and status reporting buses are tested, but no data buses. If the latter fail, no measurement results will be shown and no error messages will appear.

The check of compatibility of a board with the current R&S ZNB software consists of two parts: During "Version number" test, it is checked whether the change index (TAZ) of a board and the version number of its FPGA are within the ranges that are allowed by the current software. "Compatibility of hardware and firmware" checks whether the version number of the current software is at least as large as the minimum number recorded in the config.ini file in the flash memory of the board.

3.4.6 Service Functions

Service functions allow one to examine particular circuit sections on specific boards or to make well-defined settings that would normally change automatically according to the state of the instrument (e.g. the IF). There are a number of service functions which, if used incorrectly, could cause malfunction of the R&S ZNB. Usually, these functions are disabled. They are enabled only after a code number (PASSWORD) has been entered.

Service level	Password
0	No password necessary
1	894129

See Chapter 2.2, "Entering the Service Password", on page 146.

3.4.7 Determining defective boards

The table below lists boards that are probably defective based on the fault(s) that occurred during performance test.

	Defective board	
Problem with	**Probable**	**Also possible**
Frequency Accuracy	Frequency Reference	
Output Harmonics	Reflectometer associated with the respective port	
Output Power Linearity		
Only one port	Correction data (recorded by service tool)	Reflectometer associated with the respective port
All ports	Correction data (recorded by service tool)	DS Synthesizer
Maximum Output Power		
Only one port	Reflectometer associated with the respective port	

All ports	DS Synthesizer	
Accuracy of Output Power		
Only one port	Correction data (recorded by service tool)	Reflectometer associated with the respective port
All ports	Correction data (recorded by service tool)	DS Synthesizer
Input Power Measurement Accuracy		
Only one port	Correction data (recorded by service tool)	Reflectometer associated with the respective port
All ports	Correction data (recorded by service tool)	L Synthesizer
Input Power Linearity (Low or High Level)		
Only one port	Reflectometer associated with the respective port	
All ports	L Synthesizer	
Trace Noise Magnitude or Phase		
Only one port	Reflectometer associated with the respective port	LO Splitter associated with the respective port, semirigid LO cable, RM Connect Board
All ports	L Synthesizer	Frequency Reference
Dynamic Rangee	Reflectometers associated with the respective port pair(s)	
Input Noise Level		
Only one port	Reflectometer associated with the respective port	
All ports	L Synthesizer	Frequency Reference
Uncorrected System Performance - Directivity, Source or Load Match, Reflection or Transmission Tracking	Reflectometer associated with the respective port	

If possible, a board test should be performed before the board that appears to be defective is replaced.

3.4.8 Board Test

In the signal path, only those boards can be tested directly that provide an interface to the outside world of the R&S ZNB. These are Frequency Reference and Reflectometer. Synthesizer, Source Switch and Local Divider are not accessible from outside, so a potential malfunction of these boards must be logically deduced from observations.

3.4.8.1 Testing the Frequency Reference

1. Connect REF OUT to a spectrum analyzer using an appropriate test cable
2. The frequency of the signal must be very close to 10 MHz, its power > 5 dBm

3.4.8.2 Testing the DS Synthesizer and the Source Sections of the Reflectometers

Test Maximum Output Power (Chapter 1.4.7, "Table: Maximum Output Power", on page 73) at all ports. If Maximum Output Power is out of tolerance only at a single port, there is probably a fault in the generator part of the respective Reflectometer. If the same fault is present on all ports, the reason is most likely to be found in the DS Synthesizer board.

3.4.8.3 Testing the L Synthesizer and the Receiver Sections of the Reflectometers

Mount short circuits to all ports. Perform a Preset and view the a and b waves of all ports. If for a wave a trace at -10 dBm ±1 dB is shown, the reference (a) or test (b) receiver section of the respective Reflectometer is ok. If a fault can be observed for a single port, then probably the respective Reflectometer is defective. If the same fault is present on all ports, the reason is most likely to be found in the L Synthesizer board or board section.

3.4.8.4 Testing the Bridge Sections of the Reflectometers

It is assumed that Synthesizers and source and receiver sections of the Reflectometers are ok

Switch factory cal off: System: Service Function...: sw.common.factorycal_status.1 (Service Level 0)

For each port i:

1. Perform a Preset, measure ratio bi/ai (Source Port i)
2. Connect the SHORT from the calibration kit to the port, save measured values (Trace: Trace Config: Mem Math: Data to New Mem)
3. Connect the OPEN from the calibration kit to the port, save measured values (Trace: Trace Config: Mem Math: Data to New Mem)
4. Trace: Trace Config: All Mem All Data: Hide All Mem

5. Connect the MATCH from the calibration kit to the port
6. Trace: Trace Config: Mem Math: Define Math...: Data / (linMag(Mem2[Trc1]) + linMag(Mem3[Trc1])) / 2): OK (Note: Instead of the arithmetic mean of SHORT and OPEN, the geometric mean can be used as well: Data / (Mem2[Trc1] * Mem3[Trc1]) ^ 0.5)
7. Trace: Trace Config: Mem Math: User Defined:

The displayed math trace shows the directivity

Frequency range	Directivity
ZNB 8: 9 kHz to 50 MHz	< -10 dB
ZNB 8: 50 MHz to 8.5 GHz	< -16 dB
ZNB 20/40: 100 kHz to 10 GHz	< -12 dB
ZNB 20: 10 GHz to 20 GHz **ZNB 40**: 10 GHz to 25 GHz	< -15 dB
ZNB 40: 25 GHz to 40 GHz	< -10 dB

If the measured values are larger than the limits stated in the table, the Reflectometer must be replaced.

3.4.8.5 Testing Mainboard, Controller, Hard Disk and the Digital Sections of the Reflectometers

If there are faults in the digital part of the R&S ZNB, replace Mainboard and / or Controller and / or hard disk and /or RMs until the fault disappears.

4 Software Update / Installing Options

This chapter contains information on installing/updating the firmware, restoring the operating system and installing options on the R&S ZNB. For a complete list of R&S ZNB options refer to the "Ordering Information" section at the end of R&S ZNB product brochure or data sheet.

4.1 Installation of new R&S ZNB Firmware

For information on how to update the firmware refer to the release notes. The most recent version is provided on the R&S website www.rohde-schwarz.com.

Upgrade versions of the analyzer firmware are supplied as Microsoft Installer files; the file name is `ZNB_xxyy.msi` for the 32 bit firmware and `ZNB_xxyy_x64.msi` for the 64 bit firmware.

- The 32 bit (64 bit) firmware can only be updated with another 32 bit (64 bit) firmware.
- Make sure not to install a 32 bit firmware on a 64 bit R&S ZNB, i.e. running the 64 bit version of Windows 7 embedded; see also Chapter 4.2, "Restoring and Updating the Operating System", on page 172.

You need administrator rights to install the firmware. In factory configuration, " 894129" is preset as the password for both user accounts " Administrator" and "Instrument".

To perform a firmware update

1. Copy the setup file to any storage medium accessible from the analyzer. This may be the internal hard disk, an external storage medium (USB memory stick, CD-ROM with external drive) or a network connection (LAN, GPIB bus). Note that the update process is somewhat slower when started directly from a USB 2.x memory stick that is connected to the front panel USB connectors. Copying the file beforehand to the internal hard disk may accelerate this.
2. Double-click the setup file and follow the instructions of the setup wizard.

4.2 Restoring and Updating the Operating System

A 64-bit Windows 7 Embedded operating system can be restored or updated from a bootable USB recovery device (*Recovery Flash Drive*), whereas for a 32-bit OS an external DVD drive is required. In both cases, this recovery device is generated with the help of the *Recovery Flash Drive Tool*, which can be found in the R&S Extranet (GLORIS): Support & Services. Here, in column *Downloads*, select Firm-/Software: Firmware- by type and go to ZNB. Download the latest version of *ZNB Recovery 64Bit*

Recovery-Stick (for a 64-bit system), and *ZNB Recovery 32Bit DVD Image* (for a 32-bit system), respectively.

Then download both .exe and .doc files and follow the instructions in the .doc in order to generate the recovery device.

For R&S ZNB with 32-bit OS, an upgrade from 32 to 64 bit is recommended. This applies in particular to VNAs that are used for multiport measurements, since they may significantly benefit from > 4 GB of RAM.

The upgrade has to be performed by R&S service staff and involves

- a RAM upgrade (optional)
- a bios update for older R&S ZNB
- an update of the system hard disk to 64 bit OS and FW
- an update of additional hard disks (option B19) to 64 bit OS and FW

A downgrade to 32 bit is also possible.

Support for 32 bit OS and FW will be discontinued in the medium term.

4.3 Installing Options

A list of all available hardware and software options is provided on the R&S website www.rohde-schwarz.com. You can also follow the link on the CD supplied with the instrument.

For retrofitting, note the mounting instructions enclosed with the options.

⚠ WARNING

Shock hazard

Before opening the housing, ensure that the instrument is switched off and disconnected from the power supply by removing the plug from the AC and DC power connector.

Read all safety instructions at the beginning of this manual carefully!

Risk of electrostatic discharge

Protect the operational site against electrostatic discharge to avoid damage to electronic components of the modules. For details refer to the safety instructions at the beginning of this manual.

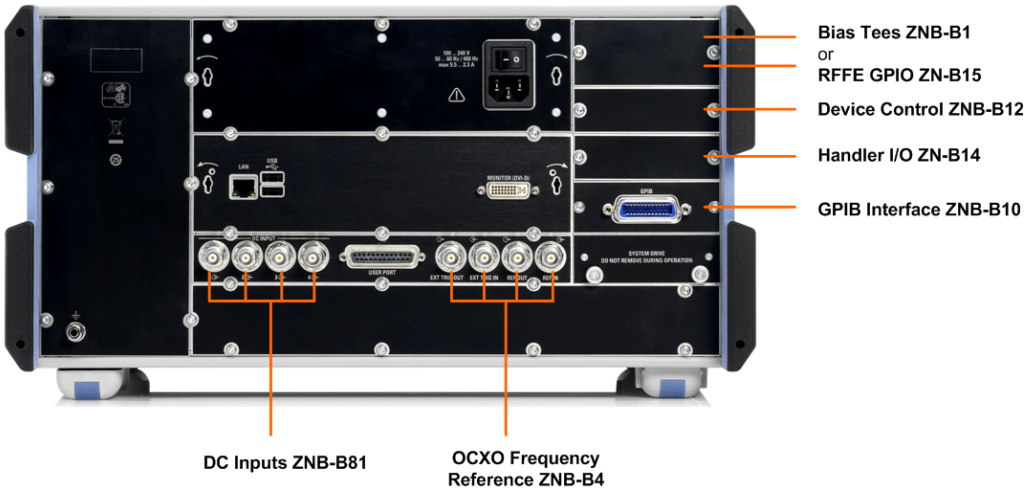
When installing hardware options, note the following

1. Switch off the instrument and disconnect the power supply cables.
2. Unscrew the part of the rear panel cover where the option is going to be inserted.

3. Plug in the option and fix it using the screws you previously removed.
4. Switch on the R&S ZNB.
5. Install additional software, if supplied, according to the instructions enclosed with the option.
6. If an adjustment is required for this option, the appropriate notes can be found in the installation instructions for the option.

4.4 Options Overview

Only those options are shown that require the fitting of additional or the exchange of existing hardware modules.



5 Documents

This chapter contains the spare parts list and the documents for the complete R&S ZNB 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.

5.1 Spare Parts

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

CAUTION

Risk of shock hazard and instrument damage

When replacing a module please note the safety instructions and the repair instructions given in Chapter 3, "Repair", on page 148 and at the beginning of this service manual.

When shipping a module be careful to provide for sufficient mechanical and antistatical protection.

5.1.1 Available Power Cables

Rohde & Schwarz provides power cables with different properties, to be used in different countries.

Table 5-1: List of power cables available

Stock No.	Earthed-contact connector	Preferably used in
DS 0006.7013.00	BS1363: 1967' 10 A 250 V complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020.00	Type 12 , 10 A 250 V complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036.00	Type 498/13 10 A 250 V complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 0041.4752.00	GB2099 , GB1002 10 A 250 V approvals CCC	China
DS 0041.6232.00	JIS C 8303 7A 125V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3 10 A, 250 V complying with AS C112-1964 Ap.	Australia

Stock No.	Earthed-contact connector	Preferably used in
DS 0025.2365.00	DIN 49 441, 10 A, 250 V, **straight** approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	Europe (except Switzerland)
DS 0086.4400.00	DIN 49 441, 10 A, 250 V, **angular** approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=ZNP6 - 2TOR 1311.6004.02 +VAR02=ZNP6 - 2PORT 1311.6004.02 *VAR12=ZNC3 - 2TOR 1311.6004.12 +VAR12=ZNC3 - 2PORT 1311.6004.12 *VAR22=ZNB4 - 2TOR 1311.6010.22 +VAR22=ZNB4 - 2PORT 1311.6010.22 *VAR24=ZNB4 -4TOR 1311.6010.24 +VAR24=ZNB4 - 4PORT 1311.6010.24 *VAR32=ZNC6- 2TOR 1311.6004.32 +VAR32=ZNC6 - 2PORT 1311.6004.32 *VAR41=ZNB8 - 2TOR 1311.6010.41 +VAR41=ZNB8 - 2PORT 1311.6010.41 *VAR42=ZNB8 - 2TOR 1311.6010.42 +VAR42=ZNB8 - 2PORT 1311.6010.42 *VAR44=ZNB8 -4TOR 1311.6010.44 +VAR44=ZNB8 - 4PORT 1311.6010.44 *VAR62=ZNB20 - 2TOR +VAR62=ZNB20 - 2PORT *VAR64=ZNBXX - 4TOR +VAR64=ZNBXX - 4PORT *VAR72=ZNB40 - 2TOR 1311.6010.72 +VAR72=ZNB40 - 2PORT 1311.6010.72 *VAR77=NICHT VERWENDET +VAR77=UNUSED *VAR82=ZNB40 - 2TOR +VAR82=ZNB40 - 2PORT *VAR84=ZNB40 - 4TOR +VAR84=ZNB40 - 4PORT *VAR92=ZND 1328.5170.92 +VAR92=ZND 1328.5170.92					
1	0	S		PH BEMERKUNG NOTE Ersatzteilstückliste von 1311.4001.01 / Spare Part List of 1311.4001.01		0999.9610.00		B	O
10	0	S		MM BW2 GERAETEFUSS BW2 FOOT		1096.2506.00		B	T
20	1	S	ARM1 ARM2 ARM3 ARM4	ED RM9 RM9 VAR 02 12 22 24 32 41 42 44 92 Verwendet in / used in: 1311.4001.01	Z	1311.4076.02		M	A
21	0	S		ED RM9 RM9 VAR 22 24 42 44 Nur in Verwendung mit Optionen B52/B54 / only with options B52/54	Z	1311.4076.05		M	P
22	1	S		ED RM9_B5X RM9_B5X VAR 22 24 42 44 Ersetzt Pos. 21 / instead of pos. 21	Z	1326.6611.05		M	W
30	1	S		EV 119X119X38 67L/S 12V PWM L100 FAN 119X119X38 67L/S 12V PWM L100 Verwendet in / used in: 1311.4001.01		1304.7021.00		B	O
40	0	S		EE SYNTH9_LS SYNTH9_LS VAR 12 22 41 42 Wird ersetzt durch / is replaced by: 1311.4124.03	Z	1311.4124.02		M	O

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
45	0	S	ASY1	EE SYNTH9_LS SYNTH9_LS VAR 02 12 22 32 41 42 Wird ersetzt durch / is replaced by: 1311.4124.05	Z	1311.4124.03		M	O
47	1	S	ASY1	EE SYNTH9_LS SYNTH9_LS VAR 02 12 22 32 41 42 Nur in Verwendung mit Optionen B52/54 / only with options B52/54 Ersetzt ab ca. 09/2013 Pos. 45 / instead of old pos. 45 from 09/2013	Z	1311.4124.05		M	P
50	0	S		ED MB_NFC MB_NFC VAR 22 24 41 42 44 Wird ersetzt durch / is replaced by: 1311.4030.03	Z	1311.4030.02		M	O
60	1	S	AREFB	EE REF BOARD REF BOARD Verwendet in / used in: 1311.4001.01	Z	1311.4053.02		M	P
70	0	S		MM BW2010 5E FRONTGRIFF KPL. BW2010 5U FRONT GRIP CPL. Wird ersetzt durch / is replaced by: 1174.3981.00	Z	1174.6516.00		B	A
75	1	S		MM BW2010 5E FRONTGRIFF BW2010 5U FRONT GRIP		1174.3981.00		B	T
80	0	S		MM BW2010 5E GRIFFDECKEL BW2010 5U GRIP COVER Wird ersetzt durch / is replaced by: 1174.5378.00		1174.6997.00		B	T
85	1	S		MM ABDECKSTOPFEN CAP		1174.5378.00		B	O
86	1	S		VS SCHRAUBE M4 X 21 ISR PA SCREW M4 X 21 ISR PA Schrauben zur Montage des Frontgriff / screws to mount front handle 2 Stück pro Griff / 2 pieces per handle		1096.4996.00		B	O
100	1	S		MM BW2010 5E RUECKWANDFUSS KOMPL. BW2010 5HU REAR FOOT COMPL. Verwendet in / used in: 1311.4001.01	Z	1174.6522.00		B	T
110	1	S		HS SATA HD WITH SW ZNB LPW10 32 BIT SATA HD WITH SW ZNB LPW10 32 BIT VAR 22 24 41 42 44 62 64 72 Verwendet in / used in: 1316.2365.01	Z	1311.4299.02		M	P
111	1	S		HS SATA HD WITH SW ZNB LPW10 64 BIT SATA HD WITH SW ZNB LPW10 64 BIT VAR 22 24 41 42 44 62 64 72	Z	1311.4299.07		M	
115	1	S		HS SATA HD WITH SW ZNB LPW11 64 BIT SATA HD WITH SW ZNB LPW11 64 BIT VAR 82 84 Verwendet in / used in: 1316.2365.01	Z	1311.4299.10		M	
120	1	S	AWHEEL	EM DREHIMP. L18 (ACHSE 14) M. TASTE ROTARY PULSE ENCODER VAR 12 22 24 32 41 42 44 62 64 72 82 84 92 Verwendet in / used in: 1311.5272.01	Z	0852.2876.00		B	T

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
130	1	S	AFP	EE FRONTPANEL_ZNBC FRONTPANEL_ZNBC VAR 22 24 41 42 44 62 64 72 82 84 Verwendet in / used in: 1311.5272.01	Z	1311.4199.02		M	P
140	1	S		SF SCHALTMATTENSATZ RUBBER KEYPAD SET VAR 12 22 24 32 41 42 44 62 64 72 82 84 92 Verwendet in / used in: 1311.5272.01		1311.5866.00		B	O
150	1	S	W203	SF STBY SCHALTFOLIE PANTHER FLEX. SWITCH BOARD VAR 02 12 22 24 32 41 42 44 62 64 72 82 84 92 Verwendet in / used in: 1311.5272.01 1317.8673.01		1311.5872.00		B	O
160	1	S		MM DREHKNOPF RD30 WFA KNOB RD30 WFA VAR 12 22 24 32 41 42 44 62 64 72 82 84 92 Verwendet in / used in: 1311.5272.01		0852.0921.00		B	O
170	0	S		ZM DISPLAY MIT TOUCHSCREEN 12.1 ZOLL DISPLAY WITH TOUCHSCREEN 12.1 INCH VAR 12 22 24 41 42 44 Wird ersetzt durch / is replaced by: 1316.2759.00	Z	1311.4282.00		M	O
180	1	S	APS	NJ PSW450-S PSU 1X 450W 12.2V 37.5A AC/DC POWER SUPPLY UNIT VAR 22 24 41 42 44 62 64 72 82 84 Verwendet in / used in: 1311.4001.01	Z	1311.5920.00		B	A
190	1	S	APC	ZE LPW10 KOMPLETT MIT RW LPW10 COMPLETE WITH RW VAR 22 24 41 42 44 Verwendet in / used in: 1311.4001.01	Z	1311.5937.00		M	P
195	1	S		ZE LPW 11 KOMPLETT MIT RW LPW 11 COMPLETE WITH RW VAR 82 84 Verwendet in / used in: 1311.4001.01	Z	1326.7682.00		M	
200	1	S		EV GUMMI-MONTAGESTOPFEN RUBBER PIN Verwendet in / used in: 1311.4001.01		1316.0010.00		B	O
210	1	S		FM VERRIEGEL.BOLZEN H=5.3 LOCKING SCREW 4-40UNC H=5.3		6105.0437.00		B	O
220	1	S	XPORT	FJ KOAX-STECKVERBINDER 50 OHM N COAXIAL CONNECTOR 50 OHM SYST. N VAR 02 12 22 24 32 41 42 44 92 Verwendet in / used in: 1311.4076.01		3584.9943.00		B	O
230	1	S	X101.2 X102.2 X103.2 X104.2	FJ BU/BU SMP 10MM RF ADAPTER SMP VAR 02 12 22 32 41 42 92 Verwendet in / used in: 1311.4124.01		3588.5988.00		B	V
240	0	S		NR IPS1		1206.0330.00		B	A

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				IPS1 VAR 12 Wird ersetzt durch / is replaced by: 1206.0452.00					
250	1	S	APC	NR IPS1 MIT MSATA IPS1 WITH MSATA VAR 02 12 32 kann ersetzt werden durch IPS2 1206.3300.00 und Harddisc ZNC mit SW 64 bit 1311.4299.08 mit Frontpanel_ZNBC_CMI 1316.2688.02 mind. TAZ 02.02 / can be replaced with IPS2 1206.3300.00 + harddisc ZNC with software 64 bit 1311.4299.08 and frontpanel_ZNBC_CMI 1316.2688.02 with TAZ 02.02 (or higher)	Z	1206.0452.00		B	A
252	1	S		NR IPS2 IPS2 VAR 02 12 92		1206.3300.00		B	T
260	1	S	AMB	ED MB_IPS Mainboard with IPS Controller VAR 02 12 32 Verwendet in / used in: 1311.4001.01	Z	1316.1500.02		M	O
270	1	S		OS TYPENSCHILD ZNC3 TYPE LABEL ZNC3 VAR 12 Verwendet in / used in: 1311.4001.01		1311.4999.00		B	O
280	1	S		ZM FRONTEINHEIT ZNB FRONT UNIT ZNB VAR 12 22 32 41 42 92 Verwendet in / used in: 1311.4001.01	Z	1311.5272.02		M	P
290	1	S		OS TYPENSCHILD ZNB4 TYPE LABEL ZNB4 VAR 22 24 Verwendet in / used in: 1311.4001.01		1311.4824.00		B	O
300	1	S		OS TYPENSCHILD ZNB8 TYPE LABEL ZNB8 VAR 41 42 44 Verwendet in / used in: 1311.4001.01		1311.4818.00		B	O
305	0	S		OS HARD DISK SCHILD ZNP IPS2 64 BIT HARD DISK LABEL ZNP IPS2 64 BIT VAR 02 ZNP discontinued		1326.8014.00		M	
310	1	S		ZM FRONTEINHEIT ZNBC 4 TOR FRONT UNIT ZNBC 4 PORT VAR 24 44 Verwendet in / used in: 1311.4001.01	Z	1311.5272.04		M	P
320	1	S	APS	NJ SCHALTNETZT. AC90-264V POWER SUPPLY VAR 02 12 32 Verwendet in / used in: 1316.2888.00		3587.0218.00		B	V
330	1	S	ADISP	ZM DISPLAY MIT TOUCHSCREEN 12.1 ZOLL DISPLAY WITH TOUCHSCREEN 12.1 INCH VAR 22 24 41 42 44 62 64 72 82 84 92 Verwendet in / used in: 1311.5272.01	Z	1316.2759.00		M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
340	1	S		HS SATA HD WITH SW ZNC IPS1 32 BIT SATA HD WITH SW ZNC IPS1 32 BIT VAR 12 32 Verwendet in / used in: 1316.2365.01	Z	1311.4299.03		M	B
342	1	S		HS SATA HD WITH SW ZNC IPS2 64 BIT SATA HD WITH SW ZNC IPS2 64 BIT VAR 12 32	Z	1311.4299.08		M	P
350	1	S		ZM CHIPCARD SERVICE KIT CHIPCARD SERVICE KIT	Z	1201.5610.03		M	B
360	1	S	AFP	EE FRONTP_ZNBC_CMI FRONTP_ZNBC_CMI VAR 02 12 32 Verwendet in / used in: 1311.5272.01 1317.8673.01	Z	1316.2688.02		M	P
370	1	S	ADISP	ZM DISPLAYEINHEIT (CMI) DISPLAY UNIT (CMI) VAR 12 32 Verwendet in / used in: 1311.5272.01	Z	1316.2907.00		M	P
380	1	S	ASY2	EE SYNTH9_L SYNTH9_L VAR 24 44 Verwendet in / used in: 1311.4001.01	Z	1316.2213.02		M	P
390	0	S	ASY1	EE SYNTH9_DS SYNTH9_DS VAR 24 44 Wird ersetzt durch / is replaced by: 1319.4130.10 Verwendet in / used in: 1311.4001.01	Z	1316.2236.02		M	V
391	1	S	ASY1	EE SYNTH9_DS SYNTH9_DS VAR 24 44 Ersetzt POS. 390 / replaces pos. 390 Auch in Verwendung mit Optionen B52/B54 / also with options B52/54	Z	1319.4130.10		M	V
400	0	S		ZM FRONTEINHEIT ZNC FRONT UNIT ZNC VAR 12 32 92 Wird ersetzt durch / is replaced by: 1311.5272.02 Ab 01.2016 wird fuer die Varianten 12, 32, 92 die Fronteinheit 1311.5272.02 verwendet / from 01.2016 the Frontunit 1311.5272.02 is used for the models 12, 32, 92	Z	1311.5272.12		M	P
410	1	S	AMB	ED MB_NFC MB_NFC VAR 22 24 41 42 44 Verwendet in / used in: 1311.4001.01	Z	1311.4030.03		M	P
490	1	S	ASY1	EE SYNTH10_LS SYNTH10_LS VAR 62 72 82 Verwendet in / used in: 1311.4001.01	Z	1317.8096.02		M	A
510	1	S	ARM1 ARM2	ZE REFLEKTOMETER 40GHZ REFLECTOMETER 40GHZ VAR 72 Verwendet in / used in: 1311.4001.01	Z	1317.8015.02		M	W

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
520	1	S	AKO1 AKO2	ZE KOPPLER 44 - S COUPLER 44 - S VAR 72 Verwendet in / used in: 1311.4001.01	Z	1317.9505.02		M	P
530	1	S	AMB	ED MB_NFC MB_NFC VAR 62 64 72 82 84 Verwendet in / used in: 1311.4001.01	Z	1317.8515.02		M	P
540	1	S		OS TYPENSCHILD ZNB40 TYPE LABEL ZNB40 VAR 72 Verwendet in / used in: 1311.4001.01		1317.8796.00		B	O
550	0	S		ZM FRONTEINHEIT ZNP FRONT UNIT ZNP VAR 02 ZNP discontinued	Z	1317.8673.02		M	B
560	0	S		HS SATA HD WITH SW ZNP IPS2 64 BIT SATA HD WITH SW ZNP IPS2 64 BIT VAR 02 ZNP discontinued	Z	1311.4299.09		M	
570	1	S		ZM FRONTEINHEIT ZNBC FRONT UNIT ZNBC VAR 62 72 82 Verwendet in / used in: 1311.4001.01	Z	1311.5272.72		M	B
800	1	S		EE BIAS BIAS VAR 22 24 41 42 44 72 Option B1 BIAS TEES ist für 1311.6010.22-24-41-42-44-72 verfügbar / option B1 BIAS TEES is available for 1311.6010.22-24-41-42-44-72	Z	1311.4347.04		M	O
810	1	S		ED RM9 RM9 VAR 22 24 41 42 44 72 Wird für die Option B1 BIAS TEES benötigt / is needed in case of an B1 BIAS TEES option	Z	1311.4076.03		M	V
820	1	S		EE GPIB_ZNBC GPIB_ZNBC VAR 02 12 22 24 41 42 44 72 Option B10 GPIB ist verfügbar für 1311.6004.02-12 und 1311.6010.22-24-41-42-44-72 / option B10 GPIB is available for 1311.6004.02-12 and 1311.6010.22-24-41-42-44-72	Z	1311.4376.02		M	P
830	1	S		EE REF BOARD REF BOARD VAR 22 24 41 42 44 72 Option B81 DC-INPUTS ist verfügbar für 1311.6010.22-24-41-42-44-72 / option B81 DC-INPUTS is available for 1311.6010.22-24-41-42-44-72	Z	1311.4053.03		M	B
840	1	S		EE OCXO HIGH PERFORMANCE OCXO HIGH PERFORMANCE VAR 22 24 41 42 44 72 Option B4 OCXO FREQUENZ REFERENCE	Z	1300.3180.08		M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ist verfügbar für 1311.6010.22-24-41-42-44-72 / option B4 OCXO FREQUENZ REFERENCE is available for 1311.6010.22-24-41-42-44-72					
850	1	S		EE HANDLER_IO HANDLER_IO VAR 02 12 22 24 32 41 42 44 72 Option B14 ist verfügbar für 1311.6004.02-12 und 1311.6010.22-24-41-42-44-72 / option B14 is available for 1311.6004.02-12 and 1311.6010.22-24-41-42-44-72	Z	1311.4418.02		M	P
852	1	S		EE HANDLER_IO HANDLER_IO VAR 02 12 22 24 32 41 42 44 72 Option B14 ist verfügbar für 1311.6004.02-12 und 1311.6010.22-24-41-42-44-72 / option B14 is available for 1311.6004.02-12 and 1311.6010.22-24-41-42-44-72	Z	1311.4418.05		M	
855	1	S	ARM	ED RM9 RM9 VAR 22 24 42 44 Option B52/54 Extended Dynamik Range ist verfügbar für 1311.6010.22-24-42-44 / option B52/54 Extended Dynamik Range is available for 1311.6010.22-24-42-44	Z	1311.4076.05		M	P
860	1	S	APC	NR IPS1 MIT MSATA IPS1 WITH MSATA VAR 12 32 Wird verwendet in / used in: 1316.2888.00	Z	1206.0452.00		B	A
880	1	S		ZM FRONTEINHEIT ZNBC FRONT UNIT ZNBC VAR 64 84 Wird verwendet in / used in: 1311.4001.01	Z	1311.5272.64		M	B
890	1	S	ASY1	EE SYNTH10_DS SYNTH10_DS VAR 64 84 Wird verwendet in / used in: 1311.4001.01	Z	1317.8280.02		M	P
891	1	S		EE SYNTH10_DS_BX SYNTH10_DS_BX Nur mit B54 und in Verbindung mit Synth10_L 1317.8309.02 / only with B54 and in connection with Synth10_L 1317.8309.02	Z	1326.6905.02		M	P
900	1	S	ASY2	EE SYNTH10_L SYNTH10_L VAR 64 84 Verwendet in / used in: 1311.4001.01 & B54 in Verbindung mit Synth10_DS_BX 1326.6905.02 / & B54 in connection with Synth10_DS_BX 1326.6905.02	Z	1317.8309.02		M	P
910	1	S	ARM1 ARM2 ARM3 ARM4	ZE REFLEKTOMETER 20GHZ REFLECTOMETER 20GHZ VAR 62 64 Verwendet in / used in: 1311.4001.01	Z	1317.8809.02		M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
920	1	S		ZE RM 40 BR RM 40 BR VAR 82 84 Verwendet in / used in: 1311.4001.01	Z	1326.7876.40		M	
930	1	S	ASY1	EE SYNTH9_LS SYNTH9_LS VAR 92	Z	1311.4124.05		M	P
940	1	S	AMP	ED MB_IPS2 MB_IPS2 VAR 92	Z	1325.5605.02		M	P
950	1	S	APS	ZM PSW EINHEIT KOMPLETT PSW UNIT COMPLETE VAR 92	Z	1328.5241.00		M	G
960	1	S		HS SATA HD WITH SW ZND IPS2 64 BIT SATA HD WITH SW ZND IPS2 64 BIT VAR 92	Z	1311.4299.06		M	P
970	1	S		OS TYPENSCHILD ZND TYPE LABEL ZND VAR 92		1328.5187.00		B	O
980	1	S		EE GPIB_ZNBC GPIB_ZNBC VAR 92 Option B10 GPIB 1328.5358.02	Z	1311.4376.02		M	P
990	1	S		EE HANDLER_IO HANDLER_IO VAR 92 Option B14 Handler I/O 1328.5364.02	Z	1311.4418.02		M	P
995	1	S		EE HANDLER_IO HANDLER_IO VAR 92 Option B14 Handler I/O	Z	1311.4418.05		M	
1000	1	S		EE DIRECT CTRL DIRECT CTRL Option B12	Z	1317.8473.02		M	B
1010	1	S		GS ZN-B121 DIRECT CONTROL CABLE ZN-B121 DIRECT CONTROL CABLE Kabel für Option B12 / cable for option B12	Z	1323.9290.00		M	P
1020	1	S		EE RFFE_BOARD RFFE_BOARD Option B15	Z	1319.3840.02		M	P
1030	1	S		EE RFFE_BOARD RFFE_BOARD Option B15	Z	1319.3840.03		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=ZNP 9KHZ-6GHZ 2TOR OHNE DISPLAY +VAR02=ZNP 9KHZ-6GHZ 2PORT WITHOUT DISPLAY *VAR12=ZNC 9KHZ-3GHZ 2TOR +VAR12=ZNC 9KHZ-3GHZ 2PORT *VAR22=ZNB 9KHZ-4.5GHZ 2TOR +VAR22=ZNB 9KHZ-4.5GHZ 2PORT *VAR24=ZNB 9KHZ-4.5GHZ 4TOR +VAR24=ZNB 9KHZ-4.5GHZ 4PORT *VAR32=ZNC6 9KHZ-6GHZ 2TOR +VAR32=ZNC6 9KHZ-6GHZ 2PORT *VAR41=ZNB 9KHZ-8.5GHZ 2TOR MIT SYNTH9 VARIANTE02 +VAR41=ZNB 9KHZ-8.5GHZ 2PORT WITH SYNTH9LS VARIANT02 *VAR42=ZNB 9KHZ-8.5GHZ 2TOR +VAR42=ZNB 9KHZ-8.5GHZ 2PORT *VAR44=ZNB 9KHZ-8.5GHZ 4TOR +VAR44=ZNB 9KHZ-8.5GHZ 4PORT *VAR62=ZNB 100KHZ-20GHZ 2TOR +VAR62=ZNB 100KHZ-20GHZ 2PORT *VAR64=ZNB 100KHZ-20GHZ 4TOR +VAR64=ZNB 100KHZ-20GHZ 4PORT *VAR72=ZNB 10MHZ-40GHZ 2TOR +VAR72=ZNB 10MHZ-40GHZ 2PORT *VAR82=ZNB 100KHZ-40GHZ 2TOR +VAR82=ZNB 100KHZ-40GHZ 2PORT *VAR84=ZNB 100KHZ-40GHZ 4TOR +VAR84=ZNB 100KHZ-40GHZ 4PORT *VAR92=ZND +VAR92=ZND *VAR96=WIRD NICHT VERWENDET +VAR96=NOT USED					
10	0	S		ZS ERSATZTEILLISTE VORHANDEN SPARE PARTS LIST AVAIL 1316.0091.01		0999.9684.00		M	O
20	1	S		ZM SCHWEISSRAHMEN ZNBC WELDING-FRAME ZNBC	Z	1317.7890.00		M	P
30	4	S		MM BW2010 HALTER-FUSS BW2010 HOLDER BASE		1174.0353.00		B	T
40	4	S		VS SCHRAUBE M4 X 10 ISR PA SCREW M4 X 10 ISR PA		3586.3313.00		B	O
50	1	S		ZN LÜFTERKASTEN KOMPLETT FAN PANEL COMPLETE	Z	1317.7948.00		M	P
60	8	S		EV GUMMI-MONTAGESTOPFEN RUBBER PIN		1316.0010.00	X	B	O
70	2	S		EV 119X119X38 67L/S 12V PWM L100 FAN 119X119X38 67L/S 12V PWM L100		1304.7021.00	X	B	O
80	1	S	AMB	ED MB_NFC MB_NFC VAR 22 24 41 42 44	Z	1311.4030.03	X	M	P
90	1	S	AMB	ED MB_IPS Mainboard with IPS Controller VAR 02 12 32	Z	1316.1500.02	X	M	O
91	1	S	AMB	ED MB_IPS2 MB_IPS2 VAR 92	Z	1325.5605.02	X	M	P
100	1	S		BC SMARTCARD SLE66 V4.4 SIM FORMAT		3586.7860.00		B	A

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				SMARTCARD SLE66 V4.4 SIM FORMAT					
110	1	S	APS	NJ PSW450-S PSU 1X 450W 12.2V 37.5A AC/DC POWER SUPPLY UNIT VAR 22 24 41 42 44 62 64 72 82 84	Z	1311.5920.00	X	B	A
111	1	S	APS	ZM PSW EINHEIT KOMPLETT PSW UNIT COMPLETE VAR 92	Z	1328.5241.00	X	M	G
120	1	S		ZM XL125-IPS2 HALTERUNG KOMPL. ZNP XL125-IPS2 ASSEMBLY COMPLETE ZNP VAR 02	Z	1326.8020.03		M	
125	1	S		ZM XL125-IPS2 HALTERUNG KOMPL. ZNC XL125-IPS2 ASSEMBLY COMPLETE ZNC VAR 12 32	Z	1326.8020.02		M	
130	1	S		ZM IPS2 HALTERUNG KOMPLETT IPS2 ASSEMBLY COMPLETE VAR 92	Z	1328.5235.00		M	B
210	1	S	APC	ZE LPW10 KOMPLETT MIT RW LPW10 COMPLETE WITH RW VAR 22 24 41 42 44	Z	1311.5937.00	X	M	P
220	1	S		ZE LPW 11 KOMPLETT MIT RW LPW 11 COMPLETE WITH RW VAR 62 64 72 82 84	Z	1326.7682.00		M	
230	1	S		ZM ZNB HD UNIT KOMPLETT LPW11 64 BIT ZNB HD UNIT COMPLETE LPW11 64 BIT VAR 62 64 72 82 84	Z	1316.2365.10		M	
260	1	S	AREFB	EE REF BOARD REF BOARD	Z	1311.4053.02	X	M	P
270	0	S	ASATA	ZM ZNB HD UNIT KOMPLETT LPW10 32 BIT ZNB HD UNIT KOMPLETT LPW10 32 BIT VAR 22 24 41 42 44 62 64 72 ## ersetzt durch 1316.2365.07 ## replaced by 1316.2365.07	Z	1316.2365.02		M	P
271	1	S	ASATA	ZM ZNB HD UNIT KOMPLETT LPW10 64 BIT ZNB HD UNIT COMPLETE LPW10 64 BIT VAR 22 24 41 42 44	Z	1316.2365.07		M	
275	0	S	ASATA	ZM ZNC HD UNIT KOMPLETT IPS1 32 BIT ZNC HD UNIT KOMPLETT IPS1 32 BIT VAR 12 32 ## ersetzt durch 1316.2365.08 ## replaced by 1316.2365.08	Z	1316.2365.03		M	P
276	1	S	ASATA	ZM ZNC HD UNIT KOMPLETT IPS2 64 BIT ZNC HD UNIT COMPLETE IPS2 64 BIT VAR 12 32	Z	1316.2365.08		M	
277	1	S	ASATA	ZM ZNP HD UNIT KOMPLETT IPS2 64 BIT ZNP HD UNIT COMPLETE IPS2 64 BIT VAR 02	Z	1316.2365.09		M	
278	1	S	ASATA	ZM HD UNIT KOMPLETT ZND HD UNIT COMPLETE ZND VAR 92	Z	1328.5206.02		M	B
279	1	S		ZN BLINDPLATTE BEDRUCKT BLIND PLATE VAR 92	Z	1326.6786.00		M	P
280	1	S		ZN DUMMY BLECH GPIB OPTION BEDRUCKT DUMMY REAR PANEL GPIB	Z	1311.6210.00		M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
290	1	S		ZN DUMMY BLECH HANDLER IO BEDRUCKT DUMMY PANEL HANDLER IO	Z	1311.5743.00		M	P
300	1	S		ZN DUMMY BLECH HANDLER IO BEDRUCKT DUMMY PANEL HANDLER IO	Z	1311.5743.00		M	P
310	1	S		ZN DUMMY BLECH BIAS BEDRUCKT DUMMY REAR PANEL BIAS VAR 02 12 22 24 32 41 42 44 92	Z	1311.6356.00		M	P
320	1	S		ZN RW BLECH LUEFTER BEDRUCKT REAR PANEL FAN AREA	Z	1311.6310.00		M	P
330	1	S		FT BUCHSE UNISOLIERT 4MM SOCKET NOT ISOLATED 4MM		1316.1652.00		B	V
340	1	S		ZN RUECKWAND UNTEN BEDRUCKT REAR PANEL BOTTOM	Z	1311.6327.00		M	P
350	31	S		VS SCHRAUBE M3 X 5 ISR PA SCREW M3 X 5 ISR PA		1096.4980.00		B	O
360	1	S	ASY_CON	EE SY_CON SY_CON	Z	1311.4201.02		M	P
370	2	S		VS SCHRAUBE M3 X 5 ISR PA SCREW M3 X 5 ISR PA		1096.4980.00		B	O
380	1	S	W21	DW HF KABEL LOCAL RM2 (2TOR) HF CABLE LOCAL RM2 (2TOR) VAR 02 12 22 32 41 42 92	Z	1317.7931.00		M	B
390	1	S	W11	DW HF KABEL LOCAL RM1 (2TOR) HF CABLE LOCAL RM1 (2TOR) VAR 02 12 22 32 41 42 92	Z	1311.5114.00		M	B
400	1	S	W41	DW HF KABEL LOCAL RM4 (4TOR) HF CABLE LOCAL RM4 (4TOR) VAR 24 44	Z	1311.5089.00		M	O
410	1	S	W21	DW HF KABEL LOCAL RM2 (4TOR) HF CABLE LOCAL RM2 (4TOR) VAR 24 44	Z	1311.5066.00		M	P
420	1	S	W31	DW HF KABEL LOCAL RM3 (4TOR) HF CABLE LOCAL RM3 (4TOR) VAR 24 44	Z	1311.5072.00		M	P
430	1	S	W11	DW HF KABEL LOCAL RM1 (4TOR) HF CABLE LOCAL RM1 (4TOR) VAR 24 44	Z	1311.5050.00		M	P
440	1	S	W40	DW HF KABEL SOURCE RM4 (4TOR) HF CABLE SOURCE RM4 (4TOR) VAR 24 44	Z	1311.5043.00		M	P
450	1	S	W30	DW HF KABEL SOURCE RM3 (4TOR) HF CABLE SOURCE RM3 (4TOR) VAR 24 44	Z	1311.5037.00		M	P
460	1	S	W20	DW HF KABEL SOURCE RM2 (2-4TOR) HF CABLE SOURCE RM2 (2-4TOR) VAR 02 12 22 24 32 41 42 44 92	Z	1311.5020.00		M	B
470	1	S	W10	DW HF KABEL SOURCE RM1 (2-4TOR) HF CABLE SOURCE RM1 (2-4TOR) VAR 02 12 22 24 32 41 42 44 92	Z	1311.5014.00		M	B
480	1	S		ZM RM AUFLAGE INKL. KÜHLTURM 2-TOR RM SUPPORT INCL COOLING TOWER 2-TOR	Z	1317.8709.04		M	O

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				VAR 02 12 22 32 41 42 62 82 92					
483	1	S		MZ BEFESTIGUNG KUEHLER 2/4 TOR CLAMPING COOLING 2/4 PORT VAR 02 12 22 24 32 41 42 44 62 64 82 84 92		1317.7902.00		M	P
485	1	S		ZM RM AUFLAGE INKL. KÜHLTURM 4-TOR RM SUPPORT INCL COOLING TOWER 4-TOR VAR 24 44 64 84	Z	1317.8709.05		M	P
490	2	S	W101 W102	DY DATENKABEL W4 DATA CABLE W4	Z	1300.2783.00		M	P
500	2	S	W103 W104	DY DATENKABEL W4 DATA CABLE W4 VAR 24 44 64 84	Z	1300.2783.00		M	P
510	2	S	ARM1 ARM2	ED RM9 RM9 VAR 02 12 22 24 32 41 42 44	Z	1311.4076.02	X	M	A
511	2	S	ARM1 ARM2	ED RM9_B5X RM9_B5X VAR 92	Z	1326.6611.05	X	M	W
515	2	S		FJ SCHUTZKAPPE F. N-BU / BNC-ST CAP VAR 02 12 22 24 32 41 42 44 92		0092.6375.00		B	O
520	2	S	ARM3 ARM4	ED RM9 RM9 VAR 24 44	Z	1311.4076.02	X	M	A
525	2	S		FJ SCHUTZKAPPE F. N-BU / BNC-ST CAP VAR 24 44		0092.6375.00		B	O
530	6	S		VS 6900/ISR M3.0 X 25 A2 COMBI SCREW 6900/ISR M3.0 X 25 A2 VAR 02 12 22 24 32 41 42 44		2101.1840.00		B	O
540	6	S		VS 6900/ISR M3.0 X 25 A2 COMBI SCREW 6900/ISR M3.0 X 25 A2 VAR 24 44		2101.1840.00		B	O
550	4	S		VS 6900/ISR M4 X 12 A2 COMBI SCREW 6900/ISR M4 X 12 A2		3584.1020.00		B	O
555	1	S	ASY1	EE SYNTH9_LS SYNTH9_LS VAR 41	Z	1311.4124.02		M	O
560	1	S	ASY1	EE SYNTH9_LS SYNTH9_LS VAR 02 12 22 32 42 92	Z	1311.4124.05	X	M	P
570	1	S	ASY1	EE SYNTH9_DS SYNTH9_DS VAR 24 44	Z	1319.4130.10	X	M	V
580	1	S	ASY2	EE SYNTH9_L SYNTH9_L VAR 24 44	Z	1316.2213.02	X	M	P
600	1	S		ZM FRONTEINHEIT ZNB FRONT UNIT ZNB VAR 12 22 32 41 42 92	Z	1311.5272.02	X	M	P
610	1	S		ZM FRONTEINHEIT ZNBC 4 TOR	Z	1311.5272.04	X	M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				FRONT UNIT ZNBC 4 PORT VAR 24 44					
615	1	S		ZM FRONTEINHEIT ZNP FRONT UNIT ZNP VAR 02	Z	1317.8673.02	X	M	B
620	1	S		OS TYPENSCHILD ZNC3 TYPE LABEL ZNC3 VAR 12		1311.4999.00	X	B	O
625	1	S		OS TYPENSCHILD ZNC6 TYPE LABEL ZNC6 VAR 32		1317.9034.00		B	O
630	1	S		OS TYPENSCHILD ZNB4 TYPE LABEL ZNB4 VAR 22 24		1311.4824.00	X	B	O
640	1	S		OS TYPENSCHILD ZNB8 TYPE LABEL ZNB8 VAR 41 42 44		1311.4818.00	X	B	O
645	1	S		OS TYPENSCHILD ZND TYPE LABEL ZND VAR 92		1328.5187.00	X	B	O
650	4	S		VS 6900/ISR M4 X 12 A2 COMBI SCREW 6900/ISR M4 X 12 A2		3584.1020.00		B	O
700	2	S		MM BW2010 5E FRONTGRIFF BW2010 5U FRONT GRIP		1174.3981.00	X	B	T
705	4	S		ZN STUETZLEISTE SUPPORT RAIL		1317.8467.00		M	P
706	8	S		VS SCHRAUBE M3 X 5 ISR PA SCREW M3 X 5 ISR PA		1096.4980.00		B	O
710	2	S		MM ABDECKSTOPFEN CAP		1174.5378.00	X	B	O
720	4	S		VS SCHRAUBE M4 X 20 ISR PA SCREW M4 X 20 ISR PA		1096.5005.00		B	O
730	2	S		KN BW2010 5E T300 SEITENTEIL LINKS BW2010 5U D300 SIDE PANEL LEFT		1176.3650.00		M	P
740	1	S		ZN ABDECKUNG OBEN MIT LEITSCHAUM COVER TOP INCL CONDUCTIVE FOAM	Z	1316.2794.00		M	B
750	1	S		ZN ABDECKUNG UNTEN MIT LEITSCHAUM COVER BOTTOM INCL CONDUCTIVE FOAM	Z	1316.2807.00		M	P
760	2	S		MM BW2010 5E RUECKWANDFUSS KOMPL. BW2010 5HU REAR FOOT COMPL.	Z	1174.6522.00	X	B	T
790	4	S		MM BW2010 3E ABDECKUNG TRAGEGRIFF BW2010 3E COVER HANDLE	Z	1174.6397.00		B	T
800	2	S		MM BW2010 3E TRAGEGRIFF T300 BW2010 3E HANDLE T300	Z	1174.6297.00		B	T
900	1	S		HS WINDOWS EMBEDDED STANDARD 7 WS7E WINDOWS EMBEDDED STANDARD 7 WS7E		3586.9834.00		B	T
950	1	S		ZB ZUBEHÖR ZNB ACCESSORIES ZNB VAR 22 24 41 42 44 62 64 72 82 84	Z	1316.0085.00		M	O

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
960	1	S		ZB ZUBEHÖR ZNC ACCESSORIES ZNC VAR 12 32	Z	1316.2413.00		M	
970	1	S		ZB ZUBEHÖR ZNP ACCESSORIES ZNP VAR 02	Z	1317.8850.00		M	
980	1	S		ZB ZUBEHÖR ZND ACCESSORIES ZND VAR 92	Z	1328.5193.00		M	V
1000	1	S		OS KCC-SCHILD KCC-LABEL		1317.8609.00		M	P
1100	1	S	AMB	ED MB_NFC MB_NFC VAR 62 64 72 82 84	Z	1317.8515.02	X	M	P
1110	1	S		MF RM AUFLAGE ZNB40 RM SUPPORT ZNB40 VAR 72		1317.8215.00		M	P
1120	2	S		MZ INLAY RM AUFLAGE ZNB40 INLAY RM SUPPORT ZNB40 VAR 72		1317.8238.00		M	P
1130	2	S	ARM1 ARM2	ZE REFLEKTOMETER 40GHZ REFLECTOMETER 40GHZ VAR 72	Z	1317.8015.02	X	M	W
1140	10	S		VS 6900/ISR M2.5 X 25 A2 COMBI SCREW 6900/ISR M2.5 X 25 A2 VAR 62 64 72 82 84		3584.5502.00		B	O
1145	10	S		VS 6900/ISR M2.5 X 25 A2 COMBI SCREW 6900/ISR M2.5 X 25 A2 VAR 64 84		3584.5502.00		B	O
1150	1	S		DW HF KABEL LOCAL RM1 RF CABLE LOCAL RM1 VAR 72	Z	1317.8050.00		M	W
1160	1	S		DW HF KABEL SOURCE RM1 RF CABLE SOURCE RM1 VAR 72	Z	1317.8196.00		M	P
1170	1	S		DW HF KABEL LOCAL RM2 RF CABLE LOCAL RM2 VAR 72	Z	1317.8044.00		M	P
1180	1	S		DW HF KABEL SOURCE RM2 RF CABLE SOURCE RM2 VAR 72	Z	1317.8180.00		M	P
1190	2	S		DW HF KABEL GEN RF CABLE GEN VAR 72	Z	1317.8150.00		M	P
1200	2	S		DW HF KABEL MEAS RF CABLE MEAS VAR 72	Z	1317.8144.00		M	P
1210	2	S		DW HF KABEL REF RF CABLE REF VAR 72	Z	1317.8138.00		M	P
1220	2	S	AKO1 AKO2	ZE KOPPLER 44 - S COUPLER 44 - S VAR 72	Z	1317.9505.02	X	M	P
1230	6	S		VS 6900/ISR M2.5 X 10 A2 COMBI SCREW 6900/ISR M2.5 X 10 A2		0041.1660.00		B	T

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				VAR 72					
1240	1	S		ZM FRONTEINHEIT ZNBC FRONT UNIT ZNBC VAR 62 72 82	Z	1311.5272.72	X	M	B
1245	1	S		ZM FRONTEINHEIT ZNBC FRONT UNIT ZNBC VAR 64 84	Z	1311.5272.64	X	M	B
1250	1	S	ASY1	EE SYNTH10_LS SYNTH10_LS VAR 62 72 82	Z	1317.8096.02	X	M	A
1260	1	S		OS TYPENSCHILD ZNB40 TYPE LABEL ZNB40 VAR 72		1317.8796.00	X	B	O
1270	1	S		MZ ABDECKUNG ZWISCHENBODEN COVER VAR 72		1317.9192.00		M	P
1280	3	S		VS SCHRAUBE M3 X 5 ISR PA SCREW M3 X 5 ISR PA VAR 72		1096.4980.00		B	O
1300	1	S	ABIAS	EE BIAS BIAS VAR 62 64 72 82 84	Z	1311.4347.04		M	O
1410	2	S	ARM1 ARM2	ZE REFLEKTOMETER 20GHZ REFLECTOMETER 20GHZ VAR 62 64	Z	1317.8809.02	X	M	P
1415	2	S	ARM3 ARM4	ZE REFLEKTOMETER 20GHZ REFLECTOMETER 20GHZ VAR 64	Z	1317.8809.02	X	M	P
1420	1	S		DW HF KABEL LOCAL RM1 (2TOR) HF CABLE LOCAL RM1 (2TOR) VAR 62	Z	1317.9005.00		M	P
1430	1	S		DW HF KABEL SOURCE RM1 (2-4TOR) HF CABLE SOURCE RM1 (2-4TOR) VAR 62 64	Z	1317.9092.00		M	P
1440	1	S		DW HF KABEL LOCAL RM2 (2TOR) HF CABLE LOCAL RM2 (2TOR) VAR 62	Z	1317.8996.00		M	W
1450	1	S		DW HF KABEL SOURCE RM2 (2-4TOR) HF CABLE SOURCE RM2 (2-4TOR) VAR 62 64	Z	1317.9086.00		M	P
1460	1	S		OS TYPENSCHILD ZNB20 TYPE LABEL ZNB20 VAR 62 64		1317.8780.00		B	O
1470	1	S		DW HF KABEL LOCAL RM1 (4TOR) HF CABLE LOCAL RM1 (4TOR) VAR 64	Z	1317.9011.00		M	P
1480	1	S		DW HF KABEL LOCAL RM2 (4TOR) HF CABLE LOCAL RM2 (4TOR) VAR 64	Z	1317.9028.00		M	P
1490	1	S		DW HF KABEL LOCAL RM3 (4TOR) HF CABLE LOCAL RM3 (4TOR) VAR 64	Z	1317.9040.00		M	O
1500	1	S		DW HF KABEL LOCAL RM4 (4TOR) HF CABLE LOCAL RM4 (4TOR) VAR 64	Z	1317.9057.00		M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
1510	1	S		DW HF KABEL SOURCE RM3 (4TOR) HF CABLE SOURCE RM3 (4TOR) VAR 64	Z	1317.9070.00		M	P
1520	1	S		DW HF KABEL SOURCE RM4 (4TOR) HF CABLE SOURCE RM4 (4TOR) VAR 64	Z	1317.9063.00		M	P
1530	1	S	ASY1	EE SYNTH10_DS SYNTH10_DS VAR 64 84	Z	1317.8280.02	X	M	P
1540	1	S	ASY2	EE SYNTH10_L SYNTH10_L VAR 64 84	Z	1317.8309.02	X	M	P
1550	2	S		FJ SCHUTZKAPPE F. N-STECK. PROTECTION CAP VAR 62 72 82		0114.1770.00		B	V
1560	4	S		FJ SCHUTZKAPPE F. N-STECK. PROTECTION CAP VAR 64 84		0114.1770.00		B	V
1610	2	S		ZE RM 40 BR RM 40 BR VAR 82 84	Z	1326.7876.40		M	
1611	2	S		MZ LEITSCHAUM RM40 SHIELDING RM40 VAR 82 84	Z	1317.9205.00		M	P
1615	2	S		ZE RM 40 BR RM 40 BR VAR 84	Z	1326.7876.40		M	
1616	2	S		MZ LEITSCHAUM RM40 SHIELDING RM40 VAR 84	Z	1317.9205.00		M	P
1620	1	S		DW HF KABEL LOCAL RM1 (2TOR) HF CABLE LOCAL RM1 (2TOR) VAR 82	Z	1326.7918.00		M	
1630	1	S		DW HF KABEL SOURCE RM1 (2-4TOR) HF CABLE SOURCE RM1 (2-4TOR) VAR 82 84	Z	1326.7999.00		M	
1640	1	S		DW HF KABEL LOCAL RM2 (2TOR) HF CABLE LOCAL RM2 (2TOR) VAR 82	Z	1326.7901.00		M	
1650	1	S		DW HF KABEL SOURCE RM2 (2-4TOR) HF CABLE SOURCE RM2 (2-4TOR) VAR 82 84	Z	1326.7982.00		M	
1660	1	S		OS TYPENSCHILD ZNB40 BR TYPE LABEL ZNB40 BR VAR 82 84		1323.9532.00		B	O
1670	1	S		DW HF KABEL LOCAL RM1 (4TOR) HF CABLE LOCAL RM1 (4TOR) VAR 84	Z	1326.7924.00		M	
1680	1	S		DW HF KABEL LOCAL RM2 (4TOR) HF CABLE LOCAL RM2 (4TOR) VAR 84	Z	1326.7930.00		M	
1690	1	S		DW HF KABEL LOCAL RM3 (4TOR) HF CABLE LOCAL RM3 (4TOR) VAR 84	Z	1326.7947.00		M	
1700	1	S		DW HF KABEL LOCAL RM4 (4TOR) HF CABLE LOCAL RM4 (4TOR)	Z	1326.7953.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				VAR 84					
1710	1	S		DW HF KABEL SOURCE RM3 (4TOR) HF CABLE SOURCE RM3 (4TOR) VAR 84	Z	1326.7976.00		M	
1720	1	S		DW HF KABEL SOURCE RM4 (4TOR) HF CABLE SOURCE RM4 (4TOR) VAR 84	Z	1326.7960.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD					
20	1	S		ZM HD HALTERUNG HOLDER HARDDISK	Z	1311.5950.00		M	V
30	1	S		HS SATA HARDDISK M. SOFTWARE ZNBC SATA HARDDISK WITH SOFTWARE ZNBC	Z	1311.4299.02	X	M	
40	2	S		MP HARDDISKHALTER 2.5 HOLDER		1201.8161.00		B	O
50	1	S		FP SATA ADAPTER VERSCHLEISSFREI SATA ADAPTOR		1308.0280.00		B	B
60	2	S		MB SPEZIALSCHRAUBE M3 SPECIAL SCREW M3		1304.9199.00		M	B

ROHDE&SCHWARZ

PANTHER

Benennung/*Designation*
HD UNIT KOMPLETT
HD UNIT COMPLETE

Datum/*Date* 2010-11-17 | Abt./*Dept.* 1ESK | Name/*Name* RN

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Dokument Nr. / Document No.
1311.5943.00 *ST*

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=FRONTEINHEIT 2-TOR MIT OPTREX DISPLAY +VAR02=FRONT UNIT 2-PORT WITH OPTREX DISPLAY *VAR04=FRONTEINHEIT 4-TOR MIT OPTREX DISPLAY +VAR04=FRONT UNIT 4-PORT WITH OPTREX DISPLAY *VAR12=FRONTEINHEIT 2-TOR MIT CMI DISPLAY +VAR12=FRONT UNIT 2-PORT WITH CMI DISPLAY *VAR14=FRONTEINHEIT 4-TOR MIT CMI DISPLAY +VAR14=FRONT UNIT 4-PORT WITH CMI DISPLAY *VAR22=ZNB4 2-TOR +VAR22=ZNB4 2-PORT *VAR24=ZNB4 4-TOR +VAR24=ZNB4 4-PORT *VAR42=ZNB8 2-TOR +VAR42=ZNB8 2-PORT *VAR44=ZNB8 4-TOR +VAR44=ZNB8 4-PORT *VAR62=FRONTEINHEIT 2-TOR ZNB20 +VAR62=FRONT UNIT 2-PORT ZNB20 *VAR64=FRONTEINHEIT 4-TOR ZNB20 +VAR64=FRONT UNIT 4-PORT ZNB20 *VAR72=FRONTEINHEIT 2-TOR ZNB40 +VAR72=FRONT UNIT 2-PORT ZNB40					
10	1	S		MZ MONTAGEWANNE MOUNTING PANEL VAR 02 04 12 14	Z	1316.2988.00		M	P
15	1	S		MZ MONTAGEWANNE ZNB40 MOUNTING PANEL ZNB40 VAR 62 64 72	Z	1317.8080.00		M	P
20	2	S		MM BW2010 RAHMENTEIL 1/1 BW2010 FRAME 1/1		1174.1014.00		B	T
30	1	S		KB ZNBC 2-TOR FRONTHAUBE BEDRUCKT ZNBC 2-PORT FRONT COVER VAR 02 12	Z	1311.4924.00		M	P
35	1	S		KB FRONTPLATTE ZNB20/40 2-TOR BEDRUCKT FRONT COVER ZNB20/40 2-TOR PRINTED VAR 62 72	Z	1317.8896.00		M	P
40	1	S		KB ZNBC 4-TOR FRONTHAUBE BEDRUCKT ZNBC 4-TOR FRONT COVER VAR 04 14	Z	1311.4930.00		M	P
42	1	S		KB FRONTPLATTE ZNB20 4-TOR BEDRUCKT FRONT COVER ZNB20 4-TOR PRINTED VAR 64	Z	1317.8909.00		M	P
45	2	S		VS SCHRAUBE F.KUST 2.0 X 5 A2 DELTA PT SCREW WN5451 20 X 5 A2		1148.3207.00		B	O
46	2	S		MB ABSTANDSÄULE 4.5 STANDOFF 4.5		1316.1846.00		M	P
50	1	S		SF SCHALTMATTENSATZ RUBBER KEYPAD SET		1311.5866.00	X	B	B

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
60	1	S	AFP	EE FRONTPANEL_ZNBC FRONTPANEL_ZNBC VAR 02 04 62 64 72	Z	1311.4199.02	X	M	P
65	1	S	AFP	EE FRONTP_ZNBC_CMI FRONTP_ZNBC_CMI VAR 12 14	Z	1316.2688.02	X	M	P
70	10	S		VS 6900/ISR M2.5 X 6 A2 COMBI SCREW 6900/ISR M2.5 X 6 A2		1148.3059.00		B	T
80	1	S	W203	SF STBY SCHALTFOLIE PANTHER FLEX. SWITCH BOARD		1311.5872.00	X	B	B
90	1	S		MZ STANDBY HALTEBLECH STANDBY MOUNTING SHEET		1311.5814.00		M	P
100	3	S		VS 6900/ISR M2.5 X 6 A2 COMBI SCREW 6900/ISR M2.5 X 6 A2		1148.3059.00		B	T
110	1	S	AWHEEL	EM DREHIMP. L18 (ACHSE 14) M. TASTE ROTARY PULSE ENCODER		0852.2876.00	X	B	T
115	1	S		VS M10 X 0.75 MUTTER PA STOP M10 X 0.75 NUT PA STOP		1316.0033.00		B	B
120	1	S	W202	DF FLEX STRIP 10P R0.5 L55 FLEX STRIP 10POL R0.5 L55		1311.4276.00		B	B
125	1	S		ZM HALTERUNG DICHTPROFIL GEKLEBT HOLDER SHIELDING	Z	1316.2271.00		M	P
126	2	S		VS 6900/ISR M2.5 X 6 A2 COMBI SCREW 6900/ISR M2.5 X 6 A2		1148.3059.00		B	T
130	1	S		MM DREHKNOPF RD30 WFA KNOB RD30 WFA		0852.0921.00	X	B	B
140	1	S	ADISP	ZM DISPLAY MIT TOUCHSCREEN 12.1 ZOLL DISPLAY WITH TOUCHSCREEN 12.1 INCH VAR 02 04 62 64 72	Z	1316.2759.00	X	M	P
150	1	S	ADISP	ZM DISPLAYEINHEIT (CMI) DISPLAY UNIT (CMI) VAR 12 14	Z	1316.2907.00	X	M	P
160	4	S		VS 7985/ISR M3 X 5 A4 SCREW 7985/ISR M3 X 5 A4 VAR 02 04 62 64 72 mit Loctite 222 sichern		6124.0468.00		B	B
165	4	S		VS 7985/ISR M2.5 X 4 A4 PA 7985/ISR M2.5 X 4 A4 PA VAR 12 14		1148.2717.00		B	T
166	4	S		VS DIN125 A2.7 A4 WASHER DIN125 VAR 12 14		0082.4663.00		B	V
170	2	S		DZ MINI. KABELHALTER 11.9X12.7X13.4 MINI. CABLE HOLDER 11.9X12.7X13.4		3587.6945.00		B	B
180	1	S	W200	DF DISPLAYKABEL 20P DISPLAY CABLE 20 WIRE VAR 02 04 62 64 72		1316.0027.00		B	B
185	1	S	W200	DF DISPLAY KABEL 30 P DISPLAY CABLE 30 POLE VAR 12 14		1316.2665.00		B	B
190	1	S	W201	DF DISPLAY 6P BACKLIGHT KABEL DISPLAY 6P BACKLIGHT CABLE VAR 02 04 62 64 72		1311.5150.00		B	B

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
200	1	S		OS EINLEGESCHILD TASTATUR ZNBC INLAYLABEL KEYBOARD ZNBC		1311.5008.00		B	B
210	1	S	W105	DY DATENKABEL W4 DATA CABLE W4 VAR 02 04 14 22 24 42 44 62 64 72	Z	1300.2783.00		M	P
220	1	S		DY KABEL FRONTEINHEIT W120 CABLE FRONT CON W120 VAR 12	Z	1318.8119.00		M	P

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=BIAS TEES FÜR 2 TOR MOD02=BIAS TEES FOR 2 PORT VAR04=BIAS TEES FÜR 4 PORTS MOD04=BIAS TEES FOR 4 PORT					
20	1	S	ABIAS	EE BIAS BIAS	Z	1311.4347.04	X	M	L
30	1	S		PI EINBAUANWEISUNG ZNB BIAS OPTION ASSEMBLY INSTRUCTION ZNB BIAS OPTION		1316.1798.00		M	P
40	1	S		PD STD SICHERHEITSHW BROSCHÜRE A4 EN ES STD SAFETY INSTR. BOOKLET A4 EN ES DE FR	Z	1171.0100.42		M	P
50	2	S	ARM9	ED RM9 RM9 VAR 02	Z	1311.4076.03	X	M	W
60	4	S	ARM9	ED RM9 RM9 VAR 04	Z	1311.4076.03	X	M	W
70	1	S		OS TYPENSCHILD ZNB8 TYPE LABEL ZNB8		1317.8773.00		B	B
80	1	S		OS TYPENSCHILD ZNB4 TYPE LABEL ZNB4		1317.8767.00		B	B

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	0	S		PH BEMERKUNG NOTE Keycodefreischaltung nach TVR320 und anschliessender Kennlinienaufnahme mit Software Tool ZNBC-Service		0999.9610.00		B	O
30	1	S		PI INSTALLATIONSANW. ZNBC-B2X AND B3X INSTALL. INSTRUCTIONS ZNBCB2X AND B3X		1316.1698.00		M	G

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	1	S		EE OCXO HIGH PERFORMANCE OCXO HIGH PERFORMANCE	Z	1300.3180.08		M	
30	1	S		PD EINBAUANWEISUNG ZNB-B4 OCXO OPTION ASSEMBLY INSTRUCTION ZNB-B4 OCXO OPT.I		1316.1800.00		M	
40	1	S		PD STD SICHERHEITSHW BROSCHÜRE A4 EN ES STD SAFETY INSTR. BOOKLET A4 EN ES DE FR	Z	1171.0100.42		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	1	S		EE GPIB_ZNBC GPIB_ZNBC	Z	1311.4376.02		M	
30	1	S		PD STD SICHERHEITSHW BROSCHÜRE A4 EN ES STD SAFETY INSTR. BOOKLET A4 EN ES DE FR	Z	1171.0100.42		M	
40	1	S		PD EINBAUANWEISUNG ZNBC-B10 ASSEMBLY INSTRUCTION ZNBC-B10		1316.0140.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=GRUNDVARIANTE +VAR02=BASIC MODEL					
20	1	S		ZM ZN-B12 DEVICE CONTROL ZN-B12 DEVICE CONTROL	Z	1319.5113.00		M	L
30	1	S		PI EINBAUANWEISUNG B12 ASSEMBLY INSTRUCTION B12		1325.5763.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=GRUNDVARIANTE +VAR02=BASIC MODEL *VAR05=VARIANTE MIT 5V +VAR05=MODEL WITH 5V					
20	1	S		EE HANDLER_IO HANDLER_IO VAR 02	Z	1311.4418.02		M	P
25	1	S		EE HANDLER_IO HANDLER_IO VAR 05	Z	1311.4418.05		M	
30	1	S		PD SICHERHEITSHW BROSCHÜRE A4 EN ES SAFETY INSTR. BOOKLET A4 EN ES DE FR	Z	1171.0100.42		M	
40	1	S		PI EINBAUANWEISUNG ZN-B14 ASSEMBLY INSTRUCTION ZN-B14		1316.2465.00		M	P

ROHDE&SCHWARZ

ZN-B14

Benennung/*Designation*
ZN-B14 HANDLER I/O
ZN-B14 HANDLER I/O

Datum/*Date* 2015-10-23 | Abt./*Dept.* 1ENK | Name/*Name* KK

Sprach./Lang	Ä.I. / *C.I*	Blatt/Sheet
de en	02.00	1 of 1

Dokument Nr. / Document No.
1316.2459.01 *ST*

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=GRUNDVARIANTE +VAR02=BASIC MODEL *VAR03=MIT AD-CONVERTER +VAR03=WITH AD-CONVERTER					
5	0	S		ZS ERSATZTEILLISTE VORHANDEN SPARE PARTS LIST AVAIL 1326.6992.01		0999.9684.00		M	O
20	1	S	ARFFE	EE RFFE_BOARD RFFE_BOARD VAR 02	Z	1319.3840.02	X	M	P
25	1	S	ARFFE	EE RFFE_BOARD RFFE_BOARD VAR 03	Z	1319.3840.03	X	M	
30	1	S		PD SICHERHEITSHW BROSCHÜRE A4 EN ES SAFETY INSTR. BOOKLET A4 EN ES DE FR	Z	1171.0100.42		M	
40	1	S		PI EINBAUANWEISUNG ZN-B15 RFFE ASSEMBLY INSTRUCTION ZN-B15 RFFE		1325.5692.00		M	P
50	1	S		GM ZN-Z25 RFFE CABLE WITH ADAPTORS ZN-Z25 RFFE CABLE WITH ADAPTORS	Z	1334.3424.02	X	M	

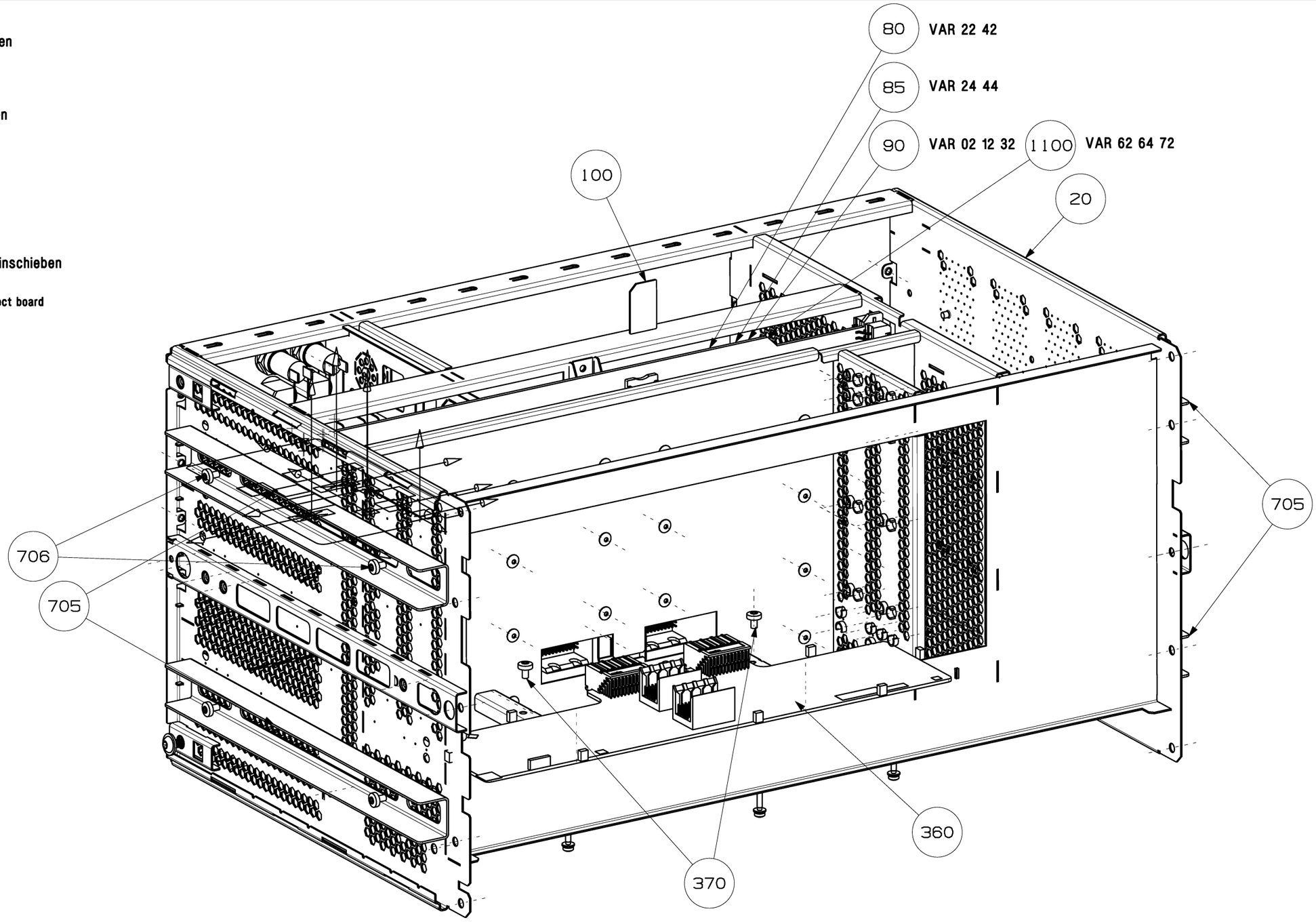
Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	1	S		EE REF BOARD REF BOARD	Z	1311.4053.03		M	
30	1	S		PD STD SICHERHEITSHW BROSCHÜRE A4 EN ES STD SAFETY INSTR. BOOKLET A4 EN ES DE FR	Z	1171.0100.42		M	
40	1	S		PD EINBAUANWEISUNG ZNB-B81 ASSEMBLY INSTRUCTION ZNB-B81		1316.0256.00		M	

- Stuezleisten anschrauben
  - mount support sheets

- Motherboard einschieben
  - insert motherboard

- SIM Karte einstecken
  - insert SIM Card

- Synth Connect Board einschieben und verschrauben
  - insert and screw synth connect board



NX

Projektions-methode

Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* ZNBC VECTOR NETWORK ANALYZER ZNBC VECTOR NETWORK ANALYZER			Sprache / *Lang.* de en	Äei. / *C.I.* 10.00	Blatt / *Sh.* 1
ZNBC	Datum *Date* 02.11.2012	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

- Montage der Festmantelverkabelung
- mount solid cables

Verkabelung VAR 72 siehe D7, VAR 62 64 siehe D8
Cabeling VAR 72 see D7, VAR 62 64 see D8

- Montage der RM Auflage inkl. Kuehltuerme noch nicht festschrauben!
- place RM support plate inkl. cooling towers, do not fix yet !

- Montage der Fronteinheit
- mount Front Unit

VAR 72 siehe D7, VAR 62 64 siehe D8
VAR 72 see D7, VAR 62 64 see D8

- Verschrauben der Reflektometer mit der RM Auflage
- screw Reflectometer with RM support plate

- Befestigung der RM Auflage
- mount RM support plate

- Festmantelkabel mit Reflektometer verbinden
- connect solid cables and reflectometer

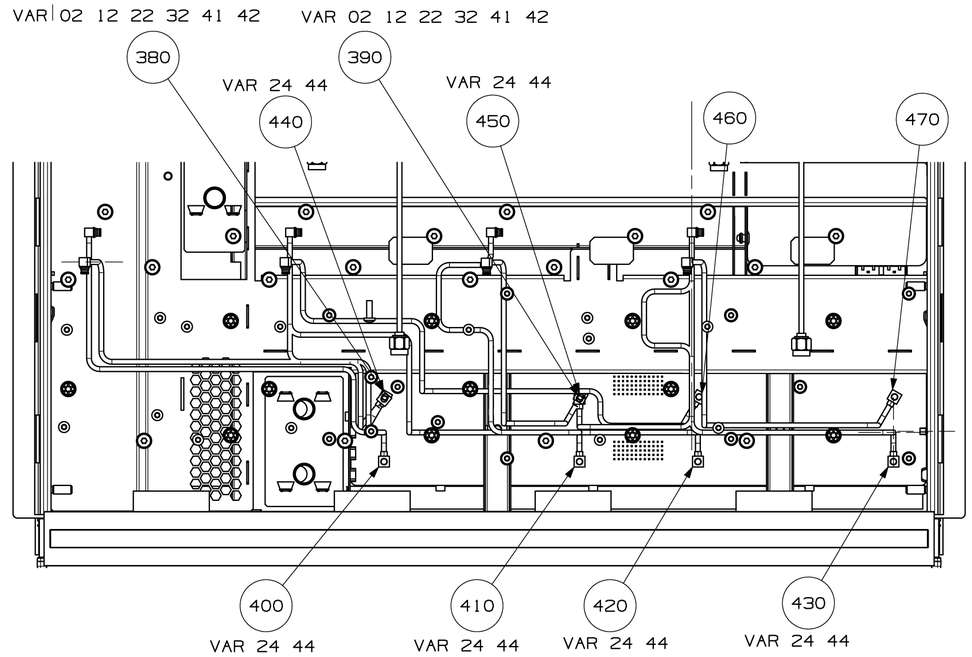
- Flachbandkabel Motherboard – Refelektometer verbinden
- connect flat cables motherboard – reflectometer

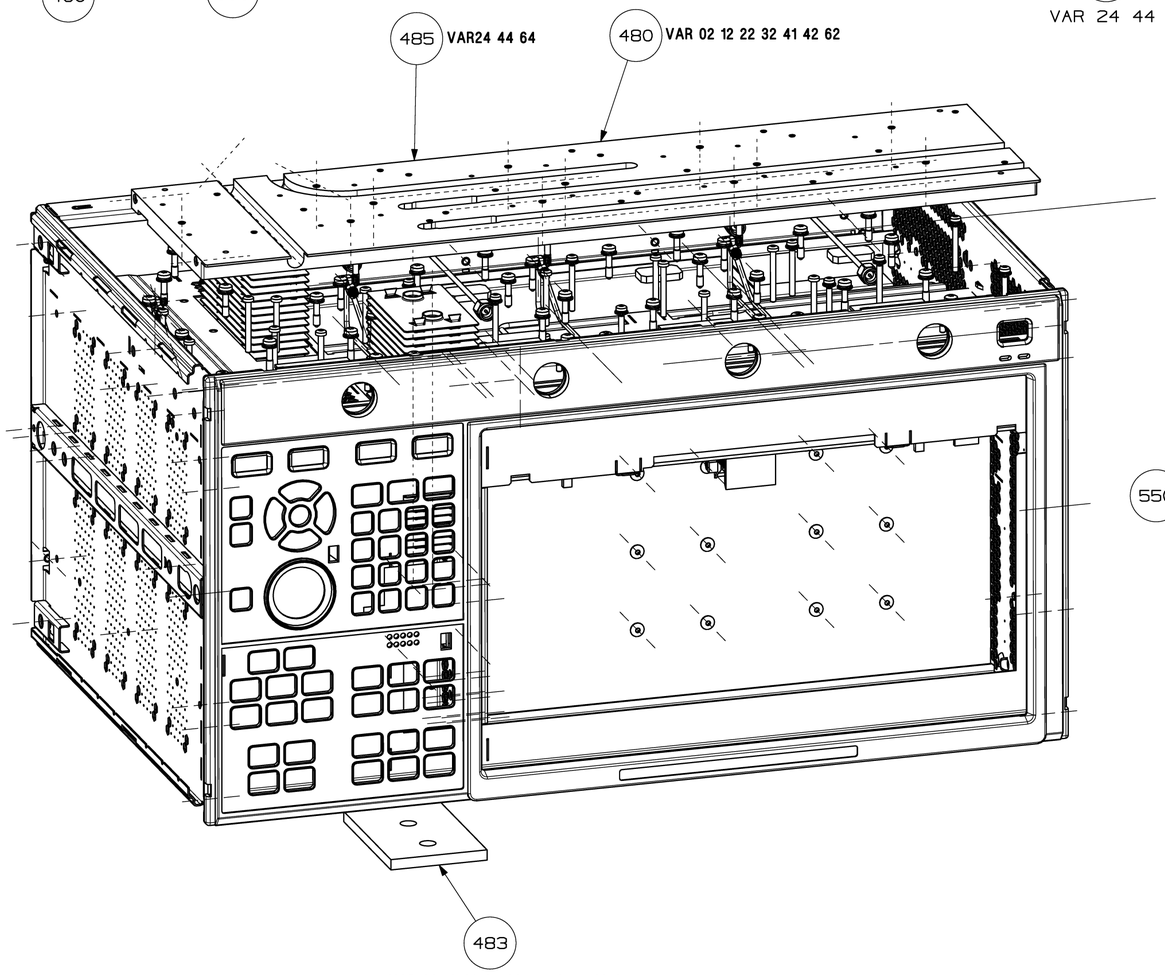
VAR 02 12 22 32 42 62

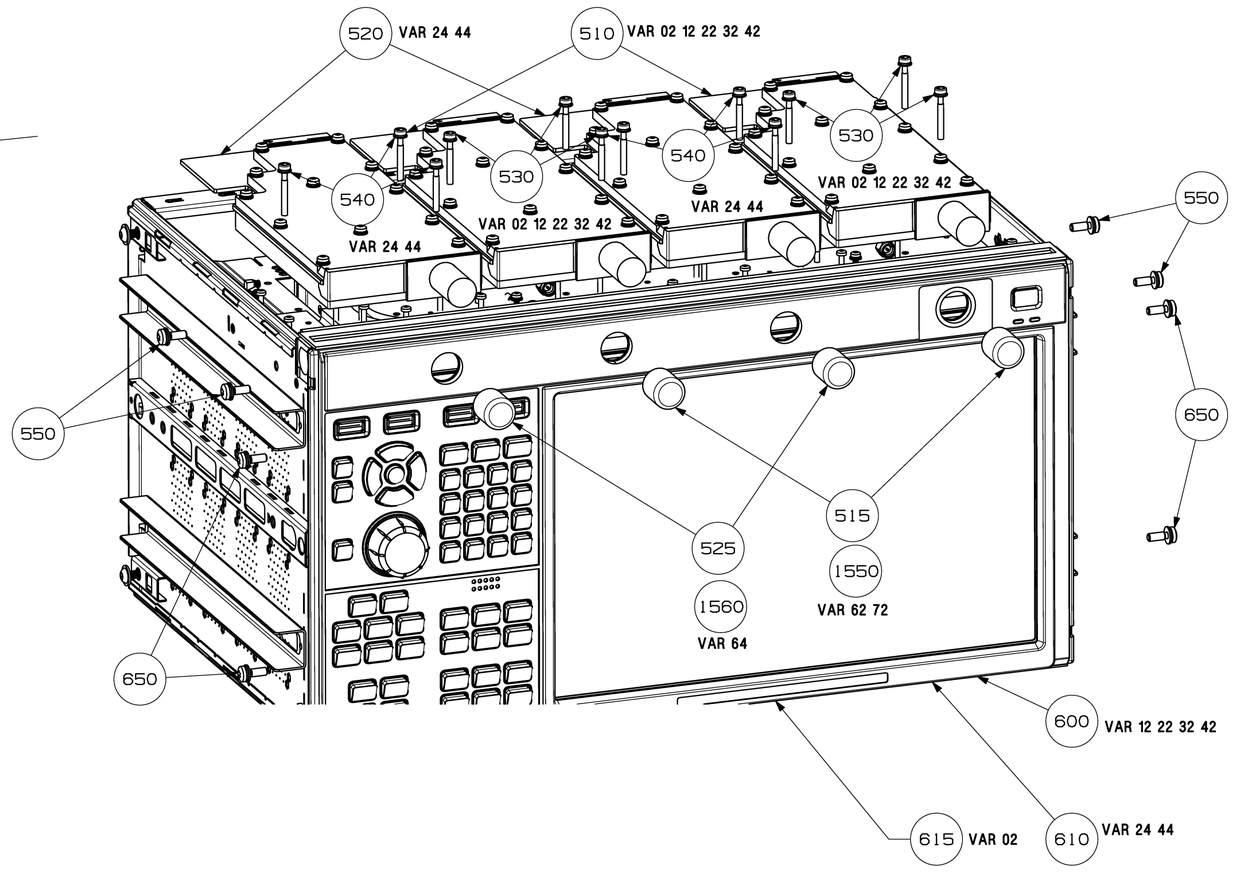
490

VAR 24 44 64

500





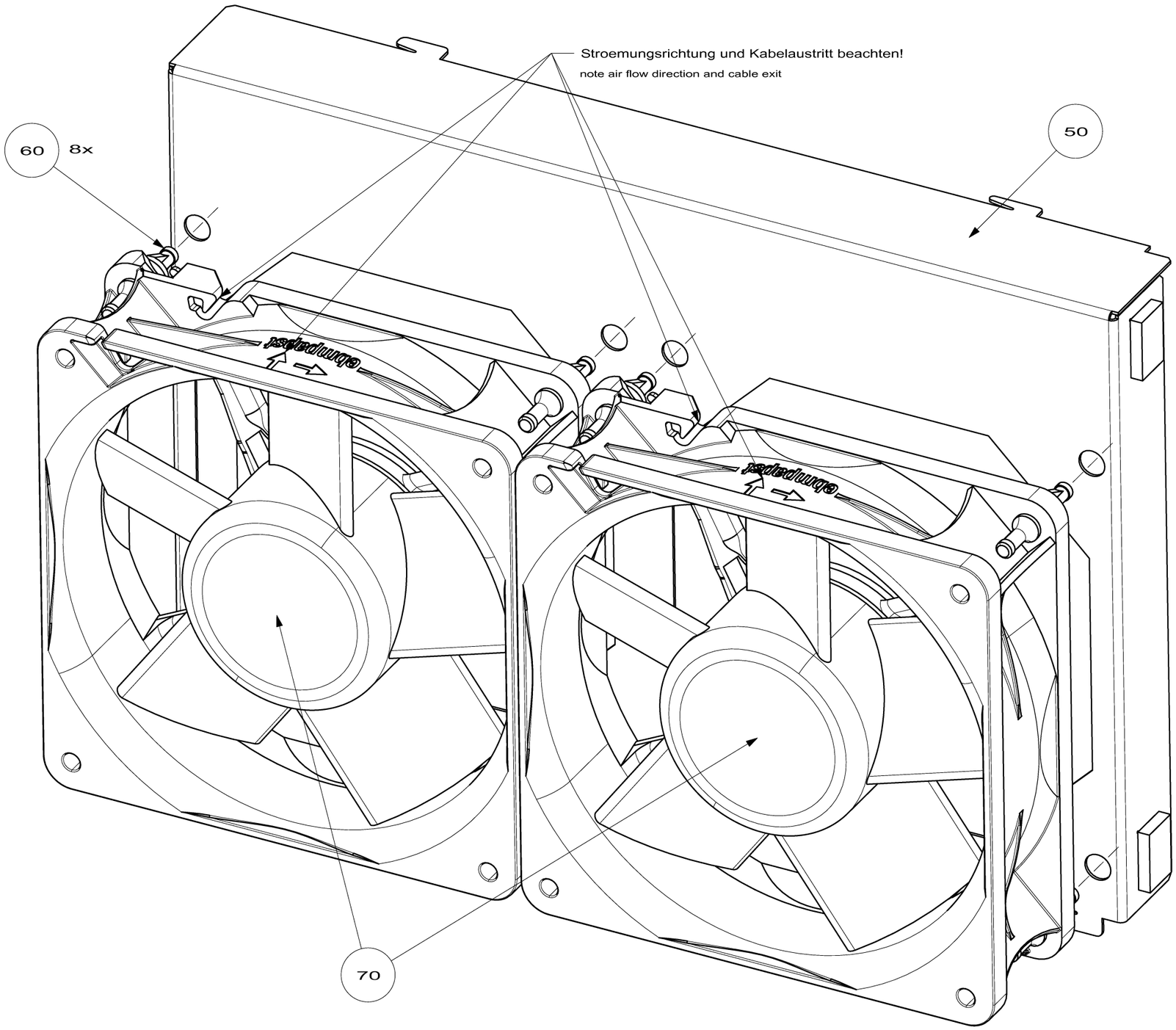


Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* ZNBC VECTOR NETWORK ANALYZER ZNBC VECTOR NETWORK ANALYZER			Sprache / *Lang.* de en	Aei. / *C.I.* 12.00	Blatt / *Sh.* 2
ZNBC	Datum *Date* 2016-01-14	Abteilung *Dept.* 3MTEK	Name *Name* hm	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

- Gummi-Montagestopfen durch Luefter ziehen
  Befestigung der Luefter am Lueftungsschacht

- pull rupper pin throuch fans; assemble to ventilation shaft



Projektions-methode

Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* ZNBC VECTOR NETWORK ANALYZER ZNBC VECTOR NETWORK ANALYZER			Sprache / *Lang.* de en	Aei. / *C.I.* 03.00	Blatt / *Sh.* 3
ZNBC	Datum *Date* 22.12.2010	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

MOD 22/24/42/44/62/72
- Synthesizer Pos. 560 (Pos. 570,580,1250) einschieben
- insert syntesizer Pos. 560 (Pos. 570,580,1250)

- Luefterbaugruppe einschieben
- insert fan assembly

- Pos. 330 mit Pos. 320 verschrauben
- assemble Pos. 330 and Pos. 320

- Module (Pos. 110,210) einschieben, Rueckwandbleche aufsetzen und mit Pos. 350 anschrauben
- insert modules (Pos. 110,210), place rear panels and mount with Pos. 350

- Festplattenlaufwerk einschieben
- insert hard disk drive

MOD 02 12 32
- Synthesizer Pos. 560 (Pos. 570,580) einschieben
- insert syntesizer Pos. 560 (Pos. 570,580)

- Luefterbaugruppe einschieben
- insert fan assembly

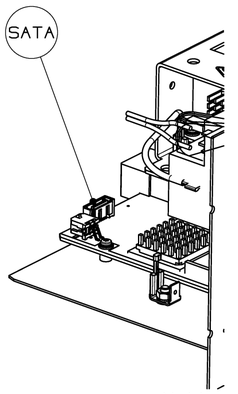
- Pos. 330 mit Pos. 320 verschrauben
- assemble Pos. 330 and Pos. 320

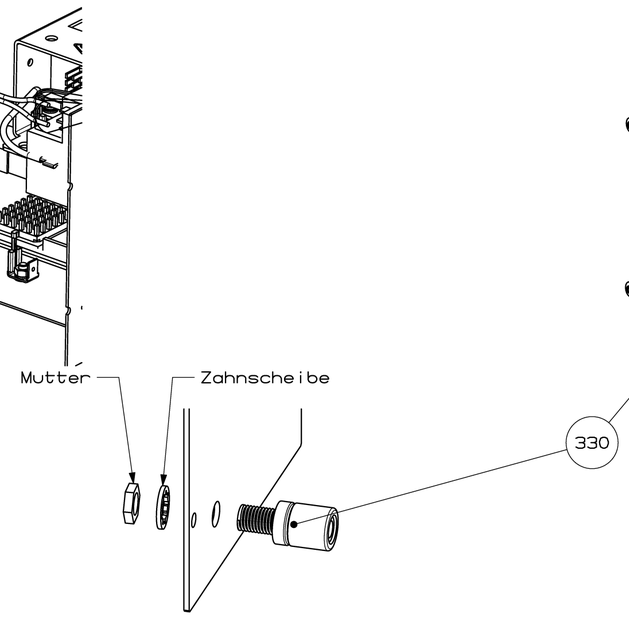
- Modul Pos. 120 einschieben, Rueckwandbleche aufsetzen und mit Pos. 350 anschrauben
- insert modul Pos. 120, place rear panels and mount with Pos. 350

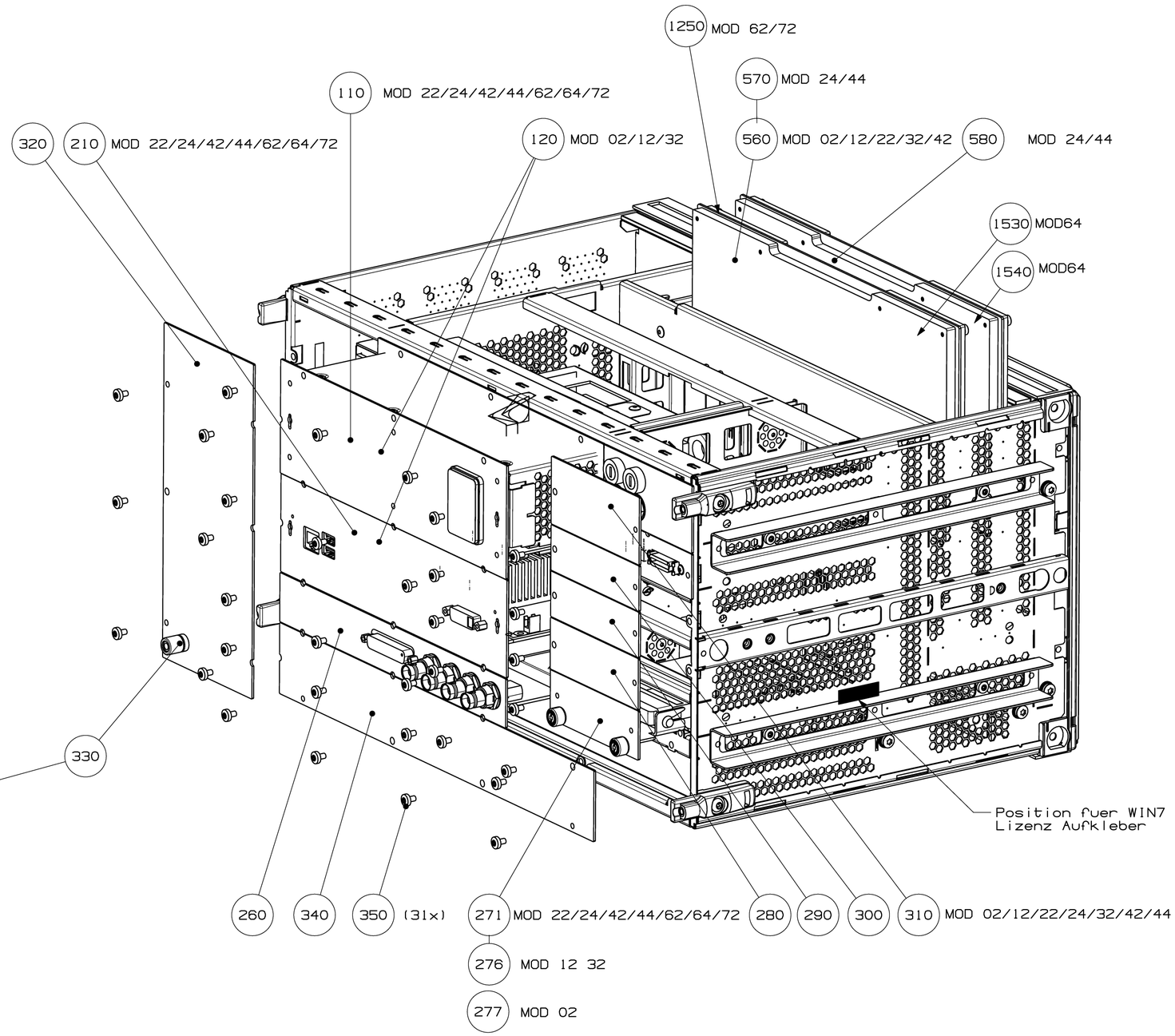
- SATA Kabel (Pos. SATA) einsetzen
- plug in SATA Cable (Pos. SATA)

- Spannungsversorgung einstecken
- plug in power supply

- Erdung einstecken
- plug in earthing







Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
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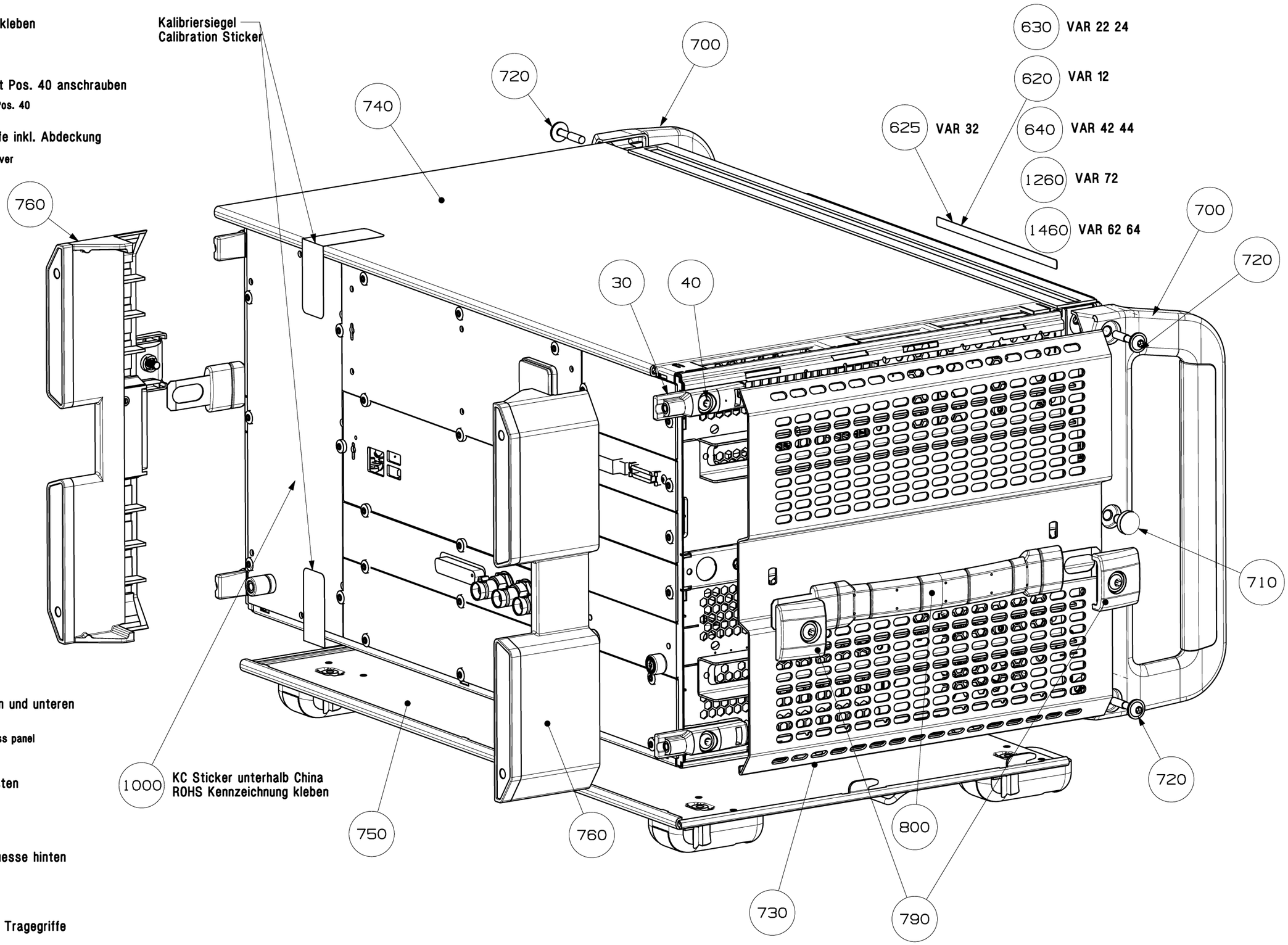
ZNBC	Datum *Date* 2014-08-20	Abteilung *Dept.* 1ESK	Name *Name* KK	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

- Typenbezeichnung aufkleben
- affix type label

- Fusshalter Pos. 30 mit Pos. 40 anschrauben
- mount holder Pos.30 using Pos. 40

- Montage der Frontgriffe inkl. Abdeckung
- mount front handles incl. cover



- Aufschieben der oberen und unteren Abdeckung
- insert upper and lower access panel

- Montage der Seitenleisten
- mount side panels

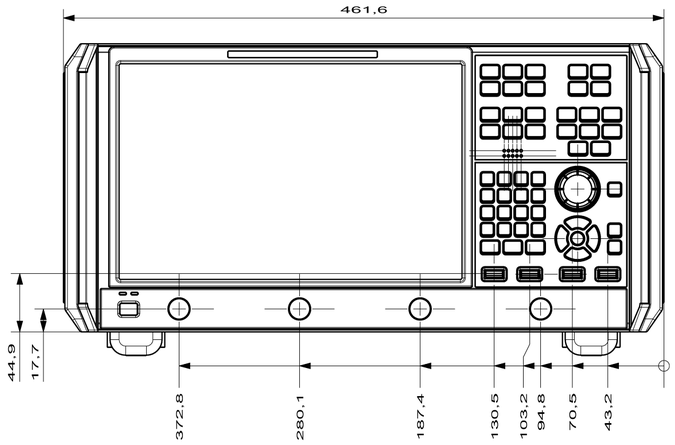
- Montage der Geraetefuesse hinten
- mount rear stand

- Montage der seitlichen Tragegriffe
- mount side handles

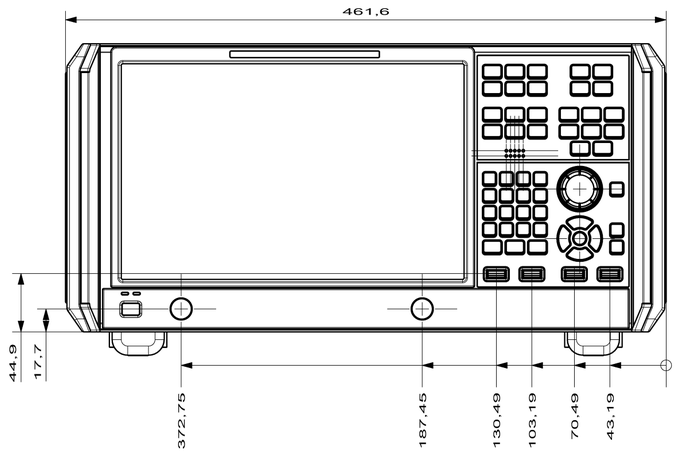
Projektions-methode
Projection Method

Maßstab / Scale: 1:2	Toleranz / Tol.: ISO2768-m	Werkstoff / Material:	
ROHDE&SCHWARZ	Benennung / Designation: ZNBC VECTOR NETWORK ANALYZER ZNBC VECTOR NETWORK ANALYZER	Sprache / Lang.: de en	Aei. / C.I.: 14.00
		Blatt / Sh.: 5	
ZNBC	Datum / Date: 28.03.2013	Abteilung / Dept.: 1ESK	Name / Name: RN
		Zeichn.Nr. / Drawing No.: 1311.4001.01	D

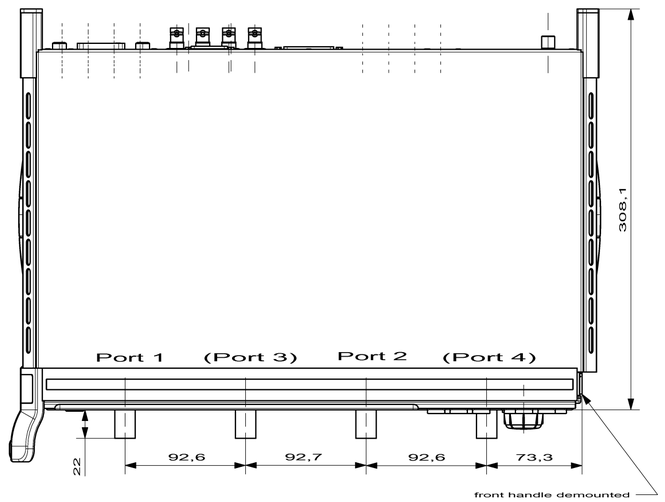
Front View ZNB 2-4Port



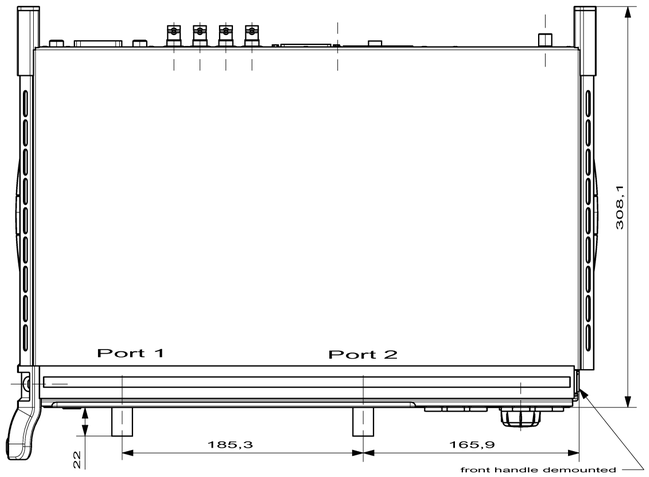
Front View ZNC



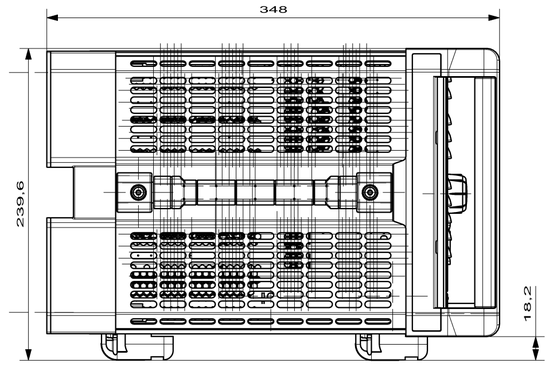
Top View ZNB2(4)-Port



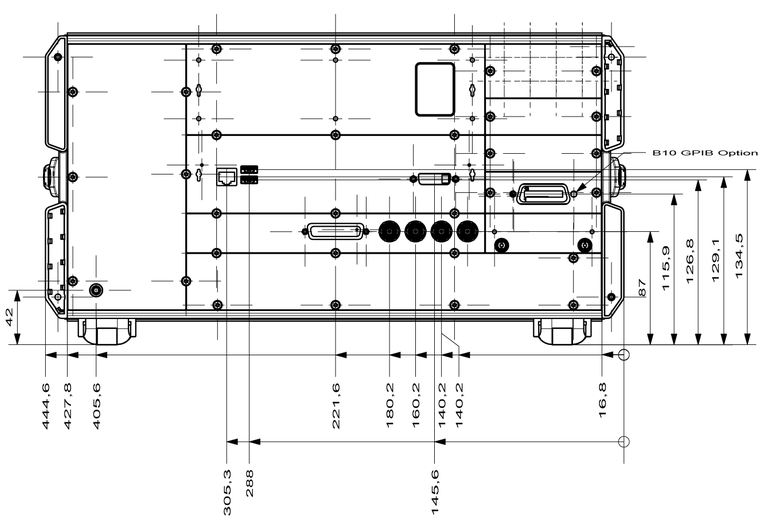
Top View ZNC



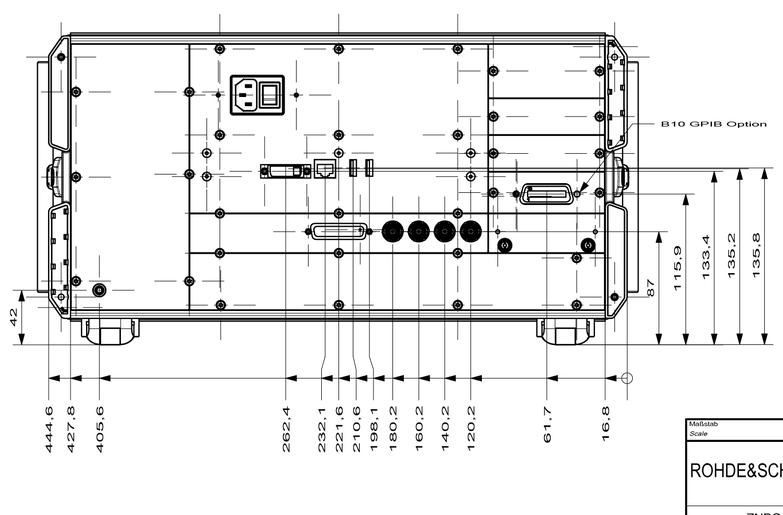
Side View ZNBC



Rear View ZNB



Rear View ZNC



Projektions-methode

Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
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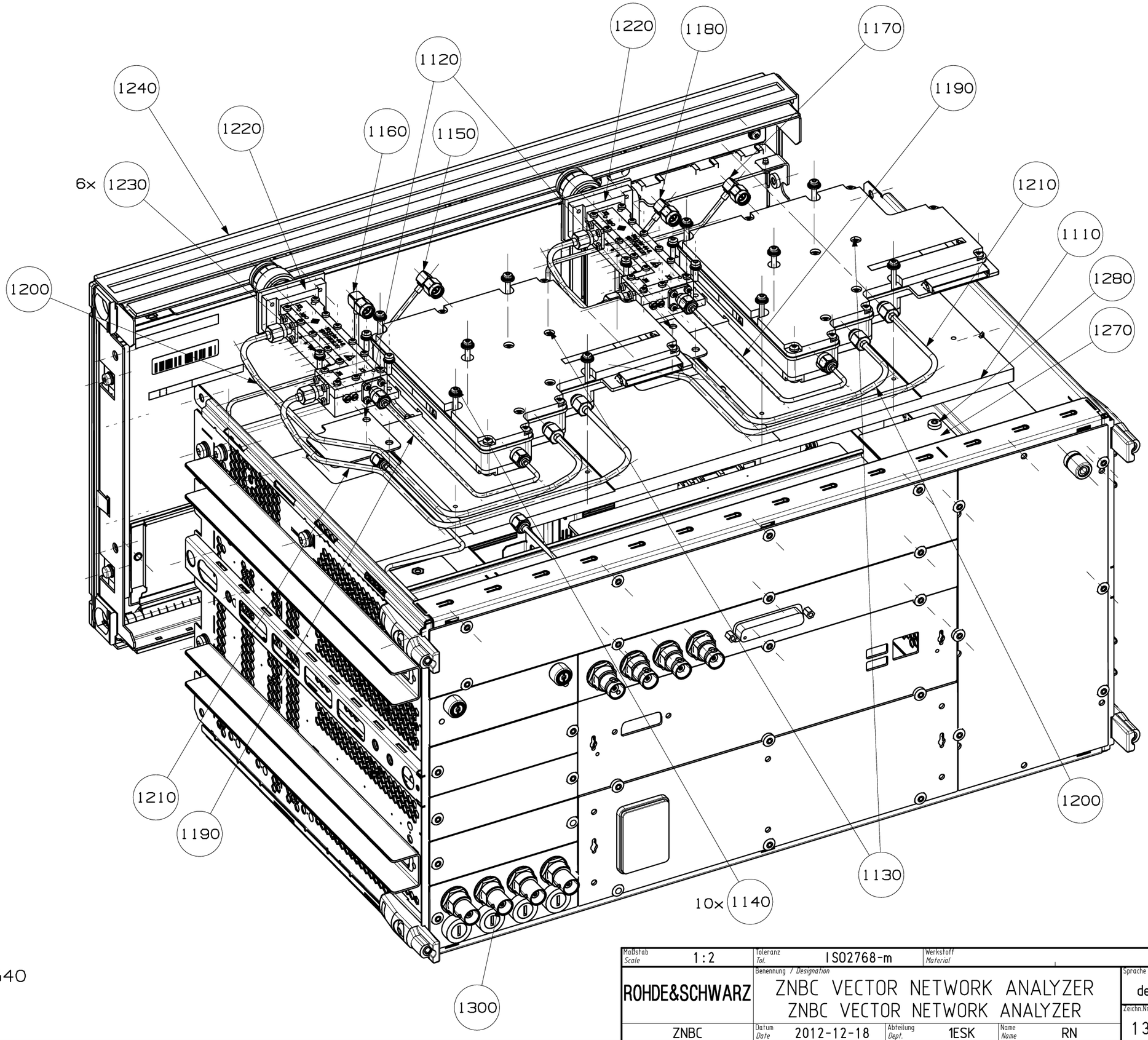
ZNBC	Datum *Date* 26.10.2010	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

NX



Var72 ZNB40

Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
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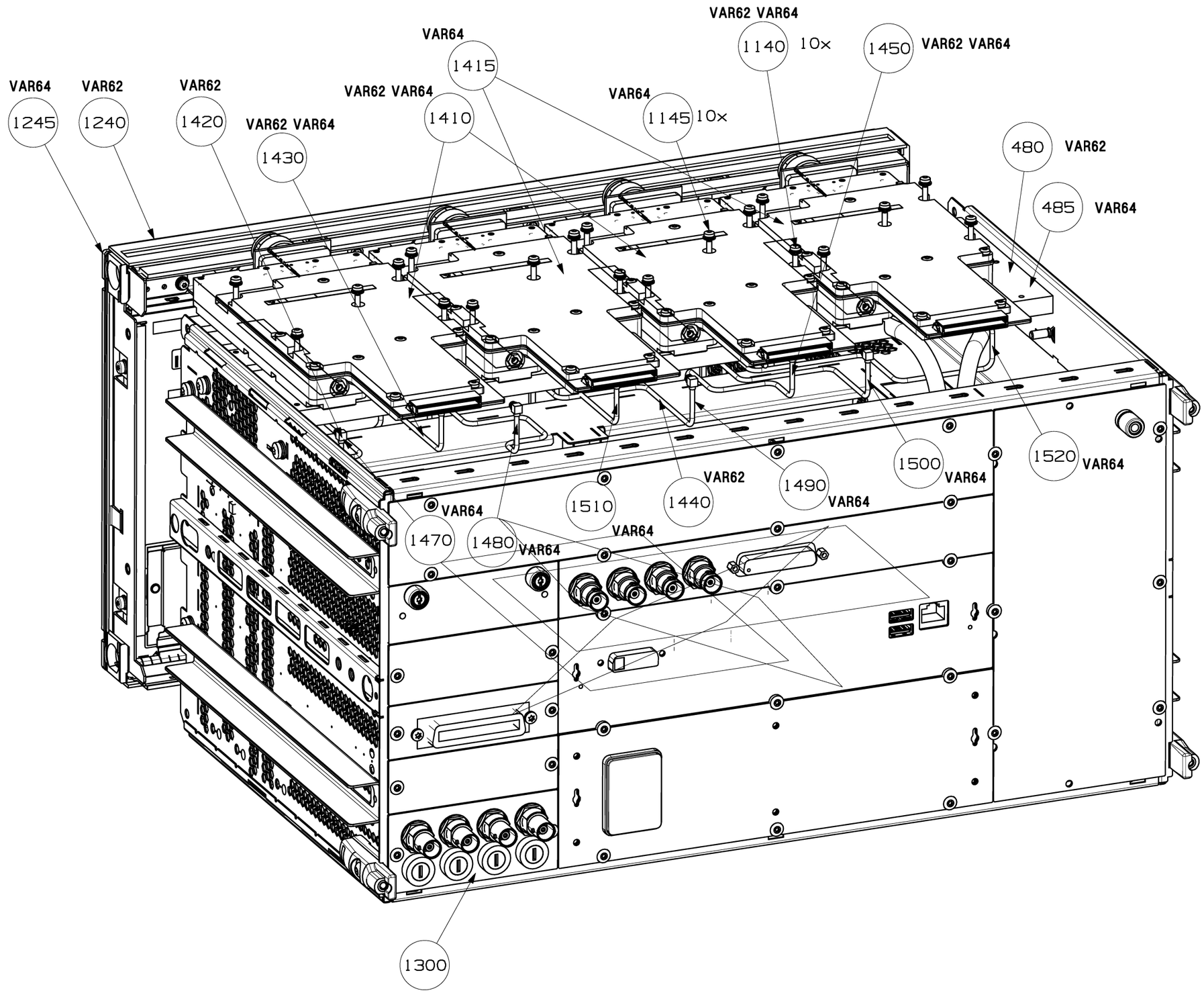
ZNBC	Datum *Date* 2012-12-18	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D



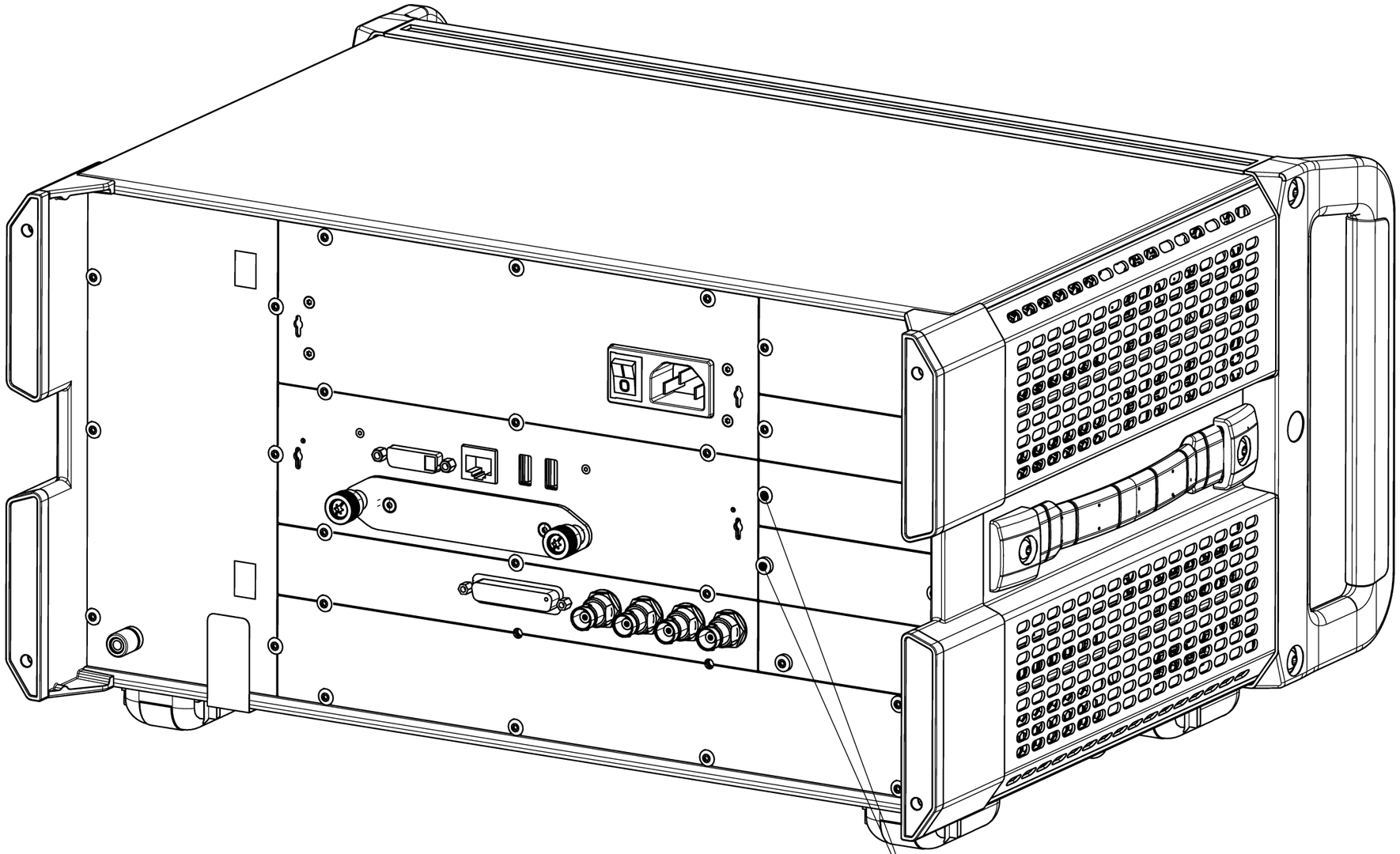
VAR 62 ZNB20 2-Port
VAR 64 ZNB20 4-Port

Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*					
ROHDE&SCHWARZ	Benennung / *Designation* ZNBC VECTOR NETWORK ANALYZER ZNBC VECTOR NETWORK ANALYZER				Sprache / *Lang.* de en	Äel. / *Cl.* 03.00	Blatt / *Sh.* 8
ZNBC	Datum *Date* 2013-01-17	Abteilung *Dept.* 1ESK	Name *Name* RN		Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

VAR / MOD 92

ZND 1328.5170.01 D 1-7



Options

ZND-B10	GPIB Interface Card	1328.5370.00 D 1
ZN-B14	Handler I/O,fuer ZNB,ZNC und ZND	1316.2465.00 M

Projektions-methode

Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* ZNBC VECTOR NETWORK ANALYZER ZNBC VECTOR NETWORK ANALYZER			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 9
ZNBC	Datum *Date* 2014-07-04	Abteilung *Dept.* 1ESK	Name *Name* Sp/BC	Zeichn.Nr. / *Drawing No.* 1311.4001.01 D		

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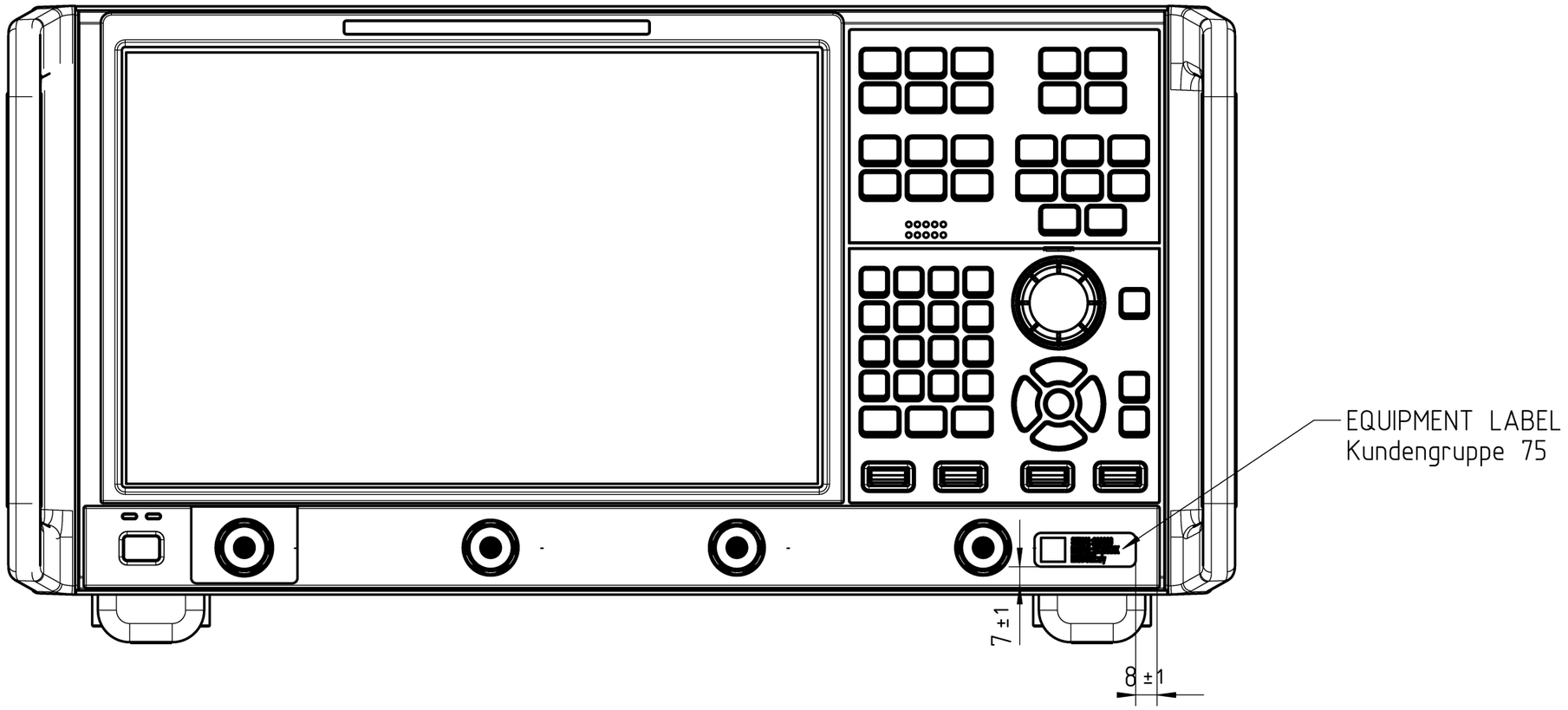

Maßeinheit
Measuring Unit
[mm]

Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
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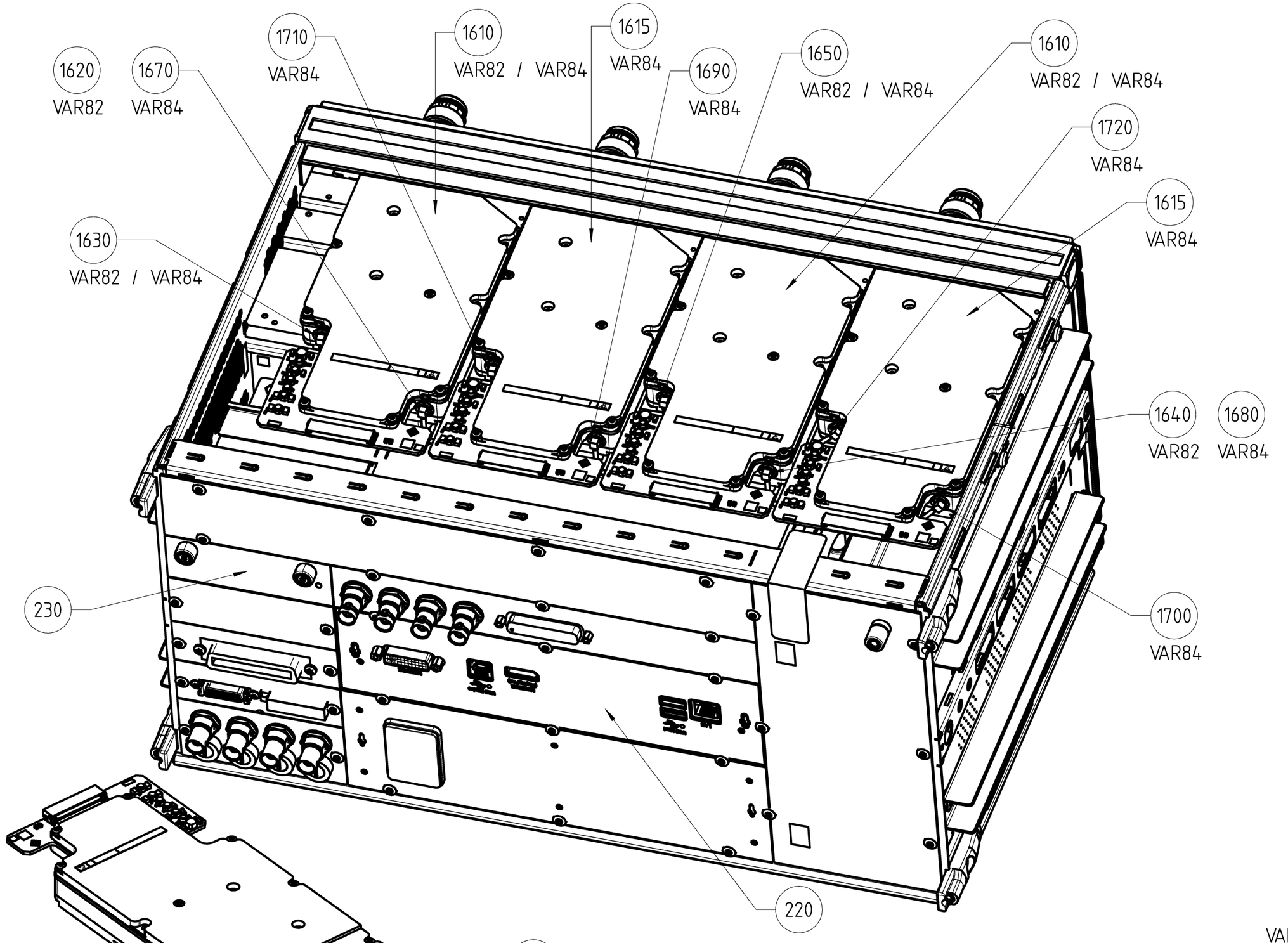
ZNBC	Datum *Date* 2014-05-14	Abteilung *Dept.* MTEK	Name *Name* MK	Zeichn.Nr. */ Drawing No.* 1311.4001.01		D

A3



VAR82: ZNB40 2-Port
VAR84: ZNB40 4-Port

Maßeinheit
Measuring Unit
[mm]

Projektions-methode
Projection Method

ISO A3

Maßstab *Scale* 1:2	Toleranz *Tol.*		Werkstoff *Material*		
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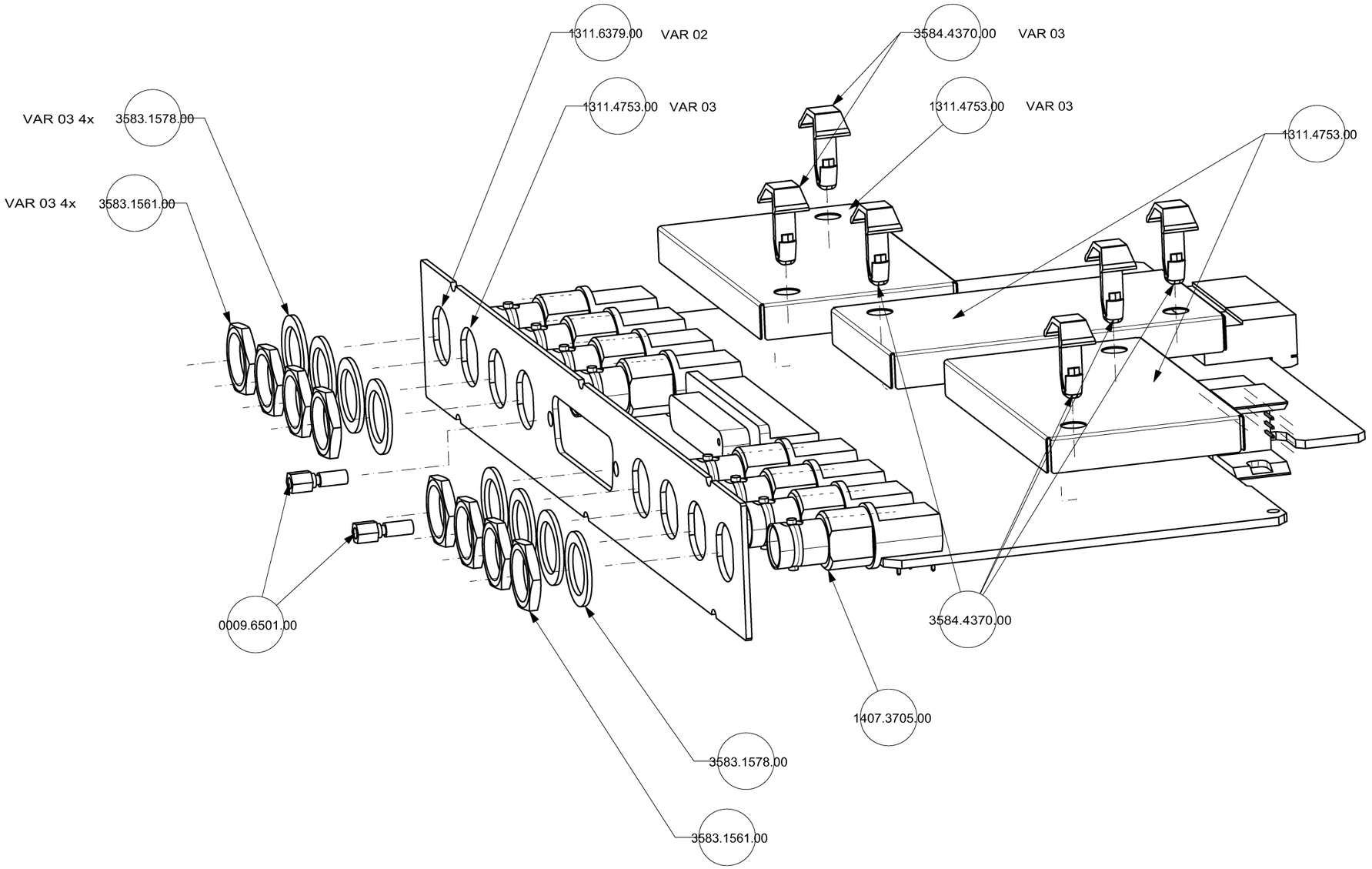
ZNBC	Datum *Date* 2017-02-06	Abteilung *Dept.* 1ENK	Name *Name* GPMR	Zeichn.Nr. / *Drawing No.* 1311.4001.01		D

NX



Projektions-methode

Projection Method

Maßstab *Scale* 1:1	Toleranz *Tol.*	Werkstoff *Material*		
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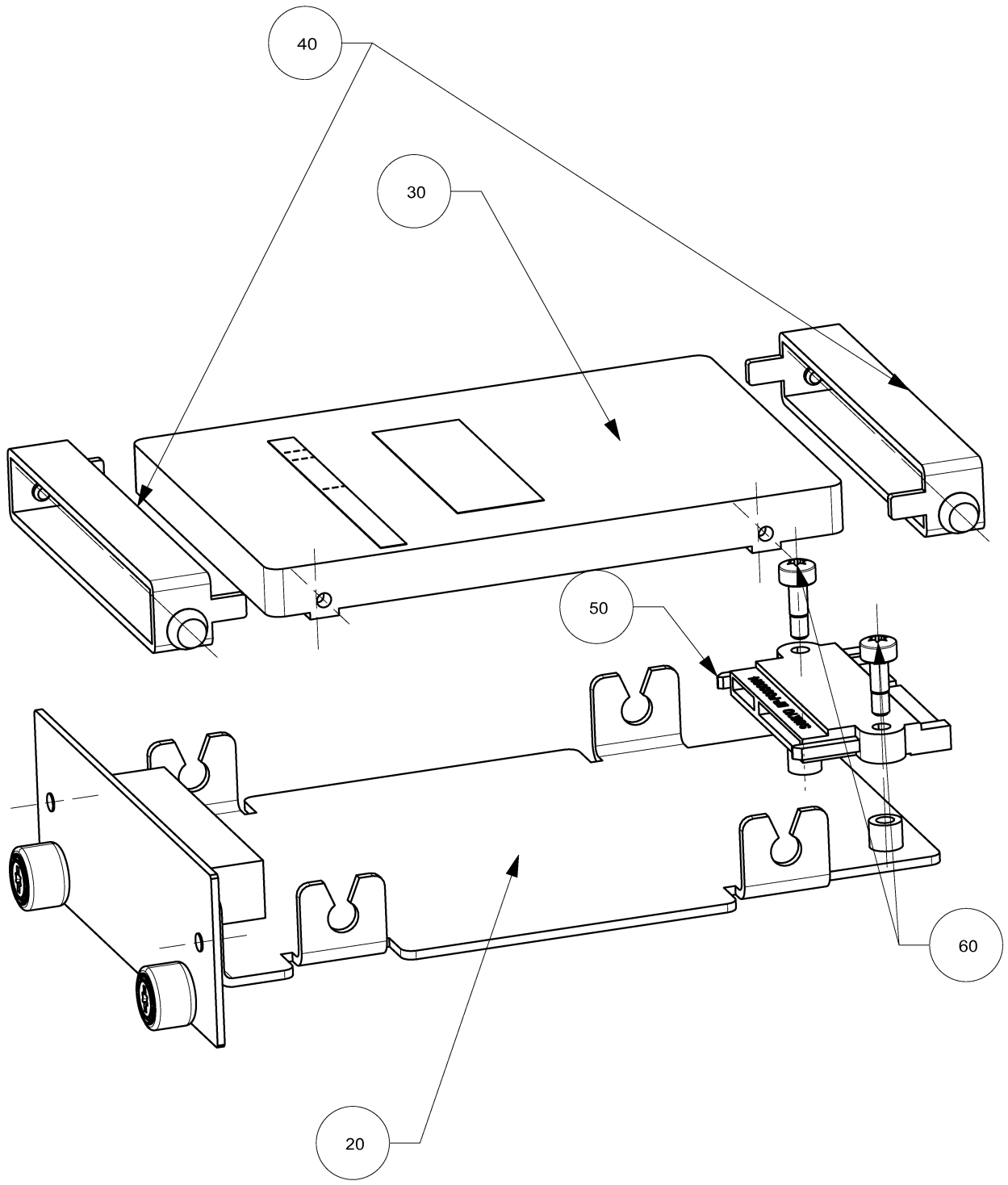
ZNBC	Datum *Date* 29.06.2010	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1311.4053.01 M

NX



Projektions-methode

Projection Method

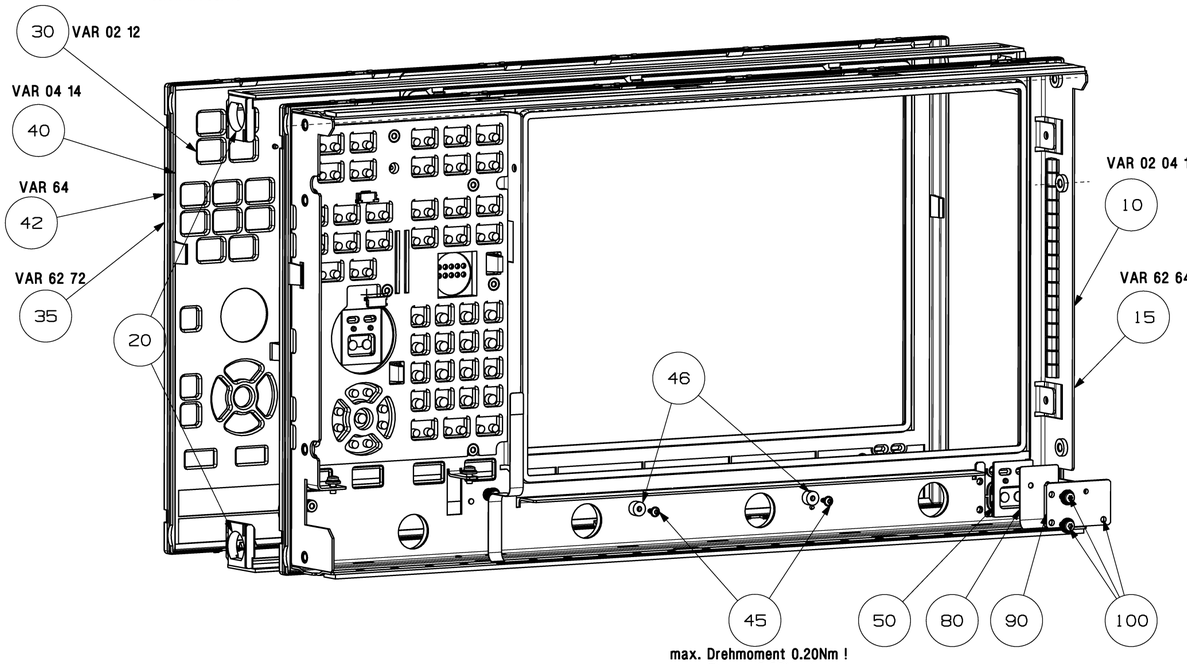
Maßstab *Scale* 1:1	Toleranz *Tol.*	Werkstoff *Material*					
ROHDE&SCHWARZ	Benennung / *Designation* HD UNIT KOMPLETT / HD UNIT COMPLETE				Sprache / *Lang.* de en	Aei. / *C.I.* 03,00	Blatt / *Sh.* 1
						Zeichn.Nr. / *Drawing No.* 1311.5943.00	D
PANTHER	Datum *Date* 13.08.2010	Abteilung *Dept.* 1ESK	Name *Name* RN				

– POS. 10 mit POS. 20, und POS. 30 (40) montieren

– mount POS. 10 with POS. 20 and POS. 30 (40)

– POS. 45 einschrauben

–screw in POS. 45



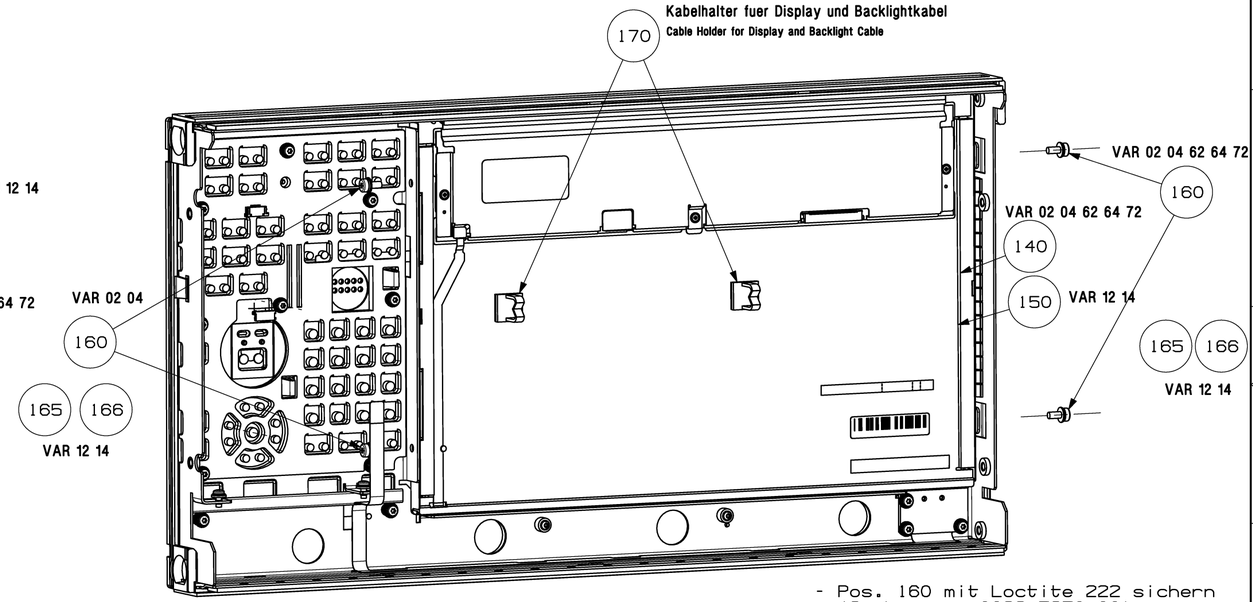
max. Drehmoment 0.20Nm !
max. Torque 0.20Nm !

– POS. 50 einlegen; POS. 80 verkleben mit POS.90 und POS. 100 verschrauben

– insert POS. 50; glue POS. 80; mount POS. 90 using POS. 100

– POS. 140 einlegen, mit 2kg gleichmaessig beschweren; mit Position 160 bzw. Position 165+166 verschrauben

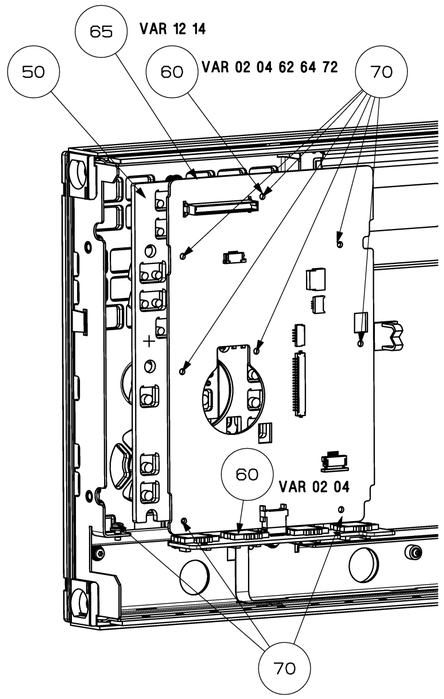
– insert POS. 140 weight down uniform with 2kg; mount with POS. 160 respectively POS. 165+166



- Pos. 160 mit Loctite 222 sichern
(Sachnummer 0088.7370.00)

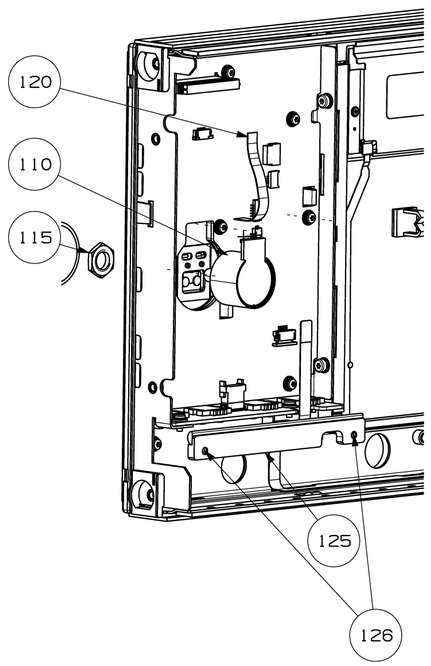
– POS. 50 einlegen; POS. 60 auflegen und mit POS. 70 verschrauben

– insert POS. 50; insert POS. 60 and fix with POS. 70



– POS. 120 mit POS. 110 verbinden mit POS. 115 fixieren
– POS. 125 aufstecken und mit POS. 126 verschrauben

– connect POS. 120 to POS. 110; mount with POS. 115
– mount POS. 125 with POS. 126



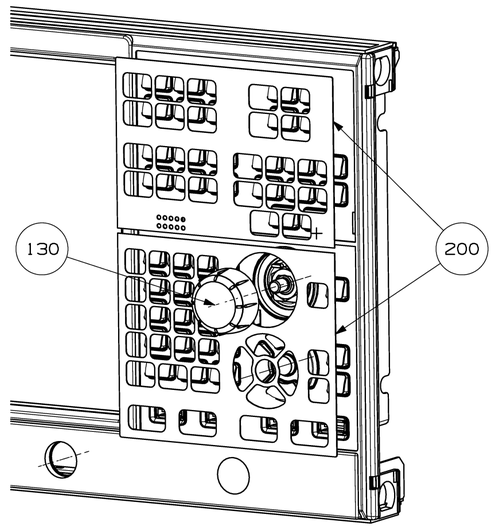
– Verbinde Kabel POS. 180 (VAR 02 04); POS. 185 (VAR 12 14), POS. 190 (VAR 02 04) and POS. 210

– connect cables POS. 180 (VAR 02 04); POS. 185 (VAR 12 14), POS. 190 (VAR 02 04) and POS. 210

180 VAR 02 04 62 64 72
185 VAR 12 14
190 VAR 02 04 62 64 72
210

– POS. 200 aufkleben und POS. 130 aufschieben

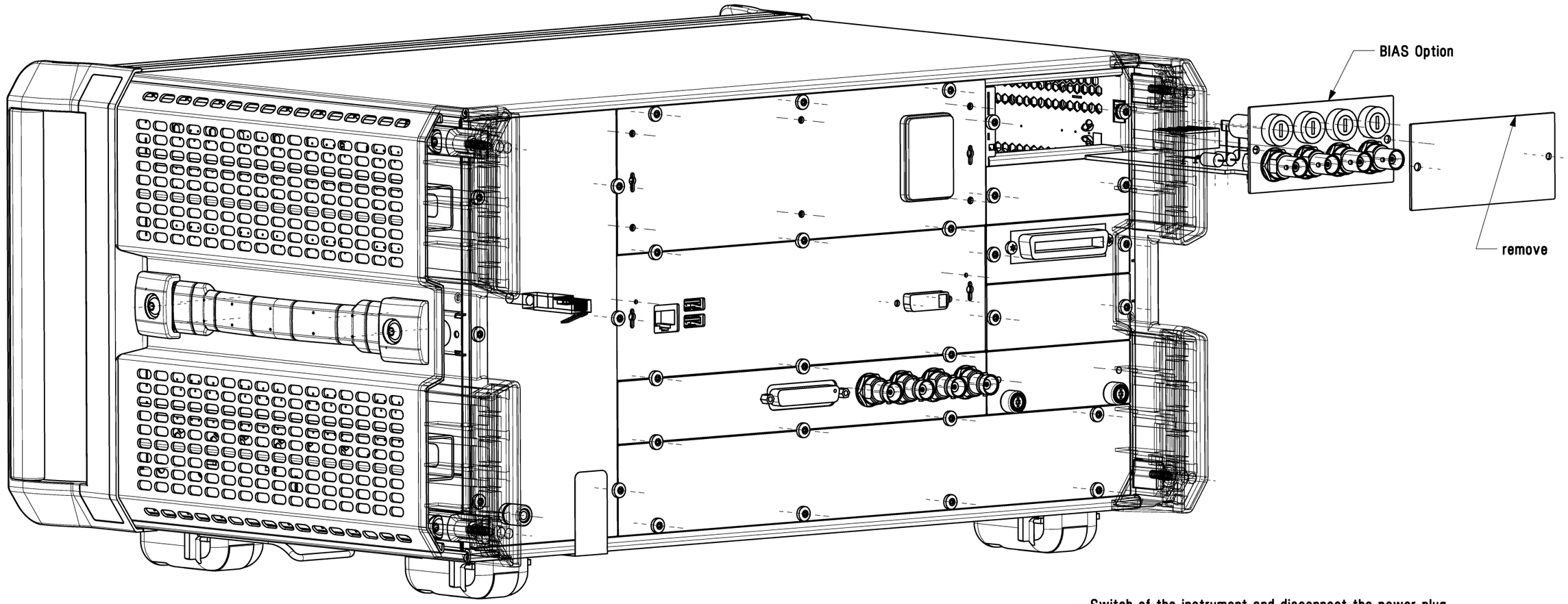
– stick POS. 200 and mount POS. 130



Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* FRONTEINHEIT ZNBC / FRONT UNIT ZNBC			Sprache / *Lang.* de en	Aei. / *C.I.* 11.00	Blatt / *Sh.* 1
ZNBC	Datum *Date* 2014-04-22	Abteilung *Dept.* 1ESK	Name *Name* BC/BU	Zeichn.Nr. / *Drawing No.* 1311.5272.01		D

NX



- Switch of the instrument and disconnect the power plug
- Unscrew screws and remove the rear panel
- Insert the BIAS Option
- Fix the screws to a torque of 1.03Nm

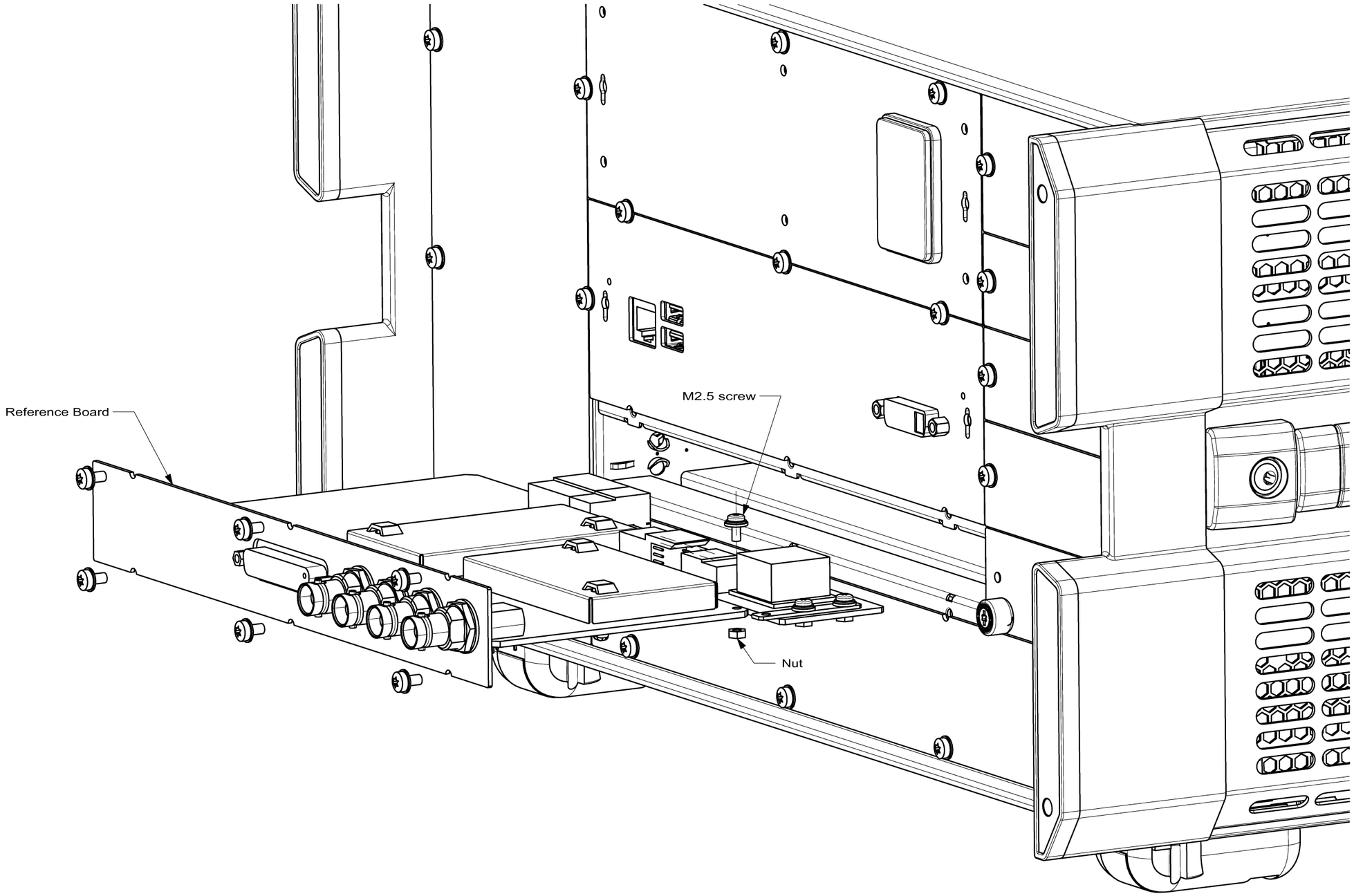
Note: For that option Reflectometer in VAR03 (1311.4076.03) are needed!
For Reflectometer replacement please refer to the Service Manual.

Subsequent characterisation using the Software Tool ZNBC Service is required.

Projektions-methode

Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.*	Werkstoff *Material*					
ROHDE&SCHWARZ	Benennung */ Designation* EINBAUANWEISUNG ZNB BIAS OPTION ASSEMBLY INSTRUCTION ZNB BIAS OPTION				Sprache */ Lang.* de en	Aei. */ C.I.* 03.00	Blatt */ Sh.* 1
					Zeichn.Nr. */ Drawing No.* 1316.1798.00		D
ZNB	Datum *Date* 18.01.2012	Abteilung *Dept.* 1ESK	Name *Name* RN				

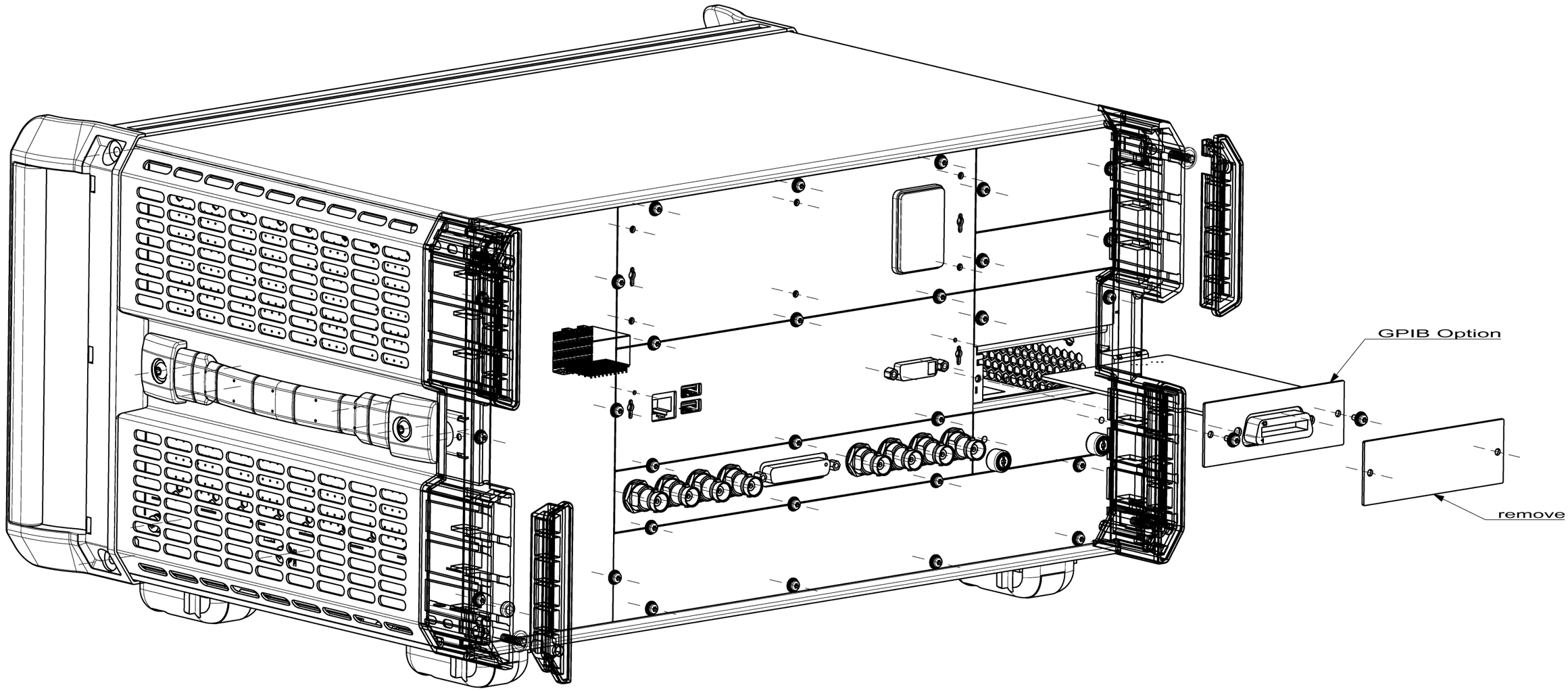


- Switch of the instrument and disconnect power plug
- Remove Reference Board
- Plug in the ZNB-B4 OCXO Option and fix using the M2.5 screw and nut
- Insert Reference Board and fix the screws to a torque of 1.03Nm

Projektions-methode

Projection Method

Maßstab *Scale* 1:1	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEISUNG ZNB-B4 OCXO OPTION ASSEMBLY INSTRUCTION ZNB-B4 OCXO OPT.			Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 1
ZNB	Datum *Date* 08.11.2010	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1316.1800.00		D



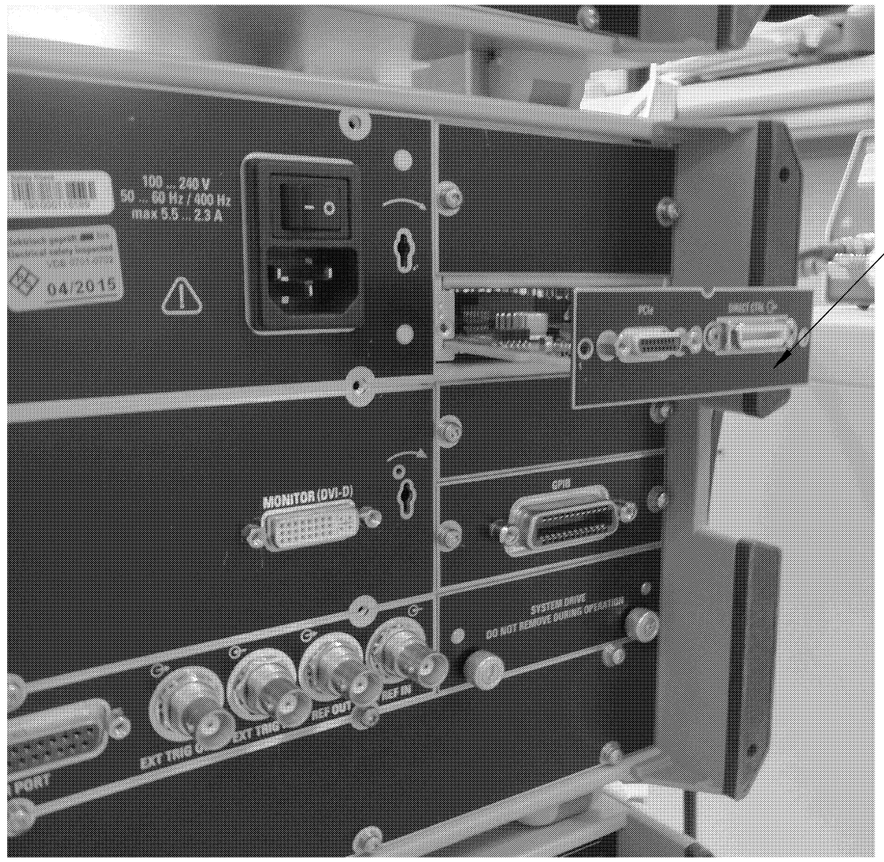
- Switch of the instrument and disconnect the power plug
- Unscrew screws and remove the rear panel
- Insert the GPIB option
- Fix the screws to a torque of 1.03Nm

Projektions-methode

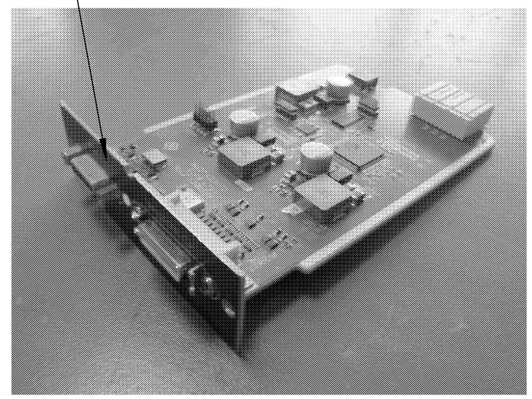
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEISUNG ZNBC-B10 / ASSEMBLY INSTRUCTION ZNBC-B10			Sprache / *Lang.* de en	Aei. / *C.I.* 01.00 / Blatt / *Sh.* 1
ZNBC	Datum *Date* 27.07.2010	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1316.0140.00	D

ZNB



ZNx-B12



Remove dummy plate and install ZNx-B12

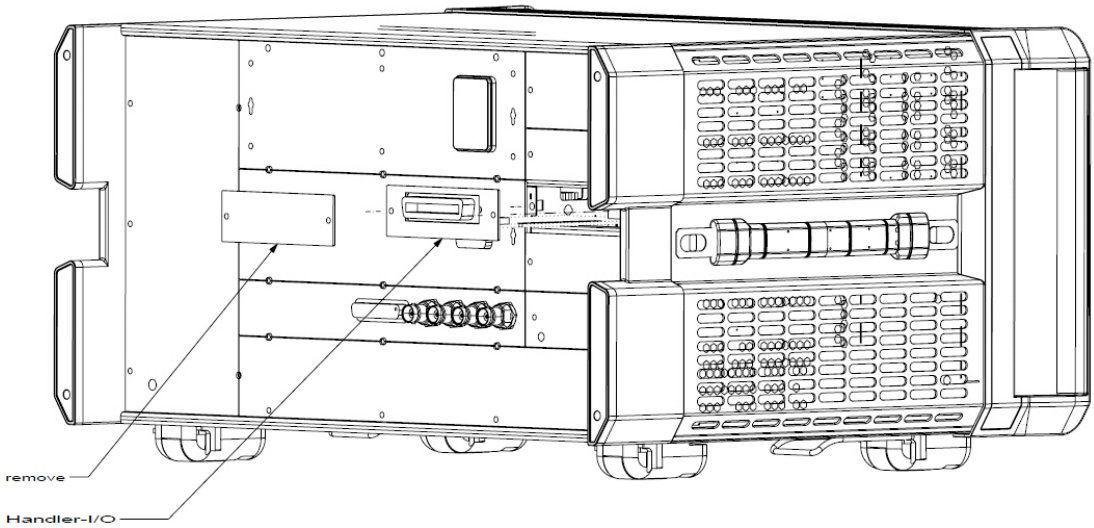
Maßeinheit
Measuring Unit
[mm]

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			Sprache */ Lang.*	Aei. */ C.I.*	Blatt */ Sh.*
ROHDE&SCHWARZ	Benennung */ Designation*	EINBAUANWEISUNG B12 ASSEMBLY INSTRUCTION B12			de en	02.00	2
B12	Datum *Date* 2014-09-16	Abteilung *Dept.* 1ESK	Name *Name* BC/BU		Zeichn.Nr. */ Drawing No.* 1325.5763.00 D		

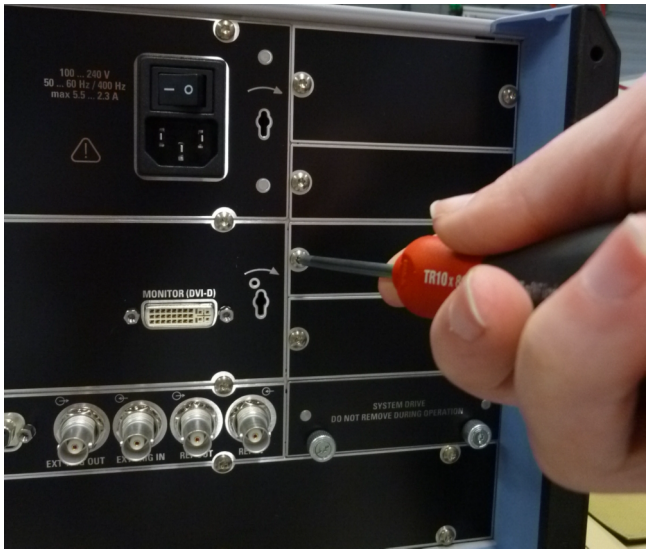
A3

Assembly Instructions for R&S ZN-B14 for ZNB/C



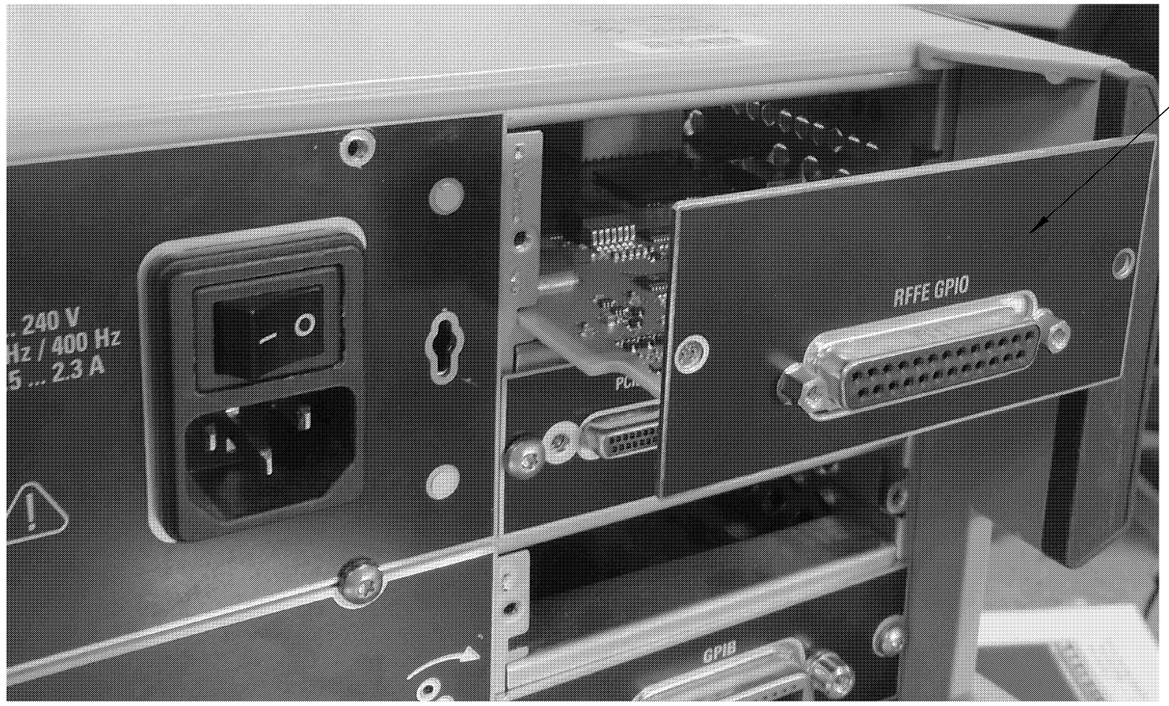
Remove Paneling

Switch off the unit and disconnect it from the power supply.
Unscrew the rear panel and remove it.



Insert the option “Handler-I/O“

Insert the Handler I/O and fix the screws to a torque of 1.03Nm



ZN-B15 RFFE GPIO

In case of ZNB20,ZNB40
or ZNB4,ZNB8 with Option ZNB-B1
remove module "EE Bias" first

please note: functionality of BIAS tee is no longer available

Direction of work:

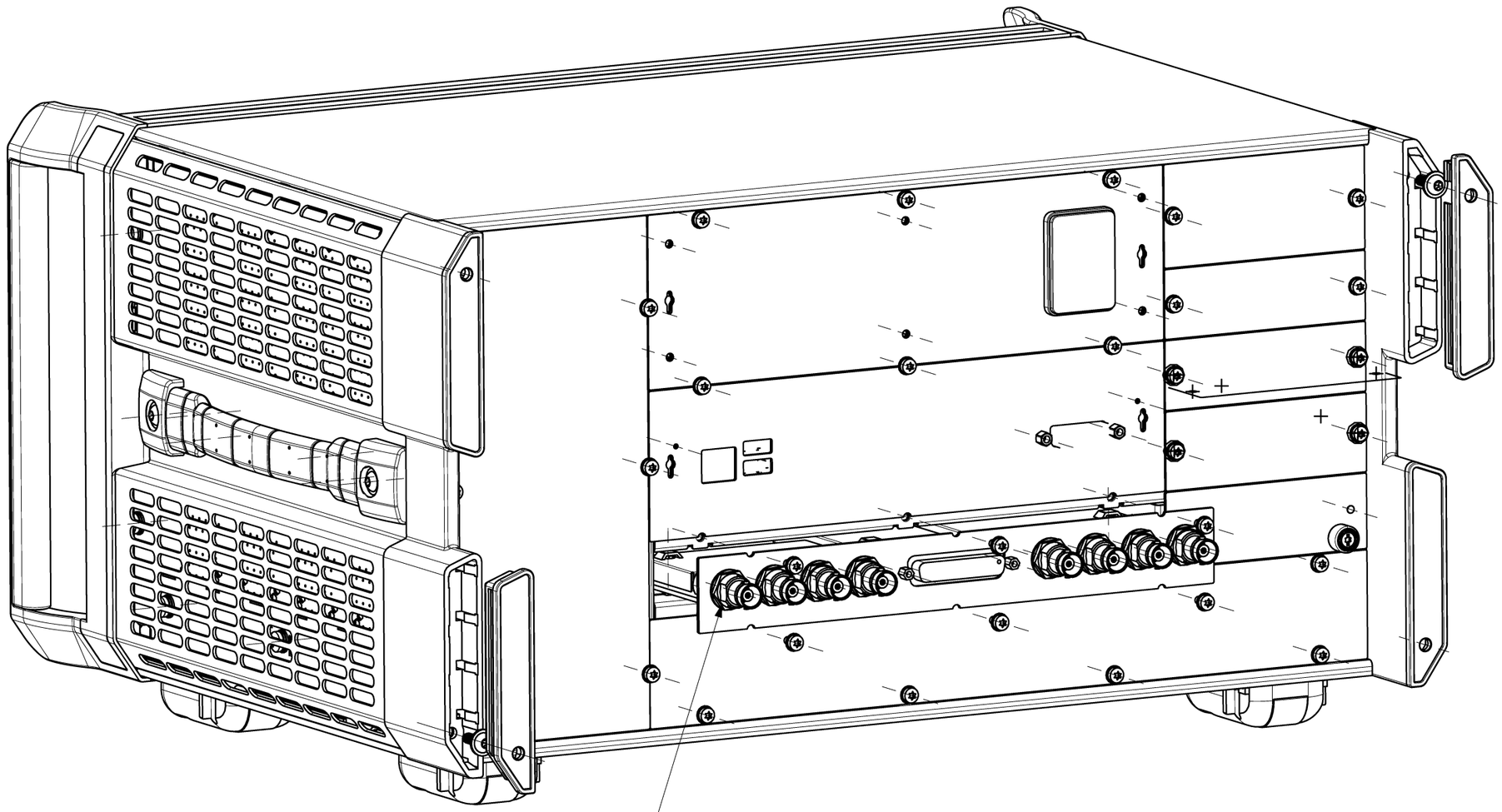
-Switch off the instrument and disconnect the power plug
-Unscrew screws and remove the rear panel or BIAS module
-Insert the ZN-B15 RFFE GPIB option
-Fix the screws to a torque of 1.03Nm

Maßstab *Scale*	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung */ Designation* EINBAUANWEISUNG ZN-B15 RFFE ASSEMBLY INSTRUCTION ZN-B15 RFFE			Sprache */ Lang.* de en	Aei. */ C.I.* 03.00	Blatt */ Sh.* 1
ZNBC	Datum *Date* 2015-06-03	Abteilung *Dept.* 3MTEK	Name *Name* mk	Zeichn.Nr. */ Drawing No.* 1325.5692.00 D		

Projektionsmethode
Projection Method

A3

NX



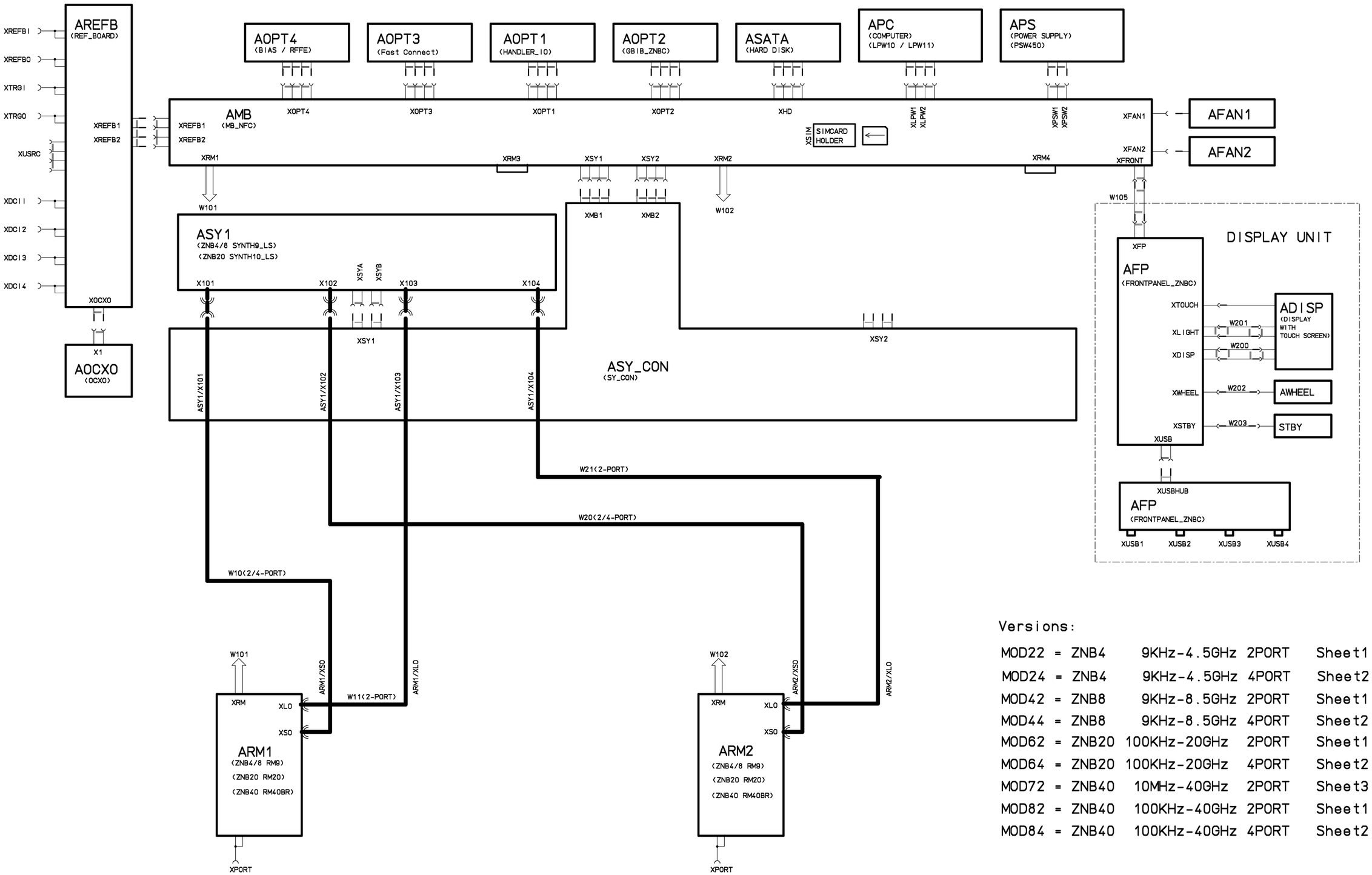
Reference Board VAR03
1311.4053.03

- switch of the instrument and disconnect the power plug
- unscrew and remove the Reference Board VAR02
- insert the reference board VAR03 with DC Input Option
- fix the screws to a torque of 1.03Nm

Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEISUNG ZNB-B81 / ASSEMBLY INSTRUCTION ZNB-B81			Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 1
ZNBC	Datum *Date* 23.08.2010	Abteilung *Dept.* 1ESK	Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1316.0256.00		D

Schutzvermerk ISO 16016 beachten.
Refer to protection notice ISO 16016.



Versions:

MOD22 = ZNB4	9KHz-4.5GHz	2PORT	Sheet1
MOD24 = ZNB4	9KHz-4.5GHz	4PORT	Sheet2
MOD42 = ZNB8	9KHz-8.5GHz	2PORT	Sheet1
MOD44 = ZNB8	9KHz-8.5GHz	4PORT	Sheet2
MOD62 = ZNB20	100KHz-20GHz	2PORT	Sheet1
MOD64 = ZNB20	100KHz-20GHz	4PORT	Sheet2
MOD72 = ZNB40	10MHz-40GHz	2PORT	Sheet3
MOD82 = ZNB40	100KHz-40GHz	2PORT	Sheet1
MOD84 = ZNB40	100KHz-40GHz	4PORT	Sheet2

ROHDE&SCHWARZ

Benennung / Designat.:
ZNB VECT.NETW.ANALYZER 2/4 PORT
ZNB VECT.NETW.ANALYZER 2/4 PORT

Datum / Date: 2017-03-06
Abteilung / Dept.: 3MTEK
Name: pfeil_u

Spr.:/Lang.: de en
Aei:/C.I.: 09.00
Blatt:/Sh.: 1 +

Zeichn.Nr.:/Drawing No.:
1311.6010.01 S

Schutzvermerk ISO 16016 beachten.
Refer to protection notice ISO 16016.

AREFB
(REF_BOARD)
XREFBI
XREFBO
XTRGI
XTRGO
XREFB1
XREFB2
XUSRC
XDCI1
XDCI2
XDCI3
XDCI4
XOCXO
X1
AOCXO
(OCXO)

AOPT4
(BIAS / RFFE)
AOPT3
(FAST CONNECT)
AOPT1
(HANDLER_IO)
AOPT2
(GBIB_ZNBC)
ASATA
(HARD DISK)
APC
(COMPUTER)
(LPW10 / LPW11)
APS
(POWER SUPPLY)
(PSW450)

AMB
(MB_NFC)
XOPT4
XOPT3
XOPT1
XOPT2
XHD
XSIM
SIMCARD HOLDER
XLPW1
XLPW2
XPSW1
XPSW2
XFAN1
XFAN2
XFRONT
AFAN1
AFAN2
XRM1
XRM3
XSY1
XSY2
XRM2
XRM4
W101
W103
W102
W104
XMB1
XMB2

ASY1
(SYNTH9_S or SYNTH9_DS)
(SYNTH10_DS)
ASY2
(SYNTH9_L)
(SYNTH10_L)
X101
X102
XSYA
XSYB
X103
X104
XSY1
XSY2
ASY_CON
(SY_CON)
ASY1/X101
ASY1/X102
ASY1/X103
ASY1/X104
ASY2/X101
ASY2/X102
ASY2/X103
ASY2/X104

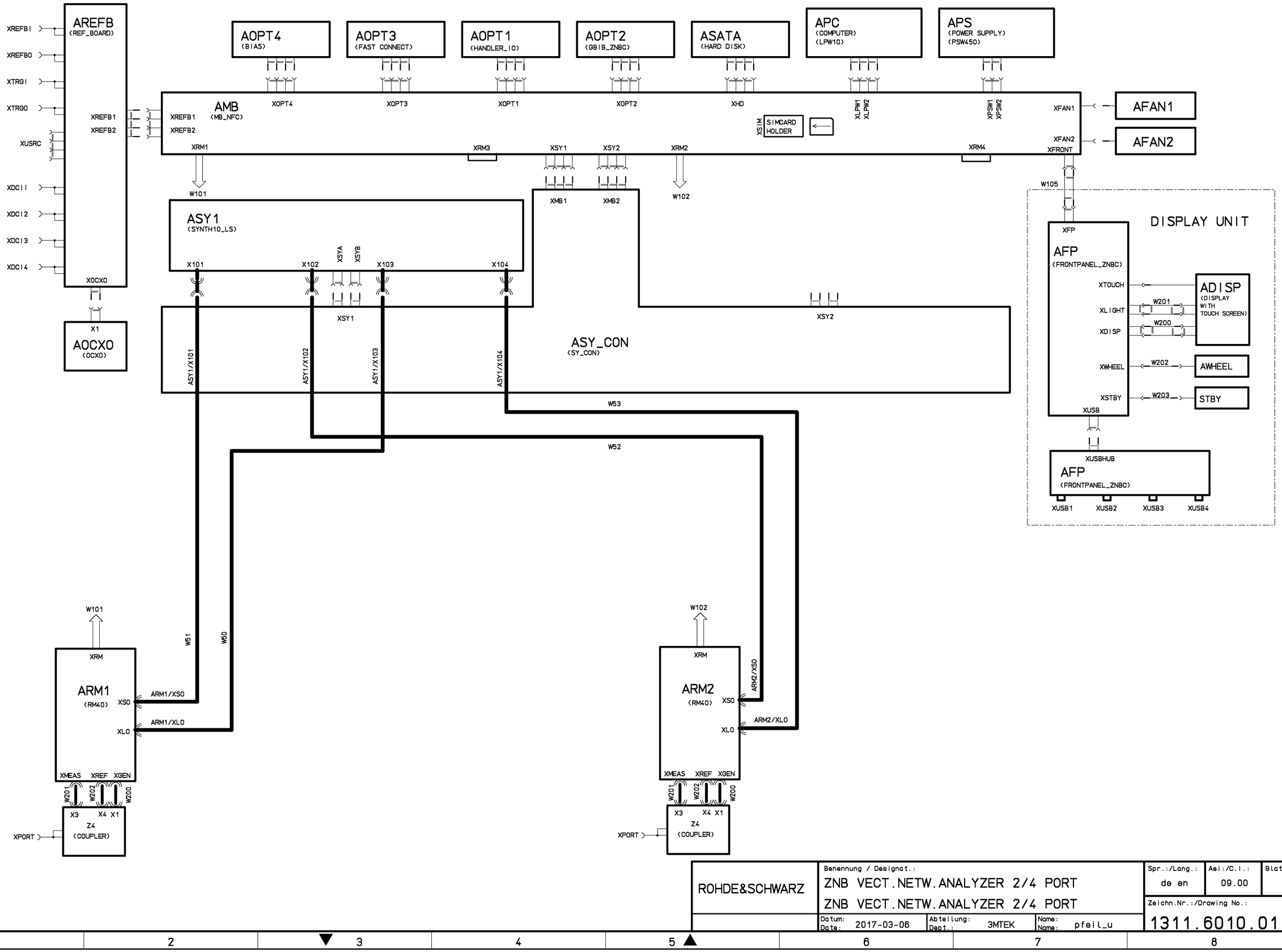
W105
DISPLAY UNIT
XFP
AFP
(FRONTPANEL_ZNBC)
XTOUCH
XLIGHT
XDISP
XWHEEL
XSTBY
XUSB
ADISP
(DISPLAY WITH TOUCH SCREEN)
W201
W200
AWHEEL
W202
STBY
W203
XUSBHUB
AFP
(FRONTPANEL_ZNBC)
XUSB1
XUSB2
XUSB3
XUSB4

W40(4-PORT)
W20(2/4-PORT)
W11(4-PORT)
W10(2/4-PORT)
W30(4-PORT)
W31(4-PORT)
W21(4-PORT)
W41(4-PORT)

W101
XRM
XLO
XSO
ARM1
(RM9)
(RM20)
(RM40BR)
XPORT
ARM1/XSO
ARM1/XLO
W103
ARM3
ARM3/XSO
ARM3/XLO
W102
ARM2
ARM2/XSO
ARM2/XLO
W104
ARM4
ARM4/XLO
ARM4/XSO

ROHDE&SCHWARZ	Benennung / Designat.: ZNB VECT.NETW.ANALYZER 2/4 PORT ZNB VECT.NETW.ANALYZER 2/4 PORT	Spr.:/Lang.: de en	Aei:/C.I.: 09.00
	Datum: 2017-03-06 Abteilung: 3MTEK Name: pfeil_u	Blatt:/Sh.: 2 +	Zeichn.Nr.:/Drawing No.: 1311.6010.01 S

Schutzvermerk ISO 16016 beachten.
Refer to protection notice ISO 16016.



ROHDE&SCHWARZ	Benennung / Designat.: ZNB VECT.NETW.ANALYZER 2/4 PORT ZNB VECT.NETW.ANALYZER 2/4 PORT	Spr.:/Lang.: de en	Aei:/C.I.: 09.00
	Datum: 2017-03-06 Abteilung: 3MTEK Name: pfeil_u	Blatt:/Sh.: 3 -	Zeichn.Nr.:/Drawing No.: 1311.6010.01 S

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