R&S®FSV
Signal and Spectrum Analyzer
Service Manual

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Test and Measurement

Service Manual

ROHDE&SCHWARZ

The Service Manual describes the following R&S®FSV models and options:

- R&S®FSV 3 (1321.3008K04)
- R&S®FSV 7 (1321.3008K07)
- R&S®FSV 13 (1321.3008K13)
- R&S®FSV 30 (1321.3008K30)
- R&S®FSV 40 (1321.3008K39)
- R&S®FSV 40 (1321.3008K40)

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

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.

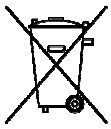
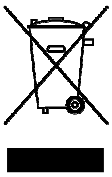
The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and, in some cases, a basic knowledge of English. 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 supply voltage
	Caution when handling heavy equipment		Standby indication
	Danger of electric shock		Direct current (DC)

Symbol	Meaning	Symbol	Meaning
	Warning! Hot surface		Alternating current (AC)
	Protective conductor terminal		Direct/alternating current (DC/AC)
	Ground		Device fully protected by double (reinforced) insulation
	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 additonal 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 severity 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 AC 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 AC supply network, or if the power switch is not suitable for this purpose, use the plug of the connecting cable to disconnect the product from the AC supply network. 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 IEC60950-1/EN60950-1 or IEC61010-1/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.

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.

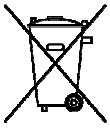
Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa 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.

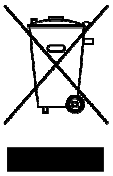
Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto 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)
	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.

Símbolo	Significado	Símbolo	Significado
	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.

PELIGRO — Indica una situación de peligro que, si no se evita, causa lesiones graves o incluso la muerte.

ADVERTENCIA — Indica una situación de peligro que, si no se evita, puede causar lesiones graves o incluso la muerte.

ATENCIÓN — Indica una situación de peligro que, si no se evita, puede causar lesiones leves o moderadas.

AVISO — 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.

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.

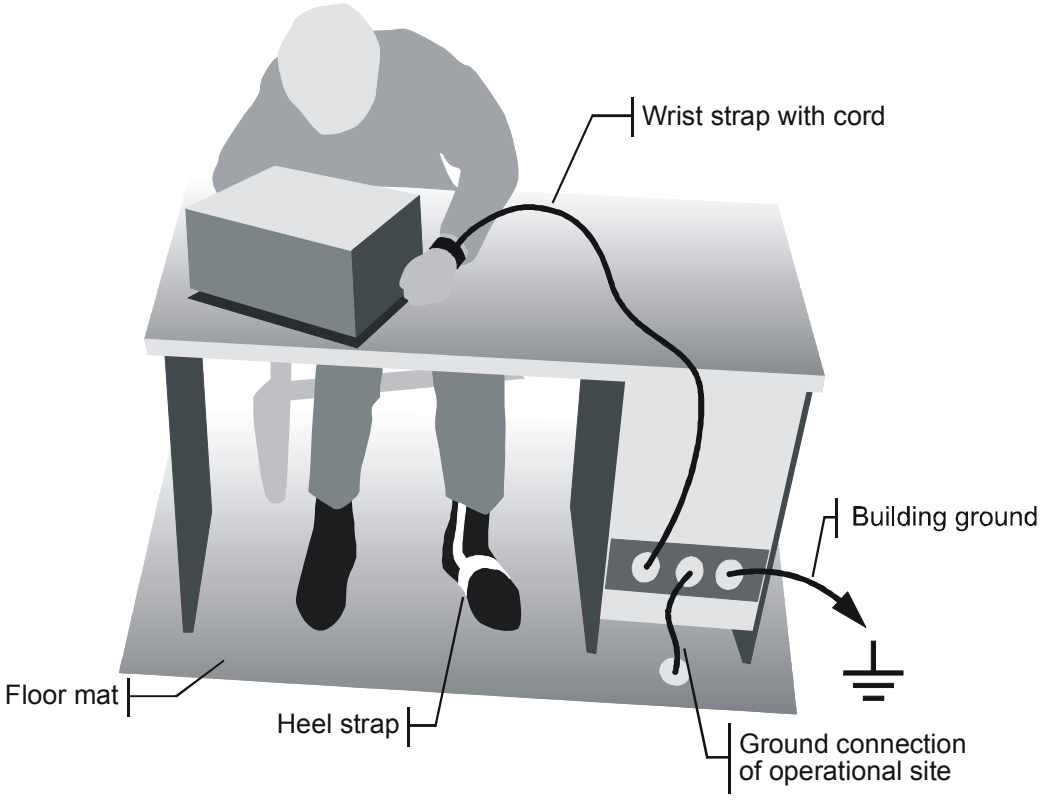
Se puede encontrar más información sobre la protección del medio ambiente en la página web de Rohde & Schwarz.

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:

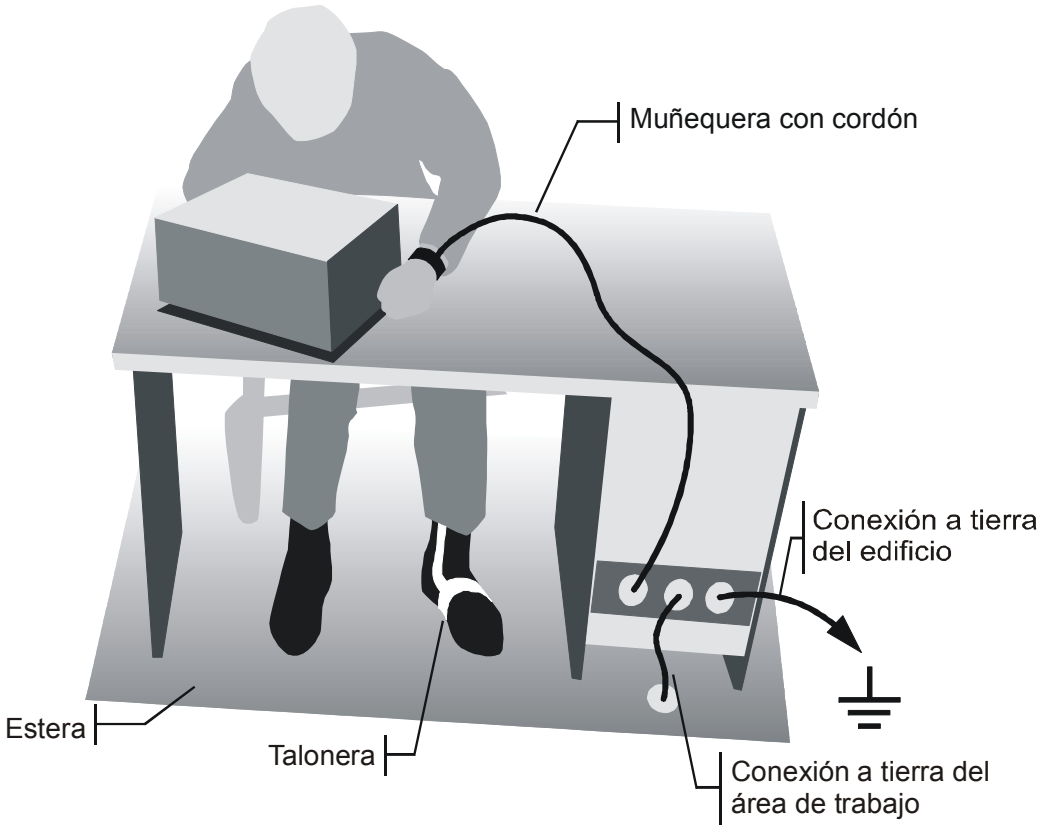
- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

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

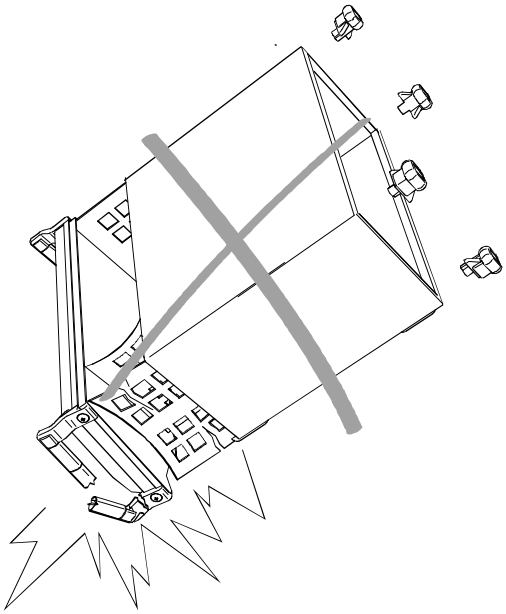
Safety Instructions for Units with Removable Cabinet

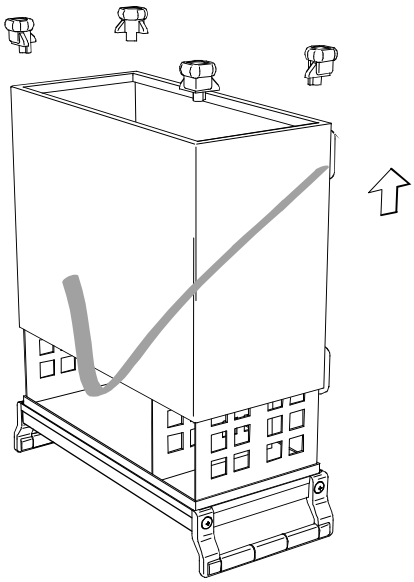
⚠ WARNING

Danger of injuries

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

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





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

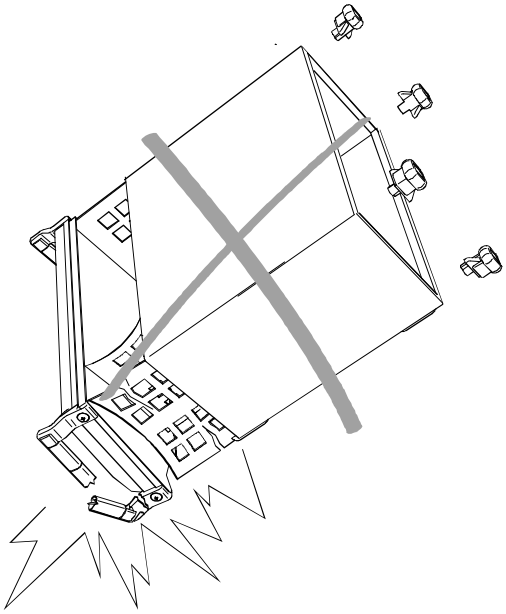
Informaciones de seguridad para aparatos con tubo de quita y pon

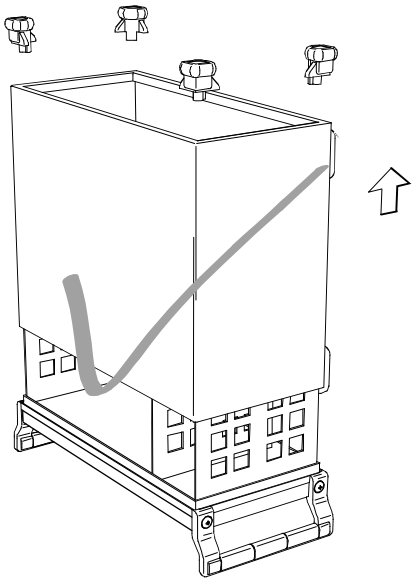
⚠ ADVERTENCIA

Peligro de heridas

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

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





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

Procedure in Case of Service and Ordering of Spare Parts

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

Please contact your local Rohde & Schwarz service center if you need service or repair work of your equipment or to order spare parts. The list of the Rohde & Schwarz representatives is provided at the beginning of this service manual. You can find the current address of your representative on our homepage www.rohde-schwarz.com. Navigate to Service & Support / Service Locations.

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 electro-static 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)

Table of Contents

Index

Documentation Overview

The user documentation for the R&S FSV is divided as follows:

- Quick Start Guide
- Operating Manual
- Service Manual
- Online Help
- Release Notes

Quick Start Guide

This manual is delivered with the instrument in printed form and in PDF format on the CD. It provides the information needed to set up and start working with the instrument. Basic operations and basic measurements are described. Also a brief introduction to remote control is given. The manual includes general information (e.g. Safety Instructions) and the following chapters:

Chapter 1	Front and Rear Panel
Chapter 2	Putting into Operation
Chapter 3	Firmware Update and Installation of Firmware Options
Chapter 4	Basic Operations
Chapter 5	Basic Measurement Examples
Chapter 6	Brief Introduction to Remote Control
Appendix A	Printer Interface
Appendix B	LAN Interface

Operating Manuals

The operating manuals are a supplement to the Quick Start Guide. Operating manuals are provided for the base unit and each additional (software) option.

The operating manual for the base unit provides basic information on operating the R&S FSV in general, and the "Spectrum" mode in particular. Furthermore, the software options that enhance the basic functionality for various measurement modes are described here. The set of measurement examples in the Quick Start Guide is expanded by more advanced measurement examples. In addition to the brief introduction to remote control in the Quick Start Guide, a description of the basic analyzer commands and programming examples is given. Information on maintenance, instrument interfaces and error messages is also provided.

In the individual option manuals, the specific instrument functions of the option are described in detail. For additional information on default settings and parameters, refer to the data sheets. Basic information on operating the R&S FSV is not included in the option manuals.

For an overview of the available operating manuals, see the R&S FSV documentation CD. These manuals are available in PDF format on the CD delivered with the instrument. The printed manuals can be ordered from Rohde & Schwarz GmbH & Co. KG.

Service Manual

This manual is available in PDF format on the CD delivered with the instrument. It informs on how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for repairing the R&S FSV by the replacement of modules. The manual includes the following chapters:

Chapter 1 Performance Test

Provides all the information necessary to check for compliance with rated specifications. The required test equipment is included, too.

Chapter 2 Adjustment

Describes the manual adjustment of the calibration source and of the frequency accuracy as well as the automatic adjustment of individual module data following module replacement.

Chapter 3 Repair

Describes the design as well as simple measures for repair and fault diagnosis, in particular, the replacement of modules.

Chapter 4 Software Update / Installing Options

Contains information on the extension and modification by installinginstrument software and retrofitting options.

Chapter 5 Documents

Contains spare parts lists, exploded views and other diagrams and drawings.

Online Help

The Online Help is part of the firmware. It provides quick access to the description of the instrument functions and the remote control commands.

Release Notes

The release notes describe the installation of the firmware, new and modified functions, eliminated problems, and last minute changes to the documentation. The corresponding firmware version is indicated on the title page of the release notes. The current release notes are provided in the Internet.

1 Performance Test

This chapter provides information on executing performance tests. After an overview of the required equipment, the test procedure and the detailed test goals are described. At the end of this chapter, templates for test reports are supplied for your convenience. Fields in the report that the user must fill out before or during the test are indicated by a gray background.

1.1 Test Equipment

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1	Signal generator	(20 Hz) 9 kHz to 4 GHz Frequency accuracy: <1x10-9 Phase noise at 500 MHz: < -94 dBc/Hz @ 100 Hz < -111 dBc/Hz @ 1 kHz < -116 dBc/Hz @ 10 kHz < -125 dBc/Hz @ 100 kHz < -144 dBc/Hz @ 1 MHz	R&S SMA100A with options SMA-B106, SMA-B22	1400.0000.02 1405.0809.02 1405.1805.02	Reference frequency accuracy IF filter Frequency response Display linearity RF attenuator Phase noise
2	Signal generator (2 units)	FSV 4/7/13: 10 MHz to 15 GHz FSV 30/39/40: 10 MHz to 40 GHz	R&S SMR20 R&S SMR40	1104.0002.20 1104.0002.40	Immunity to interference Nonlinearities Frequency response
3	Power splitter 2-resistor design	DC to 4 GHz equivalent output SWR 10 MHz to 4 GHz <1.10 level imbalance ≤ 0.1 dB	Weinschel Model 1870A		Frequency response
4	Power splitter 2-resistor design	FSV 4/7: 10 MHz to 7 GHz FSV 13: 10 MHz to 14 GHz FSV 30: 10 MHz to 30 GHz FSV 39/40: 10 MHz to 40 GHz level imbalance 4 GHz to 8 GHz:≤ 0.3dB 8 GHz to 22 GHz:≤ 0.4dB 22 GHz to 40 GHz:≤ 0.5 dB equivalent output SWR 4 GHz to 7 GHz: ≤ 1.3 8 GHz to 22 GHz: ≤ 1.4 22 GHz to 40 GHz:≤ 1.5	Weinschel Model 1534		Frequency response Third order intercept

5	50-Ohm termination	FSV4/7/13/30: 10 MHz to 30 GHz FSV39/40: 10 MHz to 40 GHz	 Anritsu 28S50 Anritsu 28K50		Noise display
6	Power meter	-30 dBm to +10 dBm Instrumentation uncertainty<0.5%	R&S NRP	1143.8500.02	Frequency response B21, LO output power
7	Power sensor	9 kHz to 7 GHz -30 dBm to 0 dBm	R&S NRP-Z91	1168.8004.02	Frequency response
8	Power sensor	10 MHz to 40 GHz -30 dBm to 0 dBm VSWR cal fact. unc. % 50 to 128 MHz 1.15 1.6 4 to 8 GHz 1.15 2 8 to 22 GHz 1.25 2.5 22 to 40 GHz 1.35 3	R&S NRP-Z55	1138.2008.02	Frequency response B21, LO output power
9	Step attenuator	variable attenuation 0 dB to 100 dB, 1-dB steps attenuation accuracy < 0.1 dB (f = 128 MHz)	R&S RSG with special calibration	1009.4505.02 0859.4822.00	Display linearity RF attenuator Reference level switching
10	Fixed Attenuator (2 units)	fixed attenuation 10 dB	Anritsu 43KC-10		Nonlinearities B21, LO output power
11	Network analyzer	FSV 4/7: 20 MHz to 7 GHz FSV 13: 20 MHz to 14 GHz FSV30/39/40: 20 MHz to 40 GHz	R&S ZVA	1145.1110.10 1145.1110.24 1145.1110.40	VSWR
12	Voltmeter	20 Hz to 9 kHz	R&S URE2	0350.5315.02	B29, frequency response
13	50 Ω termination	BNC, 50 Ω ± 0.1 %	RAD 50	0844.9352.02	B29, frequency response
14	N-cable	Attenuation <0.5 dB up to 7 GHz			B9, frequency response
15	Multimeter	Current 50 mA uncertainty +/- 0.01 mA			B21, bias current
16	Rubidium frequency standard	10 MHz Frequency accuracy: <5x10-11	Symmetricom 8040C	1150.9650.12	B14, reference frequency accuracy

1.2 Performance Test R&S FSV

Test Instructions

To ensure that rated specifications are maintained, the following preparations must be made prior to checking the rated characteristics:

- 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.
- Unless specified otherwise, all measurements will be performed with external reference frequency.

1.2.1 Checking the Reference Frequency Accuracy

Test equipment: Signal generator (chapter "Measuring Equipment and Accessories", item 1):

Frequency	e.g. 1000 MHz
Level	-20 dBm
Frequency accuracy	<1x10-9

Instruments with option R&S FSV-B14:

Rubidium frequency standard (chapter "Measuring Equipment and Accessories", item 16):

Frequency	10 MHz
Level	0 dBm
Frequency accuracy	<5x10-11

If the frequency accuracy of the test transmitter is insufficient, the transmitter can be set to the correct frequency with the aid of the frequency counter prior to the measurement.

Test setup: Connect RF output of the signal generator to RF input of the R&S FSV.

Use the rubidium frequency standard if option FSV-B14 is installed.

Signal generator settings:

- Frequency	1000 MHz
- Level	-20 dBm

R&S FSV settings: - [**PRESET**]

- [**FREQ** : CENTER : **1 GHz**]
- [**SPAN** : **1 MHz**] 1 kHz with FSV-B14
- [**BW** : RES BW MANUAL : **300 kHz**] 100 Hz with FSV-B14
- [**AMPT** : REF Level : **-8 dBm**]
- [**SETUP** : REFERENCE INT / EXT]

Switch to an internal reference source (INT)

Note: Before the following measurement, the R&S FSV must be on for at least ten minutes with an internal reference, so that the reference oscillator is warmed up.

Measurement: Switch marker frequency count:

- [**MKR** : SIGNAL COUNT]

Set the appropriate resolution:

- [**MKR : NEXT** : CNT RESOL 1 Hz] ,1 mHz with FSV-B14

Model without B4	1 GHz ± 1 kHz (corresponds to 1E-6)
Model with B4	1 GHz ± 100 Hz (corresponds 1E-7)
Model with B14	1 GHz ± 0.5 Hz (corresponds 5E-10)

Evaluation: The frequency is displayed in the marker field by the reading ´Count´.

Model with B14:
Repeat the measurement 10 times and calculate the average value.

Note: The frequency of the reference oscillator can be adjusted by means of a service function (refer to chapter "Adjustment").

1.2.2 Checking Immunity to Interference

Test equipment: Signal generator (Section "Measurement Equipment", item 2):

Frequency range	R&S FSV 4,7:	10 MHz to 9 GHz
	R&S FSV 13:	10 MHz to 15 GHz
	R&S FSV 30:	10 MHz to 30 GHz
	R&S FSV 39/40:	10 MHz to 40 GHz
maximum level	≥ 0 dBm	

Test setup: Connect RF output of the signal generator to RF input.

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**AMPT** : REF LEVEL : **-30 dBm**]
- [**SPAN** : **1 MHz**]
- [**BW** : RES BW MANUAL : **100 Hz**]

1.2.2.1 2nd IF Image Frequency Rejection

Additional signal generator settings:
- Frequency f_{in} + 2×729.9 MHz
  f_{in} - 2×729.9 MHz (see table of performance test report)
- Level: adjust the output level of signal generator for an RF-Input level of -10 dBm

Additional R&S FSV settings:
- [**FREQ** : CENTER : {f_{in}}]

  See table of performance test report for values of f_{in}.

Measurement: Set marker to peak of signal
- [**MKR** ⇒ : PEAK]

Evaluation: The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

Image frequency rejection = -10dBm – L_{dis}

1.2.2.2 3rd IF Image Frequency Rejection

Additional signal generator settings:
- Frequency f_{in} + 2×89.9 MHz
- Level: adjust the output level of signal generator for an RF-Input level of -10 dBm

Additional R&S FSV settings:
- [**FREQ** : CENTER : {f_{in}}]

See table of performance test report for values of f_{in}.

Measurement: Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

Image frequency rejection = -10dBm – L_{dis}

1.2.2.3 2nd IF Rejection

Additional signal generator settings:
- Frequency 729.9 MHz
- Level: adjust the output level of signal generator for an RF-Input level of -10 dBm

Additional R&S FSV settings:
- [**FREQ** : CENTER : {f_{in}}]

See table of performance test report for values of f_{in}.

Measurement: Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The IF rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

IF rejection = -10dBm – L_{dis}

1.2.2.4 3rd IF Rejection

Additional signal generator settings:
- Frequency 89.9 MHz
- Level: adjust the output level of signal generator for an RF-Input level of -10 dBm

Additional R&S FSV settings:
- [**FREQ** : CENTER : {f_{in}}]

  See table of performance test report for values of f_{in}.

Measurement:
Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation:
The IF rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

IF rejection = -10dBm – L_{dis}

1.2.3 Checking Nonlinearities

1.2.3.1 Third-Order Intercept Point

Test equipment: 2 signal generators (Section "Measurement Equipment", item 2)

Frequency range:

R&S FSV 4:	10 MHz to 4 GHz
R&S FSV 7:	10 MHz to 7 GHz
R&S FSV 13:	10 MHz to 14 GHz
R&S FSV 30:	10 MHz to 30 GHz
R&S FSV 39/40:	10 MHz to 40 GHz

2 attenuators (Section "Measurement Equipment", item 10)

Attenuation a_{ATT} = 10 dB

Frequency range:

R&S FSV 4:	10 MHz to 4 GHz
R&S FSV 7:	10 MHz to 7 GHz
R&S FSV 13:	10 MHz to 14 GHz
R&S FSV 30:	10 MHz to 30 GHz
R&S FSV 39/40:	10 MHz to 40 GHz

Power splitter/combiner (Section "Measurement Equipment", item 4)

Frequency range:

R&S FSV 4:	10 MHz to 4 GHz
R&S FSV 7:	10 MHz to 7 GHz
R&S FSV 13:	10 MHz to 14 GHz
R&S FSV 30:	10 MHz to 30 GHz
R&S FSV 39/40:	10 MHz to 40 GHz

Test setup: Connect RF outputs of the signal generators via 10 dB attenuators to the inputs of the combiner

Connect output of the combiner to the RF input of the R&S FSV.

Signal generator settings: - Frequency: generator 1 $f_{g1} = f_{in} - 50$ kHz
generator 2 $f_{g2} = f_{in} + 50$ kHz

(both generators): See table of performance test report for values of f_{in}

Adjust the output level of the signal generators for an input level at the R&S FSV of –15 dBm.

Switch off the ALC of the generators to reduce the interference between the generators.

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**AMPT** : **-10 dBm**]
- [**SPAN** : **500 kHz**]
- [**BW** : RES BW MANUAL : **30 Hz**]
- [**FREQ** : CENTER : {f_{in}}]

See table of performance test report for values of f_{in}

Measurement: - [**MKR FCTN** : TOI]

Evaluation: The third order intercept point (T.O.I) referred to the input signal is displayed in the marker field by the reading [TOI].

Note: If the input signal is exactly known, the level of the spurious products can alternatively be measured in a span of 20 kHz, for example. The TOI is then calculated from the average of the two spurious signals and the average of the two useful signals.

1.2.4 Checking IF Filters

Test equipment: Signal generator (Section "Measurement Equipment", item 1):
Frequency 64 MHz
Level ≥ 0 dBm

Test setup: ➢ Connect RF output of the signal generator to the RF input of the R&S FSV.

1.2.4.1 Checking the Bandwidth Switching Level Uncertainty

Reference measurement (RBW 10 kHz)

Signal generator settings:
- Frequency: 64 MHz
- Level: -20 dBm

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : **-15 dBm**]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : CENTER : **64 MHz**]
- [**BW** : COUPLING RATIO : SPAN / RBW MANUAL : **1 : ENTER**]
- [**SPAN** : **10 kHz**]
- [**SWEEP** : SWEEPTIME : **100 ms**]
- [**TRACE** : DETECTOR : RMS]

Reference measurement:
Set marker to peak of signal
- [**MKR** ⇒ : PEAK]

Set reference to peak of signal
- [**MKR** : REFERENCE FIXED]

Checking the level uncertainty:

R&S FSV settings:
- [**SPAN** : {1 x RBW}] for RBW ≤ 10 MHz or
- [**SPAN** : ZERO] for RBW > 10 MHz not with R&S FSV40, Var.39
- [**BW** : RBW MANUAL : {RBW} : **ENTER**]

See table of performance test report for values of RBW.

Measurement:
Set marker to peak of signal
- [**MKR** ⇒ : PEAK]

Evaluation: The level difference is displayed in the marker field by the reading ´Delta [T1 FXD] {xxx} dB´.

Note: To check the FFT filter, set the sweep time to auto.

- [**SWEEP** : SWEEPTIME AUTO]

1.2.5 Checking Spurious Response

Test equipment: 50 Ω termination (Section "Measurement Equipment", item 5)

Frequency range:

R&S FSV 4:	DC to 4 GHz
R&S FSV 7:	DC to 7 GHz
R&S FSV 13:	DC to 13.6 GHz
R&S FSV 30:	DC to 30 GHz
R&S FSV 39/40:	DC to 40 GHz

Test setup: ➢ Terminate the RF input of the FSV with 50 Ω

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**AMPT** : **-50 dBm**]
- [**SPAN** : **10 kHz**]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**FREQ** : CENTER : {f_{spur}}]

Measurement: -[**MKR** ⇒ : PEAK]

f_{spur}	
32 MHz	reference/4
64 MHz	reference/2
128 MHz	reference
256 MHz	reference*2
384 MHz	reference*3

1.2.6 Checking Noise Display

Test equipment: 50 Ω termination (Section "Measurement Equipment", item 5)

Frequency range:

R&S FSV 4:	DC to 4 GHz
R&S FSV 7:	DC to 7 GHz
R&S FSV 13:	DC to 13.6 GHz
R&S FSV 30:	DC to 30 GHz
R&S FSV 39/40:	DC to 40 GHz

Terminate the RF input of the FSV with 50 Ω

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**SPAN** : 0 Hz]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**BW** : SWEEP TIME MANUAL : **50 ms**]
- [**TRACE 1** : AVERAGE]
- [**TRACE 1** : SWEEP COUNT : **20 ENTER**]
- [**AMPT** : {RefLev}]
- [**FREQ** : CENTER : {f_n}]
- [**MEAS** : TIME DOMAIN POWER : MEAN]

See table of performance test report for values of f_n.

Measurement: Read out the mean marker and correct the measurement value by –30 dB for the ratio of 1 Hz / 1 kHz .

Note: For example the DANL in 1 kHz bandwidth –126 dBm results in a corrected value of –156 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 1 kHz bandwidth to reduce measurement time.

Frequency	< 10kHz	< 100kHz	< 1MHz	< 10MHz	> 10kHz
RefLev	-10 dBm	-20 dBm	-30 dBm	-60 dBm	-60 dBm

1.2.7 Checking the Level Uncertainty and the Frequency Response

Test equipment: Signal Generator (Section "Measurement Equipment", item 1)

Frequency range	9 kHz to 4 GHz
Maximum level	≥ 0 dBm

Signal Generator (Section "Measurement Equipment", item 2)

Frequency range:	FSV 7:	10 MHz to 7 GHz
	FSV 13:	10 MHz to 13.6 GHz
	FSV 30:	10 MHz to 30.0 GHz
	FSV 39/40:	10 MHz to 40.0 GHz
Maximum level:	≥ 0 dBm	

Power meter (Section "Measurement Equipment", item 6)

Power range -30 to 0 dBm	
Instrumentation uncertainty	<0.5%
Uncertainty of power reference	<1.2%
VSWR of power reference	<1.10

Power Sensor (Section "Measurement Equipment", item 7)

Frequency range	9 kHz to 7 GHz	
Power range	-30 to 0 dBm	
Cal factor uncertainty	1 MHz to 3.6 GHz	<1.6 %
	3.6 GHz to 7 GHz	<2 %
VSWR	3.6 GHz to 7 GHz	<1.15
	1 MHz to 3.6 GHz	<1.30
	50 MHz to 128 MHz	<1.10

Power Sensor (Section "Measurement Equipment", item 8)

Frequency range:

R&S FSV 7:	DC to 7 GHz	
R&S FSV 13:	DC to 26.5 GHz	
R&S FSV 29/30:	DC to 30 GHz	
R&S FSV 38/39/40:	DC to 40 GHz	
Power range	-30 to 0 dBm	
Cal factor uncertainty	50 to 128 MHz	<1.6 %
	3.6 to 8 GHz	<2 %
	8 to 22 GHz	<2.5 %
	22 to 40 GHz	<3 %
VSWR	50 to 128 MHz	<1.15
	3.6 to 8 GHz	<1.15
	8 to 22 GHz	<1.25
	22 to 40 GHz	<1.35

6 dB Power Splitter (Section "Measurement Equipment", item 3)

Frequency range	DC to 3.6 GHz

Level imbalance	10 MHz to 3.6 GHz	<0.1 dB
Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1

6 dB Power Splitter (Section "Measurement Equipment", item 4)

Frequency range:

R&S FSV 7	DC to 7 GHz
R&S FSV 13	DC to 13.6 GHz
R&S FSV 30	DC to 30 GHz
R&S FSV 39/40	DC to 40 GHz

Level imbalance	3.6 to 7 GHz	≤ 0.3 dB
	7 to 22 GHz	≤ 0.4 dB
	22 to 40 GHz	≤ 0.5 dB

Equivalent output VSWR	3.6 to 7 GHz	≤ 1.3
	7 to 22 GHz	≤ 1.4
	22 to 40 GHz	≤ 1.5

1.2.7.1 Absolute Level Uncertainty at 64 MHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.

Connect Power Sensor through a cable to RF output of Signal Generator.

Signal generator settings:
- Frequency 64 MHz
- Level -10 dBm

Measurement: Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.

Record the Power Meter indication.

Disconnect Power Sensor from the cable.

R&S FSV settings: - [**PRESET**]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**AMPT** : **-10 dBm**]
- [**SWEEP** : SWEEP TIME : **10 ms**]
- [**SPAN** : **30 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S FSV (level reading of marker 1) reflects the absolute level uncertainty of the R&S FSV. It can be calculated as:

$$\text{Level uncertainty}_{64MHz} = L_{FSV} - L_{powermeter}$$

1.2.7.2 Frequency Response < 3.6 GHz

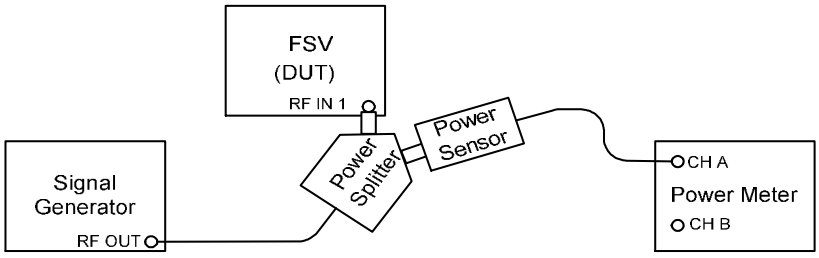
Checking the frequency response

Note: If a power splitter with higher level imbalance is used, correction of the measured frequency response is recommended.

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Use Power Splitter/Combiner (item 3) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note

Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Signal generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT {coupling}]
- [**AMPT** : RF ATTEN MANUAL : **{a_{FSV}}**]
- [**AMPT** : **0 dBm**] (-5 dBm for 5 dB attenuation)
- [**SPAN : 100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]
- [**MKR** ⇒ : MORE : EXCLUDE LO]

See table of performance test report for values of coupling and a_{FSV} .

Reference measurement:
Determine signal level $L_{powermeter}$.

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from power meter : $L_{powermeter}$

Evaluation: Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{powermeter} / dBm$

Record $\Delta Ref / dB$

Frequency Response Measurement:

Signal generator settings:
- Frequency f_{fresp}

See table of performance test report for values of f_{fresp}

R&S FSV settings: - [**SPAN : {span}**]

- [**FREQ** : CENTER : {f_{fresp}}]
- [**BW** : RES BW MANUAL : **{RBW}**]

See table below for values of span and resolution bandwidth.

See table of performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{powermeter}$

Evaluation: The frequency response can be calculated as:
Freq. response / dB = $L_{FSV} - L_{powermeter}$ - ΔRef / dB

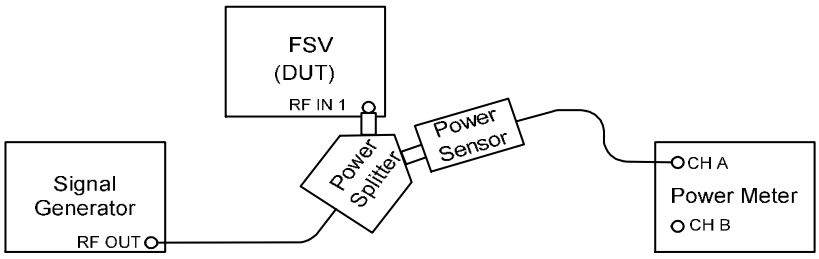
f_{center}	9 kHz	100.02 kHz	1,005 MHz	≥10 MHz
Span	0 Hz	0Hz	0 Hz	100 kHz
RBW	10 Hz	1 kHz	10 kHz	10 kHz

1.2.7.3 Frequency Response > 3.6 GHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 8).

Use Power Splitter/Combiner (item 4) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note
Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Reference Measurement:

Signal Generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT {coupling}]
- [**AMPT** : RF ATTEN MANUAL : **{a_{FSV}}**]
- [**AMPT** : **0 dBm**]
- [**SPAN** : **100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

See table of performance test report for values of coupling and a_{FSV} .

R&S FSV settings: Set marker to peak of signal
- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{PowerMeter} / dBm$

Record $\Delta Ref / dB$

Frequency Response Measurement (span = 100 kHz)

Signal Generator settings: Frequency f_{fresp}

See table in performance test report for values of f_{fresp}

R&S FSV settings: - [**FREQ** : CENTER : {f_{fresp}}]

See table in performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: The frequency response can be calculated as:

Freq. response / dB = L_{FSV} - $L_{PowerMeter}$ - ΔRef / dB

Take the value of ΔRef as ascertained before.

Frequency Response Measurement (full span)

R&S FSV settings: - [**PRESET**]

- [**AMPT** : RF INPUT DC]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [**AMPT** : **0 dBm**]

Signal Generator settings: Frequency f_{fresp}

See table in performance test report for values of f_{fresp}

R&S FSV settings: See table in performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: The frequency response can be calculated as:

Freq. response / dB = L_{FSV} - $L_{PowerMeter}$ - ΔRef / dB

Take the value of ΔRef as ascertained before.

1.2.8 Checking the Display Nonlinearity

Test equipment: Signal generator (Section "Measurement Equipment", item 1)

Frequency 128 MHz

Maximum level ≥ 10 dBm

Step attenuator (Section "Measurement Equipment", item 9)

Frequency 128 MHz

Attenuation 0 to 100 dB in 1 dB steps

Attenuation accuracy < 0.1 dB

Test setup: Connect RF output of the signal generator to RF input of the step attenuator

Connect RF output of the step attenuator to RF input of the R&S FSV

Signal generator settings:
- Frequency 128.1 MHz
- Level +10 dBm

Step attenuator settings:
- attenuation 20 dB

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**AMPT** : **0 dBm**]
- [**FREQ** :CENTER : **128.1 MHz**]
- [**SPAN** : **0 Hz**]
- [**TRACE** : DETECTOR : AV]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**SWEEP** : SWEEP TIME MANUAL : **{sweep time}**]
- [**MEAS** : TIME DOMAIN POWER : MEAN]

See table below for values of sweep time.

Reference measurement: Read out the mean marker value (= L_{Ref})

Measurement:

Step attenuator settings: - attenuation {a_{ATT}}

See table of performance test report for values of a_{ATT}.

Evaluation: Read out the mean marker value. The difference between the level of the input signal of the R&S FSV and the reference L_{Ref} (about 10 dB below the reference level) can be calculated as :

$$\Delta L = L_{FSV} - L_{Ref}$$

Note: A frequency between 5 MHz and 1 GHz may be used. It is recommended to use correction values for the uncertainty of the attenuator.

a_{ATT}	10 dB to 50 dB	50 dB to 80 dB
Sweep time	200 ms	600 ms

1.2.9 Checking the RF Attenuator Uncertainty

Test equipment: Signal generator (Section "Measurement Equipment", item 1)

Frequency 128 MHz

Maximum level ≥ 10 dBm

Step attenuator (Section "Measurement Equipment", item 9)

Frequency 128 MHz

Attenuation 0 to 80 dB in 5 dB steps

Attenuation accuracy < 0.1 dB

Test setup: Connect RF output of the signal generator to RF input of the step attenuator

Connect RF output of the step attenuator to RF input of the R&S FSV

Signal generator settings: - Frequency 128.1 MHz

- Level 10 dBm

R&S FSV settings: - [**PRESET**]

- [**FREQ** : CENTER : **128.1 MHz**]
- [**SPAN** : **500 Hz**]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**BW** : VIDEO BW MANUAL : **100 Hz**]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**AMPT** : **-35 dBm**]

Reference measurement: Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Set reference to peak of signal

- [**MKR** : REFERENCE FIXED]

Measurement

Step attenuator settings: - Attenuation { 80dB - a_{FSV}}

R&S FSV settings: - [**AMPT** : RF ATTEN MANUAL : { a_{FSV}}]

- [**AMPT** : {-45dBm + a_{FSV} } **dBm**]
- [**MKR** ⇒ : PEAK]

See table below for values of a_{FSV}, a_{ATT} and reference level.

Evaluation: The difference between the level of the input signal of the R&S FSV and the reference (at 10 dB RF-Attenuation) is displayed in the marker field by the reading Delta [T1 FXD].

a_{ATT}	**70 dB**	**80 dB**	**75 dB**	**65 dB**	**60 dB**	**55 dB**	**50 dB**	**40dB**	**30 dB**	**20 dB**	**10 dB**
a_{FSV}	10 dB	0 dB	5 dB	15 dB	20 dB	25 dB	30 dB	40dB	50 dB	60 dB	70 dB
reference level	-35 dBm	-45 dBm	-40 dBm	-30 dBm	-25 dBm	-20 dBm	-15 dBm	-5 dBm	5 dBm	+15 dBm	+25 dBm

1.2.10 Checking the Phase Noise

Test equipment: Signal generator (refer to "Measurement Equipment", item 1)

Frequency	500 MHz	
Level	≥ 0 dBm	
Phase noise at 500 MHz:		< -94 dBc/Hz @ 100 Hz
		< -111 dBc/Hz @ 1 kHz
		< -116 dBc/Hz @ 10 kHz
		< -125 dBc/Hz @ 100 kHz
		< -144 dBc/Hz @ 1 MHz

Test setup: Connect RF output of the signal generator to RF input of the R&S FSV.

Signal generator settings:
- Frequency 500 MHz
- Level 3 dBm

Adjust the output level of the signal generator for an input level at the R&S FSV of 3 dBm.

R&S FSV settings:
- [**PRESET**]
- [**SETUP** : REFERENCE INT]
- [**FREQ** : CENTER : **500 MHz**]
- [**AMPT** : ATTEN MANUAL**: 10 dB**]
- [**AMPT : 0 dBm**]
- [**SPAN** : **1 MHz**]
- [**SWEEP** : SWEEP TIME MANUAL : **1 ms**]
- [**TRACE 1** : DETECTOR RMS]
- [**SWEEP** : SINGLE]
- [**MKR FCTN** : SIGNAL COUNT]

Set center frequency to counter frequency

- [**MKR FCTN** : PHASE NOISE]
- [**TRACE** : AVERAGE]
- [**SWEEP** : SWEEP COUNT : {sweep count} : **ENTER**]
- [**SWEEP** : SWEEP TIME MANUAL : {sweep time} : **ENTER**]
- [**SPAN** : {span}]
- [**MKR** : {Offset}]

See table below for values of reference level, sweep time, sweep count and span.

Refer to "Performance Test Report" table for values of offset.

Evaluation: The phase noise is displayed in the marker field by the reading ´PHNOISE 2´.

Note: Please make sure not to measure on a spurious signal.

In case of a IF overload the level of the signal generator has to be reduced.

Settings for phase noise measurement				
Offset	Span	RBW / Sweeptime / Sweepcount	Reference level	a_{FSV}
100 Hz	200 Hz	5 Hz / 2000 ms / 5	0 dBm	10 dB
1 kHz	2 kHz	100 Hz / 800 ms / 5	0 dBm	10 dB
10 kHz	20 kHz	1 kHz / 500 ms /5	0 dBm	10 dB
100 kHz	200 kHz	10 kHz / 200 ms /5	0 dBm	10 dB
1 MHz	2 MHz	10 kHz / 100 ms /5	0 dBm	10 dB

1.2.11 Checking the VSWR at the RF Input

Test equipment: Network analyzer (Section "Measurement Equipment", item 11)

Test setup: Connect the test port of the network analyzer to the RF input 1 of the R&S FSV.

R&S FSV settings: - [**PRESET**]

- [**AMPT** : RF INPUT {state}]
- [**AMPT** : RF ATTEN MANUAL : {a_{FSV}**}**]

See table of performance test report for values of a_{FSV} ,f_{in} and state .

Measurement: Determine the VSWR of the R&S FSV at the frequencies shown in the performance test report. See operating manual of the network analyzer for detailed information about VSWR measurement.

1.3 Performance Test Option Tracking Generator R&S FSV-B9

1.3.1 Checking Absolute Level Uncertainty

Test equipment: N-cable (Section "Measurement Equipment", item 14)

Frequency range: 0…7 GHz

Attenuation: < 0.5 dB

Test setup: Connect RF Output and RF Input.

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**SPAN** : 0 Hz]
- [**BW** : RES BW MANUAL : **5 Hz**]
- [**BW** : SWEEP TIME MANUAL : **500 ms**]
- [**AMPT** : **-10 dBm**]
- [**FREQ** : CENTER : **64 MHz**]
- [**MEAS** : Time Dom Power : **Mean**]
- [**OUTPUT** : STATE : On]
- [**SOURCE** : POWER : -10dBm]

Measurement: Read out the mean marker.

Evaluation: The difference between the signal level measured with the R&S FSV (level reading of marker 1) and the nominal value reflects the absolute level uncertainty of the tracking generator. It can be calculated as:

$$\text{Level uncertainty}_{64MHz} = L_{FSV} + 10\ \text{dBm} + a_{Cable(64\ MHz)}$$

1.3.2 Checking the Frequency Response

Test equipment: N-cable (Section "Measurement Equipment", item 14)

Frequency range: 0…7 GHz

Attenuation: < 0.5 dB

Test setup: Connect RF Output and RF Input.

Reference measurement:

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**SPAN** : 0 Hz]
- [**BW** : RES BW MANUAL : **5 Hz**]
- [**BW** : SWEEP TIME MANUAL : **500 ms**]
- [**AMPT** : **-10 dBm**]
- [**FREQ** : CENTER : **64 MHz**]
- [**MEAS** : Time Dom Power : **Mean**]
- [**OUTPUT** : STATE : On]
- [**SOURCE** : POWER : -10dBm]

Measurement: Read out the mean marker.

Evaluation: Calculate:

$$L_{ref} = L_{FSV} + a_{Cable(64\ MHz)}$$

Checking the frequency response

R&S FSV settings: - [**PRESET**]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : START : **100 kHz**]
- [**BW** : RES BW MANUAL : **50 kHz**]
- [**BW** : SWEEP TIME MANUAL : **10 s**]
- [**AMPT** : **-10 dBm**]
- [**OUTPUT** : STATE : On]
- [**SOURCE** : POWER : -10dBm]

Measurement: Set marker to peak of signal

- [**MKR** ⇒ : PEAK] (=L_{max} at f_1)

Set marker to minimum value

- [**MKR** ⇒ : MORE : MIN] (=L_{min} at f_2)

Evaluation: The frequency response can be calculated as:

Max. freq. response / dB = L_{max} - L_{ref} + $a_{Cable(f1)}$

Min. freq. response / dB = L_{min} - L_{ref} + $a_{Cable(f2)}$

Take the value of L_{ref} as ascertained before.

1.4 Performance Test Option LO/IF Ports for External Mixers R&S FSV-B21

1.4.1 Checking LO-Level

Test equipment: Power Meter (Section "Measurement Equipment", item 6)

Power sensor (section "Measurement Equipment", item 8)

Frequency range	7.0 MHz to 15.5 GHz
Max. input power	P_{max} = +23 dBm
RSS ≤ 2.5% referred to measured power	
Impedance	Z = 50 Ω

Fixed attenuator with 10 dB (Section "Measurement Equipment" item 10)

Power meter settings: Connect power sensor to the power meter and execute function ´ZERO´ when there is no signal applied to the power sensor

R&S FSV settings:
- [**PRESET**]
- [**SENS** : MIX ON
- [**SPAN** : ZERO SPAN]
- [**SETUP** : SERVICE : ENTER PASSWORT **894129**]

Select LO-Power:

- [**SENS** : MIX:LOP {P_{LO}}]

for P_{LO} = 13,0dBm, 15,5dBm and 17,0dBm

Bias current set to zero:

- [**SENS** : MIX:BIAS 0.0]

Select upper sideband with service-function:

- [**SETUP** : SERVICE FUNCTIONS **2.5.2.2.1**]
- [**FREQ CENTER** : {$f_{Center1}$}]

resulting LO-frequency $f_{LO} = (f_{Center1} – 729,9\ MHz) / 2$

Select lower sideband with service-function:

- [**SETUP** : SERVICE FUNCTIONS **2.5.2.2.0**]
- [**FREQ CENTER** : {$f_{Center2}$}]

resulting LO-frequency $f_{LO} = (f_{Center1} + 729,9\ MHz) / 2$

Test setup: Connect power sensor via fixed attenuator to the output ‘LO_{out} / IF_{in}’

Measurement: Determine level of the LO-signal $L_{LO,meas}$
To achieve higher accuracy it is recommended to compensate the frequency response of the power sensor. For compensation frequency use f_{LO}

Evaluation: The level of the LO-signal can be determined as $L_{LO} = L_{LO,meas} + 10\ dB$

1.4.2 Checking the Input LO_{out} / IF_{in} (2-Port-Mixers)

Test equipment: Signal Generator (section "Measurement Equipment", item 1)

Frequency 729.9 MHz

Output power -20 dBm

R&S FSV settings:
- [**PRESET**]
- [**SENS** : MIX ON]
- [**SENS** : MIX:HARM:BAND USER]
- [**SENS** : MIX:HARM 2]
- [**SPAN** : ZERO SPAN]
- [**FREQ** : CENT 16.7299GHz]
- [**SENS** : BAND 2KHz]
- [**DET** : FUNC RMS
- [**SETUP :** SERVICE : ENTER PASSWORT **894129**]

Switch off LO with service function:

- [**SETUP** : SERVICE FUNCTIONS **2.5.2.8.0**]

Bias current set to zero:

- [**SENS** : MIX:BIAS 0.0]

Select 2-port case:

- [**SENS** : MIX:PORT 2]

ZF-Attenuation set to 0dB

- [**SENS** : MIX:LOSS 0.0]

Signal generator settings:
- Frequency 729.9 MHz
- Input Level DUT –30 dBm +/- 0,1 dB

Test setup: Connect the generator to the connector LO_{out} / IF_{in};

Measurement:
- [**MKR->** : PEAK]

Read out the marker

1.4.3 Checking the Input IF_{in} (3-Port-Mixers)

Test equipment: Signal Generator (section "Measurement Equipment", item 1)

Frequency 729.9 MHz

Output power -20 dBm

R&S FSV settings:
- [**PRESET**]
- [**SENS** : MIX ON]
- [**SENS** : MIX:HARM:BAND USER]
- [**SENS** : MIX:HARM 2]
- [**SPAN** : ZERO SPAN]
- [**FREQ** : CENT 16.7299GHz]
- [**SENS** : BAND 2KHz]
- [**DET** : FUNC RMS
- [**SETUP :** SERVICE : ENTER PASSWORT **894129**]

Switch off LO with service function:

- [**SETUP** : SERVICE FUNCTIONS **2.5.2.8.0**]

Bias current set to zero:

- [**SENS** : MIX:BIAS 0.0]

Select 3-port case:

- [**SENS** : MIX:PORT 3]

ZF-Attenuation set to 0dB

- [**SENS** : MIX:LOSS 0.0]

Signal generator settings:
- Frequency 729.9 MHz
- Input Level DUT –30 dBm +/- 0,1 dB

Test setup: Connect the generator to the connector LO_{out} / IF_{in};

Measurement:
- [**MKR->** : PEAK]

Read out the marker

1.4.4 Checking the Bias Supply

Test equipment: Multimeter (section "Measurement Equipment", item 15)

R&S FSV settings: - [**PRESET**]

- [**SENS** : MIX ON
- [**SPAN** : ZERO SPAN]
- [**SETUP** : SERVICE : ENTER PASSWORT **894129**]

Switch off LO with service function:

- [**SETUP** : SERVICE FUNCTIONS **2.5.2.8.0**]

Bias current {I_{bias}} setting:

- [**SENS** : MIX:BIAS {I_{bias}}]

Bias {I_{bias}}: - 10 mA, 0 mA, + 10 mA)

Test setup: Connect the DC current meter between cable conductor and ground of LO_{out} / IF_{in}

Measurement: Read out the current

1.5 Performance Test Option RF Preamplifier R&S FSV-B22

1.5.1 Checking Noise Display

Test equipment: 50 Ω termination (Section "Measurement Equipment", item 5)

Frequency range:

R&S FSV 4: DC to 4 GHz

R&S FSV 7/13/30/39/40: DC to 7 GHz

Terminate the RF input of the FSV with 50 Ω

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : PREAMP ON]
- [**SPAN** : 0 Hz]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**BW** : SWEEP TIME MANUAL : **50 ms**]
- [**TRACE 1** : AVERAGE]
- [**TRACE 1** : SWEEP COUNT : **20 ENTER**]
- [**AMPT** : {RefLev}]
- [**FREQ** : CENTER : {f_n}]
- [**MEAS** : Time Dom Power : **Mean**]

See table of performance test report for values of f_n.

Measurement: Read out the mean marker and correct the measurement value by –30 dB for the ratio of 1 Hz / 1 kHz .

Note: For example the DANL in 1 kHz bandwidth –126 dBm results in a corrected value of –156 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 1 kHz bandwidth to reduce measurement time.

Frequency	**< 1MHz**	**< 10MHz**	**> 10kHz**
RefLev	-30 dBm	-60 dBm	-60 dBm

1.5.2 Checking the Level Uncertainty and the Frequency Response

Test equipment: - Signal Generator (Section "Measurement Equipment", item 1)

Frequency range	9 kHz to 3.6 GHz
Maximum level	≥ 0 dBm

- Signal Generator (Section "Measurement Equipment", item 2)

Frequency range:	FSV 7/13/30/39/40	10 MHz to 7 GHz
Maximum level:	≥ 0 dBm	

- Power meter (Section "Measurement Equipment", item 6)

Power range -30 to 0 dBm	
Instrumentation uncertainty	<0.5%
Uncertainty of power reference	<1.2%
VSWR of power reference	<1.10

- Power Sensor (Section "Measurement Equipment", item 7)

Frequency range	9 kHz to 7 GHz	
Power range	-30 to 0 dBm	
Cal factor uncertainty	1 MHz to 3.6 GHz	<1.6 %
	3.6 GHz to 7 GHz	<2 %
	3.6 GHz to 7 GHz	<1.15
VSWR	1 MHz to 3.6 GHz	<1.30
	50 MHz to 128 MHz	<1.10

- 6 dB Power Splitter (Section "Measurement Equipment", item 3)

Frequency range	DC to 3.6 GHz	
Level imbalance	10 MHz to 3.6 GHz	<0.1 dB
Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1

- 6 dB Power Splitter (Section "Measurement Equipment", item 4)

Frequency range:

R&S FSV 7	DC to 7 GHz	
Level imbalance	3.6 to 7 GHz	≤ 0.3 dB
Equivalent output VSWR	3.6 to 7 GHz	≤ 1.3

1.5.2.1 Absolute Level Uncertainty at 64 MHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.

Connect Power Sensor through a cable to RF output of Signal Generator.

Signal generator settings:
- Frequency 64 MHz
- Level -10 dBm

Measurement: Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.

Record the Power Meter indication.

Disconnect Power Sensor from the cable.

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **30 dB**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : PREAMP ON]
- [**AMPT** : **-10 dBm**]
- [**SWEEP** : SWEEP TIME : **10 ms**]
- [**SPAN** : **30 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S FSV (level reading of marker 1) reflects the absolute level uncertainty of the R&S FSV. It can be calculated as:

$$\text{Level uncertainty}_{64MHz} = L_{FSV} - L_{powermeter}$$

1.5.2.2 Frequency Response < 3.6 GHz

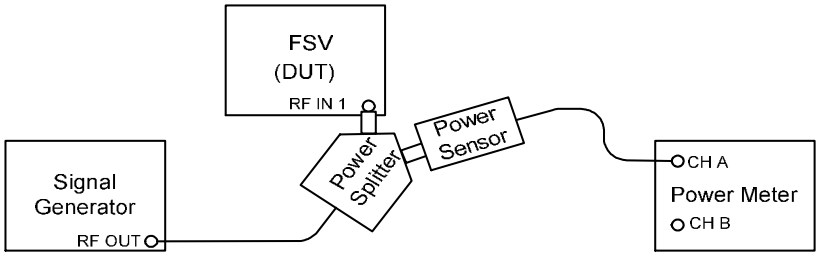
Checking the frequency response

Note: If a power splitter with higher level imbalance is used, correction of the measured frequency response is recommended.

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Use Power Splitter/Combiner (item 3) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note

Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Signal generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : RF ATTEN MANUAL : **30 dB**]
- [**AMPT** : PREAMP ON]
- [**AMPT** : **0 dBm**]
- [**SPAN : 100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]
- [**MKR** ⇒ : MORE : EXCLUDE LO]

Reference measurement:

Determine signal level $L_{powermeter}$.

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter:

Read level indication from power meter : $L_{PowerMeter}$

Evaluation:

Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{PowerMeter} / dBm$

Record $\Delta Ref / dB$

Frequency Response Measurement:

Signal generator settings:

- Frequency f_{fresp}

See table of performance test report for values of f_{fresp}

R&S FSV settings:

- [**SPAN : {span}**]
- [**FREQ** : CENTER : {f_{fresp}}]
- [**BW** : RES BW MANUAL : **{RBW}**]

See table below for values of span and resolution bandwidth.

See table of performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter:

Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation:

The frequency response can be calculated as:
Freq. response / dB = $L_{FSV} - L_{PowerMeter} - \Delta Ref / dB$

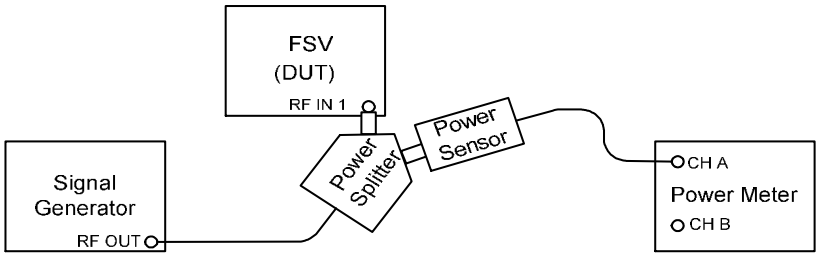
f_{center}	**9 kHz**	**100.02 kHz**	**1,005 MHz**	**≥10 MHz**
Span	0 Hz	0Hz	0 Hz	100 kHz
RBW	10 Hz	1 kHz	10 kHz	10 kHz

1.5.2.3 Frequency Response > 3.6 GHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 8).

Use Power Splitter/Combiner (item 4) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note
Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Reference Measurement:

Signal Generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : RF ATTEN MANUAL : **30 dB**]
- [**AMPT** : PREAMP ON]
- [**AMPT** : **0 dBm**]
- [**SPAN** : **100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

See table of performance test report for values of coupling and a_{FSV} .

R&S FSV settings: Set marker to peak of signal
- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{PowerMeter} / dBm$
Record $\Delta Ref / dB$

Frequency Response Measurement

Signal Generator settings: Frequency f_{fresp}
See table in performance test report for values of f_{fresp}

R&S FSV settings: - [**FREQ** : CENTER : {f_{fresp}}]
See table in performance test report for values of f_{fresp}
Set marker to peak of signal
- [**MKR** ⇒ : PEAK]
Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: The frequency response can be calculated as:
Freq. response / dB = $L_{FSV} - L_{PowerMeter} - \Delta Ref / dB$
Take the value of ΔRef as ascertained before.

1.6 Performance Test Option RF Preamplifier R&S FSV-B24

1.6.1 Checking Noise Display

Test equipment: 50 Ω termination (Section "Measurement Equipment", item 5)

Frequency range:

R&S FSV 13:	DC to 13.6 GHz
R&S FSV 30:	DC to 30 GHz
R&S FSV 39/40:	DC to 40 GHz

Terminate the RF input of the FSV with 50 Ω

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : PREAMP ON]
- [**SPAN** : 0 Hz]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**BW** : SWEEP TIME MANUAL : **50 ms**]
- [**TRACE 1** : AVERAGE]
- [**TRACE 1** : SWEEP COUNT : **20 ENTER**]
- [**AMPT** : {RefLev}]
- [**FREQ** : CENTER : {f_n}]
- [**MEAS** : Time Dom Power : **Mean**]

See table of performance test report for values of f_n.

Measurement: Read out the mean marker and correct the measurement value by –30 dB for the ratio of 1 Hz / 1 kHz .

Note: For example the DANL in 1 kHz bandwidth –126 dBm results in a corrected value of -156 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 1 kHz bandwidth to reduce measurement time.

Frequency	< 1MHz	< 10MHz	> 10kHz
RefLev	-40 dBm	-60 dBm	-60 dBm

1.6.2 Checking the Level Uncertainty and the Frequency Response

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Test equipment: Signal Generator (Section "Measurement Equipment", item 1)

Frequency range	9 kHz to 3.6 GHz
Maximum level	≥ 0 dBm

Signal Generator (Section "Measurement Equipment", item 2)

Frequency range:	FSV 13:	10 MHz to 13.6 GHz
	FSV 30:	10 MHz to 30.0 GHz
	FSV 39/40:	10 MHz to 40.0 GHz
Maximum level:	≥ 0 dBm	

Power meter (Section "Measurement Equipment", item 6)

Power range -30 to 0 dBm	
Instrumentation uncertainty	<0.5%
Uncertainty of power reference	<1.2%
VSWR of power reference	<1.10

Power Sensor (Section "Measurement Equipment", item 7)

Frequency range	9 kHz to 7 GHz	
Power range	-30 to 0 dBm	
Cal factor uncertainty	1 MHz to 3.6 GHz	<1.6 %
	3.6 GHz to 7 GHz	<2 %
	3.6 GHz to 7 GHz	<1.15
VSWR	1 MHz to 3.6 GHz	<1.30
	50 MHz to 128 MHz	<1.10

Power Sensor (Section "Measurement Equipment", item 8)

Frequency range:

R&S FSV 13:	DC to 26.5 GHz	
R&S FSV 29/30:	DC to 30 GHz	
R&S FSV 38/39/40:	DC to 40 GHz	
Power range	-30 to 0 dBm	
Cal factor uncertainty	50 to 128 MHz	<1.6 %
	3.6 to 8 GHz	<2 %
	8 to 22 GHz	<2.5 %
	22 to 40 GHz	<3 %
VSWR	50 to 128 MHz	<1.15
	3.6 to 8 GHz	<1.15
	8 to 22 GHz	<1.25
	22 to 40 GHz	<1.35

6 dB Power Splitter (Section "Measurement Equipment", item 3)

Frequency range	DC to 3.6 GHz	
Level imbalance	10 MHz to 3.6 GHz	<0.1 dB
Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1

6 dB Power Splitter (Section "Measurement Equipment", item 4)

Frequency range:

R&S FSV 13	DC to 13.6 GHz
R&S FSV 29/30	DC to 30 GHz
R&S FSV 38/39/40	DC to 40 GHz

Level imbalance	3.6 to 7 GHz	≤ 0.3 dB
	7 to 22 GHz	≤ 0.4 dB
	22 to 40 GHz	≤ 0.5 dB

Equivalent output VSWR	3.6 to 7 GHz	≤ 1.3
	7 to 22 GHz	≤ 1.4
	22 to 40 GHz	≤ 1.5

1.6.2.1 Absolute Level Uncertainty at 64 MHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.

Connect Power Sensor through a cable to RF output of Signal Generator.

Signal generator settings:
- Frequency 64 MHz
- Level -10 dBm

Measurement: Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.

Record the Power Meter indication.

Disconnect Power Sensor from the cable.

R&S FSV settings: - [**PRESET**]

- [**AMPT** : RF ATTEN MANUAL : **30 dB**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : PREAMP ON]
- [**AMPT** : **-10 dBm**]
- [**SWEEP** : SWEEP TIME : **10 ms**]
- [**SPAN** : **30 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S FSV (level reading of marker 1) reflects the absolute level uncertainty of the R&S FSV. It can be calculated as:

$$\text{Level uncertainty}_{64MHz} = L_{FSV} - L_{powermeter}$$

1.6.2.2 Frequency Response < 3.6 GHz

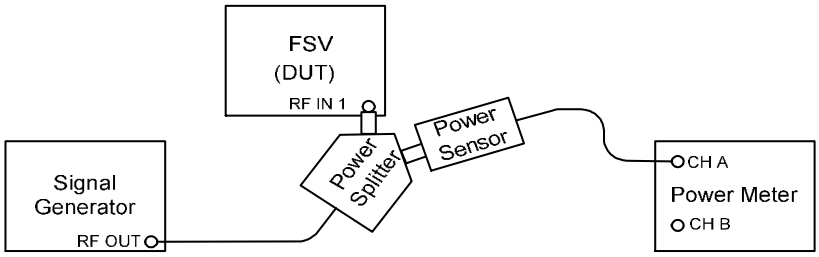
Checking the frequency response

Note: If a power splitter with higher level imbalance is used, correction of the measured frequency response is recommended.

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Use Power Splitter/Combiner (item 3) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note
Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Signal generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : RF ATTEN MANUAL : **40 dB**]
- [**AMPT** : PREAMP ON]
- [**AMPT** : **0 dBm**]
- [**SPAN : 100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]
- [**MKR** ⇒ : MORE : EXCLUDE LO]

Reference measurement: Determine signal level $L_{powermeter}$.

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from power meter : $L_{PowerMeter}$

Evaluation: Calculate
ΔRef / dB = L_{FSV} / dBm - $L_{PowerMeter}$ / dBm

Record ΔRef / dB

Frequency Response Measurement:

Signal generator settings: - Frequency f_{fresp}

See table of performance test report for values of f_{fresp}

R&S FSV settings: - [**SPAN : {span}**]

- [**FREQ** : CENTER : {f_{fresp}}]
- [**BW** : RES BW MANUAL : **{RBW}**]

See table below for values of span and resolution bandwidth.

See table of performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** $\Rightarrow$: PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: The frequency response can be calculated as:
Freq. response / dB = L_{FSV} - $L_{PowerMeter}$ - ΔRef / dB

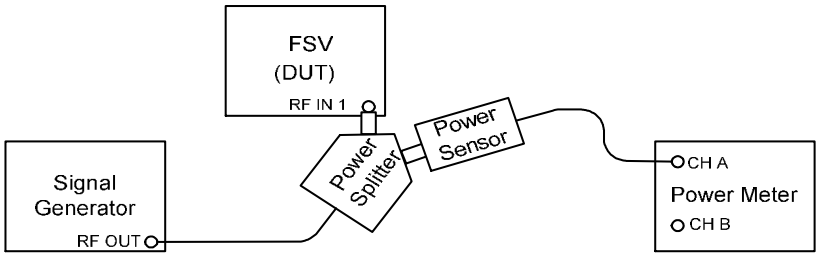
f_{center}	9 kHz	100.02 kHz	1,005 MHz	≥10 MHz
Span	0 Hz	0Hz	0 Hz	100 kHz
RBW	10 Hz	1 kHz	10 kHz	10 kHz

1.6.2.3 Frequency Response > 3.6 GHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 8).

Use Power Splitter/Combiner (item 4) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note
Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Reference Measurement:

Signal Generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : RF ATTEN MANUAL : **40 dB**]
- [**AMPT** : PREAMP ON]
- [**AMPT** : **0 dBm**]
- [**SPAN** : **100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

See table of performance test report for values of coupling and a_{FSV} .

R&S FSV settings: Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{PowerMeter} / dBm$
Record $\Delta Ref / dB$

Frequency Response Measurement

Signal Generator settings: Frequency f_{fresp}
See table in performance test report for values of f_{fresp}

R&S FSV settings: - [**FREQ** : CENTER : {f_{fresp}}]
See table in performance test report for values of f_{fresp}
Set marker to peak of signal
- [**MKR** ⇒ : PEAK]
Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: The frequency response can be calculated as:
Freq. response / dB = $L_{FSV} - L_{PowerMeter} - \Delta Ref / dB$
Take the value of ΔRef as ascertained before.

1.7 Performance Test Option Electronic Attenuator R&S FSV-B25

1.7.1 Checking the Electronic Attenuator Uncertainty

Test equipment: - Signal generator (Section "Measurement Equipment", item 1)

Frequency 128 MHz

Maximum level ≥ 10 dBm

- Step attenuator (Section "Measurement Equipment", item 9)

Frequency 128 MHz

Attenuation 0 to 100 dB in 1 dB steps

Attenuation accuracy < 0.1 dB

Test setup: Connect RF output of the signal generator to RF input of the step attenuator

Connect RF output of the step attenuator to RF input of the R&S FSV

Signal generator settings: - Frequency 128.1 MHz

- Level 10 dBm

R&S FSV settings: - [**PRESET**]

- [**FREQ** : CENTER : **128.1 MHz**]
- [**SPAN** : **500 Hz**]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**BW** : VIDEO BW MANUAL : **100 Hz**]
- [**AMPT** : EL ATTEN MANUAL : **0 dB**]
- [**AMPT** : MECH ATT MANUAL : **10 dB**]
- [**AMPT** : **-35 dBm**]

Reference measurement: Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Set reference to peak of signal

- [**MKR** : REFERENCE FIXED]

Measurement

Step attenuator settings: - Attenuation { 70dB - a_{El} }

R&S FSV settings: - [**AMPT** : EL ATTEN MANUAL : { a_{EL}}]

- [**AMPT** : {-35dBm + a_{EL} } **dBm**]
- [**MKR** ⇒ : PEAK]

See table below for values of a_{FSV}, a_{ATT} and reference level.

Evaluation: The difference between the level of the input signal of the R&S FSV and the reference (at 10 dB RF-Attenuation) is displayed in the marker field by the reading Delta [T1 FXD].

a_{ATT}	**70 dB**	**69 dB**	**68 dB**	**67 dB**	**…**	**48 dB**	**47 dB**	**46dB**	**45 dB**
a_{FSV}	0 dB	1 dB	2 dB	3 dB	…	22 dB	23 dB	24 dB	25 dB
reference level	-35 dBm	-34 dBm	-35 dBm	-34 dBm	…	-13 dBm	-12 dBm	-11 dBm	-10 dBm

1.7.2 Checking the Level Uncertainty and the Frequency Response

Test equipment: - Signal Generator (Section "Measurement Equipment", item 1)

Frequency range	9 kHz to 3.6 GHz
Maximum level	≥ 0 dBm

- Signal Generator (Section "Measurement Equipment", item 2)

Frequency range:	FSV 7/13/30/39/40:	10 MHz to 7 GHz
Maximum level:	≥ 0 dBm	

- Power meter (Section "Measurement Equipment", item 6)

Power range -30 to 0 dBm	
Instrumentation uncertainty	<0.5%
Uncertainty of power reference	<1.2%
VSWR of power reference	<1.10

- Power Sensor (Section "Measurement Equipment", item 7)

Frequency range	9 kHz to 7 GHz	
Power range	-30 to 0 dBm	
Cal factor uncertainty	1 MHz to 3.6 GHz	<1.6 %
	3.6 GHz to 7 GHz	<2 %
VSWR	3.6 GHz to 7 GHz	<1.15
	1 MHz to 3.6 GHz	<1.30
	50 MHz to 128 MHz	<1.10

- 6 dB Power Splitter (Section "Measurement Equipment", item 3)

Frequency range	DC to 3.6 GHz	
Level imbalance	10 MHz to 3.6 GHz	<0.1 dB
Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1

- 6 dB Power Splitter (Section "Measurement Equipment", item 4)

Frequency range:

R&S FSV 7	DC to 7 GHz	
Level imbalance	3.6 to 7 GHz	≤ 0.3 dB
Equivalent output VSWR	3.6 to 7 GHz	≤ 1.3

1.7.2.1 Absolute Level Uncertainty at 64 MHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.

Connect Power Sensor through a cable to RF output of Signal Generator.

Signal generator settings:
- Frequency 64 MHz
- Level -10 dBm

Measurement: Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.

Record the Power Meter indication.

Disconnect Power Sensor from the cable.

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : EL ATTEN MANUAL : **0 dB }**]
- [**AMPT** : MECH ATT MANUAL : **10 dB**]
- [**AMPT** : **-10 dBm**]
- [**SWEEP** : SWEEP TIME : **10 ms**]
- [**SPAN** : **30 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S FSV (level reading of marker 1) reflects the absolute level uncertainty of the R&S FSV. It can be calculated as:

$$\text{Level uncertainty}_{64MHz} = L_{FSV} - L_{powermeter}$$

1.7.2.2 Frequency Response < 3.6 GHz

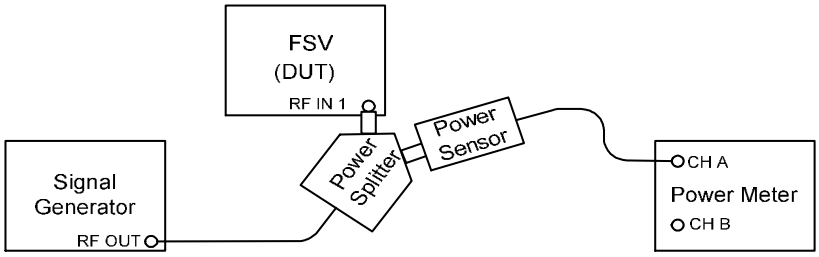
Checking the frequency response

Note: If a power splitter with higher level imbalance is used, correction of the measured frequency response is recommended.

Test setup: Standardize the Power Meter and Power Sensor (item 6, 7).

Use Power Splitter/Combiner (item 3) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note
Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Signal generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : EL ATTEN MANUAL : $\mathbf{a_{EL}}$**}**]
- [**AMPT** : MECH ATT MANUAL : **10 dB**]
- [**AMPT** : **0 dBm**]
- [**SPAN : 100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]
- [**MKR** ⇒ : MORE : EXCLUDE LO]

See table of performance test report for values of a_{EL} .

Reference measurement:

Determine signal level $L_{powermeter}$.

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter:

Read level indication from power meter : $L_{PowerMeter}$

Evaluation:

Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{PowerMeter} / dBm$

Record $\Delta Ref / dB$

Frequency Response Measurement:

Signal generator settings:

- Frequency f_{fresp}

See table of performance test report for values of f_{fresp}

R&S FSV settings:

- [**SPAN : {span}**]
- [**FREQ** : CENTER : {f_{fresp}}]
- [**BW** : RES BW MANUAL : **{RBW}**]

See table below for values of span and resolution bandwidth.

See table of performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter:

Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation:

The frequency response can be calculated as:
Freq. response / dB = $L_{FSV} - L_{PowerMeter} - \Delta Ref / dB$

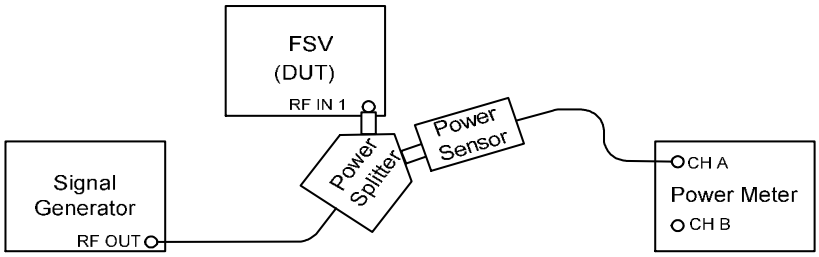
f_{center}	**9 kHz**	**100.02 kHz**	**1,005 MHz**	**≥10 MHz**
Span	0 Hz	0Hz	0 Hz	100 kHz
RBW	10 Hz	1 kHz	10 kHz	10 kHz

1.7.2.3 Frequency Response > 3.6 GHz

Test setup: Standardize the Power Meter and Power Sensor (item 6, 8).

Use Power Splitter/Combiner (item 4) and connect equipment as shown below.

Connect the power splitter directly to the R&S FSV RF input.



Important Note
Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Reference Measurement:

Signal Generator settings:
- Level 0 dBm
- Frequency 64 MHz

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : EL ATTEN MANUAL : $\mathbf{a_{EL}}$**}**]
- [**AMPT** : MECH ATT MANUAL : **10 dB**]
- [**AMPT** : **0 dBm**]
- [**SPAN** : **100 kHz**]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : **64 MHz**]

  See table of performance test report for values of a_{EL} .

R&S FSV settings: Set marker to peak of signal
- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: Calculate
$\Delta Ref / dB = L_{FSV} / dBm - L_{PowerMeter} / dBm$
Record $\Delta Ref / dB$

Frequency Response Measurement

Frequency f_{fresp}
See table in performance test report for values of f_{fresp}

R&S FSV settings: - [**FREQ** : CENTER : {f_{fresp}}]
See table in performance test report for values of f_{fresp}
Set marker to peak of signal
- [**MKR** ⇒ : PEAK]
Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Power Meter: Read level indication from Power Meter : $L_{PowerMeter}$

Evaluation: The frequency response can be calculated as:
Freq. response / dB = $L_{FSV} - L_{PowerMeter} - \Delta Ref / dB$
Take the value of ΔRef as ascertained before.

1.8 Performance Test Option Frequency Range Extension 10 Hz R&S FSV-B29

1.8.1 Checking Noise Display

Test equipment: 50 Ω termination (Section "Measurement Equipment", item 5)

Frequency range:

R&S FSV 4:	DC to 4 GHz
R&S FSV 7/13/30/39/40:	DC to 7 GHz

Terminate the RF input of the FSV with 50 Ω

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**SPAN** : 0 Hz]
- [**BW** : RES BW MANUAL : **5 Hz**]
- [**BW** : SWEEP TIME MANUAL : **500 ms**]
- [**TRACE 1** : AVERAGE]
- [**TRACE 1** : SWEEP COUNT : **20 ENTER**]
- [**AMPT** : **-10 dBm**]
- [**FREQ** : CENTER : {f_n}]
- [**MEAS** : Time Dom Power : **Mean**]

See table of performance test report for values of f_n.

Measurement: Read out the mean marker and correct the measurement value by –7 dB for the ratio of 1 Hz / 5 Hz .

Note: For example the DANL in 5 Hz bandwidth –120 dBm results in a corrected value of –127 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 5 Hz bandwidth to reduce measurement time.

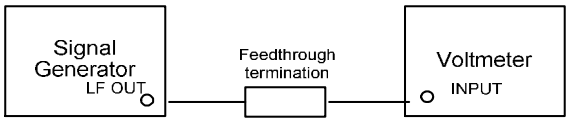
1.8.2 Checking the Frequency Response

Test equipment:
- Signal Generator (Section "Measurement Equipment", item 1)
  Frequency range 20 Hz to 128 MHz
  Maximum level ≥ 0 dBm
- Voltmeter (Section "Measurement Equipment", item 10)
  Frequency range 20 Hz to 100 kHz
- 50 Ω feedthrough termination (Section "Measurement Equipment", item 13)

Reference measurement: See chapter “Frequency Response < 3.6 GHz”

Signal generator calibration:

Test setup: Connect the LF output of the signal generator via the feedthrough termination with the input of the voltmeter.



Signal generator settings:
- Level 141 mV

Measurement:
- Set the Signal Generator frequency to the first value listed in the table below.
- Read the voltage at the voltmeter. Calculate the level / dBm as follows:
  L_{Gen} / dBm = 10 × log((V_{Gen}^2 / 50 Ohm) / 1 mW)
- Record the measured values in the table below.

Repeat the steps for the remaining frequencies listed in the table below.

Applied frequency (f_{fresp})	L_{Gen} / dBm
20 Hz	_____
110 Hz	_____
1010 Hz	_____
2010 Hz	_____
3010 Hz	_____
5010 Hz	_____
7010 Hz	_____
8990 Hz	_____

Checking the frequency response

Test setup: Connect the LF output of the signal generator with the input of the R&S FSV.

Signal Generator settings:
- Frequency f_{fresp}

  See table of performance test report for values of f_{fresp}

R&S FSV settings:
- [**PRESET**]
- [**AMPT** : RF INPUT DC]
- [**AMPT** : RF ATTEN MANUAL : **10 dB }**]
- [**AMPT** : **0 dBm**]
- [**SPAN : 10 Hz**]
- [**BW** : RES BW MANUAL : **10 Hz**], for f_{fresp} = 20 Hz: RBW = 3 Hz
- [**TRACE** : DETECTOR : RMS]

Measurement:
- [**FREQ** : CENTER : {f_{fresp}}]

See table in performance test report for values of f_{fresp}

Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Read level indication from R&S FSV (reading of marker 1): L_{FSV}

Evaluation: The frequency response can be calculated as:

Freq. response / dB = L_{FSV} - L_{Gen} - ΔRef / dB

Take the value of ΔRef as ascertained before.

1.8.3 Performance Test Report R&S FSV

ROHDE&SCHWARZ	Signal Analyzer R&S FSV	1321.3001.04 / 07 / 13 / 30 / 39 / 40
Serial number:		
Date:		
Person responsible:		
Signature:		

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	General Tests					
Page 13	Reference Frequency Accuracy					
	Basic unit	999.999	_____	1000.001	MHz	
	with option R&S FSV-B4	999.9999	_____	1000.0001	MHz	
	with option R&S FSV-B14	999.9999995	_____	1000.0000005	MHz	
Page 15	2^{nd} IF Image Frequency Rejection f_{in}					
	FSV 4/7/13/30/39/40:					
	101 MHz	80	_____	-	dB	
	1799 MHz	80	_____	-	dB	
	3599 MHz	80	_____	-	dB	
	FSV 7/13/30/39/40:					
	5299 MHz	80	_____	-	dB	
	6999 MHz	80	_____	-	dB	
	FSV 13/30/39/40:					
	9999 MHz	80	_____	-	dB	
	FSV 30/39/40:					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	17999 MHz	80	_____	-	dB	
	25999 MHz *)	80	_____	-	dB	
	FSV 39/40:					
	33999 MHz	70	_____	-	dB	
	38539 MHz	70	_____	-	dB	
	*) f_{in} – 2×729.9 MHz					
Page 16	3rd IF Image Frequency Rejection f_{in}					
	FSV 4/7/13/30/39/40:					
	101 MHz	80	_____	-	dB	
	3599 MHz	80	_____	-	dB	
	FSV 7/13/30/39/40:					
	6999 MHz	80	_____	-	dB	
	FSV 13/30/39/40:					
	9999 MHz	80	_____	-	dB	
	FSV 30/39/40:					
	21999 MHz	80	_____	-	dB	
	FSV 38/39/40:					
	32999 MHz	80	_____	-	dB	
	36999 MHz	80	_____	-	dB	
Page 16	2nd IF Rejection f_{in}					
	FSV 4/7/13/30/39/40:					
	101 MHz	80	_____	-	dB	
	3599 MHz	80	_____	-		
	FSV 7/13/30/39/40:					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5299 MHz	80	_____	-		
	6999 MHz	80	_____	-		
	FSV 13/30/39/40:					
	9999 MHz	80	_____	-	dB	
	FSV 30/39/40:					
	21999 MHz	80	_____	-	dB	
	FSV 39/40:					
	32999 MHz	80	_____	-	dB	
	36999 MHz	80	_____	-	dB	
Page 17	3rd IF Rejection f_{in}					
	1001 MHz	80	_____	-	dB	
Page 18	Third-Order Intercept Point f_{in}					
	FSV 4/7/13/30/39/40:					
	10.2 MHz	12	_____	-	dBm	
	50.2 MHz	12	_____	-	dBm	
	100.2 MHz	13	_____	-	dBm	
	600.2 MHz	13	_____	-	dBm	
	1100.2 MHz	13	_____	-	dBm	
	1600.2 MHz	13	_____	-	dBm	
	2100.2 MHz	13	_____	-	dBm	
	2600.2 MHz	13	_____	-	dBm	
	3100.2 MHz	13	_____	-	dBm	
	3599.2 MHz	13	_____	-	dBm	
	3601.2 MHz	15	_____	-	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	FSV 7/13/30/39/40:					
	4101.2 MHz	15	_____	-	dBm	
	4601.2 MHz	15	_____	-	dBm	
	5101.2 MHz	15	_____	-	dBm	
	5601.2 MHz	15	_____	-	dBm	
	6101.2 MHz	15	_____	-	dBm	
	6601.2 MHz	15	_____	-	dBm	
	6999.2 MHz	15	_____	-	dBm	
	FSV 13/30/39/40:					
	7999 MHz	15	_____		dBm	
	8999 MHz	15	_____		dBm	
	9999 MHz	15	_____		dBm	
	10999 MHz	15	_____		dBm	
	11999 MHz	15	_____		dBm	
	12999 MHz	15	_____		dBm	
	FSV 30/39/40:					
	13999 MHz	15	_____		dBm	
	15999 MHz	15	_____		dBm	
	17999 MHz	15	_____		dBm	
	19999 MHz	15	_____		dBm	
	21999 MHz	15	_____		dBm	
	23999 MHz	15	_____		dBm	
	25999 MHz	15	_____		dBm	
	27999 MHz	15	_____		dBm	
	29999 MHz	15	_____		dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	FSV 39/40:					
	32999 MHz	15	_____		dBm	
	34999 MHz	15	_____		dBm	
	36999 MHz	15	_____		dBm	
	38999 MHz	15	_____		dBm	
	39999 MHz	15	_____		dBm	
Page 20	Bandwidth switching level uncertainty sweep mode RBW					
	40 MHz (with option FSV-B70 only)	-0.1	_____	0.1	dB	
	28 MHz (not with R&S FSV40, Var.39)	-0.1	_____	0.1	dB	
	20 MHz (not with R&S FSV40, Var.39)	-0.1	_____	0.1	dB	
	10 MHz	-0.1	_____	0.1	dB	
	5 MHz	-0.1	_____	0.1	dB	
	3 MHz	-0.1	_____	0.1	dB	
	2 MHz	-0.1	_____	0.1	dB	
	1 MHz	-0.1	_____	0.1	dB	
	500 kHz	-0.1	_____	0.1	dB	
	300 kHz	-0.1	_____	0.1	dB	
	200 kHz	-0.1	_____	0.1	dB	
	100 kHz	-0.1	_____	0.1	dB	
	10 kHz		Reference			
	1 kHz	-0.1	_____	0.1	dB	
	100 Hz	-0.1	_____	0.1	dB	
Page 20	Bandwidth switching level uncertainty FFT mode RBW					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	300 kHz	-0.2	_____	0.2	dB	
	200 kHz	-0.2	_____	0.2	dB	
	100 kHz	-0.2	_____	0.2	dB	
	10 kHz	-0.2	_____	0.2	dB	
	1 kHz	-0.2	_____	0.2	dB	
	100 Hz	-0.2	_____	0.2	dB	
Page 21	Spurious Response f_{spur}					
	16 MHz	-	_____	-103	dBm	
	32 MHz	-	_____	-103	dBm	
	64 MHz	-	_____	-103	dBm	
	128 MHz	-	_____	-103	dBm	
Page 22	Noise Display normalized to 1 Hz Preamplifier = OFF f_n					
	FSV 4/7:					
	9 kHz	-	_____	-130	dBm	
	99 kHz	-	_____	-130	dBm	
	999 kHz	-	_____	-145	dBm	
	10.1 MHz	-	_____	-152	dBm	
	19.99 MHz	-	_____	-152	dBm	
	49.99 MHz	-	_____	-152	dBm	
	99.99 MHz	-	_____	-152	dBm	
	199.9 MHz	-	_____	-152	dBm	
	499.9 MHz	-	_____	-152	dBm	
	599.9 MHz	-	_____	-152	dBm	
	699.9 MHz	-	_____	-152	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	799.9 MHz	-	_____	-152	dBm	
	899.9 MHz	-	_____	-152	dBm	
	999.9 MHz	-	_____	-152	dBm	
	1199.9 MHz	-	_____	-150	dBm	
	1399.9 MHz	-	_____	-150	dBm	
	1599.9 MHz	-	_____	-150	dBm	
	1799.9 MHz	-	_____	-150	dBm	
	1999.9 MHz	-	_____	-150	dBm	
	2199.9 MHz	-	_____	-150	dBm	
	2399.9 MHz	-	_____	-150	dBm	
	2599.9 MHz	-	_____	-150	dBm	
	2799.9 MHz	-	_____	-150	dBm	
	2999.9 MHz	-	_____	-150	dBm	
	3199.9 MHz	-	_____	-150	dBm	
	3399.9 MHz	-	_____	-150	dBm	
	3599.9 MHz	-	_____	-150	dBm	
	3799.9 MHz	-	_____	-148	dBm	
	3999.9 MHz	-	_____	-148	dBm	
	FSV 7:					
	4199.9 MHz	-	_____	-148	dBm	
	4399.9 MHz	-	_____	-148	dBm	
	4599.9 MHz	-	_____	-148	dBm	
	4799.9 MHz	-	_____	-148	dBm	
	4999.9 MHz	-	_____	-148	dBm	
	5199.9 MHz	-	_____	-148	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5399.9 MHz	-	_____	-148	dBm	
	5599.9 MHz	-	_____	-148	dBm	
	5799.9 MHz	-	_____	-148	dBm	
	5999.9 MHz	-	_____	-148	dBm	
	6199.9 MHz	-	_____	-146	dBm	
	6399.9 MHz	-	_____	-146	dBm	
	6599.9 MHz	-	_____	-146	dBm	
	6799.9 MHz	-	_____	-146	dBm	
	6999.9 MHz	-	_____	-146	dBm	
Page 22	Noise Display normalized to 1 Hz Preamplifier = OFF, without option FSV-B24 f_n					
	FSV 13/30/39/40:					
	9 kHz	-	_____	-130	dBm	
	99 kHz	-	_____	-130	dBm	
	999 kHz	-	_____	-145	dBm	
	10.1 MHz	-	_____	-151	dBm	
	19.99 MHz	-	_____	-151	dBm	
	49.99 MHz	-	_____	-151	dBm	
	99.99 MHz	-	_____	-151	dBm	
	199.9 MHz	-	_____	-151	dBm	
	499.9 MHz	-	_____	-151	dBm	
	599.9 MHz	-	_____	-151	dBm	
	699.9 MHz	-	_____	-151	dBm	
	799.9 MHz	-	_____	-151	dBm	
	899.9 MHz	-	_____	-151	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	999.9 MHz	-	_____	-151	dBm	
	1199.9 MHz	-	_____	-149	dBm	
	1399.9 MHz	-	_____	-149	dBm	
	1599.9 MHz	-	_____	-149	dBm	
	1799.9 MHz	-	_____	-149	dBm	
	1999.9 MHz	-	_____	-149	dBm	
	2199.9 MHz	-	_____	-149	dBm	
	2399.9 MHz	-	_____	-149	dBm	
	2599.9 MHz	-	_____	-149	dBm	
	2799.9 MHz	-	_____	-149	dBm	
	2999.9 MHz	-	_____	-149	dBm	
	3199.9 MHz	-	_____	-149	dBm	
	3399.9 MHz	-	_____	-149	dBm	
	3599.9 MHz	-	_____	-149	dBm	
	3799.9 MHz	-	_____	-146	dBm	
	3999.9 MHz	-	_____	-146	dBm	
	4199.9 MHz	-	_____	-146	dBm	
	4399.9 MHz	-	_____	-146	dBm	
	4599.9 MHz	-	_____	-146	dBm	
	4799.9 MHz	-	_____	-146	dBm	
	4999.9 MHz	-	_____	-146	dBm	
	5199.9 MHz	-	_____	-146	dBm	
	5399.9 MHz	-	_____	-146	dBm	
	5599.9 MHz	-	_____	-146	dBm	
	5799.9 MHz	-	_____	-146	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5999.9 MHz	-	_____	-146	dBm	
	6199.9 MHz	-	_____	-144	dBm	
	6399.9 MHz	-	_____	-144	dBm	
	6599.9 MHz	-	_____	-144	dBm	
	6799.9 MHz	-	_____	-144	dBm	
	6999.9 MHz	-	_____	-144	dBm	
	FSV 13/30:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	7499.9 MHz	-	_____	-148	dBm	
	7999.9 MHz	-	_____	-148	dBm	
	8499.9 MHz	-	_____	-148	dBm	
	8999.9 MHz	-	_____	-148	dBm	
	9499.9 MHz	-	_____	-148	dBm	
	9999.9 MHz	-	_____	-148	dBm	
	10499.9 MHz	-	_____	-148	dBm	
	10999.9 MHz	-	_____	-148	dBm	
	11499.9 MHz	-	_____	-148	dBm	
	11999.9 MHz	-	_____	-148	dBm	
	12499.9 MHz	-	_____	-148	dBm	
	12999.9 MHz	-	_____	-148	dBm	
	13499.9 MHz	-	_____	-148	dBm	
	FSV 30:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	13999.9 MHz	-	_____	-148	dBm	
	14999.9 MHz	-	_____	-148	dBm	
	15999.9 MHz	-	_____	-144	dBm	
	16999.9 MHz	-	_____	-144	dBm	
	17999.9 MHz	-	_____	-144	dBm	
	18999.9 MHz	-	_____	-144	dBm	
	19999.9 MHz	-	_____	-144	dBm	
	20999.9 MHz	-	_____	-144	dBm	
	21999.9 MHz	-	_____	-144	dBm	
	22999.9 MHz	-	_____	-144	dBm	
	23999.9 MHz	-	_____	-144	dBm	
	24999.9 MHz	-	_____	-144	dBm	
	25999.9 MHz	-	_____	-144	dBm	
	26999.9 MHz	-	_____	-144	dBm	
	27999.9 MHz	-	_____	-144	dBm	
	28999.9 MHz	-	_____	-144	dBm	
	29999.9 MHz	-	_____	-144	dBm	
	FSV 39/40:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	7499.9 MHz	-	_____	-145	dBm	
	7999.9 MHz	-	_____	-145	dBm	
	8499.9 MHz	-	_____	-145	dBm	
	8999.9 MHz	-	_____	-145	dBm	
	9499.9 MHz	-	_____	-145	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	9999.9 MHz	-	_____	-145	dBm	
	10499.9 MHz	-	_____	-145	dBm	
	10999.9 MHz	-	_____	-145	dBm	
	11499.9 MHz	-	_____	-145	dBm	
	11999.9 MHz	-	_____	-145	dBm	
	12499.9 MHz	-	_____	-145	dBm	
	12999.9 MHz	-	_____	-145	dBm	
	13499.9 MHz	-	_____	-145	dBm	
	13999.9 MHz	-	_____	-145	dBm	
	14999.9 MHz	-	_____	-145	dBm	
	15999.9 MHz	-	_____	-142	dBm	
	16999.9 MHz	-	_____	-142	dBm	
	17999.9 MHz	-	_____	-142	dBm	
	18999.9 MHz	-	_____	-142	dBm	
	19999.9 MHz	-	_____	-142	dBm	
	20999.9 MHz	-	_____	-142	dBm	
	21999.9 MHz	-	_____	-142	dBm	
	22999.9 MHz	-	_____	-142	dBm	
	23999.9 MHz	-	_____	-142	dBm	
	24999.9 MHz	-	_____	-142	dBm	
	25999.9 MHz	-	_____	-142	dBm	
	26999.9 MHz	-	_____	-142	dBm	
	27999.9 MHz	-	_____	-142	dBm	
	28999.9 MHz	-	_____	-142	dBm	
	29999.9 MHz	-	_____	-142	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	31999.9 MHz	-	_____	-142	dBm	
	32999.9 MHz	-	_____	-142	dBm	
	33999.9 MHz	-	_____	-142	dBm	
	34999.9 MHz	-	_____	-136	dBm	
	35999.9 MHz	-	_____	-136	dBm	
	36999.9 MHz	-	_____	-136	dBm	
	37999.9 MHz	-	_____	-136	dBm	
	38999.9 MHz	-	_____	-136	dBm	
	39999.9 MHz	-	_____	-136	dBm	
Page 22	Noise Display normalized to 1 Hz Preamplifier = OFF, with option FSV-B24 f_n					
	FSV 13/30/39/40:					
	9 kHz	-	_____	-130	dBm	
	99 kHz	-	_____	-130	dBm	
	999 kHz	-	_____	-145	dBm	
	10.1 MHz	-	_____	-150	dBm	
	19.99 MHz	-	_____	-150	dBm	
	49.99 MHz	-	_____	-150	dBm	
	99.99 MHz	-	_____	-150	dBm	
	199.9 MHz	-	_____	-150	dBm	
	499.9 MHz	-	_____	-150	dBm	
	599.9 MHz	-	_____	-150	dBm	
	699.9 MHz	-	_____	-150	dBm	
	799.9 MHz	-	_____	-150	dBm	
	899.9 MHz	-	_____	-150	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	999.9 MHz	-	_____	-150	dBm	
	1199.9 MHz	-	_____	-147	dBm	
	1399.9 MHz	-	_____	-147	dBm	
	1599.9 MHz	-	_____	-147	dBm	
	1799.9 MHz	-	_____	-147	dBm	
	1999.9 MHz	-	_____	-147	dBm	
	2199.9 MHz	-	_____	-147	dBm	
	2399.9 MHz	-	_____	-147	dBm	
	2599.9 MHz	-	_____	-147	dBm	
	2799.9 MHz	-	_____	-147	dBm	
	2999.9 MHz	-	_____	-147	dBm	
	3199.9 MHz	-	_____	-147	dBm	
	3399.9 MHz	-	_____	-147	dBm	
	3599.9 MHz	-	_____	-147	dBm	
	3799.9 MHz	-	_____	-144	dBm	
	3999.9 MHz	-	_____	-144	dBm	
	4199.9 MHz	-	_____	-144	dBm	
	4399.9 MHz	-	_____	-144	dBm	
	4599.9 MHz	-	_____	-144	dBm	
	4799.9 MHz	-	_____	-144	dBm	
	4999.9 MHz	-	_____	-144	dBm	
	5199.9 MHz	-	_____	-144	dBm	
	5399.9 MHz	-	_____	-144	dBm	
	5599.9 MHz	-	_____	-144	dBm	
	5799.9 MHz	-	_____	-144	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5999.9 MHz	-	_____	-144	dBm	
	6199.9 MHz	-	_____	-141	dBm	
	6399.9 MHz	-	_____	-141	dBm	
	6599.9 MHz	-	_____	-141	dBm	
	6799.9 MHz	-	_____	-141	dBm	
	6999.9 MHz	-	_____	-141	dBm	
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	7499.9 MHz	-	_____	-145	dBm	
	7999.9 MHz	-	_____	-145	dBm	
	8499.9 MHz	-	_____	-145	dBm	
	8999.9 MHz	-	_____	-145	dBm	
	9499.9 MHz	-	_____	-145	dBm	
	9999.9 MHz	-	_____	-145	dBm	
	10499.9 MHz	-	_____	-145	dBm	
	10999.9 MHz	-	_____	-145	dBm	
	11499.9 MHz	-	_____	-145	dBm	
	11999.9 MHz	-	_____	-145	dBm	
	12499.9 MHz	-	_____	-145	dBm	
	12999.9 MHz	-	_____	-145	dBm	
	13499.9 MHz	-	_____	-145	dBm	
	FSV 30:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	13999.9 MHz	-	_____	-143	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	14999.9 MHz	-	_____	-143	dBm	
	15999.9 MHz	-	_____	-141	dBm	
	16999.9 MHz	-	_____	-141	dBm	
	17999.9 MHz	-	_____	-141	dBm	
	18999.9 MHz	-	_____	-141	dBm	
	19999.9 MHz	-	_____	-141	dBm	
	20999.9 MHz	-	_____	-141	dBm	
	21999.9 MHz	-	_____	-141	dBm	
	22999.9 MHz	-	_____	-141	dBm	
	23999.9 MHz	-	_____	-141	dBm	
	24999.9 MHz	-	_____	-141	dBm	
	25999.9 MHz	-	_____	-141	dBm	
	26999.9 MHz	-	_____	-141	dBm	
	27999.9 MHz	-	_____	-141	dBm	
	28999.9 MHz	-	_____	-141	dBm	
	29999.9 MHz	-	_____	-141	dBm	
	FSV 39/40:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	7499.9 MHz	-	_____	-143	dBm	
	7999.9 MHz	-	_____	-143	dBm	
	8499.9 MHz	-	_____	-143	dBm	
	8999.9 MHz	-	_____	-143	dBm	
	9499.9 MHz	-	_____	-143	dBm	
	9999.9 MHz	-	_____	-143	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	10499.9 MHz	-	_____	-143	dBm	
	10999.9 MHz	-	_____	-143	dBm	
	11499.9 MHz	-	_____	-143	dBm	
	11999.9 MHz	-	_____	-143	dBm	
	12499.9 MHz	-	_____	-143	dBm	
	12999.9 MHz	-	_____	-143	dBm	
	13499.9 MHz	-	_____	-143	dBm	
	13999.9 MHz	-	_____	-141	dBm	
	14999.9 MHz	-	_____	-141	dBm	
	15999.9 MHz	-	_____	-139	dBm	
	16999.9 MHz	-	_____	-139	dBm	
	17999.9 MHz	-	_____	-139	dBm	
	18999.9 MHz	-	_____	-139	dBm	
	19999.9 MHz	-	_____	-139	dBm	
	20999.9 MHz	-	_____	-139	dBm	
	21999.9 MHz	-	_____	-139	dBm	
	22999.9 MHz	-	_____	-139	dBm	
	23999.9 MHz	-	_____	-139	dBm	
	24999.9 MHz	-	_____	-139	dBm	
	25999.9 MHz	-	_____	-139	dBm	
	26999.9 MHz	-	_____	-139	dBm	
	27999.9 MHz	-	_____	-139	dBm	
	28999.9 MHz	-	_____	-139	dBm	
	29999.9 MHz	-	_____	-139	dBm	
	31999.9 MHz	-	_____	-139	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	32999.9 MHz	-	_____	-139	dBm	
	33999.9 MHz	-	_____	-139	dBm	
	34999.9 MHz	-	_____	-132	dBm	
	35999.9 MHz	-	_____	-132	dBm	
	36999.9 MHz	-	_____	-132	dBm	
	37999.9 MHz	-	_____	-132	dBm	
	38999.9 MHz	-	_____	-132	dBm	
	39999.9 MHz	-	_____	-132	dBm	
Page 24	Absolute level uncertainty at 64 MHz	-0.2	_____	0.2	dB	
Page 25	Frequency response < 3.6 GHz, RF attenuation 5 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-1	_____	1	dB	
	100.02 kHz	-1	_____	1	dB	
	1.005 MHz	-1	_____	1	dB	
	10.15 MHz	-1	_____	1	dB	
	51 MHz	-1		1	dB	
	64 MHz		Reference			
	101 MHz	-1	_____	1	dB	
	201 MHz	-1	_____	1	dB	
	301 MHz	-1	_____	1	dB	
	401 MHz	-1	_____	1	dB	
	501 MHz	-1	_____	1	dB	
	601 MHz	-1	_____	1	dB	
	701 MHz	-1	_____	1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	801 MHz	-1	_____	1	dB	
	901 MHz	-1	_____	1	dB	
	1001 MHz	-1	_____	1	dB	
	1501 MHz	-1	_____	1	dB	
	2001 MHz	-1	_____	1	dB	
	2501 MHz	-1	_____	1	dB	
	3001 MHz	-1	_____	1	dB	
	3599 MHz	-1	_____	1	dB	
	FSV 4:					
	3999 MHz	-1.5	_____	1.5	dB	
Page 27	FSV7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 5 dB, DC coupled f_{fresp}					
	4001 MHz	-1.5	_____	1.5	dB	
	4501 MHz	-1.5	_____	1.5	dB	
	5001 MHz	-1.5	_____	1.5	dB	
	5501 MHz	-1.5	_____	1.5	dB	
	6001 MHz	-1.5	_____	1.5	dB	
	6501 MHz	-1.5	_____	1.5	dB	
	6999 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 5 dB, DC coupled f_{fresp}					
	7001 MHz	-2.5	_____	2.5	dB	
	7501 MHz	-2.5	_____	2.5	dB	
	8001 MHz	-2.5	_____	2.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	8501 MHz	-2.5	_____	2.5	dB	
	9001 MHz	-2.5	_____	2.5	dB	
	9501 MHz	-2.5	_____	2.5	dB	
	10001 MHz	-2.5	_____	2.5	dB	
	10501 MHz	-2.5	_____	2.5	dB	
	11001 MHz	-2.5	_____	2.5	dB	
	11501 MHz	-2.5	_____	2.5	dB	
	12001 MHz	-2.5	_____	2.5	dB	
	12501 MHz	-2.5	_____	2.5	dB	
	13001 MHz	-2.5	_____	2.5	dB	
	13501 MHz	-2.5	_____	2.5	dB	
	13599 MHz	-2.5	_____	2.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 5 dB, DC coupled f_{fresp}					
	14001 MHz	-3	_____	3	dB	
	15001 MHz	-3	_____	3	dB	
	16001 MHz	-3	_____	3	dB	
	17001 MHz	-3	_____	3	dB	
	18001 MHz	-3	_____	3	dB	
	19001 MHz	-3	_____	3	dB	
	20001 MHz	-3	_____	3	dB	
	21001 MHz	-3	_____	3	dB	
	22001 MHz	-3	_____	3	dB	
	23001 MHz	-3	_____	3	dB	
	24001 MHz	-3	_____	3	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	25001 MHz	-3	_____	3	dB	
	26001 MHz	-3	_____	3	dB	
	27001 MHz	-3	_____	3	dB	
	28001 MHz	-3	_____	3	dB	
	29001 MHz	-3	_____	3	dB	
	29999 MHz	-3	_____	3	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 5 dB, DC coupled f_{fresp}					
	30001 MHz	-3.5	_____	3.5	dB	
	31001 MHz	-3.5	_____	3.5	dB	
	32001 MHz	-3.5	_____	3.5	dB	
	33001 MHz	-3.5	_____	3.5	dB	
	34001 MHz	-3.5	_____	3.5	dB	
	35001 MHz	-3.5	_____	3.5	dB	
	36001 MHz	-3.5	_____	3.5	dB	
	37001 MHz	-3.5	_____	3.5	dB	
	38001 MHz	-3.5	_____	3.5	dB	
	39001 MHz	-3.5	_____	3.5	dB	
	39999 MHz	-3.5	_____	3.5	dB	
Page 25	Frequency response < 3.6 GHz, RF attenuation 10 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-0.5	_____	0.5	dB	
	100.02 kHz	-0.5	_____	0.5	dB	
	1.005 MHz	-0.5	_____	0.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	10.15 MHz	-0.3	_____	0.3	dB	
	51 MHz	-0.3	_____	0.3	dB	
	64 MHz		Reference			
	101 MHz	-0.3	_____	0.3	dB	
	201 MHz	-0.3	_____	0.3	dB	
	301 MHz	-0.3	_____	0.3	dB	
	401 MHz	-0.3	_____	0.3	dB	
	501 MHz	-0.3	_____	0.3	dB	
	601 MHz	-0.3	_____	0.3	dB	
	701 MHz	-0.3	_____	0.3	dB	
	801 MHz	-0.3	_____	0.3	dB	
	901 MHz	-0.3	_____	0.3	dB	
	1001 MHz	-0.3	_____	0.3	dB	
	1501 MHz	-0.3	_____	0.3	dB	
	2001 MHz	-0.3	_____	0.3	dB	
	2501 MHz	-0.3	_____	0.3	dB	
	3001 MHz	-0.3	_____	0.3	dB	
	3599 MHz	-0.3	_____	0.3	dB	
	FSV 4:					
	3999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled f_{fresp}					
	4001 MHz	-0.5	_____	0.5	dB	
	4501 MHz	-0.5	_____	0.5	dB	
	5001 MHz	-0.5	_____	0.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5501 MHz	-0.5	_____	0.5	dB	
	6001 MHz	-0.5	_____	0.5	dB	
	6501 MHz	-0.5	_____	0.5	dB	
	6999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled f_{fresp}					
	7001 MHz	-1.5	_____	1.5	dB	
	7501 MHz	-1.5	_____	1.5	dB	
	8001 MHz	-1.5	_____	1.5	dB	
	8501 MHz	-1.5	_____	1.5	dB	
	9001 MHz	-1.5	_____	1.5	dB	
	9501 MHz	-1.5	_____	1.5	dB	
	10001 MHz	-1.5	_____	1.5	dB	
	10501 MHz	-1.5	_____	1.5	dB	
	11001 MHz	-1.5	_____	1.5	dB	
	11501 MHz	-1.5	_____	1.5	dB	
	12001 MHz	-1.5	_____	1.5	dB	
	12501 MHz	-1.5	_____	1.5	dB	
	13001 MHz	-1.5	_____	1.5	dB	
	13501 MHz	-1.5	_____	1.5	dB	
	13599 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled f_{fresp}					
	14001 MHz	-2	_____	2	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	15001 MHz	-2	_____	2	dB	
	16001 MHz	-2	_____	2	dB	
	17001 MHz	-2	_____	2	dB	
	18001 MHz	-2	_____	2	dB	
	19001 MHz	-2	_____	2	dB	
	20001 MHz	-2	_____	2	dB	
	21001 MHz	-2	_____	2	dB	
	22001 MHz	-2	_____	2	dB	
	23001 MHz	-2	_____	2	dB	
	24001 MHz	-2	_____	2	dB	
	25001 MHz	-2	_____	2	dB	
	26001 MHz	-2	_____	2	dB	
	27001 MHz	-2	_____	2	dB	
	28001 MHz	-2	_____	2	dB	
	29001 MHz	-2	_____	2	dB	
	29999 MHz	-2	_____	2	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled f_{fresp}					
	30001 MHz	-2.5	_____	2.5	dB	
	31001 MHz	-2.5	_____	2.5	dB	
	32001 MHz	-2.5	_____	2.5	dB	
	33001 MHz	-2.5	_____	2.5	dB	
	34001 MHz	-2.5	_____	2.5	dB	
	35001 MHz	-2.5	_____	2.5	dB	
	36001 MHz	-2.5	_____	2.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	37001 MHz	-2.5	_____	2.5	dB	
	38001 MHz	-2.5	_____	2.5	dB	
	39001 MHz	-2.5	_____	2.5	dB	
	39999 MHz	-2.5	_____	2.5	dB	
Page 25	Frequency response < 3.6 GHz, RF attenuation 20 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-0.5	_____	0.5	dB	
	100.02 kHz	-0.5	_____	0.5	dB	
	1.005 MHz	-0.5	_____	0.5	dB	
	10.15 MHz	-0.3	_____	0.3	dB	
	51 MHz	-0.3	_____	0.3	dB	
	64 MHz		Reference			
	101 MHz	-0.3	_____	0.3	dB	
	201 MHz	-0.3	_____	0.3	dB	
	301 MHz	-0.3	_____	0.3	dB	
	401 MHz	-0.3	_____	0.3	dB	
	501 MHz	-0.3	_____	0.3	dB	
	601 MHz	-0.3	_____	0.3	dB	
	701 MHz	-0.3	_____	0.3	dB	
	801 MHz	-0.3	_____	0.3	dB	
	901 MHz	-0.3	_____	0.3	dB	
	1001 MHz	-0.3	_____	0.3	dB	
	1501 MHz	-0.3	_____	0.3	dB	
	2001 MHz	-0.3	_____	0.3	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	2501 MHz	-0.3	_____	0.3	dB	
	3001 MHz	-0.3	_____	0.3	dB	
	3599 MHz	-0.3	_____	0.3	dB	
	FSV 4:					
	3999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 20 dB, DC coupled f_{fresp}					
	4001 MHz	-0.5	_____	0.5	dB	
	4501 MHz	-0.5	_____	0.5	dB	
	5001 MHz	-0.5	_____	0.5	dB	
	5501 MHz	-0.5	_____	0.5	dB	
	6001 MHz	-0.5	_____	0.5	dB	
	6501 MHz	-0.5	_____	0.5	dB	
	6999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 20 dB, DC coupled f_{fresp}					
	7001 MHz	-1.5	_____	1.5	dB	
	7501 MHz	-1.5	_____	1.5	dB	
	8001 MHz	-1.5	_____	1.5	dB	
	8501 MHz	-1.5	_____	1.5	dB	
	9001 MHz	-1.5	_____	1.5	dB	
	9501 MHz	-1.5	_____	1.5	dB	
	10001 MHz	-1.5	_____	1.5	dB	
	10501 MHz	-1.5	_____	1.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	11001 MHz	-1.5	_____	1.5	dB	
	11501 MHz	-1.5	_____	1.5	dB	
	12001 MHz	-1.5	_____	1.5	dB	
	12501 MHz	-1.5	_____	1.5	dB	
	13001 MHz	-1.5	_____	1.5	dB	
	13501 MHz	-1.5	_____	1.5	dB	
	13599 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 20 dB, DC coupled f_{fresp}					
	14001 MHz	-2	_____	2	dB	
	15001 MHz	-2	_____	2	dB	
	16001 MHz	-2	_____	2	dB	
	17001 MHz	-2	_____	2	dB	
	18001 MHz	-2	_____	2	dB	
	19001 MHz	-2	_____	2	dB	
	20001 MHz	-2	_____	2	dB	
	21001 MHz	-2	_____	2	dB	
	22001 MHz	-2	_____	2	dB	
	23001 MHz	-2	_____	2	dB	
	24001 MHz	-2	_____	2	dB	
	25001 MHz	-2	_____	2	dB	
	26001 MHz	-2	_____	2	dB	
	27001 MHz	-2	_____	2	dB	
	28001 MHz	-2	_____	2	dB	
	29001 MHz	-2	_____	2	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	29999 MHz	-2	_____	2	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 20 dB, DC coupled f_{fresp}					
	30001 MHz	-2.5	_____	2.5	dB	
	31001 MHz	-2.5	_____	2.5	dB	
	32001 MHz	-2.5	_____	2.5	dB	
	33001 MHz	-2.5	_____	2.5	dB	
	34001 MHz	-2.5	_____	2.5	dB	
	35001 MHz	-2.5	_____	2.5	dB	
	36001 MHz	-2.5	_____	2.5	dB	
	37001 MHz	-2.5	_____	2.5	dB	
	38001 MHz	-2.5	_____	2.5	dB	
	39001 MHz	-2.5	_____	2.5	dB	
	39999 MHz	-2.5	_____	2.5	dB	
Page 25	Frequency response < 3.6 GHz, RF attenuation 30 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-0.5	_____	0.5	dB	
	100.02 kHz	-0.5	_____	0.5	dB	
	1.005 MHz	-0.5	_____	0.5	dB	
	10.15 MHz	-0.3	_____	0.3	dB	
	51 MHz	-0.3	_____	0.3	dB	
	64 MHz		Reference			
	101 MHz	-0.3	_____	0.3	dB	
	201 MHz	-0.3	_____	0.3	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	301 MHz	-0.3	_____	0.3	dB	
	401 MHz	-0.3	_____	0.3	dB	
	501 MHz	-0.3	_____	0.3	dB	
	601 MHz	-0.3	_____	0.3	dB	
	701 MHz	-0.3	_____	0.3	dB	
	801 MHz	-0.3	_____	0.3	dB	
	901 MHz	-0.3	_____	0.3	dB	
	1001 MHz	-0.3	_____	0.3	dB	
	1501 MHz	-0.3	_____	0.3	dB	
	2001 MHz	-0.3	_____	0.3	dB	
	2501 MHz	-0.3	_____	0.3	dB	
	3001 MHz	-0.3	_____	0.3	dB	
	3599 MHz	-0.3	_____	0.3	dB	
	FSV 4:					
	3999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 30 dB, DC coupled f_{fresp}				dB	
	4001 MHz	-0.5	_____	0.5	dB	
	4501 MHz	-0.5	_____	0.5	dB	
	5001 MHz	-0.5	_____	0.5	dB	
	5501 MHz	-0.5	_____	0.5	dB	
	6001 MHz	-0.5	_____	0.5	dB	
	6501 MHz	-0.5	_____	0.5	dB	
	6999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 13/30/39/40:					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	Frequency response > 3.6 GHz, RF attenuation = 30 dB, DC coupled f_{fresp}					
	7001 MHz	-1.5	_____	1.5	dB	
	7501 MHz	-1.5	_____	1.5	dB	
	8001 MHz	-1.5	_____	1.5	dB	
	8501 MHz	-1.5	_____	1.5	dB	
	9001 MHz	-1.5	_____	1.5	dB	
	9501 MHz	-1.5	_____	1.5	dB	
	10001 MHz	-1.5	_____	1.5	dB	
	10501 MHz	-1.5	_____	1.5	dB	
	11001 MHz	-1.5	_____	1.5	dB	
	11501 MHz	-1.5	_____	1.5	dB	
	12001 MHz	-1.5	_____	1.5	dB	
	12501 MHz	-1.5	_____	1.5	dB	
	13001 MHz	-1.5	_____	1.5	dB	
	13501 MHz	-1.5	_____	1.5	dB	
	13599 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 30 dB, DC coupled f_{fresp}					
	14001 MHz	-2	_____	2	dB	
	15001 MHz	-2	_____	2	dB	
	16001 MHz	-2	_____	2	dB	
	17001 MHz	-2	_____	2	dB	
	18001 MHz	-2	_____	2	dB	
	19001 MHz	-2	_____	2	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	20001 MHz	-2	_____	2	dB	
	21001 MHz	-2	_____	2	dB	
	22001 MHz	-2	_____	2	dB	
	23001 MHz	-2	_____	2	dB	
	24001 MHz	-2	_____	2	dB	
	25001 MHz	-2	_____	2	dB	
	26001 MHz	-2	_____	2	dB	
	27001 MHz	-2	_____	2	dB	
	28001 MHz	-2	_____	2	dB	
	29001 MHz	-2	_____	2	dB	
	29999 MHz	-2	_____	2	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 30 dB, DC coupled f_{fresp}					
	30001 MHz	-2.5	_____	2.5	dB	
	31001 MHz	-2.5	_____	2.5	dB	
	32001 MHz	-2.5	_____	2.5	dB	
	33001 MHz	-2.5	_____	2.5	dB	
	34001 MHz	-2.5	_____	2.5	dB	
	35001 MHz	-2.5	_____	2.5	dB	
	36001 MHz	-2.5	_____	2.5	dB	
	37001 MHz	-2.5	_____	2.5	dB	
	38001 MHz	-2.5	_____	2.5	dB	
	39001 MHz	-2.5	_____	2.5	dB	
	39999 MHz	-2.5	_____	2.5	dB	
Page 25	Frequency response < 3.6 GHz, RF					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	attenuation 40 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-0.5	_____	0.5	dB	
	100.02 kHz	-0.5	_____	0.5	dB	
	1.005 MHz	-0.5	_____	0.5	dB	
	10.15 MHz	-0.3	_____	0.3	dB	
	51 MHz	-0.3	_____	0.3	dB	
	64 MHz		Reference			
	101 MHz	-0.3	_____	0.3	dB	
	201 MHz	-0.3	_____	0.3	dB	
	301 MHz	-0.3	_____	0.3	dB	
	401 MHz	-0.3	_____	0.3	dB	
	501 MHz	-0.3	_____	0.3	dB	
	601 MHz	-0.3	_____	0.3	dB	
	701 MHz	-0.3	_____	0.3	dB	
	801 MHz	-0.3	_____	0.3	dB	
	901 MHz	-0.3	_____	0.3	dB	
	1001 MHz	-0.3	_____	0.3	dB	
	1501 MHz	-0.3	_____	0.3	dB	
	2001 MHz	-0.3	_____	0.3	dB	
	2501 MHz	-0.3	_____	0.3	dB	
	3001 MHz	-0.3	_____	0.3	dB	
	3599 MHz	-0.3	_____	0.3	dB	
	FSV 4:					
	3999 MHz	-0.5	_____	0.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 27	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled f_{fresp}					
	4001 MHz	-0.5	_____	0.5	dB	
	4501 MHz	-0.5	_____	0.5	dB	
	5001 MHz	-0.5	_____	0.5	dB	
	5501 MHz	-0.5	_____	0.5	dB	
	6001 MHz	-0.5	_____	0.5	dB	
	6501 MHz	-0.5	_____	0.5	dB	
	6999 MHz	-0.5	_____	0.5	dB	
Page 27	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled f_{fresp}					
	7001 MHz	-1.5	_____	1.5	dB	
	7501 MHz	-1.5	_____	1.5	dB	
	8001 MHz	-1.5	_____	1.5	dB	
	8501 MHz	-1.5	_____	1.5	dB	
	9001 MHz	-1.5	_____	1.5	dB	
	9501 MHz	-1.5	_____	1.5	dB	
	10001 MHz	-1.5	_____	1.5	dB	
	10501 MHz	-1.5	_____	1.5	dB	
	11001 MHz	-1.5	_____	1.5	dB	
	11501 MHz	-1.5	_____	1.5	dB	
	12001 MHz	-1.5	_____	1.5	dB	
	12501 MHz	-1.5	_____	1.5	dB	
	13001 MHz	-1.5	_____	1.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	13501 MHz	-1.5	_____	1.5	dB	
	13599 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled f_{fresp}					
	14001 MHz	-2	_____	2	dB	
	15001 MHz	-2	_____	2	dB	
	16001 MHz	-2	_____	2	dB	
	17001 MHz	-2	_____	2	dB	
	18001 MHz	-2	_____	2	dB	
	19001 MHz	-2	_____	2	dB	
	20001 MHz	-2	_____	2	dB	
	21001 MHz	-2	_____	2	dB	
	22001 MHz	-2	_____	2	dB	
	23001 MHz	-2	_____	2	dB	
	24001 MHz	-2	_____	2	dB	
	25001 MHz	-2	_____	2	dB	
	26001 MHz	-2	_____	2	dB	
	27001 MHz	-2	_____	2	dB	
	28001 MHz	-2	_____	2	dB	
	29001 MHz	-2	_____	2	dB	
	29999 MHz	-2	_____	2	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled f_{fresp}					
	30001 MHz	-2.5	_____	2.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	31001 MHz	-2.5	_____	2.5	dB	
	32001 MHz	-2.5	_____	2.5	dB	
	33001 MHz	-2.5	_____	2.5	dB	
	34001 MHz	-2.5	_____	2.5	dB	
	35001 MHz	-2.5	_____	2.5	dB	
	36001 MHz	-2.5	_____	2.5	dB	
	37001 MHz	-2.5	_____	2.5	dB	
	38001 MHz	-2.5	_____	2.5	dB	
	39001 MHz	-2.5	_____	2.5	dB	
	39999 MHz	-2.5	_____	2.5	dB	
Page 25	Frequency response < 3.6 GHz, RF attenuation 10 dB, AC coupled f_{fresp}					
	FSV 4/7:					
	1.005 MHz	-1	_____	1	dB	
	FSV 4/7/13/30/39/40:					
	10.15 MHz	-1	_____	1	dB	
	51 MHz	-1	_____	1	dB	
	64 MHz		Reference			
	101 MHz	-1	_____	1	dB	
	201 MHz	-1	_____	1	dB	
	301 MHz	-1	_____	1	dB	
	401 MHz	-1	_____	1	dB	
	501 MHz	-1	_____	1	dB	
	601 MHz	-1	_____	1	dB	
	701 MHz	-1	_____	1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	801 MHz	-1	_____	1	dB	
	901 MHz	-1	_____	1	dB	
	1001 MHz	-1	_____	1	dB	
	1501 MHz	-1	_____	1	dB	
	2001 MHz	-1	_____	1	dB	
	2501 MHz	-1	_____	1	dB	
	3001 MHz	-1	_____	1	dB	
	3599 MHz	-1	_____	1	dB	
	FSV 4:					
	3999 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, AC coupled f_{fresp}					
	4001 MHz	-1.5	_____	1.5	dB	
	4501 MHz	-1.5	_____	1.5	dB	
	5001 MHz	-1.5	_____	1.5	dB	
	5501 MHz	-1.5	_____	1.5	dB	
	6001 MHz	-1.5	_____	1.5	dB	
	6501 MHz	-1.5	_____	1.5	dB	
	6999 MHz	-1.5	_____	1.5	dB	
Page 27	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, AC coupled f_{fresp}					
	7001 MHz	-2.5	_____	2.5	dB	
	7501 MHz	-2.5	_____	2.5	dB	
	8001 MHz	-2.5	_____	2.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	8501 MHz	-2.5	_____	2.5	dB	
	9001 MHz	-2.5	_____	2.5	dB	
	9501 MHz	-2.5	_____	2.5	dB	
	10001 MHz	-2.5	_____	2.5	dB	
	10501 MHz	-2.5	_____	2.5	dB	
	11001 MHz	-2.5	_____	2.5	dB	
	11501 MHz	-2.5	_____	2.5	dB	
	12001 MHz	-2.5	_____	2.5	dB	
	12501 MHz	-2.5	_____	2.5	dB	
	13001 MHz	-2.5	_____	2.5	dB	
	13501 MHz	-2.5	_____	2.5	dB	
	13599 MHz	-2.5	_____	2.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, AC coupled f_{fresp}					
	14001 MHz	-3	_____	3	dB	
	15001 MHz	-3	_____	3	dB	
	16001 MHz	-3	_____	3	dB	
	17001 MHz	-3	_____	3	dB	
	18001 MHz	-3	_____	3	dB	
	19001 MHz	-3	_____	3	dB	
	20001 MHz	-3	_____	3	dB	
	21001 MHz	-3	_____	3	dB	
	22001 MHz	-3	_____	3	dB	
	23001 MHz	-3	_____	3	dB	
	24001 MHz	-3	_____	3	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	25001 MHz	-3	_____	3	dB	
	26001 MHz	-3	_____	3	dB	
	27001 MHz	-3	_____	3	dB	
	28001 MHz	-3	_____	3	dB	
	29001 MHz	-3	_____	3	dB	
	29999 MHz	-3	_____	3	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, AC coupled f_{fresp}					
	30001 MHz	-3.5	_____	3.5	dB	
	31001 MHz	-3.5	_____	3.5	dB	
	32001 MHz	-3.5	_____	3.5	dB	
	33001 MHz	-3.5	_____	3.5	dB	
	34001 MHz	-3.5	_____	3.5	dB	
	35001 MHz	-3.5	_____	3.5	dB	
	36001 MHz	-3.5	_____	3.5	dB	
	37001 MHz	-3.5	_____	3.5	dB	
	38001 MHz	-3.5	_____	3.5	dB	
	39001 MHz	-3.5	_____	3.5	dB	
	39999 MHz	-3.5	_____	3.5	dB	
Page 27	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled, full span f_{fresp}					
	7001 MHz	-2.5	_____	2.5	dB	
	7501 MHz	-2.5	_____	2.5	dB	
	8001 MHz	-2.5	_____	2.5	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	8501 MHz	-2.5	_____	2.5	dB	
	9001 MHz	-2.5	_____	2.5	dB	
	9501 MHz	-2.5	_____	2.5	dB	
	10001 MHz	-2.5	_____	2.5	dB	
	10501 MHz	-2.5	_____	2.5	dB	
	11001 MHz	-2.5	_____	2.5	dB	
	11501 MHz	-2.5	_____	2.5	dB	
	12001 MHz	-2.5	_____	2.5	dB	
	12501 MHz	-2.5	_____	2.5	dB	
	13001 MHz	-2.5	_____	2.5	dB	
	13501 MHz	-2.5	_____	2.5	dB	
	13599 MHz	-2.5	_____	2.5	dB	
Page 27	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled, full span f_{fresp}					
	14001 MHz	-3	_____	3	dB	
	15001 MHz	-3	_____	3	dB	
	16001 MHz	-3	_____	3	dB	
	17001 MHz	-3	_____	3	dB	
	18001 MHz	-3	_____	3	dB	
	19001 MHz	-3	_____	3	dB	
	20001 MHz	-3	_____	3	dB	
	21001 MHz	-3	_____	3	dB	
	22001 MHz	-3	_____	3	dB	
	23001 MHz	-3	_____	3	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	24001 MHz	-3	_____	3	dB	
	25001 MHz	-3	_____	3	dB	
	26001 MHz	-3	_____	3	dB	
	27001 MHz	-3	_____	3	dB	
	28001 MHz	-3	_____	3	dB	
	29001 MHz	-3	_____	3	dB	
	29999 MHz	-3	_____	3	dB	
Page 27	FSV 39/40: Frequency response > 3.6 GHz, RF attenuation = 10 dB, DC coupled, full span f_{fresp}					
	30001 MHz	-3.5	_____	3.5	dB	
	31001 MHz	-3.5	_____	3.5	dB	
	32001 MHz	-3.5	_____	3.5	dB	
	33001 MHz	-3.5	_____	3.5	dB	
	34001 MHz	-3.5	_____	3.5	dB	
	35001 MHz	-3.5	_____	3.5	dB	
	36001 MHz	-3.5	_____	3.5	dB	
	37001 MHz	-3.5	_____	3.5	dB	
	38001 MHz	-3.5	_____	3.5	dB	
	39001 MHz	-3.5	_____	3.5	dB	
	39999 MHz	-3.5	_____	3.5	dB	
Page 29	Display Nonlinearity a_{att}					
	10 dB	9.9	_____	10.1	dB	
	12 dB	7.9	_____	8.1	dB	
	14 dB	5.9	_____	6.1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	16 dB	3.9	_____	4.1	dB	
	18 dB	1.9	_____	2.1	dB	
	20 dB	-	Reference	-		
	22 dB	-2.1	_____	-1.9	dB	
	24 dB	-4.1	_____	-3.9	dB	
	26 dB	-6.1	_____	-5.9	dB	
	28 dB	-8.1	_____	-7.9	dB	
	30 dB	-10.1	_____	-9.9	dB	
	32 dB	-12.1	_____	-11.9	dB	
	34 dB	-14.1	_____	-13.9	dB	
	36 dB	-16.1	_____	-15.9	dB	
	38 dB	-18.1	_____	-17.9	dB	
	40 dB	-20.1	_____	-19.9	dB	
	42 dB	-22.1	_____	-21.9	dB	
	44 dB	-24.1	_____	-23.9	dB	
	46 dB	-26.1	_____	-25.9	dB	
	48 dB	-28.1	_____	-27.9	dB	
	50 dB	-30.1	_____	-29.9	dB	
	52 dB	-32.1	_____	-31.9	dB	
	54 dB	-34.1	_____	-33.9	dB	
	56 dB	-36.1	_____	-35.9	dB	
	58 dB	-38.1	_____	-37.9	dB	
	60 dB	-40.1	_____	-39.9	dB	
	65 dB	-45.1	_____	-44.9	dB	
	70 dB	-50.1	_____	-49.9	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	75 dB	-55.1	_____	-54.9	dB	
	80 dB	-60.1	_____	-59.9	dB	
Page 31	RF Attenuator uncertainty a_{FSV}					
	0 dB	9.8	_____	10.2	dB	
	5 dB	4.8	_____	5.2	dB	
	10 dB		Reference			
	15 dB	-5.2	_____	-4.8	dB	
	20 dB	-10.2	_____	-9.8	dB	
	25 dB	-15.2	_____	-14.8	dB	
	30 dB	-20.2	_____	-19.8	dB	
	40 dB	-30.2	_____	-29.8	dB	
	50 dB	-40.2	_____	-39.8	dB	
	60 dB	-50.2	_____	-49.8	dB	
	70 dB	-60.2	_____	-59.8	dB	
Page 32	Phase Noise Offset					
	100 Hz	-	_____	-84	dBc (1Hz)	
	1 kHz	-	_____	-101	dBc (1Hz)	
	10 kHz	-	_____	-106	dBc (1Hz)	
	100 KHz (measured at 96 kHz)	-	_____	-115	dBc (1Hz)	
	1 MHz	-	_____	-134	dBc (1Hz)	
Page 34	VSWR					
	10 dB, DC coupled f_{in}					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	FSV 4/7/13/30/39/40:					
	10 MHz	-	_____	1.5		
	250 MHz	-	_____	1.5		
	500 MHz	-	_____	1.5		
	750 MHz	-	_____	1.5		
	1000 MHz	-	_____	1.5		
	1250 MHz	-	_____	1.5		
	1500 MHz	-	_____	1.5		
	1750 MHz	-	_____	1.5		
	2000 MHz	-	_____	1.5		
	2250 MHz	-	_____	1.5		
	2500 MHz	-	_____	1.5		
	2750 MHz	-	_____	1.5		
	3000 MHz	-	_____	1.5		
	3250 MHz	-	_____	1.5		
	3500 MHz	-	_____	1.5		
	3750 MHz	-	_____	2		
	4000 MHz	-	_____	2		
	FSV 7/13/30/39/40:					
	4250 MHz	-	_____	2		
	4500 MHz	-	_____	2		
	4750 MHz	-	_____	2		
	5000 MHz	-	_____	2		
	5250 MHz	-	_____	2		
	5500 MHz	-	_____	2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5750 MHz	-	_____	2		
	6000 MHz	-	_____	2		
	6250 MHz	-	_____	2		
	6500 MHz	-	_____	2		
	6750 MHz	-	_____	2		
	7000 MHz	-	_____	2		
	FSV 13/30/39/40:					
	8000 MHz	-	_____	2		
	9000 MHz	-	_____	2		
	10000 MHz	-	_____	2		
	11000 MHz	-	_____	2		
	12000 MHz	-	_____	2		
	13000 MHz	-	_____	2		
	FSV 30/39/40:					
	14000 MHz	-	_____	2		
	16000 MHz	-	_____	2		
	18000 MHz	-	_____	2		
	20000 MHz	-	_____	2.2		
	22000 MHz	-	_____	2.2		
	24000 MHz	-	_____	2.2		
	26000 MHz	-	_____	2.2		
	28000 MHz	-	_____	2.2		
	29999 MHz	-	_____	2.2		
	FSV 39/40:					
	31000 MHz	-	_____	2.5		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	33000 MHz	-	_____	2.5		
	35000 MHz	-	_____	2.5		
	37000 MHz	-	_____	2.5		
	39000 MHz	-	_____	2.5		
	39999 MHz	-	_____	2.5		
Page 34	VSWR					
	20 dB, DC coupled f_{in}					
	FSV 4/7/13/30/39/40:					
	10 MHz	-	_____	1.5		
	250 MHz	-	_____	1.5		
	500 MHz	-	_____	1.5		
	750 MHz	-	_____	1.5		
	1000 MHz	-	_____	1.5		
	1250 MHz	-	_____	1.5		
	1500 MHz	-	_____	1.5		
	1750 MHz	-	_____	1.5		
	2000 MHz	-	_____	1.5		
	2250 MHz	-	_____	1.5		
	2500 MHz	-	_____	1.5		
	2750 MHz	-	_____	1.5		
	3000 MHz	-	_____	1.5		
	3250 MHz	-	_____	1.5		
	3500 MHz	-	_____	1.5		
	3750 MHz	-	_____	2		
	4000 MHz	-	_____	2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	FSV 7/13/30/39/40:					
	4250 MHz	-	_____	2		
	4500 MHz	-	_____	2		
	4750 MHz	-	_____	2		
	5000 MHz	-	_____	2		
	5250 MHz	-	_____	2		
	5500 MHz	-	_____	2		
	5750 MHz	-	_____	2		
	6000 MHz	-	_____	2		
	6250 MHz	-	_____	2		
	6500 MHz	-	_____	2		
	6750 MHz	-	_____	2		
	7000 MHz	-	_____	2		
	FSV 13/30/39/40:					
	8000 MHz	-	_____	2		
	9000 MHz	-	_____	2		
	10000 MHz	-	_____	2		
	11000 MHz	-	_____	2		
	12000 MHz	-	_____	2		
	13000 MHz	-	_____	2		
	FSV 30/39/40:					
	14000 MHz	-	_____	2		
	16000 MHz	-	_____	2		
	18000 MHz	-	_____	2		
	20000 MHz	-	_____	2.2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	22000 MHz	-	_____	2.2		
	24000 MHz	-	_____	2.2		
	26000 MHz	-	_____	2.2		
	28000 MHz	-	_____	2.2		
	29999 MHz	-	_____	2.2		
	FSV 39/40:					
	31000 MHz	-	_____	2.5		
	33000 MHz	-	_____	2.5		
	35000 MHz	-	_____	2.5		
	37000 MHz	-	_____	2.5		
	39000 MHz	-	_____	2.5		
	39999 MHz	-	_____	2.5		
Page 34	VSWR					
	40 dB, DC coupled f_{in}					
	FSV 4/7/13/30/39/40:					
	10 MHz	-	_____	1.5		
	250 MHz	-	_____	1.5		
	500 MHz	-	_____	1.5		
	750 MHz	-	_____	1.5		
	1000 MHz	-	_____	1.5		
	1250 MHz	-	_____	1.5		
	1500 MHz	-	_____	1.5		
	1750 MHz	-	_____	1.5		
	2000 MHz	-	_____	1.5		
	2250 MHz	-	_____	1.5		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	2500 MHz	-	_____	1.5		
	2750 MHz	-	_____	1.5		
	3000 MHz	-	_____	1.5		
	3250 MHz	-	_____	1.5		
	3500 MHz	-	_____	1.5		
	3750 MHz	-	_____	2		
	4000 MHz	-	_____	2		
	FSV 7/13/30/39/40:					
	4250 MHz	-	_____	2		
	4500 MHz	-	_____	2		
	4750 MHz	-	_____	2		
	5000 MHz	-	_____	2		
	5250 MHz	-	_____	2		
	5500 MHz	-	_____	2		
	5750 MHz	-	_____	2		
	6000 MHz	-	_____	2		
	6250 MHz	-	_____	2		
	6500 MHz	-	_____	2		
	6750 MHz	-	_____	2		
	7000 MHz	-	_____	2		
	FSV 13/30/39/40:					
	8000 MHz	-	_____	2		
	9000 MHz	-	_____	2		
	10000 MHz	-	_____	2		
	11000 MHz	-	_____	2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	12000 MHz	-	_____	2		
	13000 MHz	-	_____	2		
	FSV 30/38/40:					
	14000 MHz	-	_____	2		
	16000 MHz	-	_____	2		
	18000 MHz	-	_____	2		
	20000 MHz	-	_____	2.2		
	22000 MHz	-	_____	2.2		
	24000 MHz	-	_____	2.2		
	26000 MHz	-	_____	2.2		
	28000 MHz	-	_____	2.2		
	29999 MHz	-	_____	2.2		
	FSV 39/40:					
	31000 MHz	-	_____	2.5		
	33000 MHz	-	_____	2.5		
	35000 MHz	-	_____	2.5		
	37000 MHz	-	_____	2.5		
	39000 MHz	-	_____	2.5		
	39999 MHz	-	_____	2.5		
Page 34	VSWR					
	10 dB, AC coupled f_{in}					
	FSV 4/7/13/30/39/40:					
	10 MHz	-	_____	1.5		
	250 MHz	-	_____	1.5		
	500 MHz	-	_____	1.5		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	750 MHz	-	_____	1.5		
	1000 MHz	-	_____	1.5		
	1250 MHz	-	_____	1.5		
	1500 MHz	-	_____	1.5		
	1750 MHz	-	_____	1.5		
	2000 MHz	-	_____	1.5		
	2250 MHz	-	_____	1.5		
	2500 MHz	-	_____	1.5		
	2750 MHz	-	_____	1.5		
	3000 MHz	-	_____	1.5		
	3250 MHz	-	_____	1.5		
	3500 MHz	-	_____	1.5		
	3750 MHz	-	_____	2		
	4000 MHz	-	_____	2		
	FSV 7/13/30/39/40:					
	4250 MHz	-	_____	2		
	4500 MHz	-	_____	2		
	4750 MHz	-	_____	2		
	5000 MHz	-	_____	2		
	5250 MHz	-	_____	2		
	5500 MHz	-	_____	2		
	5750 MHz	-	_____	2		
	6000 MHz	-	_____	2		
	6250 MHz	-	_____	2		
	6500 MHz	-	_____	2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	6750 MHz	-	_____	2		
	7000 MHz	-	_____	2		
	FSV 13/30/39/40:					
	8000 MHz	-	_____	2		
	9000 MHz	-	_____	2		
	10000 MHz	-	_____	2		
	11000 MHz	-	_____	2		
	12000 MHz	-	_____	2		
	13000 MHz	-	_____	2		
	FSV 30/39/40:					
	14000 MHz	-	_____	2		
	16000 MHz	-	_____	2		
	18000 MHz	-	_____	2		
	20000 MHz	-	_____	2.2		
	22000 MHz	-	_____	2.2		
	24000 MHz	-	_____	2.2		
	26000 MHz	-	_____	2.2		
	26999 MHz	-	_____	2.2		
Page 34	VSWR					
	20 dB, AC coupled f_{in}					
	FSV 4/7/13/30/39/40:					
	10 MHz	-	_____	1.5		
	250 MHz	-	_____	1.5		
	500 MHz	-	_____	1.5		
	750 MHz	-	_____	1.5		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	1000 MHz	-	_____	1.5		
	1250 MHz	-	_____	1.5		
	1500 MHz	-	_____	1.5		
	1750 MHz	-	_____	1.5		
	2000 MHz	-	_____	1.5		
	2250 MHz	-	_____	1.5		
	2500 MHz	-	_____	1.5		
	2750 MHz	-	_____	1.5		
	3000 MHz	-	_____	1.5		
	3250 MHz	-	_____	1.5		
	3500 MHz	-	_____	1.5		
	3750 MHz	-	_____	2		
	4000 MHz	-	_____	2		
	FSV 7/13/30/39/40:					
	4250 MHz	-	_____	2		
	4500 MHz	-	_____	2		
	4750 MHz	-	_____	2		
	5000 MHz	-	_____	2		
	5250 MHz	-	_____	2		
	5500 MHz	-	_____	2		
	5750 MHz	-	_____	2		
	6000 MHz	-	_____	2		
	6250 MHz	-	_____	2		
	6500 MHz	-	_____	2		
	6750 MHz	-	_____	2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	7000 MHz	-	_____	2		
	FSV 13/30/39/40:					
	8000 MHz	-	_____	2		
	9000 MHz	-	_____	2		
	10000 MHz	-	_____	2		
	11000 MHz	-	_____	2		
	12000 MHz	-	_____	2		
	13000 MHz	-	_____	2		
	FSV 30/39/40:					
	14000 MHz	-	_____	2		
	16000 MHz	-	_____	2		
	18000 MHz	-	_____	2		
	20000 MHz	-	_____	2.2		
	22000 MHz	-	_____	2.2		
	24000 MHz	-	_____	2.2		
	26000 MHz	-	_____	2.2		
	26999 MHz	-	_____	2.2		
Page 34	VSWR					
	40 dB, AC coupled f_{in}					
	FSV 4/7/13/30/39/40:					
	10 MHz	-	_____	1.5		
	250 MHz	-	_____	1.5		
	500 MHz	-	_____	1.5		
	750 MHz	-	_____	1.5		
	1000 MHz	-	_____	1.5		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	1250 MHz	-	_____	1.5		
	1500 MHz	-	_____	1.5		
	1750 MHz	-	_____	1.5		
	2000 MHz	-	_____	1.5		
	2250 MHz	-	_____	1.5		
	2500 MHz	-	_____	1.5		
	2750 MHz	-	_____	1.5		
	3000 MHz	-	_____	1.5		
	3250 MHz	-	_____	1.5		
	3500 MHz	-	_____	1.5		
	3750 MHz	-	_____	2		
	4000 MHz	-	_____	2		
	FSV 7/13/30/39/40:					
	4250 MHz	-	_____	2		
	4500 MHz	-	_____	2		
	4750 MHz	-	_____	2		
	5000 MHz	-	_____	2		
	5250 MHz	-	_____	2		
	5500 MHz	-	_____	2		
	5750 MHz	-	_____	2		
	6000 MHz	-	_____	2		
	6250 MHz	-	_____	2		
	6500 MHz	-	_____	2		
	6750 MHz	-	_____	2		
	7000 MHz	-	_____	2		

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	FSV 13/30/39/40:					
	8000 MHz	-	_____	2		
	9000 MHz	-	_____	2		
	10000 MHz	-	_____	2		
	11000 MHz	-	_____	2		
	12000 MHz	-	_____	2		
	13000 MHz	-	_____	2		
	FSV 30/39/40:					
	14000 MHz	-	_____	2		
	16000 MHz	-	_____	2		
	18000 MHz	-	_____	2		
	20000 MHz	-	_____	2.2		
	22000 MHz	-	_____	2.2		
	24000 MHz	-	_____	2.2		
	26000 MHz	-	_____	2.2		
	26999 MHz	-	_____	2.2		

1.8.4 Performance Test Report Option R&S FSV-B9

ROHDE&SCHWARZ	Option Tracking Generator R&S FSV-B9	1310.9639.02
Serial number: Date: Person responsible: Signature:		

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 35	Absolute level uncertainty at 64 MHz, output level -10 dBm	-1	_____	+1	dB	
Page 36	Frequency response					
	FSV 4:					
	100 kHz to 4 GHz, min. value	-3	_____	+3	dB	
	100 kHz to 4 GHz, max. value	-3	_____	+3		
	FSV 7/13/29/30/38/39/40:					
	100 kHz to 7 GHz, min. value	-3	_____	+3	dB	
	100 kHz to 7 GHz, max. value	-3	_____	+3	dB	

1.8.5 Performance Test Report Option R&S FSV-B21

ROHDE&SCHWARZ	**Option LO/IF ports for external mixers R&S FSV-B21**	**1310.9597.02**
Serial number:		
Date:		
Person responsible:		
Signature:		

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 37	LO level $f_{Center1}$					
	16,1899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	16,5899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	16,9899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	17,3899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	17,7899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	18,1899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	18,5899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	18,9899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	19,3899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	19,7899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	20,1899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	20,5899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	20,9899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	21,3899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	21,7899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	22,1899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	22,5899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	22,9899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	23,3899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	23,7899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	24,1899 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
Page 37	LO level $f_{Center2}$					
	23,1301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	23,5301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	23,9301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	24,3301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	24,7301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	25,1301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	25,5301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	25,9301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	26,3301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	26,7301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	27,1301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	27,5301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	27,9301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	28,3301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	28,7301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	29,1301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	29,5301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
	29,7301 GHz	P_{LO} - 1		P_{LO} + 1	dBm	
Page 39	level display 2-port-mixer	-31		-29	dBm	
Page 40	level display 3-port-mixer	-31		-29	dBm	
Page 41	Bias current I_{bias}					
	-10 mA	-12.0		-8.0	mA	
	0 mA	-1.0		+1.0	mA	
	+10 mA	+8.0		+12.0	mA	

1.8.6 Performance Test Report Option R&S FSV-B22

ROHDE&SCHWARZ	Option RF Preamplifier R&S FSV-B22	1310.9600.02
Serial number: Date: Person responsible: Signature:		

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 41	Noise Display normalized to 1 Hz Preamplifier = ON f_n					
	FSV 4/7:					
	101 kHz	-		-150	dBm	
	999 kHz	-		-150	dBm	
	10.1 MHz	-		-162	dBm	
	19.99 MHz	-		-162	dBm	
	49.99 MHz	-		-162	dBm	
	99.99 MHz	-		-162	dBm	
	199.9 MHz	-		-162	dBm	
	499.9 MHz	-		-162	dBm	
	599.9 MHz	-		-162	dBm	
	699.9 MHz	-		-162	dBm	
	799.9 MHz	-		-162	dBm	
	899.9 MHz	-		-162	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	999.9 MHz	-		-162	dBm	
	1199.9 MHz	-		-160	dBm	
	1399.9 MHz	-		-160	dBm	
	1599.9 MHz	-		-160	dBm	
	1799.9 MHz	-		-160	dBm	
	1999.9 MHz	-		-160	dBm	
	2199.9 MHz	-		-160	dBm	
	2399.9 MHz	-		-160	dBm	
	2599.9 MHz	-		-160	dBm	
	2799.9 MHz	-		-160	dBm	
	2999.9 MHz	-		-160	dBm	
	3199.9 MHz	-		-160	dBm	
	3399.9 MHz	-		-160	dBm	
	3599.9 MHz	-		-160	dBm	
	3799.9 MHz	-		-158	dBm	
	3999.9 MHz	-		-158	dBm	
	FSV 7:					
	4199.9 MHz	-		-158	dBm	
	4399.9 MHz	-		-158	dBm	
	4599.9 MHz	-		-158	dBm	
	4799.9 MHz	-		-158	dBm	
	4999.9 MHz	-		-158	dBm	
	5199.9 MHz	-		-158	dBm	
	5399.9 MHz	-		-158	dBm	
	5599.9 MHz	-		-158	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	5799.9 MHz	-		-158	dBm	
	5999.9 MHz	-		-158	dBm	
	6199.9 MHz	-		-156	dBm	
	6399.9 MHz	-		-156	dBm	
	6599.9 MHz	-		-156	dBm	
	6799.9 MHz	-		-156	dBm	
	6999.9 MHz	-		-156	dBm	
Page 41	Noise Display normalized to 1 Hz Preamplifier = ON f_n					
	FSV 13/30/39/40:					
	101 kHz	-		-145	dBm	
	999 kHz	-		-145	dBm	
	10.1 MHz	-		-155	dBm	
	19.99 MHz	-		-155	dBm	
	49.99 MHz	-		-161	dBm	
	99.99 MHz	-		-161	dBm	
	199.9 MHz	-		-161	dBm	
	499.9 MHz	-		-161	dBm	
	599.9 MHz	-		-161	dBm	
	699.9 MHz	-		-161	dBm	
	799.9 MHz	-		-161	dBm	
	899.9 MHz	-		-161	dBm	
	999.9 MHz	-		-161	dBm	
	1199.9 MHz	-		-159	dBm	
	1399.9 MHz	-		-159	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	1599.9 MHz	-		-159	dBm	
	1799.9 MHz	-		-159	dBm	
	1999.9 MHz	-		-159	dBm	
	2199.9 MHz	-		-159	dBm	
	2399.9 MHz	-		-159	dBm	
	2599.9 MHz	-		-159	dBm	
	2799.9 MHz	-		-159	dBm	
	2999.9 MHz	-		-159	dBm	
	3199.9 MHz	-		-159	dBm	
	3399.9 MHz	-		-159	dBm	
	3599.9 MHz	-		-159	dBm	
	3799.9 MHz	-		-156	dBm	
	3999.9 MHz	-		-156	dBm	
	4199.9 MHz	-		-156	dBm	
	4399.9 MHz	-		-156	dBm	
	4599.9 MHz	-		-156	dBm	
	4799.9 MHz	-		-156	dBm	
	4999.9 MHz	-		-156	dBm	
	5199.9 MHz	-		-156	dBm	
	5399.9 MHz	-		-156	dBm	
	5599.9 MHz	-		-156	dBm	
	5799.9 MHz	-		-156	dBm	
	5999.9 MHz	-		-156	dBm	
	6199.9 MHz	-		-154	dBm	
	6399.9 MHz	-		-154	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	6599.9 MHz	-		-154	dBm	
	6799.9 MHz	-		-154	dBm	
	6999.9 MHz	-		-154	dBm	
Page 44	Absolute level uncertainty at 64 MHz	-0.2		0.2	dB	
Page 45	Frequency response < 3.6 GHz, RF attenuation 30 dB, DC coupled Preamplifier = ON f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-1		1	dB	
	100.02 kHz	-1		1	dB	
	1.005 MHz	-1		1	dB	
	10.15 MHz	-1		1	dB	
	51 MHz	-1		1	dB	
	64 MHz		Reference			
	101 MHz	-1		1	dB	
	201 MHz	-1		1	dB	
	301 MHz	-1		1	dB	
	401 MHz	-1		1	dB	
	501 MHz	-1		1	dB	
	601 MHz	-1		1	dB	
	701 MHz	-1		1	dB	
	801 MHz	-1		1	dB	
	901 MHz	-1		1	dB	
	1001 MHz	-1		1	dB	
	1501 MHz	-1		1	dB	
	2001 MHz	-1		1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	2501 MHz	-1		1	dB	
	3001 MHz	-1		1	dB	
	3599 MHz	-1		1	dB	
	FSV 4:					
	3999 MHz	-1.5		1.5	dB	
Page 46	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 30 dB, DC coupled Preamplifier = ON f_{fresp}					
	4001 MHz	-1.5		1.5	dB	
	4501 MHz	-1.5		1.5	dB	
	5001 MHz	-1.5		1.5	dB	
	5501 MHz	-1.5		1.5	dB	
	6001 MHz	-1.5		1.5	dB	
	6501 MHz	-1.5		1.5	dB	
	6999 MHz	-1.5		1.5	dB	

1.8.7 Performance Test Report Option R&S FSV-B24

ROHDE&SCHWARZ	**Option RF Preamplifier R&S FSV-B24**
Serial number:	
Date:	
Person responsible:	
Signature:	

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 49	Noise Display normalized to 1 Hz Preamplifier = ON f_n					
	FSV 13/30/39/40:					
	101 kHz	-	_____	-145	dBm	
	999 kHz	-	_____	-155	dBm	
	10.1 MHz	-	_____	-155	dBm	
	19.99 MHz	-	_____	-155	dBm	
	49.99 MHz	-	_____	-160	dBm	
	99.99 MHz	-	_____	-160	dBm	
	199.9 MHz	-	_____	-160	dBm	
	499.9 MHz	-	_____	-160	dBm	
	599.9 MHz	-	_____	-160	dBm	
	699.9 MHz	-	_____	-160	dBm	
	799.9 MHz	-	_____	-160	dBm	
	899.9 MHz	-	_____	-160	dBm	
	999.9 MHz	-	_____	-160	dBm	
	1199.9 MHz	-	_____	-157	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	1399.9 MHz	-	_____	-157	dBm	
	1599.9 MHz	-	_____	-157	dBm	
	1799.9 MHz	-	_____	-157	dBm	
	1999.9 MHz	-	_____	-157	dBm	
	2199.9 MHz	-	_____	-157	dBm	
	2399.9 MHz	-	_____	-157	dBm	
	2599.9 MHz	-	_____	-157	dBm	
	2799.9 MHz	-	_____	-157	dBm	
	2999.9 MHz	-	_____	-157	dBm	
	3199.9 MHz	-	_____	-157	dBm	
	3399.9 MHz	-	_____	-157	dBm	
	3599.9 MHz	-	_____	-157	dBm	
	3799.9 MHz	-	_____	-153	dBm	
	3999.9 MHz	-	_____	-153	dBm	
	4199.9 MHz	-	_____	-153	dBm	
	4399.9 MHz	-	_____	-153	dBm	
	4599.9 MHz	-	_____	-153	dBm	
	4799.9 MHz	-	_____	-153	dBm	
	4999.9 MHz	-	_____	-153	dBm	
	5199.9 MHz	-	_____	-153	dBm	
	5399.9 MHz	-	_____	-153	dBm	
	5599.9 MHz	-	_____	-153	dBm	
	5799.9 MHz	-	_____	-153	dBm	
	5999.9 MHz	-	_____	-153	dBm	
	6199.9 MHz	-	_____	-150	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	6399.9 MHz	-	_____	-150	dBm	
	6599.9 MHz	-	_____	-150	dBm	
	6799.9 MHz	-	_____	-150	dBm	
	6999.9 MHz	-	_____	-150	dBm	
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	7499.9 MHz	-	_____	-164	dBm	
	7999.9 MHz	-	_____	-164	dBm	
	8499.9 MHz	-	_____	-164	dBm	
	8999.9 MHz	-	_____	-164	dBm	
	9499.9 MHz	-	_____	-164	dBm	
	9999.9 MHz	-	_____	-164	dBm	
	10499.9 MHz	-	_____	-164	dBm	
	10999.9 MHz	-	_____	-164	dBm	
	11499.9 MHz	-	_____	-164	dBm	
	11999.9 MHz	-	_____	-164	dBm	
	12499.9 MHz	-	_____	-164	dBm	
	12999.9 MHz	-	_____	-164	dBm	
	13499.9 MHz	-	_____	-164	dBm	
	FSV 30/39/40:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	13999.9 MHz	-	_____	-164	dBm	
	14999.9 MHz	-	_____	-164	dBm	
	15999.9 MHz	-	_____	-159	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	16999.9 MHz	-	_____	-159	dBm	
	17999.9 MHz	-	_____	-159	dBm	
	18999.9 MHz	-	_____	-159	dBm	
	19999.9 MHz	-	_____	-159	dBm	
	20999.9 MHz	-	_____	-159	dBm	
	21999.9 MHz	-	_____	-159	dBm	
	22999.9 MHz	-	_____	-159	dBm	
	23999.9 MHz	-	_____	-159	dBm	
	24999.9 MHz	-	_____	-159	dBm	
	25999.9 MHz	-	_____	-159	dBm	
	26999.9 MHz	-	_____	-159	dBm	
	27999.9 MHz	-	_____	-159	dBm	
	28999.9 MHz	-	_____	-159	dBm	
	29999.9 MHz	-	_____	-159	dBm	
	FSV 39/40:					
	with FSV-B160 installed:			add 1,5 dB to specified limits below!		
	31999.9 MHz	-	_____	-159	dBm	
	32999.9 MHz	-	_____	-159	dBm	
	33999.9 MHz	-	_____	-159	dBm	
	34999.9 MHz	-	_____	-154	dBm	
	35999.9 MHz	-	_____	-154	dBm	
	36999.9 MHz	-	_____	-154	dBm	
	37999.9 MHz	-	_____	-154	dBm	
	38999.9 MHz	-	_____	-154	dBm	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	39999.9 MHz	-	_____	-154	dBm	
Page 52	Absolute level uncertainty at 64 MHz	-0.2		0.2	dB	
Page 53	Frequency response < 3.6 GHz, RF attenuation 40 dB, DC coupled Preamplifier = ON f_{fresp}					
	FSV 13/30/39/40:					
	9 kHz	-1	_____	1	dB	
	100.02 kHz	-1	_____	1	dB	
	1.005 MHz	-1	_____	1	dB	
	10.15 MHz	-1	_____	1	dB	
	51 MHz	-1		1	dB	
	64 MHz		Reference			
	101 MHz	-1	_____	1	dB	
	201 MHz	-1	_____	1	dB	
	301 MHz	-1	_____	1	dB	
	401 MHz	-1	_____	1	dB	
	501 MHz	-1	_____	1	dB	
	601 MHz	-1	_____	1	dB	
	701 MHz	-1	_____	1	dB	
	801 MHz	-1	_____	1	dB	
	901 MHz	-1	_____	1	dB	
	1001 MHz	-1	_____	1	dB	
	1501 MHz	-1	_____	1	dB	
	2001 MHz	-1	_____	1	dB	
	2501 MHz	-1	_____	1	dB	
	3001 MHz	-1	_____	1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	3599 MHz	-1	_____	1	dB	
Page 56	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled Preamplifier = ON f_{fresp}					
	4001 MHz	-1.5		1.5	dB	
	4501 MHz	-1.5		1.5	dB	
	5001 MHz	-1.5		1.5	dB	
	5501 MHz	-1.5		1.5	dB	
	6001 MHz	-1.5		1.5	dB	
	6501 MHz	-1.5		1.5	dB	
	6999 MHz	-1.5		1.5	dB	
Page 56	FSV 13/30/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled Preamplifier = ON f_{fresp}					
	7001 MHz	-3	_____	3	dB	
	7501 MHz	-3	_____	3	dB	
	8001 MHz	-3	_____	3	dB	
	8501 MHz	-3	_____	3	dB	
	9001 MHz	-3	_____	3	dB	
	9501 MHz	-3	_____	3	dB	
	10001 MHz	-3	_____	3	dB	
	10501 MHz	-3	_____	3	dB	
	11001 MHz	-3	_____	3	dB	
	11501 MHz	-3	_____	3	dB	
	12001 MHz	-3	_____	3	dB	
	12501 MHz	-3	_____	3	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	13001 MHz	-3	_____	3	dB	
	13501 MHz	-3	_____	3	dB	
	13599 MHz	-3	_____	3	dB	
Page 56	FSV 30/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled Preamplifier = ON f_{fresp}					
	14001 MHz	-3.5	_____	3.5	dB	
	15001 MHz	-3.5	_____	3.5	dB	
	16001 MHz	-3.5	_____	3.5	dB	
	17001 MHz	-3.5	_____	3.5	dB	
	18001 MHz	-3.5	_____	3.5	dB	
	19001 MHz	-3.5	_____	3.5	dB	
	20001 MHz	-3.5	_____	3.5	dB	
	21001 MHz	-3.5	_____	3.5	dB	
	22001 MHz	-3.5	_____	3.5	dB	
	23001 MHz	-3.5	_____	3.5	dB	
	24001 MHz	-3.5	_____	3.5	dB	
	25001 MHz	-3.5	_____	3.5	dB	
	26001 MHz	-3.5	_____	3.5	dB	
	27001 MHz	-3.5	_____	3.5	dB	
	28001 MHz	-3.5	_____	3.5	dB	
	29001 MHz	-3.5	_____	3.5	dB	
	29999 MHz	-3.5	_____	3.5	dB	
Page 56	FSV 38/39/40: Frequency response > 3.6 GHz, RF attenuation = 40 dB, DC coupled Preamplifier = ON f_{fresp}					

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	30001 MHz	-4	_____	4	dB	
	31001 MHz	-4	_____	4	dB	
	32001 MHz	-4	_____	4	dB	
	33001 MHz	-4	_____	4	dB	
	34001 MHz	-4	_____	4	dB	
	35001 MHz	-4	_____	4	dB	
	36001 MHz	-4	_____	4	dB	
	37001 MHz	-4	_____	4	dB	
	38001 MHz	-4	_____	4	dB	
	39001 MHz	-4	_____	4	dB	
	39999 MHz	-4	_____	4	dB	

1.8.8 Performance Test Report Option R&S FSV-B25

ROHDE&SCHWARZ	Option Electronic Attenuator R&S FSV-B25	1310.9616.02
Serial number: Date: Person responsible: Signature:		

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 58	Electronic attenuator uncertainty a_{EL}					
	0 dB		Reference			

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	1 dB	-1.2		-0.8	dB	
	2 dB	-2.2		-1.8		
	3 dB	-3.2		-2.8	dB	
	4 dB	-4.2		-3.8	dB	
	5 dB	-5.2		-4.8	dB	
	6 dB	-6.2		-5.8	dB	
	7 dB	-7.2		-6.8	dB	
	8 dB	-8.2		-7.8	dB	
	9 dB	-9.2		-8.8	dB	
	10 dB	-10.2		-9.8	dB	
	11 dB	-11.2		-10.8	dB	
	12 dB	-12.2		-11.8	dB	
	13 dB	-13.2		-12.8	dB	
	14 dB	-14.2		-13.8	dB	
	15 dB	-15.2		-14.8	dB	
	16 dB	-16.2		-15.8	dB	
	17 dB	-17.2		-16.8	dB	
	18 dB	-18.2		-17.8	dB	
	19 dB	-19.2		-18.8	dB	
	20 dB	-20.2		-19.8	dB	
	21 dB	-21.2		-20.8	dB	
	22 dB	-22.2		-21.8	dB	
	23 dB	-23.2		-22.8	dB	
	24 dB	-24.2		-23.8	dB	
	25 dB	-25.2		-24.8	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 61	Absolute level uncertainty at 64 MHz	-0.2		0.2	dB	
Page 61	Frequency response < 3.6 GHz, electronic attenuation 15 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-1		1	dB	
	100.02 kHz	-1		1	dB	
	1.005 MHz	-1		1	dB	
	10.15 MHz	-1		1	dB	
	51 MHz	-1		1	dB	
	64 MHz		Reference			
	101 MHz	-1		1	dB	
	201 MHz	-1		1	dB	
	301 MHz	-1		1	dB	
	401 MHz	-1		1	dB	
	501 MHz	-1		1	dB	
	601 MHz	-1		1	dB	
	701 MHz	-1		1	dB	
	801 MHz	-1		1	dB	
	901 MHz	-1		1	dB	
	1001 MHz	-1		1	dB	
	1501 MHz	-1		1	dB	
	2001 MHz	-1		1	dB	
	2501 MHz	-1		1	dB	
	3001 MHz	-1		1	dB	
	3599 MHz	-1		1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	FSV 4:					
	3999 MHz	-1.5		1.5	dB	
Page 63	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, electronic attenuation 15 dB, DC coupled f_{fresp}					
	4001 MHz	-1.5		1.5	dB	
	4501 MHz	-1.5		1.5	dB	
	5001 MHz	-1.5		1.5	dB	
	5501 MHz	-1.5		1.5	dB	
	6001 MHz	-1.5		1.5	dB	
	6501 MHz	-1.5		1.5	dB	
	6999 MHz	-1.5		1.5	dB	
Page 61	Frequency response < 3.6 GHz, electronic attenuation 25 dB, DC coupled f_{fresp}					
	FSV 4/7/13/30/39/40:					
	9 kHz	-1		1	dB	
	100.02 kHz	-1		1	dB	
	1.005 MHz	-1		1	dB	
	10.15 MHz	-1		1	dB	
	51 MHz	-1		1	dB	
	64 MHz		Reference			
	101 MHz	-1		1	dB	
	201 MHz	-1		1	dB	
	301 MHz	-1		1	dB	
	401 MHz	-1		1	dB	

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
	501 MHz	-1		1	dB	
	601 MHz	-1		1	dB	
	701 MHz	-1		1	dB	
	801 MHz	-1		1	dB	
	901 MHz	-1		1	dB	
	1001 MHz	-1		1	dB	
	1501 MHz	-1		1	dB	
	2001 MHz	-1		1	dB	
	2501 MHz	-1		1	dB	
	3001 MHz	-1		1	dB	
	3599 MHz	-1		1	dB	
	FSV 4:					
	3999 MHz	-1.5		1.5	dB	
Page 63	FSV 7/13/30/39/40: Frequency response > 3.6 GHz, electronic attenuation 25 dB, DC coupled f_{fresp}					
	4001 MHz	-1.5		1.5	dB	
	4501 MHz	-1.5		1.5	dB	
	5001 MHz	-1.5		1.5	dB	
	5501 MHz	-1.5		1.5	dB	
	6001 MHz	-1.5		1.5	dB	
	6501 MHz	-1.5		1.5	dB	
	6999 MHz	-1.5		1.5	dB	

1.8.9 Performance Test Report Option R&S FSV-B29

ROHDE&SCHWARZ	Option Freq. Range Extension 10 Hz R&S FSV-B29	1310.9639.02
Serial number:		
Date:		
Person responsible:		
Signature:		

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit	MU
Page 66	Noise Display normalized to 1 Hz Preamplifier = OFF f_n					
	20 Hz	-		-100	dBm	
	80 Hz	-		-110	dBm	
	1010 Hz	-		-120	dBm	
Page 67	Frequency response < 9 kHz, RF attenuation 10 dB DC coupled f_{fresp}					
	20 Hz	-1		+1	dB	
	110 Hz	-1		+1	dB	
	1010 Hz	-1		+1	dB	
	2010 Hz	-1		+1	dB	
	3010 Hz	-1		+1	dB	
	5010 Hz	-1		+1	dB	
	7010 Hz	-1		+1	dB	
	8990 Hz	-1		+1	dB	

2 Adjustment

NOTICE

Risk of erroneous measurement results

Adjustment must be carried out exclusively by qualified personnel since any change can considerably affect the instrument's measurement accuracy.

2.1 Measuring Equipment

Table 2-1: Measuring Equipment and Accessories for Manual Adjustment of the R&S FSV Reference Oscillator

Item	Type of equipment	Recommended Specifications	Recommended Equipment	R&S Order No.	Use
1	Signal generator	Frequency: 1 GHz Output level: >-20 dBm Uncertainty of frequency:1x10^{-9}	R&S SMA100A		Frequency Accuracy of Reference Oscillator
2	Rubidium-frequency standard	10 MHz Frequency accuracy: <5x10^{-11}	Symmetricom 8040C	1150.9650.12	B14, reference frequency accuracy

2.2 Adjusting the Frequency Accuracy

2.2.1 Instruments without R&S FSV-B4 and instruments with R&S FSV-B4 installed

Automatic adjustment of the reference oscillator without adjustment software: (Instruments with and without option R&S FSV-B4)..

Test equipment: Signal generator (chapter "Measuring Equipment and Accessories", item. 1):

- Frequency: e.g. 1000 MHz
- Level: -15 dBm
- Frequency accuracy: <1x10^{-9}

If the frequency accuracy of the test transmitter is insufficient, the transmitter can be set to the correct frequency with the aid of the frequency counter prior to the measurement.

Test setup: Connect RF output of the signal generator to RF input of the R&S FSV.

R&S FSV settings:
- [**SETUP:** MORE: SERVICE: PASSWORD: **894129**]

Warming up the reference oscillator

Before the following measurement, the R&S FSV must be on for at least ten minutes with an internal reference, so that the reference oscillator is warmed up.

Measurement:
- Start automatic adjustment by entering the service function:

[**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.3.12**]

The instrument performs the automatic adjustment. The new tuning values are stored in the EEPROM automatically.

2.2.2 Instruments with R&S FSV-B14 installed

For adjusting the reference frequency with B14 installed, a signal generator providing a frequency accuracy better than $5x10^{-11}$ is needed! This high frequency accuracy can be provided by use of the rubidium frequency standard, listed in the measurement equipment, as the reference source for the signal generator.

Test equipment: Signal generator (chapter "Measuring Equipment and Accessories", item. 1) with rubidium frequency standard or a equivalent 10MHz frequency source as reference source (chapter "Measuring Equipment and Accessories", item. 2):
- Frequency: 1000 MHz
- Level: -10 dBm
- Frequency accuracy: $<5x10^{-11}$

Test setup: Connect RF output of the signal generator to RF input of the R&S FSV.

R&S FSV settings:
- [**SETUP:** MORE: SERVICE: PASSWORD: **894129**]

Warming up the reference oscillator

Before the following measurement, the R&S FSV must be on for at least ten minutes with an internal reference, so that the reference oscillator is warmed up.

Measurement:

- Measure the reference Frequency error:

- [**PRESET**]
- [**FREQ** : CENTER : **1 GHz**]
- [**SPAN** : **1 kHz**]
- [**BW** : RES BW MANUAL : **100 Hz**]
- [**AMPT** : REF Level : **-8 dBm**]
- [**SETUP** : REFERENCE INT / EXT]
- [**MKR** : SIGNAL COUNT]
- [**MKR : NEXT** : CNT RESOL 1 mHz]

The frequency is displayed in the marker field by the reading ´Count´.
Repeat the measurement 10 times and calculate the average value.

- Adjustment of the reference oscillator:

- [**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.22.1.0.1**]

wait for about 30 seconds

calculate the frequency error: 1000MHz – measured frequency

Adjust the oscillator:

- [**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.22.1.4.XXX**]

where XXX is the calculated error multiplied by -1 and divided by $1x10^{-15}$.
Maximum value is 20000000.

- Repeat the measurement described above: measurement result: 1 GHz ± 0.5 Hz (corresponds 5E-10)
- If frequency error is not within tolerance repeat adjustment.
- If frequency error is in tolerance save the adjustment:

- [**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.22.1.6**]

- [**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.22.1.0.0**]

2.3 Troubleshooting Automatic Adjustment

Checking the input signal:

The automatic adjustment routine checks the power level of the input signal. The adjustment is aborted if the input level is not within the range from -10 dBm to -20 dBm.

The automatic adjustment is also aborted if the input signal is not within the nominal frequency range:

- Model without OCXO (option R&S FSV-B4): 1.0 GHz ± 1 kHz
- Model with OCXO (option R&S FSV-B4): 1.0 GHz ± 100 Hz

For verification proceed as follows:

R&S FSV settings:

- [SETUP : REFERENCE : INT]

  Toggle to internal reference.

Signal generator settings:

Frequency: as above (e.g. 1000 MHz)

R&S FSV settings:

[**PRESET**]
[**FREQ** : **1 GHz**]
[**SPAN** : **100 kHz**]
[**BW** : RES BW MANUAL: **10 kHz**]
[**MKR FUNC** : SIGNAL COUNT]

Measurement:

- Read out the power level of the marker and check whether the input level is within the range from -10 dBm to -20 dBm.
- Read out the frequency value (Count:) of the marker and check whether the input signal frequency is in the nominal frequency range as shown above.

Checking appropriate warm-up of the instrument:

The automatic adjustment routine checks the drift of the internal reference oscillator. If there is to much drift (warming up is not completed) the adjustment is aborted.

Checking the R&S FSV-B4 option

Disconnect the instrument from all power supplies, remove option R&S FSV-B4, connect the power again and perform the automatic adjustment as described above. If this works correctly, most likely the R&S FSV-B4 option is defective.

2.4 Frequency Response Correction

2.4.1 RF Input of Instrument

With some boards (see chapter 3, section "Repair"), a frequency response correction is necessary. This correction can be performed by R&S service representations.

2.4.2 Tracking Generator

Adjustment of the tracking generator (R&S FSV-B9) output level.

1. Press the “Windows” button at the instrument. Open “My Computer”.
2. Open the file:
   “C:\R_S\Instr\eeprom\trackinggenerator\SglValues.dat” with a text editor while the firmware is running.
3. Edit the values in the [ATT_ERROR] section of the file:

   ABSOLUTE_ERROR_ALC_ON=0.0

   ABSOLUTE_ERROR_ALC_OFF=0.0
4. Overwrite the existing file by saving the edited file.
5. Change to analyzer firmware and enter the service password:

   [SETUP : MORE : SERVICE : PASSWORD : 30473035]
6. Load the edited file:

   [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.25.0.trackinggenerator]
7. Measure the level accuracy according to the performance test at 64MHz as described in chapter “1.3.1 Checking Absolute Level Uncertainty”
8. Calculate values to write in the "SglValues.dat" file: measured value +10dBm. (the correction value is <0 if the output power is below -10dBm).
9. Edit the values in the [ATT_ERROR] section of the "SglValues.dat" file:

   ABSOLUTE_ERROR_ALC_ON=[calculated Value]

   ABSOLUTE_ERROR_ALC_OFF=0.0
10. Keep the "SglValues.dat" file opened and continue as follows:

    [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.8.0.1.2]
11. Repeat steps 7 and 8.
12. Edit the values in the [ATT_ERROR] section of the file “SglValues.dat”:

    ABSOLUTE_ERROR_ALC_ON=[do not edit!]

    ABSOLUTE_ERROR_ALC_OFF=[calculated Value]
13. Save the file by overwriting the old one.

14. Load the edited file:

    [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.25.0.track]

15. Repeat step 7. Deviation to nominal output level (-10dBm) must be < 1,5dB.

16. Continue as follows:

    [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.8.0.0]

17. Repeat step 7. Deviation to nominal output level (-10dBm) must be < 1dB.

18. Save the file in the EEPROM:

    [SETUP : MORE : SERVICE : SERVICE FUNCTION : 3.8.6.1]

19. Check the frequency response by doing the performance test as described in chapter “1.3.1 Checking Absolute Level Uncertainty”.

3 Repair

The following chapter describes how to replace modules in the R&S FSV. The general procedures to open and complete the instrument are described in the introduction. For all descriptions, the numbers in parenthesis refer to the elements indicated in the inserted graphics.

WARNING

Shock hazard

Before opening the casing, make sure that the instrument is switched off and disconnected from all power supplies.

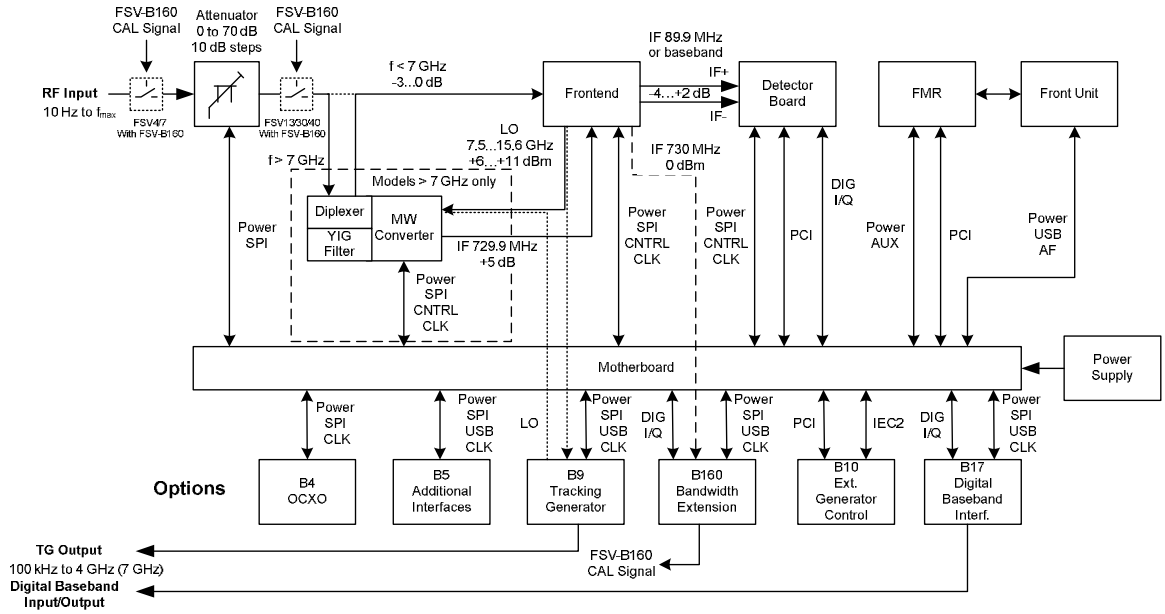
Read all safety instructions at the beginning of this manual carefully!

Ensuring correct operation with performance tests

It is recommended that you perform a performance test according to chapter 1 every time the configuration of the instrument is changed. Thus you can verify that the instrument is operating correctly.

3.1 Functional Description

The following figure shows a block diagram of the R&S FSV.



The R&S FSV is a triple-conversion (double conversion for frequencies > 7 GHz) heterodyne receiver for the frequency range from 10 Hz to 4 GHz, 7 GHz , 13 GHz, 30 GHz or 40 GHz, depending on the instrument model. After signals are received, they are processed by the frontend to a digital IF of approx. 90 MHz. This IF is fed to the detector board where the digital filtering is provided. The remaining data are transferred to the host processor via a PCI interface. The hardware settings are controlled via a serial interface on the motherboard that is set from the host via the PCI interface.

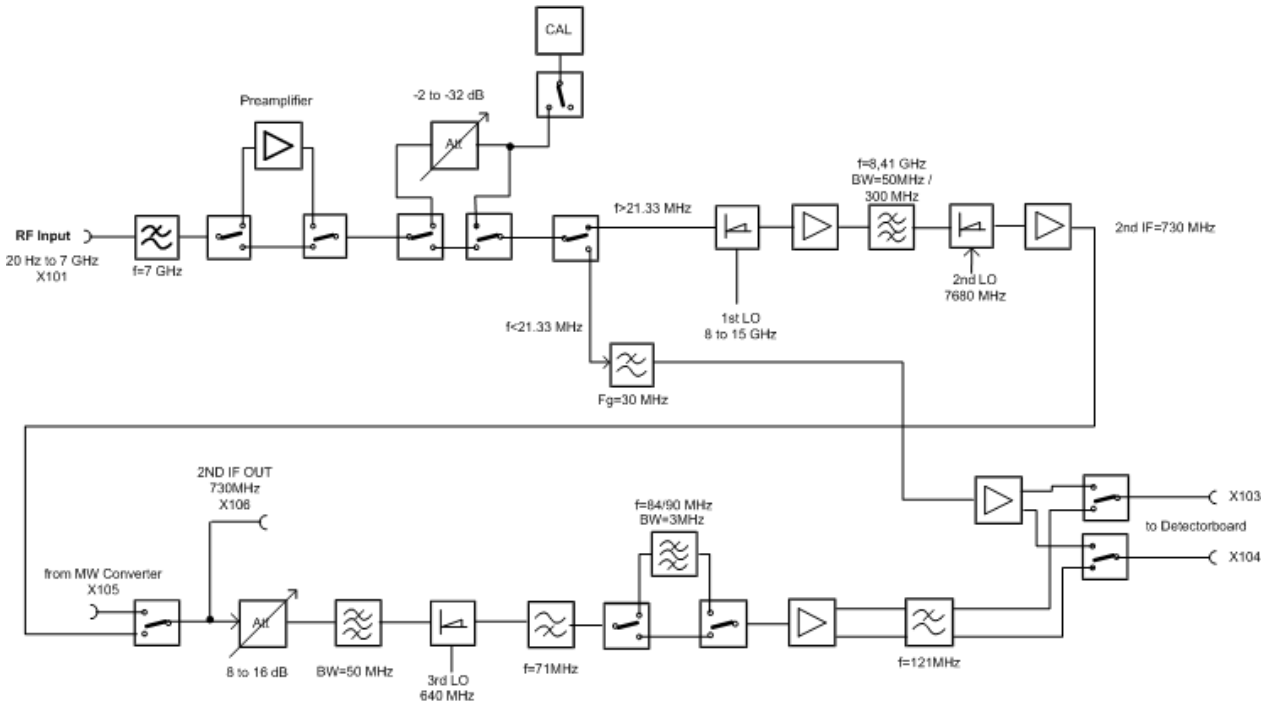
3.1.1 Attenuator

The attenuator switch in steps of 10 dB and have maximum total attenuation of 70 dB and contain an AC coupling that can be bypassed.

3.1.2 Frontend

The frontend converts the receive frequency in the range from 20 Hz to 7 GHz to an IF of approx. 90 MHz. The module also includes the required local oscillators and associated frequency processing circuits.

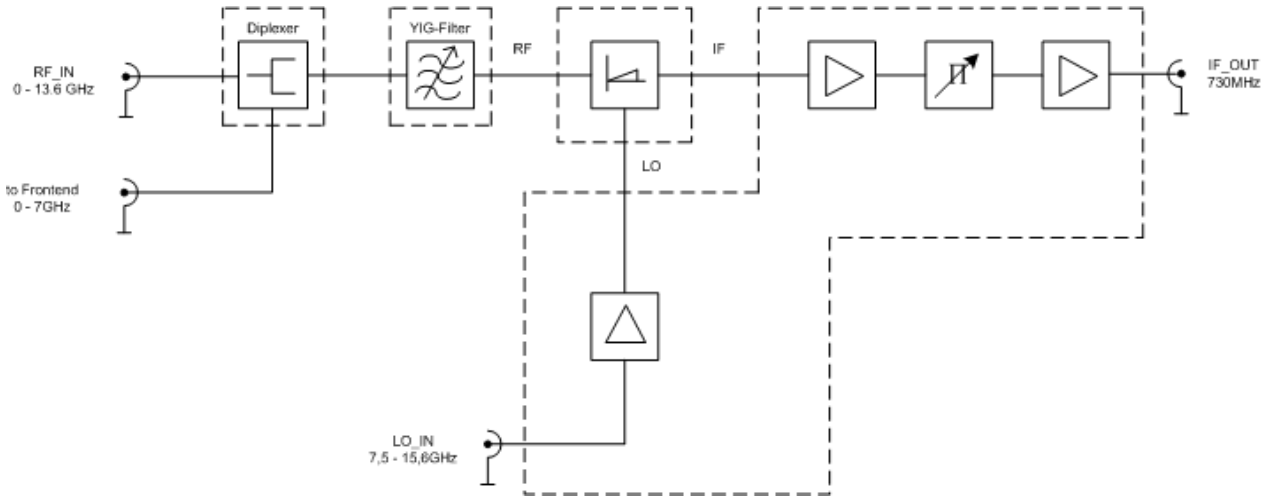
The following figure shows a block diagram of the R&S FSV frontend:



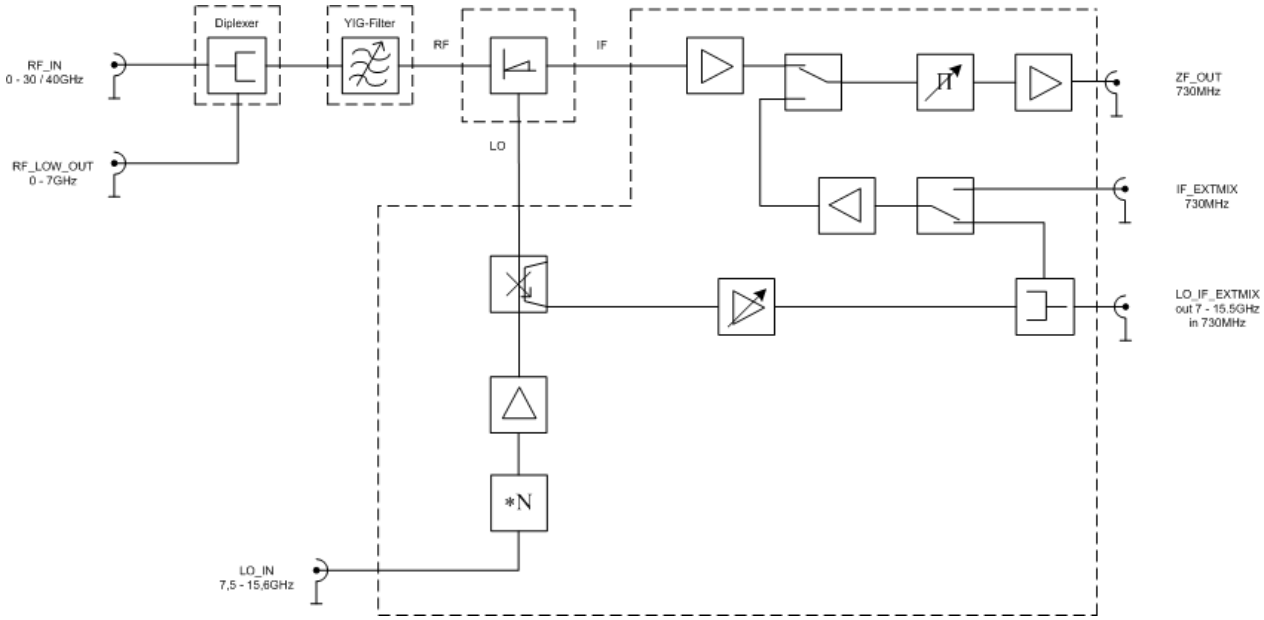
3.1.3 Microwave Converter Unit

The high frequency models of the R&S FSV (frequency range > 7 GHz) also comprise a microwave converter board. This module converts the input signals in the range above 7 GHz to the second IF of approx. 730 MHz. After the attenuator, the input signals are split within the diplexer into the two signal paths < 7 GHz and > 7 GHz. Signals above 7 GHz are forwarded to the mixer via the YIG filter.

The following figure shows a block diagram of the microwave converter unit for R&S FSV13:



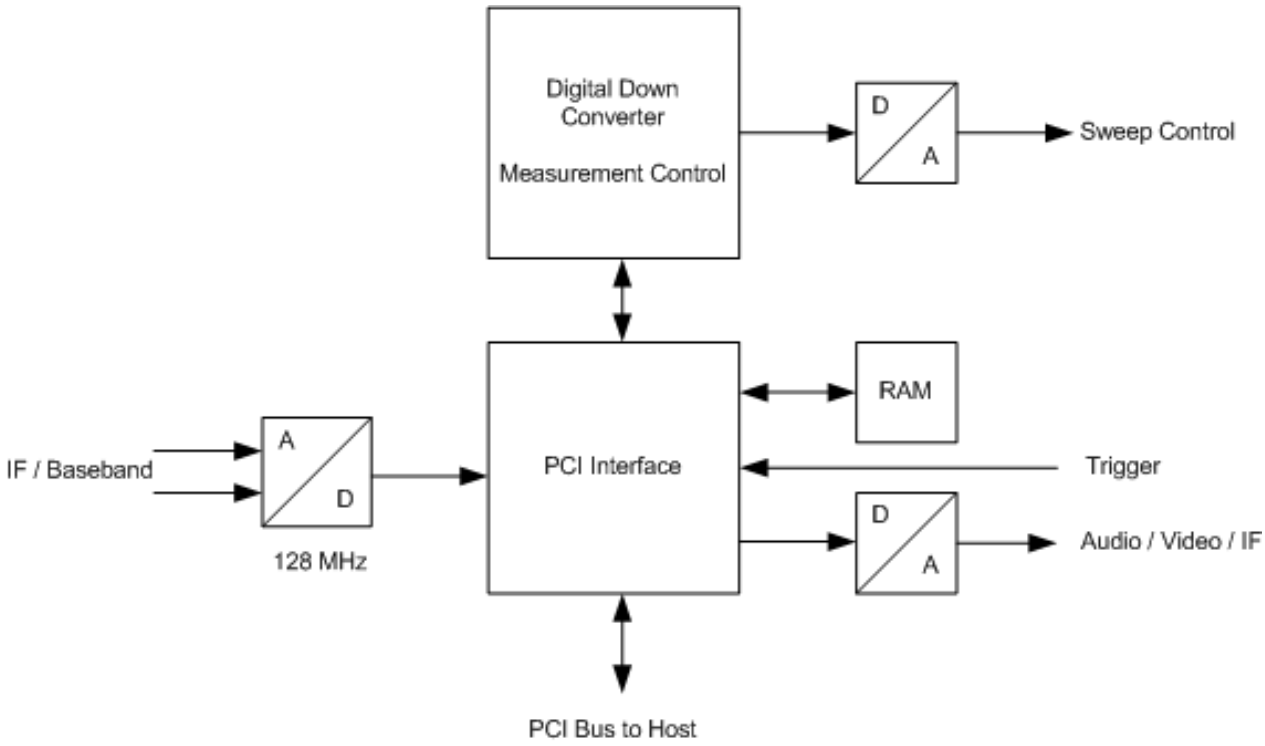
The following figure shows a block diagram of the microwave converter unit for R&S FSV30/40:



3.1.4 Detector Board

The detector board digitizes the IF or baseband signal of the front end. The module contains the digital signal processing and the sequence control of the analyzer. The detector board is connected to the front module controller via PCI bus.

The following figure shows a block diagram of the R&S FSV detector board:



3.1.5 Motherboard

The motherboard provides slots for the modules. It contains signal connections and the power and reference signal distribution.

3.1.6 Front Module Controller

The front module controller (FMR) contains all the necessary components on a board, including the processor, memory chips (SIMM modules), I/O devices (PCI bus), lithium battery, IEC/IEEE bus controller, LCD graphics controller, external VGA monitor graphics interface (monitor), controller for SATA hard drive and an USB interfaces.

3.1.7 Front Unit

The front unit consists of an aluminium case panel and a mounting plate which accommodates the LCD with touch screen, the touch screen controller, the backlight inverter, the keyboard mat with the membrane, the rotary knob and the front connector board.

3.1.8 Power Supply

The power supply module provides all currents necessary for the operation of the R&S FSV. It can be switched off by means of the power switch on the rear panel.

The power supply module is a primary clocked switching power supply. On the secondary side, it generates the following DC voltages: +3.3 V, +5.2 V, +12 V, -12 V and 13.5 V standby.

A control signal controlled by the front module controller (depending on the STANDBY/ON key on the front of the instrument frame) activates the power supply. In standby operation, it only supplies the 13.5V-standby voltage for the crystal oscillator and the LED STANDBY on the front panel.

3.1.9 Options

3.1.9.1 OCXO R&S FSV-B4

The R&S FSV-B4 option contains an oven-controlled crystal oscillator (OCXO). This OCXO generates a 10 MHz signal, which is routed to the frontend and used as a reference signal.

3.1.9.2 Additional Interfaces R&S FSV-B5

The R&S FSV-B5 option contains the interfaces IF/Video output, trigger output, aux port and two USB ports.

3.1.9.3 Tracking Generator R&S FSV-B9

In normal operation (no frequency offset), the tracking generator generates a signal exactly at the input frequency of the R&S FSV in the frequency range up to 4 GHz (7 GHz for models > 4 GHz).

To support frequency-converting measurements, a constant frequency offset of ±1 GHz between the input frequency of the R&S FSV and the output signal of the tracking generator can be set. In addition, I/Q modulation or AM or FM of the output signal can be performed using two analog input signals.

The output level is controlled and can be adjusted between -60 dBm and 0 dBm in 0.1 dB steps.

3.1.9.4 External Generator Control R&S FSV-B10

The external generator control option permits a number of commercially available generators to be operated as tracking generators on the R&S FSV. The generator is controlled via the – optional – second IEC bus interface of the R&S FSV (= IEC2, supplied together with the option); with some Rohde & Schwarz generators, it can also be controlled via the TTL synchronization interface included in the AUX Control interface of the R&S FSV.

The external generator control option (R&S FSV-B10) cannot be installed together with the bandwidth extension option R&S FSV-B160.

3.1.9.5 Bandwidth Extension R&S FSV-B160

The bandwidth extension option R&S FSV-B160 extends the I/Q bandwidth to 160 MHz. It contains the A/D converter, the synthesizer for mixing, as well as an FPGA which transfers the data to the detector board.

The option R&S FSV-B160 cannot be installed together with the external generator control option R&S FSV-B10.

3.1.9.6 Ultra precision reference R&S FSV-B14

The ultra precision reference option (R&S FSV-B14) contains an ultra precise reference oscillator. This oscillator generates the 10 MHz reference frequency for the R&S FSV like the R&S FSV-B4.

3.1.9.7 DC Power Supply R&S FSV-B30

With the optional DC Power Supply adapter (R&S FSV-B30) installed the instrument can operate from a 12 V DC source.

3.1.9.8 Battery Pack R&S FSV-B32

The optional battery pack (R&S FSV-B32) provides a 12 V DC power source to feed the DC Power Supply adapter (R&S FSV-B30). With the battery pack the instrument can operate independently from any stationary power source.

3.1.9.9 Battery Charger R&S FSV-B34

The optional battery charger R&S FSV-B34 is used to charge the four batteries of the battery pack FSV-B32.

3.1.9.10 RF Preamplifier R&S FSV-B24

The optional RF Preamplifier (R&S FSV-B24) is mounted on the microwave converter board. It provides a preamplifier in the frequency range from 7 GHz to 13.6 GHz / 30 GHz / 40 GHz (depending on the instrument model).

3.1.9.11 Audio Demodulator R&S FSV-B3

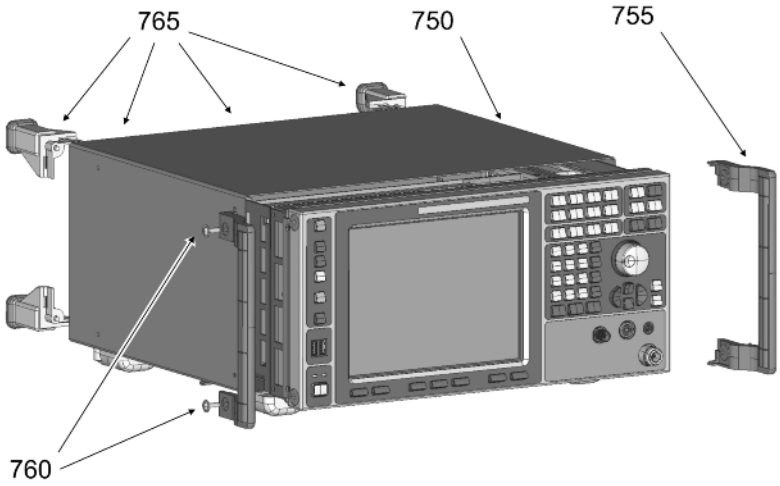
The audio demodulator option R&S FSV-B3 provides the volume regulator and the headphone plug on the front of the instrument and the loudspeaker in the instrument.

3.1.9.12 Digital Baseband Interface R&S FSV-B17

The Digital Baseband Interface option R&S FSV-B17 provides an input and output connector for digital baseband signals.

3.2 Opening the Instrument

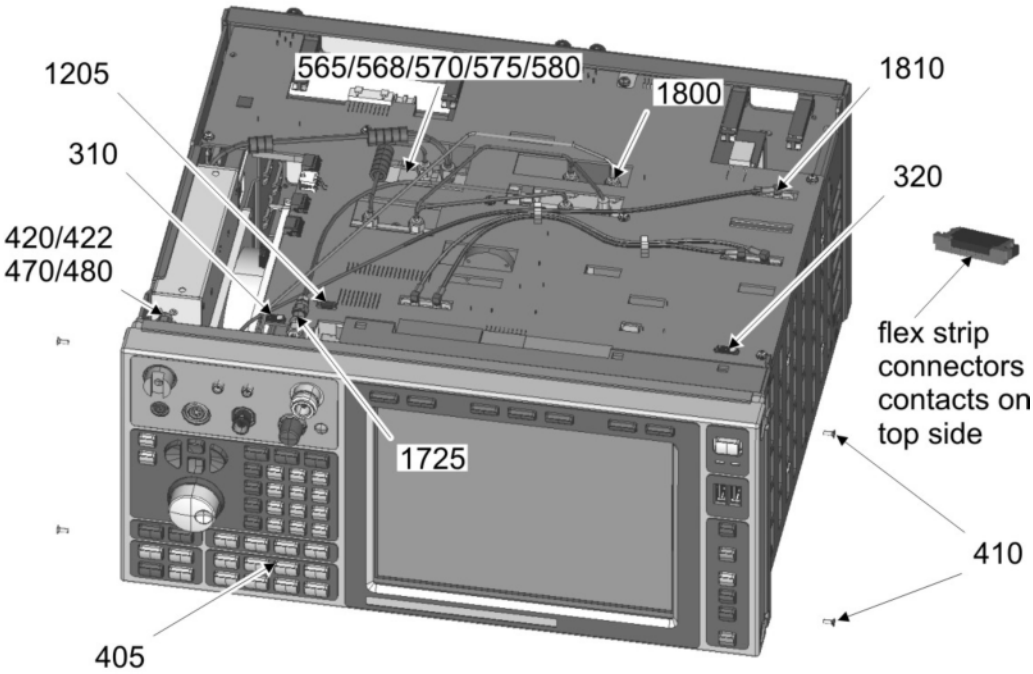
3.2.1 Removing the Housing



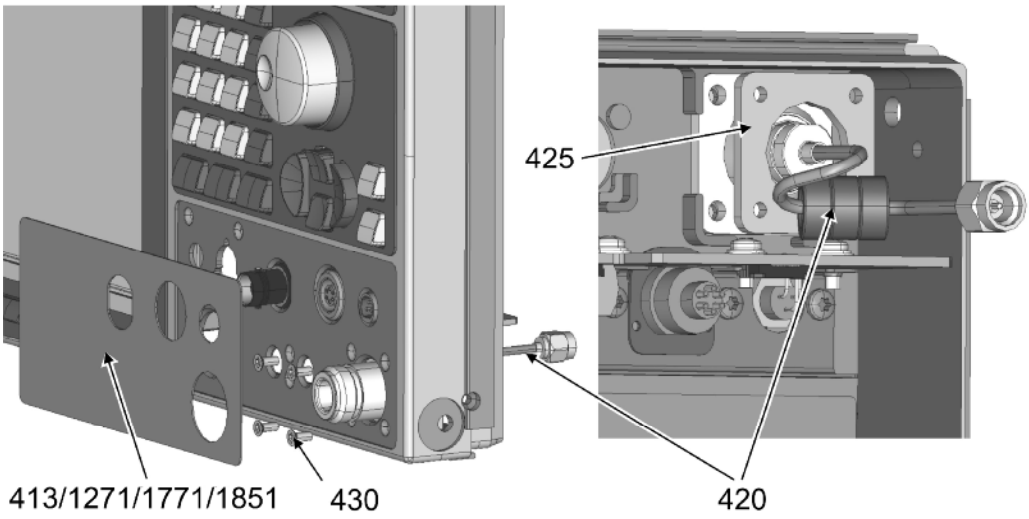
1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing. (750)

3.2.2 Unmounting the Front Unit

1. Remove the housing from the instrument as described in chapter 3.2.1.
2. Unscrew the four screws (760) of the front handles (755) on both sides and remove them.



3. Disconnect the cable flex strip (310) and (320).
4. For instruments with option R&S FSV-B3: Disconnect the cable flex strip (1205).
5. For instruments with option R&S FSV-B9: Disconnect RF cable W13-2 (1725) from the front unit side (405).
6. For instruments with option R&S FSV-B21: Disconnect RF cable W18 (1800) and RF cable W19 (1810) from the MW Converter Unit (565/570/575/580).
7. For R&S FSV4/7 with option R&S FSV-B160 installed:



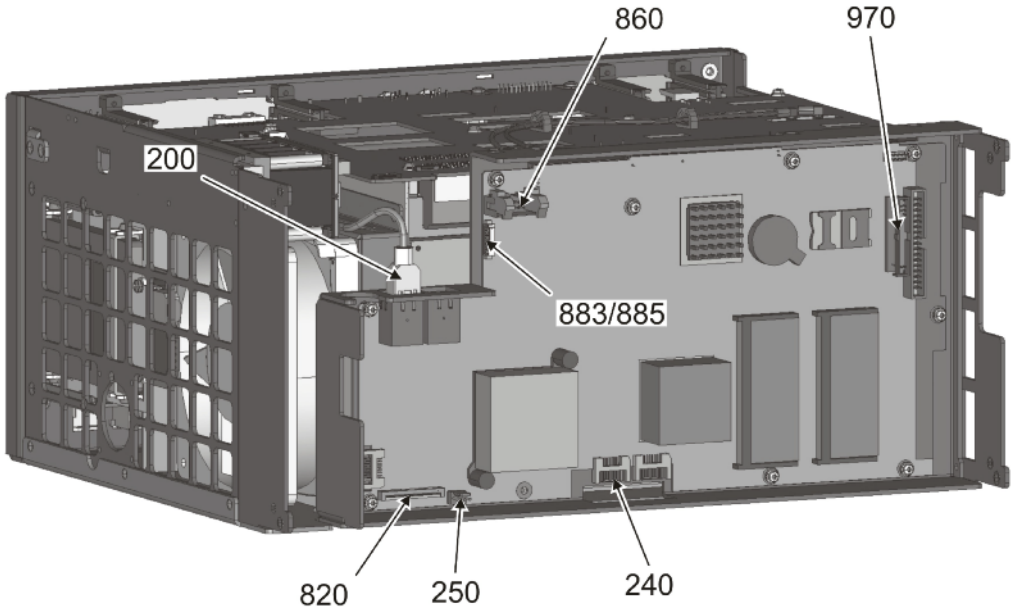
a. Remove the label R&S FSV connector (413/1271/1771/1851).
b. Unscrew the four screws (430) fastening the RF input connector.
c. Disconnect the cable W1 and remove it.

8. Unscrew four screws (410) in the front unit.

   NOTICE! Risk of damage to the instrument. Cables are still connected to the controller.

9. For R&S FSV4/7 without option R&S FSV-B160 installed and R&S FSV13/30/40: Disconnect RF cable W1 (420/422/470/480).

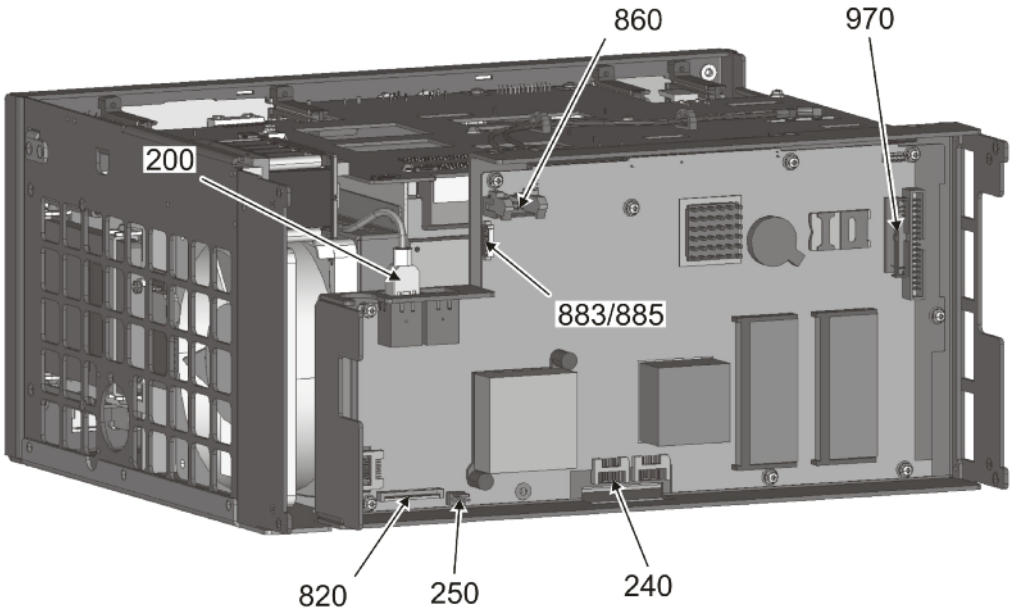
10. Move the front unit (405) carefully a few millimeters to the front side to disconnect the controller cables.



11. Disconnect cable flex switch board R&S FSV (820), cable rotary puls-generator (860), cable W31 LST board FMR (970), cable touch-controller-usb-board (883/885), patchcable (200), SATA datacable (240) and SATA powercable (250) from the controller.
12. Remove the front unit (405) completely.

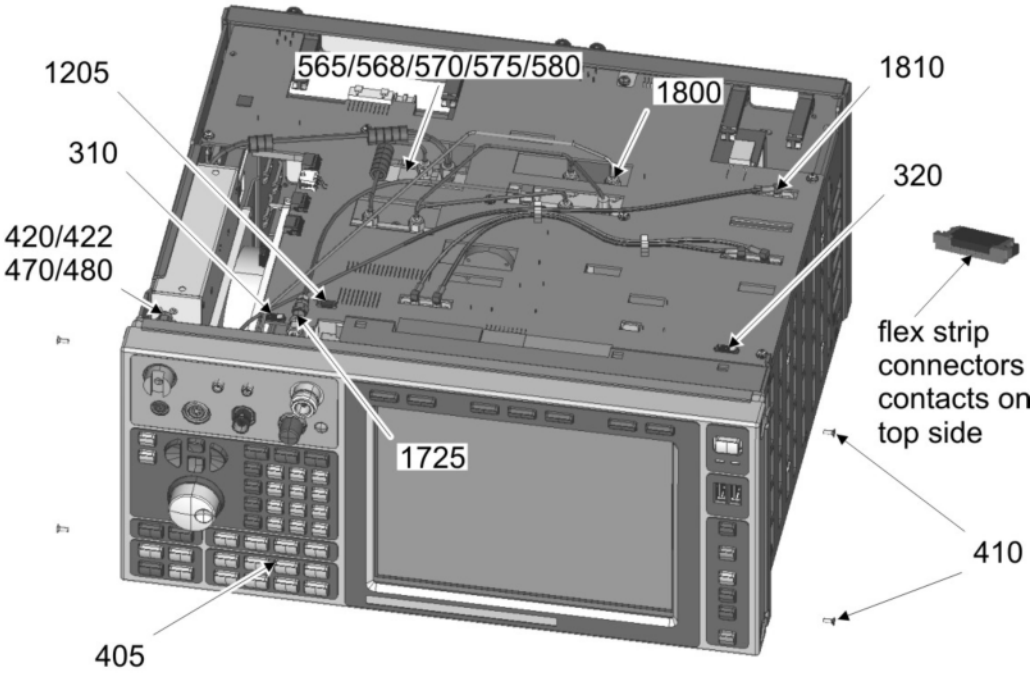
3.3 Completing the Instrument

3.3.1 Mounting the Front Unit



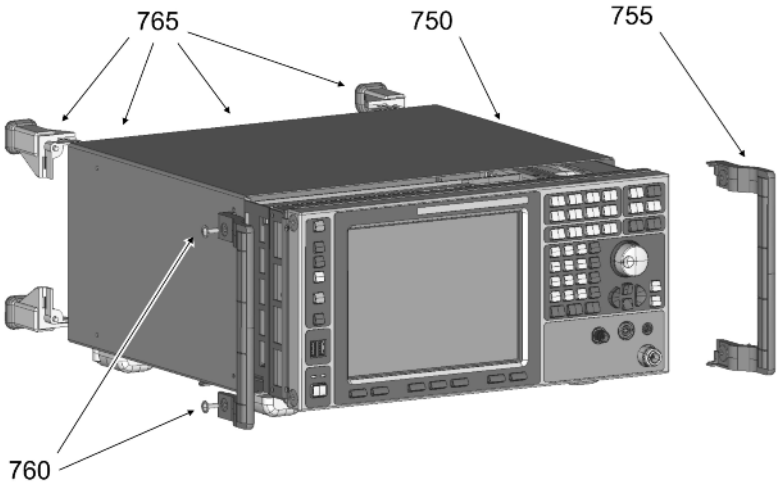
1. Connect cable flex switch board R&S FSV (820), cable rotary puls-generator (860), cable W31 LST board FMR (970), cable touch-controller-usb-board (883/885), patchcable (200), SATA datacable (240) and SATA powercable (250).

   NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.



2. Assemble the front unit (405) carefully
3. For R&S FSV4/7 without option R&S FSV-B160 installed and R&S FSV13/30/40: Connect RF cable W1 (420/422/470/480).
4. Connect cable flex strip (310) and (320).
5. For instruments with option R&S FSV-B3 installed: Connect the cable flex strip (1205).

   Note: The flex strip connector contacts are on the top of the device.
6. For instruments with Option R&S FSV-B9: Connect RF cable W13-2 (1725).
7. For instruments with Option R&S FSV-B21: Connect RF cable W18 (1800) and RF cable W19 (1810) to the MW Converter Unit (565/570/575/580).
8. Fasten the four screws (410) to screw the front unit (405) together with the unit frame (22/24).
9. For R&S FSV4/7 with option R&S FSV-B160 installed:
   a. Carefully insert the RF input connector.
   b. Install the four (420) screws fastening the connector.
   c. Connect the cable W1 (420/422/470/480).
   d. Place the label R&S FSV connector (413/1271/1771/1851) on the front unit.
10. Mount the front handles (755) on both sides by using the four screws (760).



3.3.2 Closing the Instrument Housing

1. Mount the housing (750) and adjust it properly to the front unit (405).
2. Mount the rear wall feet (765).

3.4 Module Replacement

WARNING

Danger of injury during module replacement

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

Observe the safety instructions for units with a removable casing.

Follow the step-by-step instructions for module replacement carefully to avoid injury and to help ensure safe operation.

NOTICE

Risk of electrostatic discharge

Protect the work area against electrostatic discharge to avoid damage to electronic components in the modules. For details, refer to the safety instructions at the beginning of this manual.

3.4.1 Overview of the Required Tests and Adjustments after Replacing Modules

NOTICE

Performance test

It is highly recommended that you perform a performance test according to chapter 1 every time the instrument is opened in addition to the tests and adjustments mentioned in the table below to ensure accurate measurements.

Table 3-1: Overview of modules for replacement

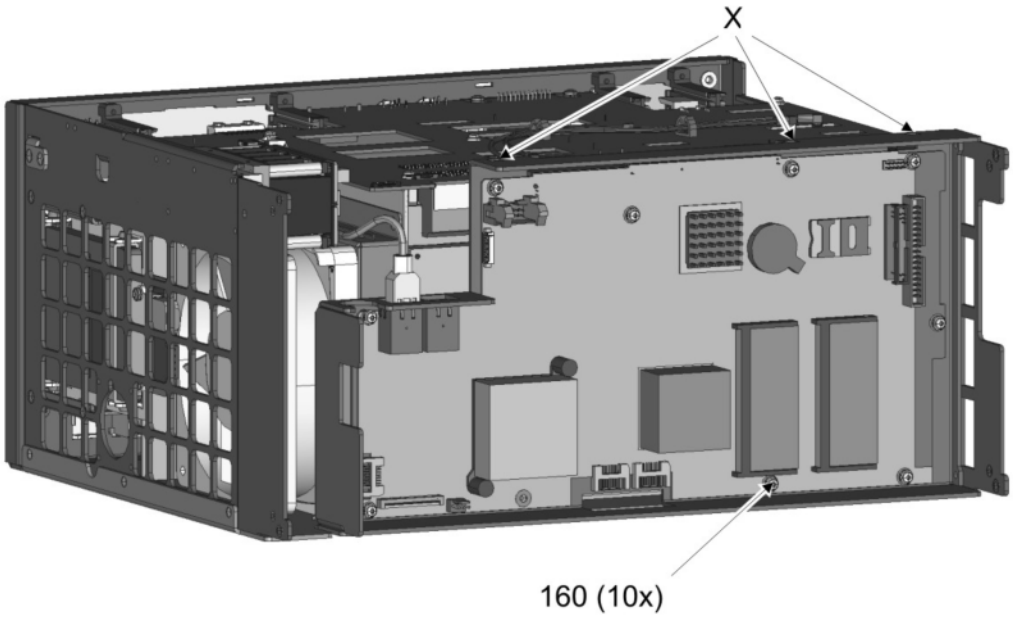
Module	Required tests and adjustments after replacement		
	Function tests and system error correction	Adjustment	Other
RF Input Cable W1	SELFTEST / SELF ALIGNMENT	Frequency response	
Test Port Adapter	SELFTEST / SELF ALIGNMENT	Frequency response	
Attenuator	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	
Frontend	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	
Microwave Converter Unit	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	
Diplexer	SELFTEST / SELF ALIGNMENT	Frequency response	
Mixer	SELFTEST / SELF ALIGNMENT	Frequency response	
YIG Unit	SELFTEST / SELF ALIGNMENT	Frequency response	
Detector Board	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT		
Mother Board	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	EEPROM backup and Restore
Adapter Board	SELFTEST / SELF ALIGNMENT		
Front Module Controller	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	BIOS Update, Time Control Management
Power Supply	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Secondary Supply Voltages	
Hard Drive with SW	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT		FW Update
Lithium Battery	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	Date check
Power Supply Fan	SELFTEST / SELF ALIGNMENT		
Front Unit	SELFTEST / SELF ALIGNMENT	Frequency response	

Module	Required tests and adjustments after replacement		
	Function tests and system error correction	Adjustment	Other
Display with Touch Screen	SELFTEST / SELF ALIGNMENT	Touch Screen / Frequency response	
Front Connector Board	SELFTEST / SELF ALIGNMENT	Frequency response	
Touch Controller USB Board	SELFTEST / SELF ALIGNMENT	Frequency response	
Rotary Pulse Generator	SELFTEST / SELF ALIGNMENT	Frequency response	
Push Button Board Set	SELFTEST / SELF ALIGNMENT	Frequency response	Key Test
Flex Switch Board	SELFTEST / SELF ALIGNMENT	Frequency response	Key Test
AF Output	SELFTEST / SELF ALIGNMENT	Frequency response	
Fan	SELFTEST / SELF ALIGNMENT		
OCXO FSV-B4	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Ref. Freq.	
Additional Interface FSV-B5	SELFTEST / SELF ALIGNMENT		
Tracking Generator FSV-B9	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response, T.G. output level	
RF Cable W13 (T.G. Out)	SELFTEST / SELF ALIGNMENT	Frequency response, T.G. output level	
Ext. Generator Control FSV-B10	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT		Ext. Contrl. Functional Check
IEC-Bus Control FSV-B10	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT		Ext. Contrl. Functional Check
Digital I/O LVDS FSV-B17	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT		LVDS Loopback Test
Preamplifier Unit FSV-B24	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT	Frequency response	
Bandwidth Extension FSV-B160	SYSTEM INFO/ SELFTEST / SELF ALIGNMENT		LVDS Loopback Test
FSV-B160 CAL Signal Relay	SELFTEST / SELF ALIGNMENT	Frequency response	

3.4.2 Controller A90

See 5.1 Spare Parts, item 155, and explosion drawings 1307.9002.01 sheet 1.

3.4.2.1 Removing the Controller



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Unscrew ten screws (160).
4. Remove the controller using a screwdriver, if necessary. Put the screwdriver into each of the three holes (indicated by an X in the graphic) to press the controller out.

3.4.2.2 Installing the New Controller

1. Carefully insert the new controller (155) and fasten it using ten screws (160).
2. Mount the front unit as described in chapter 3.3.1.
3. Complete the instrument as described in chapter 3.3.2.

3.4.2.3 Putting into Operation

In case a trial key was installed or should be installed in the future, also the time control key must be entered. Request the code via the service support database.

► Connect the instrument to the mains and switch on the instrument power switch. The instrument is now in standby mode.

NOTICE

Risk of causing instrument unusability
During the BIOS update, do not switch off the instrument.

If you terminate the update procedure before it is completed, the instrument will likely not boot again. In this case, contact your Rohde & Schwarz service center.

To perform the BIOS update you may need a USB flash drive or a USB CDROM drive and a USB keyboard.

1. Download the latest bios archive from “Firmware/Software”. In Gloris select "FW by type" and choose "FSV". Download the latest archive file which confirm to your CPU board. The Version of the CPU board can be read out in the following table (since firmware version 1.30):

   [**SETUP** : System Info : Version + Options]

   The version of the CPU board is displayed as additional information in the BIOS version string
2. Follow the instructions in the PDF file delivered with the bios archive on how to create the bootable medium to update the BIOS.
3. Update the Bios and restart the instrument.
4. Start self test and check results:

   [**SETUP** : SERVICE : SELFTEST] then[SELFTEST RESULTS]
5. Start a total calibration and check the result:

   [**SETUP** : ALIGNMENT] then[SHOW ALIGN RESULTS]
6. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
7. Adjust the instrument as described in chapter 2.

3.4.3 Lithium Battery on the Controller

See 5.1 Spare Parts, item 159, and explosion drawings 1307.9002.01 sheet 1.

The lithium battery is located on the controller.

WARNING

Risk of intoxication and explosion

Observe the safety regulations for batteries in the Grouped Safety Messages at the beginning of the manual.

3.4.3.1 Removing the Lithium Battery

1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Carefully push the contact springs of the battery holder up and remove the battery (159).

3.4.3.2 Installing the New Battery

1. Carefully push the contact springs of the battery holder up and insert battery into the holder beneath the springs.

   Note: The plus pole (+) of the battery points upwards.

   NOTICE! Risk of damage to the instrument. Do not short-circuit the battery!
2. Mount the front unit as described in chapter 3.3.1.
3. Complete the instrument as described in chapter 3.3.2.

3.4.3.3 Putting into Operation

1. Connect the instrument to the mains and switch on its power switch. The instrument is now in standby mode.
2. After starting the instrument, check hardware info:

   [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
3. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
5. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
6. Adjust the instrument as described in chapter 2.

3.4.4 SATA Hard Drive A91

See chapter 5.1 Spare Parts, item 276/277, and explosion drawings 1307.9002.01 sheet 1.

The spare part is already formatted for the R&S FSV and contains the complete software.

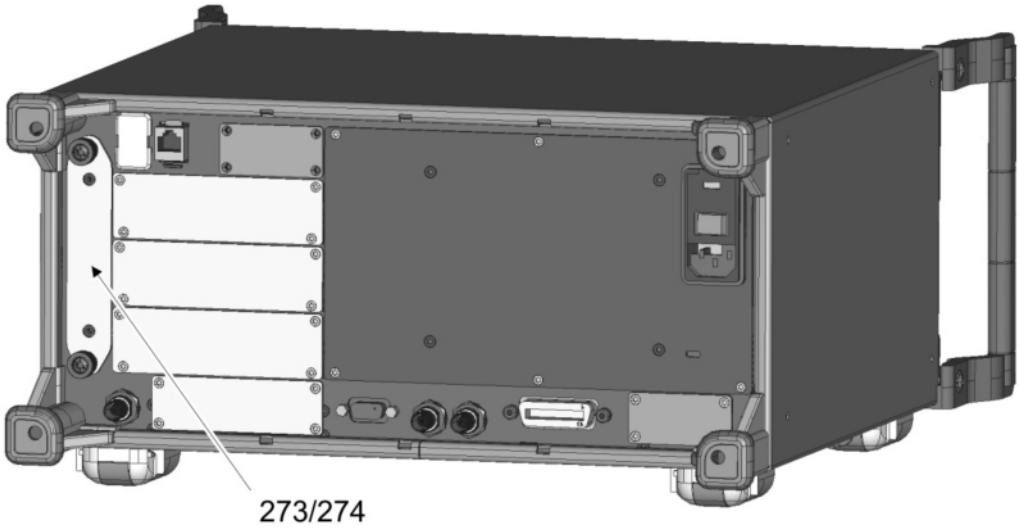
NOTICE

Risk of losing important information

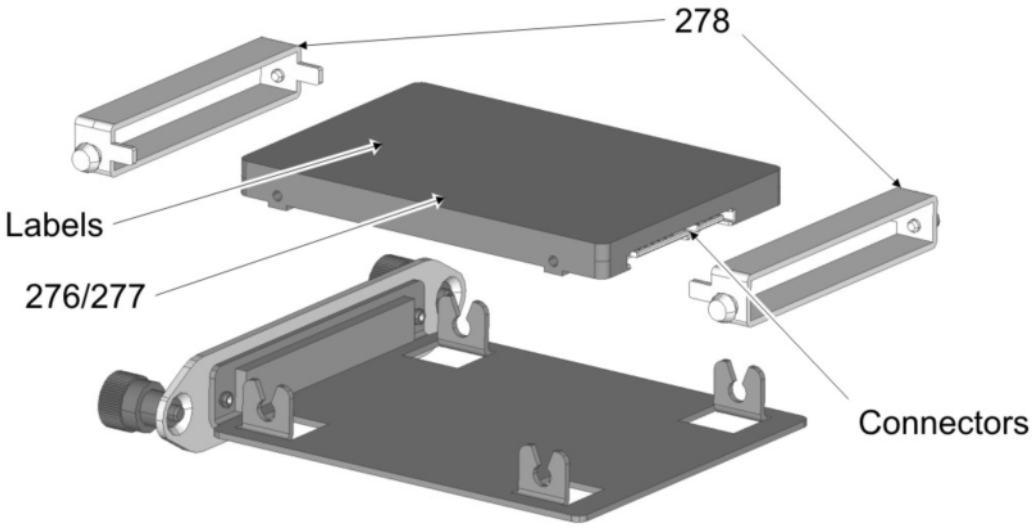
Important information about the type of instrument, installed hardware, options, etc., is stored both on the motherboard and on the hard drive. This information is required in order to restore the instrument in case of errors. Thus, do not replace the motherboard and the hard drive at the same time, as doing so will cause this information to be lost. If the instrument does not function after the hard drive has been replaced, do not replace the motherboard. Instead, re-install the old hard drive and then replace the motherboard.

3.4.4.1 Removing the SATA Hard Drive

1. Switch off the instrument and disconnect the power plug.
2. Unscrew the two knurled screws and remove the Hard Drive (273/274) to the rear.



3. Carefully remove the hard drive (276/277) together with the two holders (278) from the sheet-metal part.
4. Remove the two holders (278) from the hard drive (276/277).



3.4.4.2 Installing the New Hard Drive

1. Attach the two holders (278) to the new hard drive (276/277).
2. Push the new hard drive (276/277) together with the two holders (278) into the holes of the sheet metal part.

   Note: Make sure that all parts are orientated as shown in the picture above and that they lock in place. The connectors have to be on the rear of the hard drive and the labels above.
3. Insert the Hard Drive (273/274) and fasten the two knurled screws.
4. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

NOTICE

Blue screen after replacing a hard drive

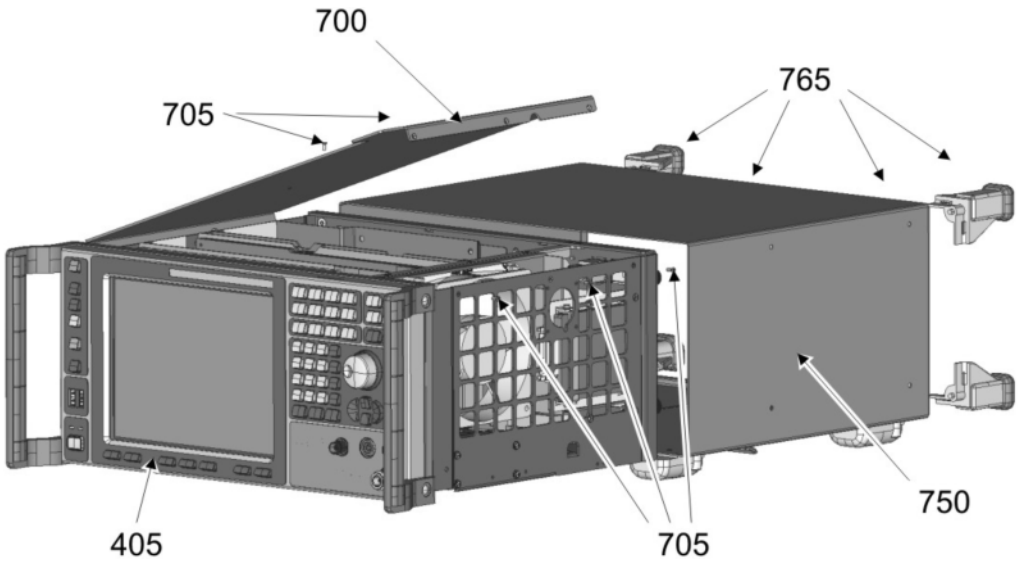
If a blue screen appears after starting the instrument, make sure that the knurled screws are fixed properly and the hard drive has a contact to the SATA adaptor.

3.4.5 SATA Adaptor A92

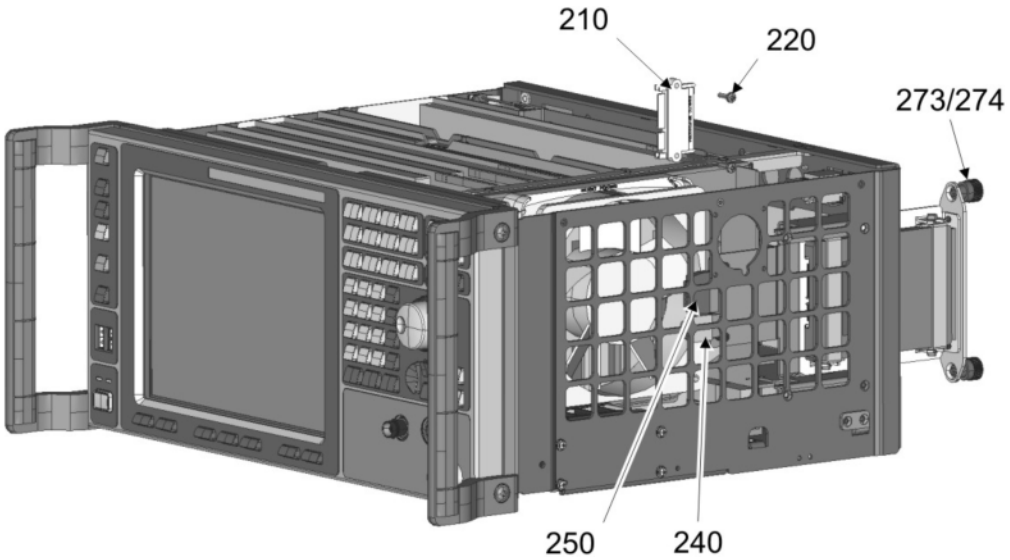
See chapter "5.1 Spare Parts", item 210, and explosion drawing 1307.9002.01 sheet 1.

The SATA Adaptor is fitted at the right side of the instrument frame of the R&S FSV.

3.4.5.1 Removing the SATA Adaptor



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove the cover.
5. If your R&S FSV has an audio-option R&S FSV B3 remove the speaker as described in chapter “3.4.29.1 Removing the Speaker”.



6. Unscrew the two knurled screws and remove the hard drive (273/274) to the rear.
7. Disconnect the SATA data cable (240) and the SATA power cable (250).
8. Unscrew two screws (220) and remove them together with the SATA adaptor (210).

3.4.5.2 Installing the New SATA Adaptor

1. Mount the new SATA adaptor (210) with two screws (220).
2. Reconnect the SATA data cable (240) and the SATA power cable (250).
3. Insert the hard drive (273/274) at the rear and fix it with the two knurled screws.
4. If your R&S FSV has an audio option R&S FSV B3 assemble the speaker as described in chapter “3.4.29.2 Installing the New Speaker”.
5. Mount the top cover (700) on the instrument with five screws (705).
6. Mount the housing (750) and adjust it properly to the front unit (405).
7. Mount the rear wall feet (765).
8. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
9. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
10. Start alignment and check the result:

    [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

NOTICE

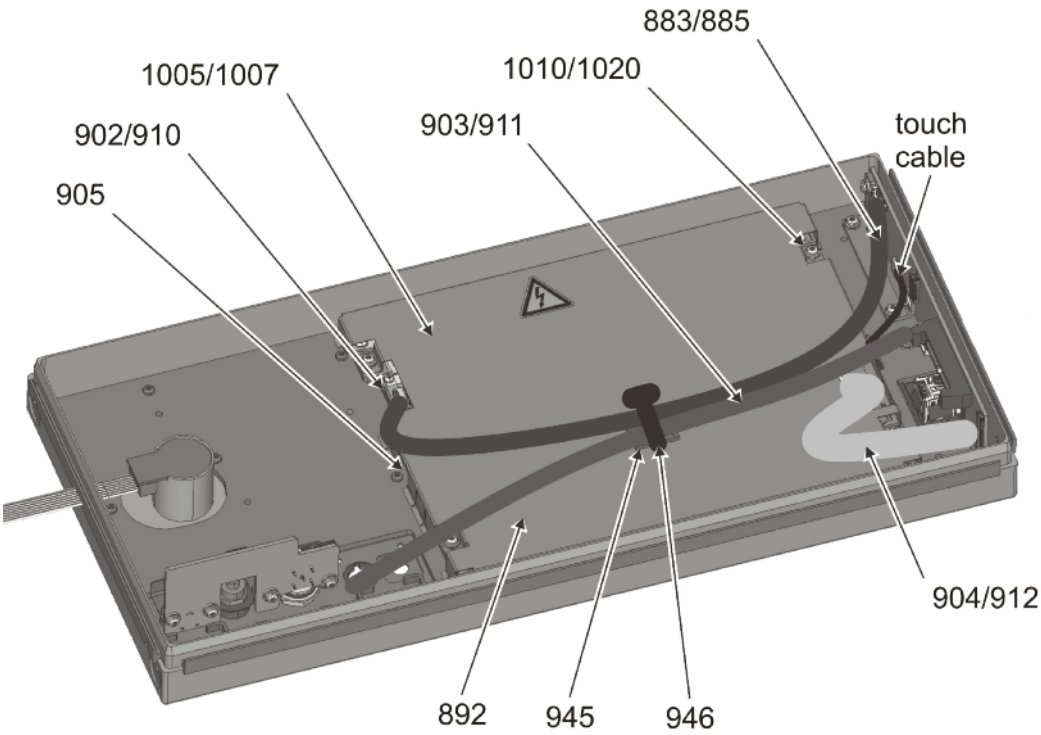
Blue screen after replacing a hard drive

If a blue screen appears after starting the instrument, make sure that the knurled screws are fixed properly and the hard drive has a contact to the SATA adaptor.

3.4.6 Display with Touch Screen

See chapter "5.1 Spare Parts", item 902/910, and explosion drawing 1307.9025.01 sheet 1 (item 902) or sheet 3 (item 910).

3.4.6.1 Removing the Touch Screen



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Remove the cable tie (946).
4. Put the cable (892) to the right, without plugging off.
5. Unplug the display cable (904/912) on the display side.
6. Unplug the LED backlight cable (903/911) from the display (902/910) and put it to the right.
7. Remove the touch cable from the touch controller board (883/885).
8. Unscrew four screws (1010/1020) in the display shielding (1005/1007).
9. Remove the display shielding (1005/1007) carefully.
10. Remove the display with touch screen (902/910).
11. Make sure that the rubber seal (905) remains in the groove of the front unit.

3.4.6.2 Installing the New Touch Screen

1. Make sure that the rubber seal (905) is properly located in the groove of the front unit.
2. Carefully put in the new touch screen (902/910).
3. Mount the display shielding (1005/1007) with four screws (1010/1020).

4. Connect the touch cable to the touch controller board (883/885).
5. Connect the LED backlight cable (903/911) to the display (902/910).
6. Connect the display cable (904/912) to the display (902/907).
7. Tie the LED backlight cable (903/911) and the cable (892) together with a cable tie (946) and the holder (945).
8. Mount the front unit as described in chapter 3.3.1.
9. Complete the instrument as described in chapter 3.3.2.

3.4.6.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Calibrating the touch screen: to calibrate the touch screen you need a USB mouse or a USB keyboard with a touch ball.

   [SETUP : ALIGNMENT : TOUCH SCREEN ALIGNMENT], follow the instructions on the screen.
3. Start selftest and check results:

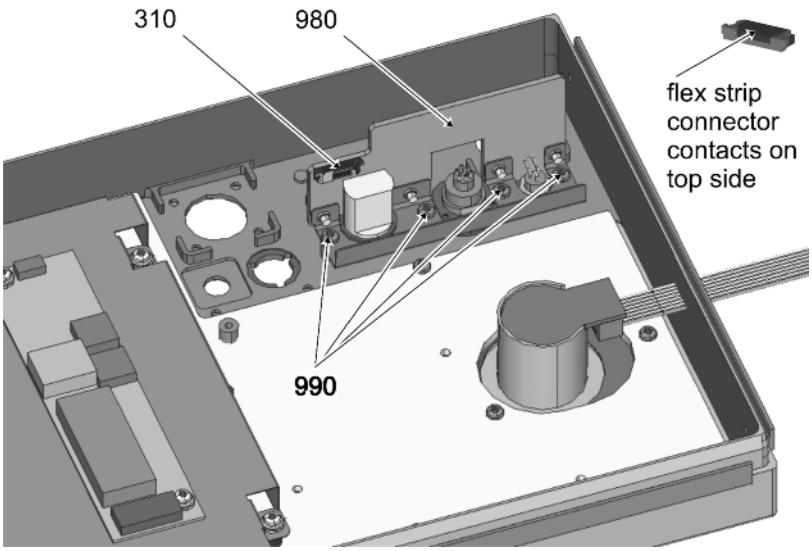
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
5. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
6. Adjust the instrument as described in chapter 2.

3.4.7 Front Connector Board A20

See chapter "5.1 Spare Parts", item 980, and explosion drawing 1307.9025.01 sheet 1.

3.4.7.1 Removing the Front Connector Board



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Unplug the flex strip cable (310) from the front connector board (980).
4. Unscrew four screws (990) from the front connector board (980).
5. Remove the front connector board (980) carefully.

3.4.7.2 Installing the New Front Connector Board

1. Mount the new front connector board (980) carefully with four screws (990).
2. Connect the flex strip cable (310) to the front connector board (980).

   Note: The flex strip connector contacts are on the top of the device.
3. Mount the front unit as described in chapter 3.3.1.
4. Complete the instrument as described in chapter 3.3.2.

3.4.7.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
3. Start alignment and check the result:

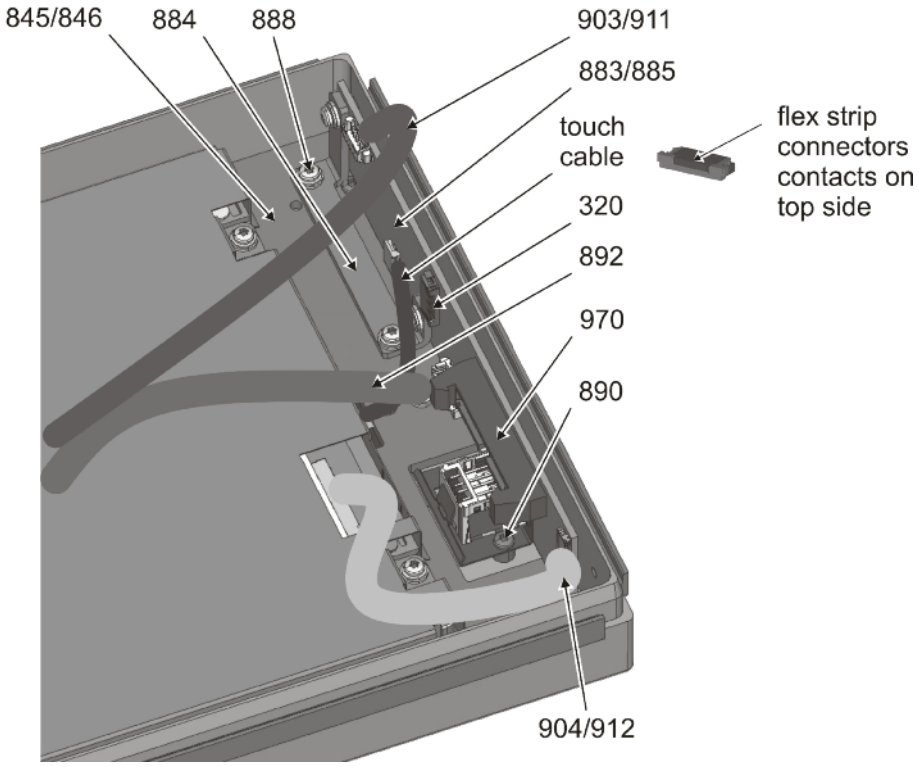
   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
4. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.

5. Adjust the instrument as described in chapter 2.

3.4.8 Touch Controller USB Board A60

See chapter "5.1 Spare Parts", item 883/885, and explosion drawing 1307.9025.01 sheet 1 (item 883) or sheet 3 (item 885).

3.4.8.1 Removing the Touch Controller USB Board



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Unplug the cable (892), the touch cable, the LED backlight cable (903/911) and the display cable (904/912) from the touch-controller-USB-board (883/885).
4. Unscrew two screws (888) from the keyboard holder (845/846) and two screws (890).
5. Carefully remove the USB-touch-controller-board (883/885).
6. Unscrew two screws (888) from the touch-controller-USB-board (883/885) and remove the holder touch controller (884), the cable W31 LST board FMR (970) and the flex strip cable (320) completely.

3.4.8.2 Installing the New Touch Controller USB Board

1. Mount the holder touch controller (884) with two screws (888) to the new touch-controller-USB-board (883/885).
2. Mount the new touch-controller-USB-board (883/885) carefully with two screws (890) and two screws (888) to the front unit.
3. Connect the cable (892), the touch cable, the LED backlight cable (903/911) and the display cable (904/912) with the touch-controller-USB-board (883/885).
4. Connect the cable W31 LST board FMR (970) and the flex strip cable (320) to the touch-controller-USB-board (883/885).
5. Mount the front unit as described in chapter 3.3.1.
6. Complete the instrument as described in chapter 3.3.2.

3.4.8.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:

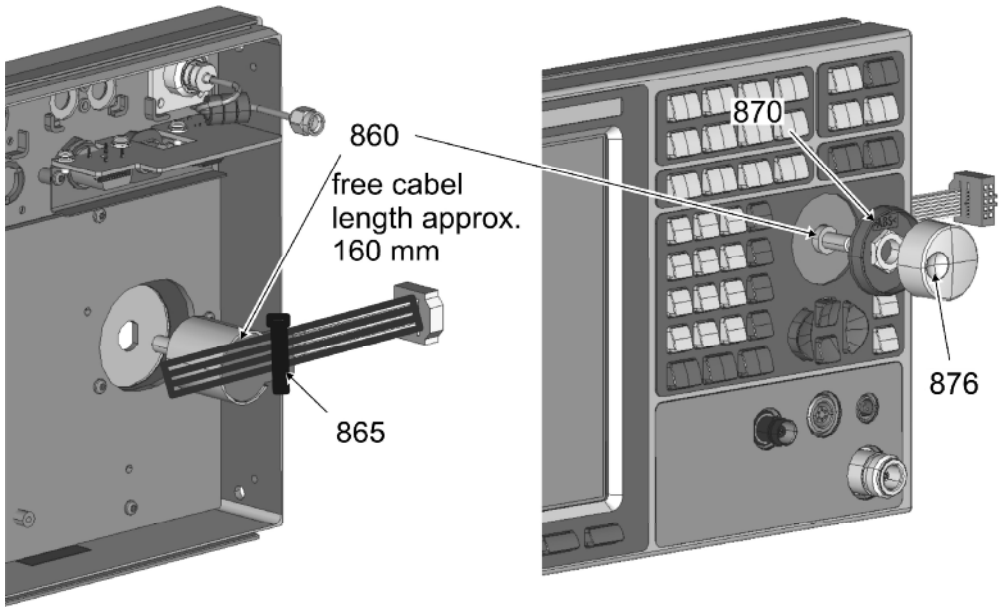
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
3. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
4. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
5. Adjust the instrument as described in chapter 2.

3.4.9 Rotary Pulse-Generator A70

See chapter "5.1 Spare Parts", item 860, and explosion drawing 1307.9025.01 sheet 1.

3.4.9.1 Removing the Rotary Pulse-Generator



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Remove the knob (876) carefully from the rotary pulse generator (860).
4. Unscrew the collar with nut (876).
5. Remove the rotary pulse generator from the frame unit.

3.4.9.2 Installing the New Rotary Pulse-Generator

1. Mount the new rotary pulse-generator (860) carefully with the collar with nut (871) to the front unit.
2. Assemble the knob (876).
3. Shorten the free length of the cable (860) carefully to approx.160mm by using a cable tie (865).
4. Mount the front unit as described in chapter 3.3.1.
5. Complete the instrument as described in chapter 3.3.2.

3.4.9.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
3. Start alignment and check the result:

[SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

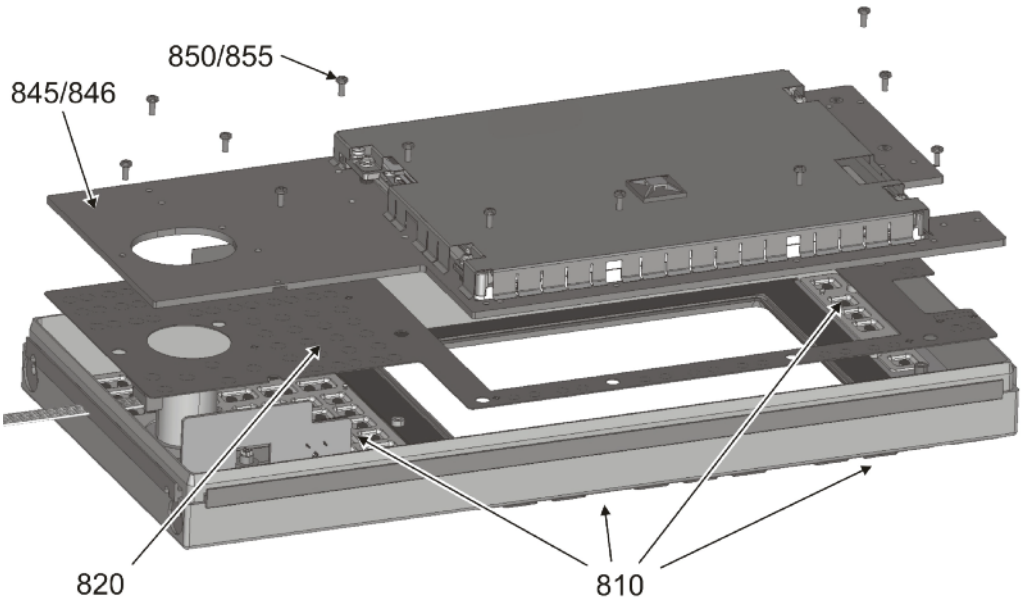
4. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
5. Adjust the instrument as described in chapter 2.

3.4.10 Push-Button Board Set A80

See chapter "5.1 Spare Parts", item 810, and explosion drawing 1307.9025.01 sheet 1.

NOTE: For quality reasons, it is strictly recommended that you change the Push-Button Board Set (810) together with the flex switch board (820)!

3.4.10.1 Removing the Push-Button Board Set



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Remove the USB-touch-controller-board (883/885) as described in “3.4.8.1 Removing the Touch Controller USB Board”.
4. Unscrew twelve screws (850/855) from the keyboard holder (845/846) and remove the holder together with the display carefully.
5. Remove the flex switch board (820).
6. Remove the four pieces of the push-button board set (810).

3.4.10.2 Installing the New Push-Button Board Set

1. Insert four pieces of the new push-button board set (810) into the front cover.

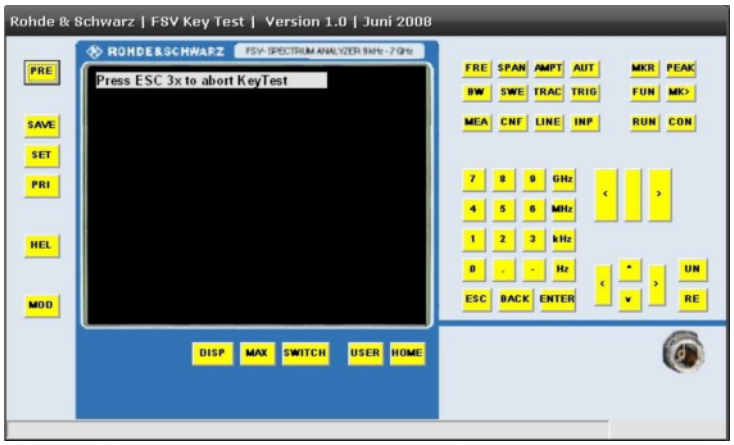
2. Place in the flex switch board (820). Make sure that all nipples of the push-button board set (810) pass through the holes of the flex switch board (820).
3. Assemble the keyboard holder (845/846) with twelve screws (850/855).
4. Assemble the touch-controller-USB-board (883/885) as described in "3.4.8.2 Installing the New Touch Controller USB Board".
5. Mount the front unit as described in chapter 3.3.1.
6. Complete the instrument as described in chapter 3.3.2.

3.4.10.3 Checking the Push-Button Board Set and Putting into Operation

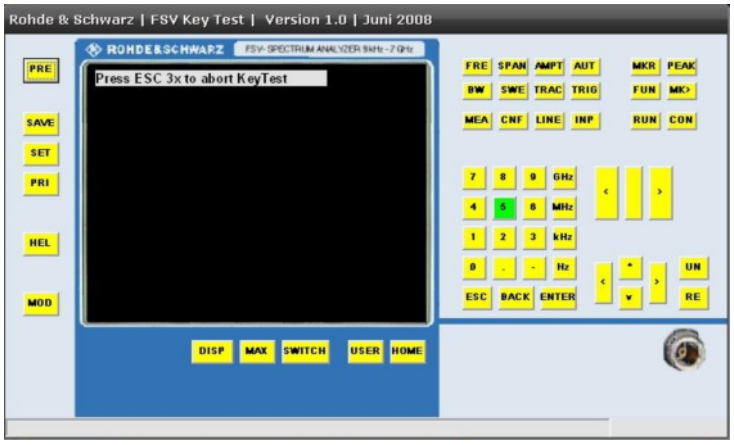
1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Starting the key test tool:

   [SETUP : MORE : SERVICE : ENTER PASSWORD : 894129 ENTER]

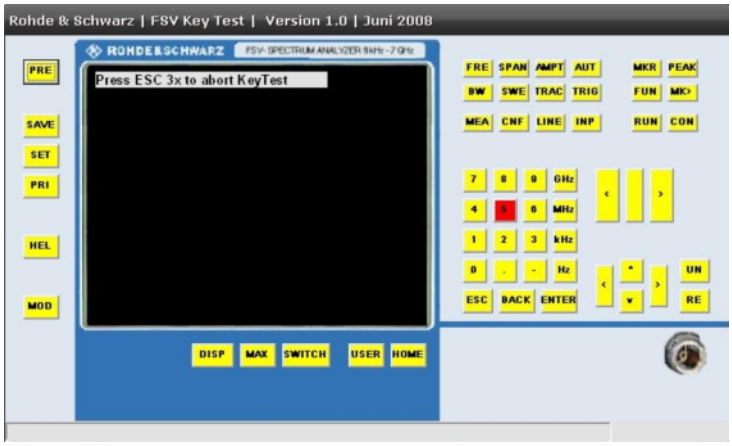
   [SETUP : MORE : SERVICE : SERVIE FUNCTION : 2.0.14.0]



3. After the first pressing of a key the corresponding button changes its color from yellow to green:



4. If the key is pressed a second time, the corresponding button changes its color from green to red.
5. If a key does not match the given key code, the corresponding button does not changes its color and the unknown key code is displayed in the dialog status line.



6. To verify that all keys works properly, all keys should be pressed twice and finally all displayed buttons should have a red color. Otherwise the keyboard does not work properly.
7. Press the ESC key three times to abort the key test tool during the test.
8. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
9. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
10. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
11. Adjust the instrument as described in chapter 2.

3.4.11 Flex Switch Board A81

See chapter "5.1 Spare Parts", item 820, and explosion drawing 1307.9025.01 sheet 1 and sheet 2.

NOTE: For quality reasons, it is strictly recommended that you change the Push-Button Board Set (810) together with the flex switch board (820)!

The procedure is the same as the one described in section “3.4.10 Push-Button Board Set A80”.

The flex switch board (820) is placed above the push-button board set (810).

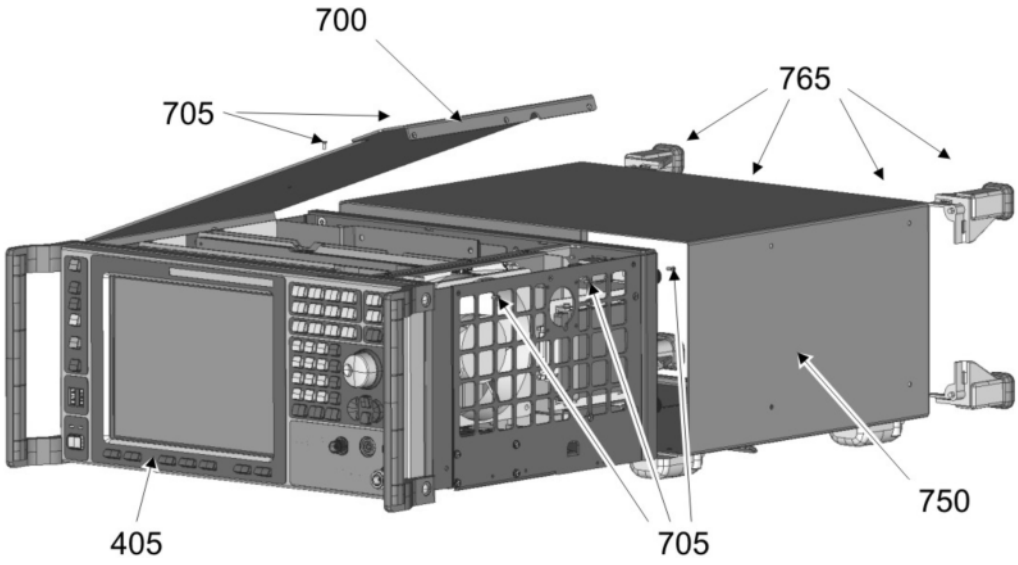
Finally the key test described in section “1” must also be performed using the tool.

3.4.12 Power Supply (R&S FSV4/7)

See chapter "5.1 Spare Parts", item 2300, explosion drawing 1307.9002.01 sheet 2, and drawing 1164.5423.01.

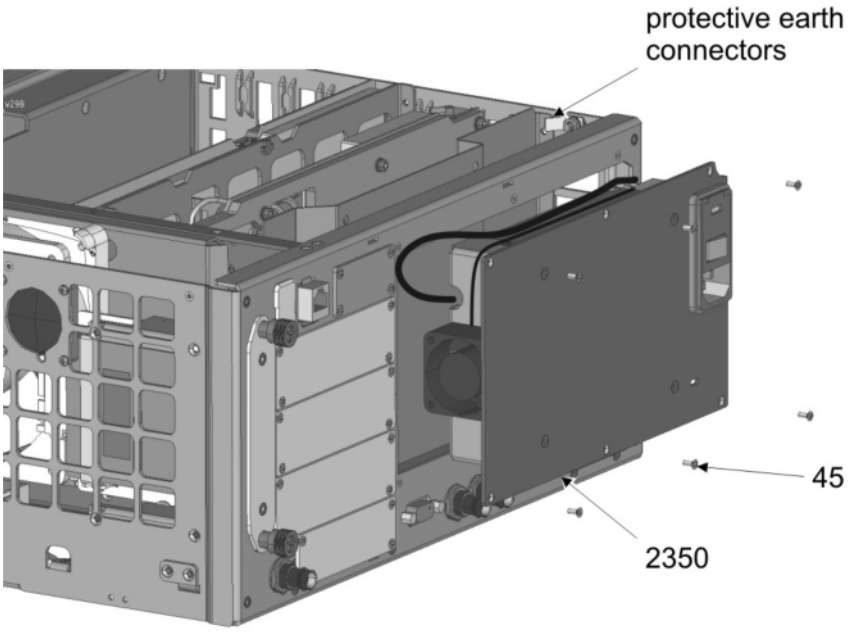
The power supply is fitted at the rear of the instrument frame of the R&S FSV.

3.4.12.1 Removing the top cover



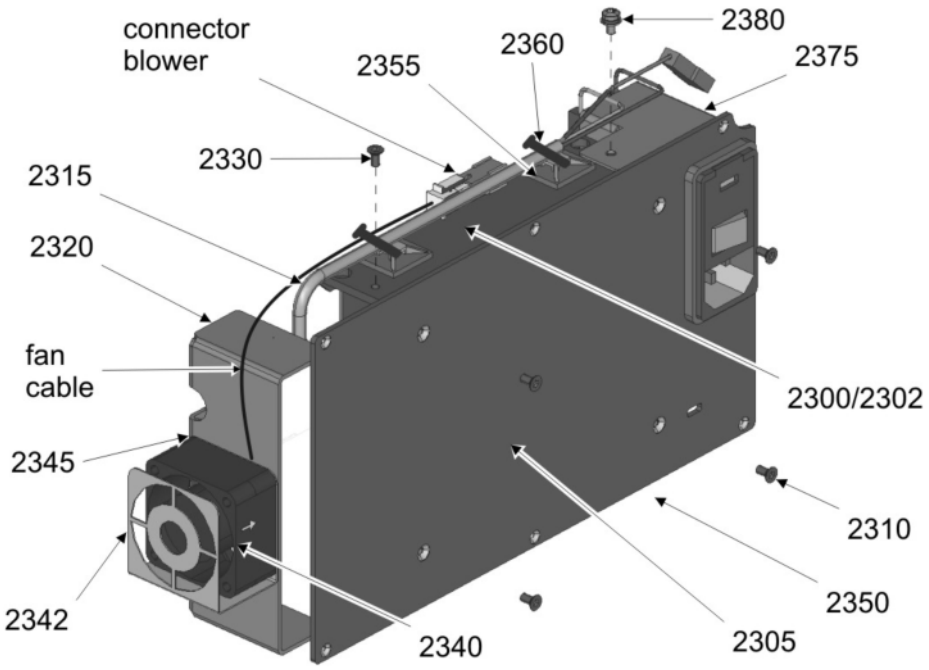
1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.

3.4.12.2 Removing the Power Supply Unit



1. Remove both protective earth conductors from their connector.
2. Unscrew six screws (45).
3. Carefully take the rear plate approx. 40 mm out of the instrument.
4. Disconnect the cable power supply motherboard (2350) from the motherboard.
5. Remove the unit completely.

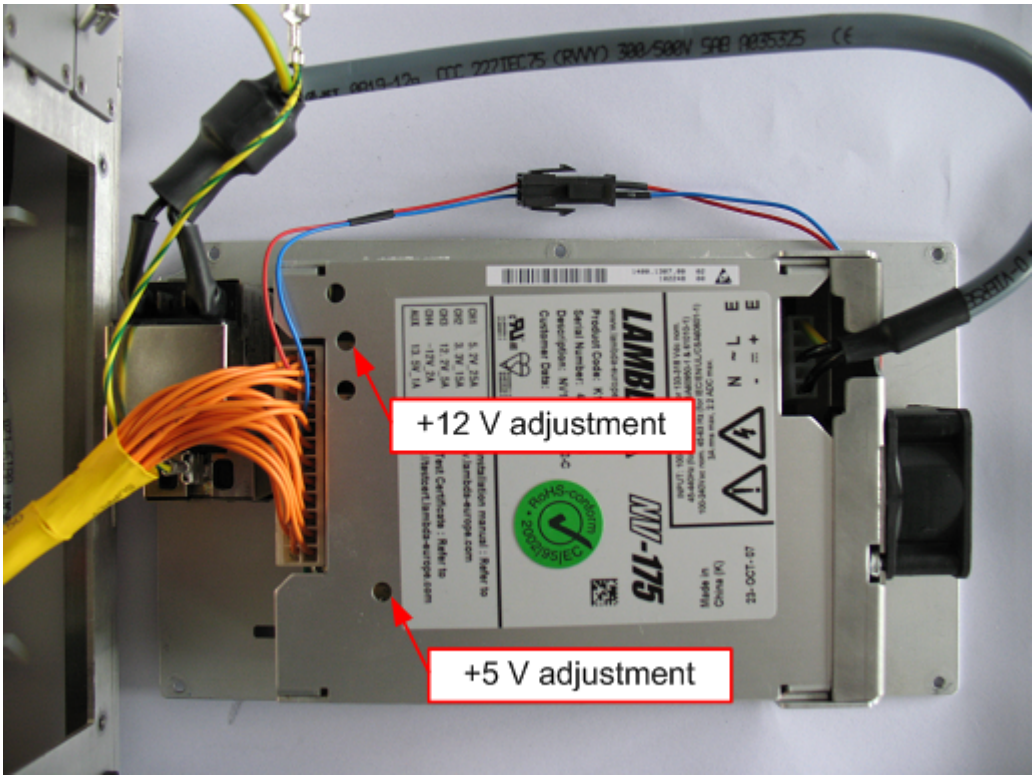
3.4.12.3 Removing the Power Supply



1. Remove both cable ties (2360).
2. Disconnect the cable power supply motherboard (2350) from the power supply (2300/2302).
3. Unscrew two screws (2330) and remove the bracket fan (2320) approx. 20 mm from the power supply.
4. Disconnect the cable power input (2315) from the power supply.
5. Unscrew four screws (2310) and remove the power supply.
6. Remove the touch protection (2375) with the screw (2380).

3.4.12.4 Installing the New Power Supply

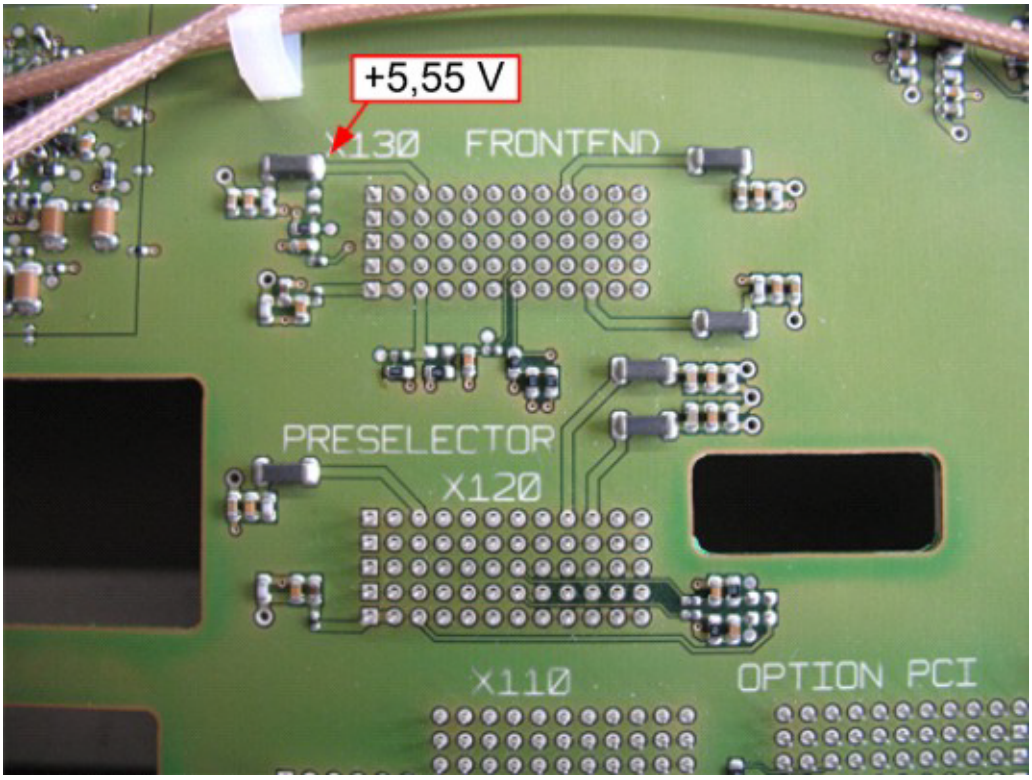
1. Mount the power supply (2300/2302) with four screws (2310) to the rear plate (2305).
2. Mount the bracket fan (2320) with two screws (2330).
3. Fix the touch protection (2375) with a screw (2380).
4. Connect the cable power input (2315) and the cable power supply motherboard (2350) to the power supply (2300/2302).
5. Connect the cable power supply motherboard (2350) to the motherboard.
6. Place the power supply outside of the instrument.



7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

   NOTICE! Mains voltage is applied to the power supply.

8. Adjust the +5 V voltage to +5.55 V ± 10 mV, measured at the motherboard (frontend connector).



9. Switch the instrument off.
10. Tie the cable power input (2315) and the fan cable together with both cable ties (2360) and the holders (2355).
11. Carefully insert the power supply (2300/2302) into the instrument.

    NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.
12. Mount the rear plate to the instrument with six screws (45).
13. Connect two protective earth conductors to their connectors.
14. Fix the top cover (700) with five screws (705).
15. Mount the housing (750) and adjust it properly to the front unit (405).
16. Mount the rear wall feet (765).
17. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
18. Start selftest and check results:

    [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
19. Start alignment and check the result:

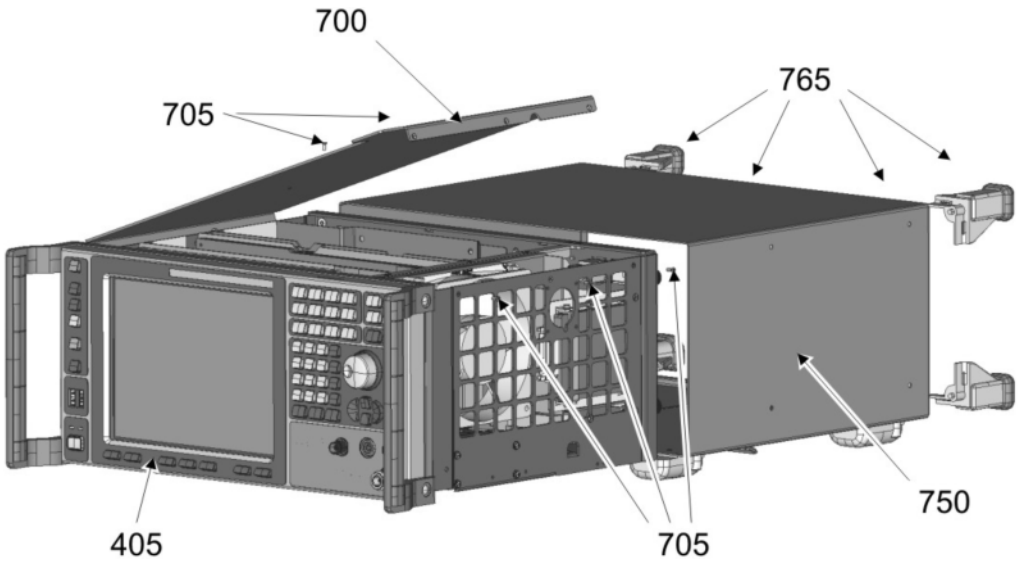
    [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.13 Power Supply (R&S FSV13/30/40)

See chapter "5.1 Spare Parts", item 30, and explosion drawing 1307.9002.01 sheet 2.

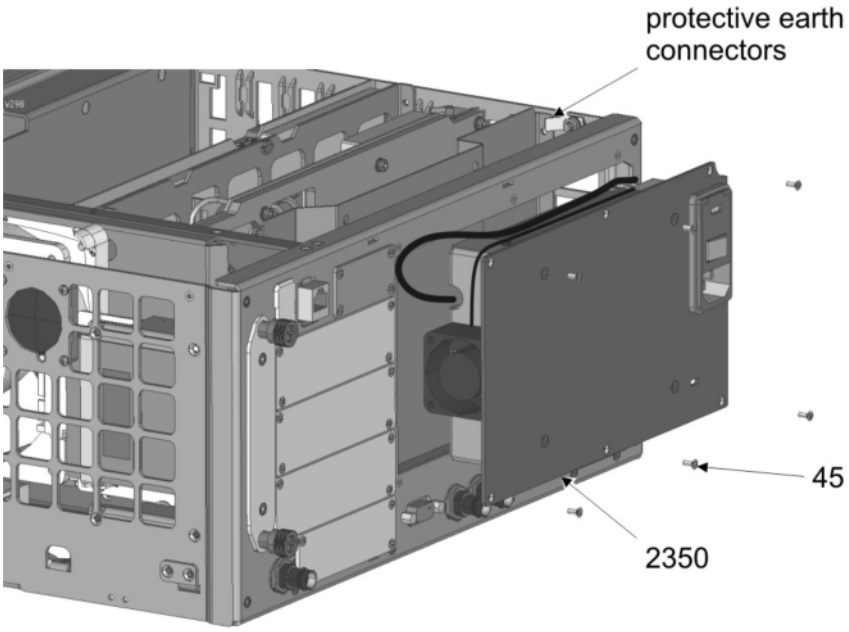
The power supply is fitted at the rear of the instrument frame of the R&S FSV.

3.4.13.1 Removing the top cover



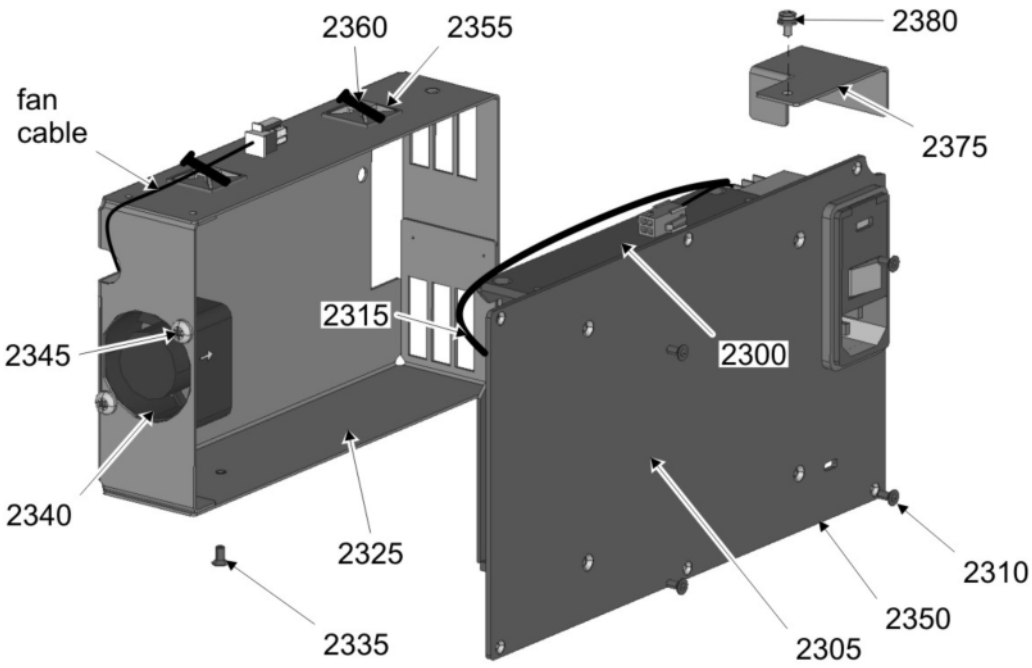
1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.

3.4.13.2 Removing the Power Supply Unit



1. Remove both protective earth conductors from their connector.
2. Unscrew six screws (45).
3. Carefully take the rear plate approx. 40 mm out of the instrument.
4. Disconnect the cable power supply motherboard (2350) from the motherboard.
5. Remove the unit completely.

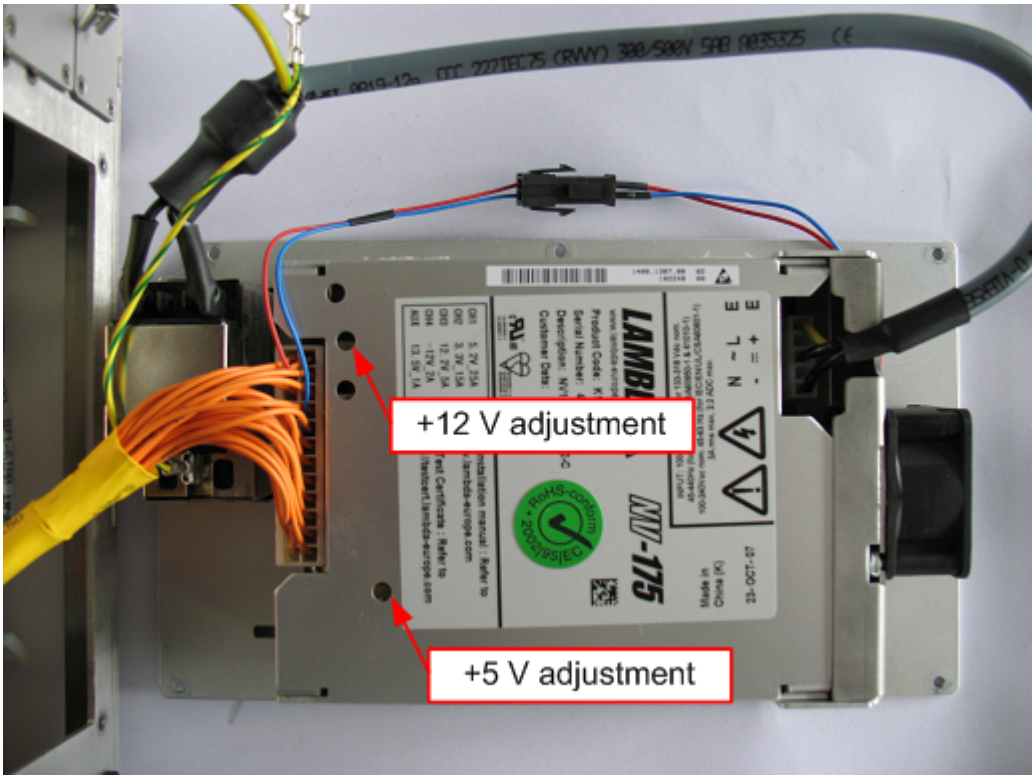
3.4.13.3 Removing the Power Supply



1. Remove both cable ties (2360).
2. Disconnect the fan (2340).
3. Disconnect the cable power supply motherboard (62) from the power supply (2300).
4. Disconnect the cable power supply motherboard (2350) and the cable power input (2315) from the power supply (2300).
5. Unscrew two screws (2335/2380), remove the shielding (2325) and the touch-protection (2375) from the power supply (2300).
6. Unscrew four screws (2310) and remove the power supply (2300).

3.4.13.4 Installing the New Power Supply

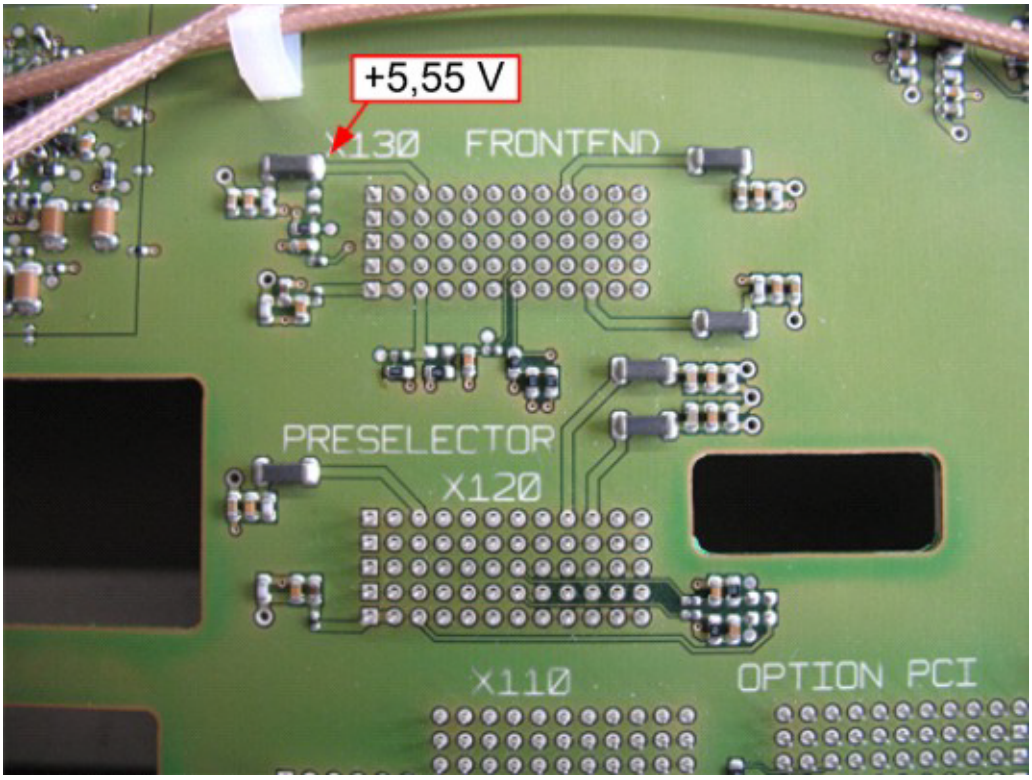
1. Mount the power supply (2300) with four screws (2310) to the rear plate (2305).
2. Mount the shielding (2320) with one screw (2335).
3. Fix the touch protection (2375) with a screw (2380).
4. Connect the cable power input (2315) and the cable power supply motherboard (2350) to the power supply (2300).
5. Connect the fan (2340).
6. Connect the cable power supply motherboard (2350) to the motherboard.
7. Place the power supply outside of the instrument.



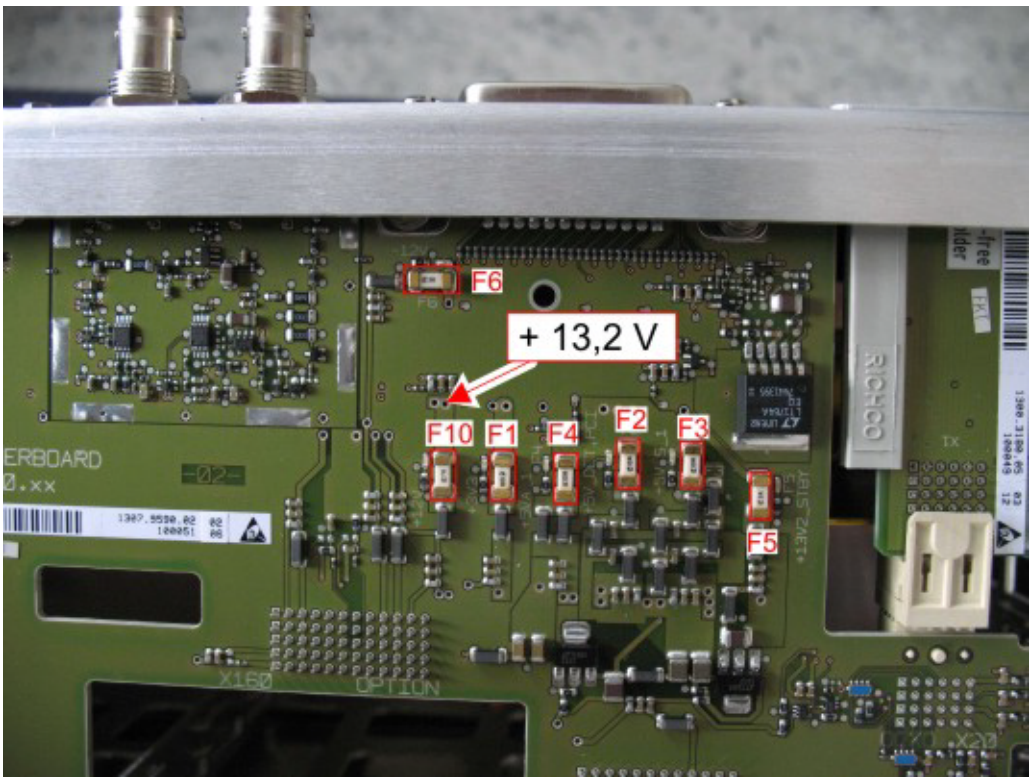
8. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

   NOTICE! Mains voltage is applied to the power supply.

9. Adjust the +5 V voltage to +5.55 V ± 10 mV, measured at the motherboard (frontend connector).



10. **R&S FSV40:** Adjust the +12 V voltage to +13.2 V ± 10 mV, measured at the motherboard (Fuse F10).



11. Switch the instrument off.
12. Tie the cable power input (2315) and the fan cable together with both cable ties (2360) and the holders (2355).
13. Carefully put the power supply (2300) into the instrument.

    NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.
14. Mount the rear plate with six screws (45) to the instrument.
15. Connect the two protective earth conductors to their connector.
16. Mount the top cover (700) on the instrument with five screws (705).
17. Mount the housing (750) and adjust it properly to the front unit (405).
18. Mount the rear wall feet (765).
19. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
20. Start selftest and check results:

    [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
21. Start alignment and check the result:

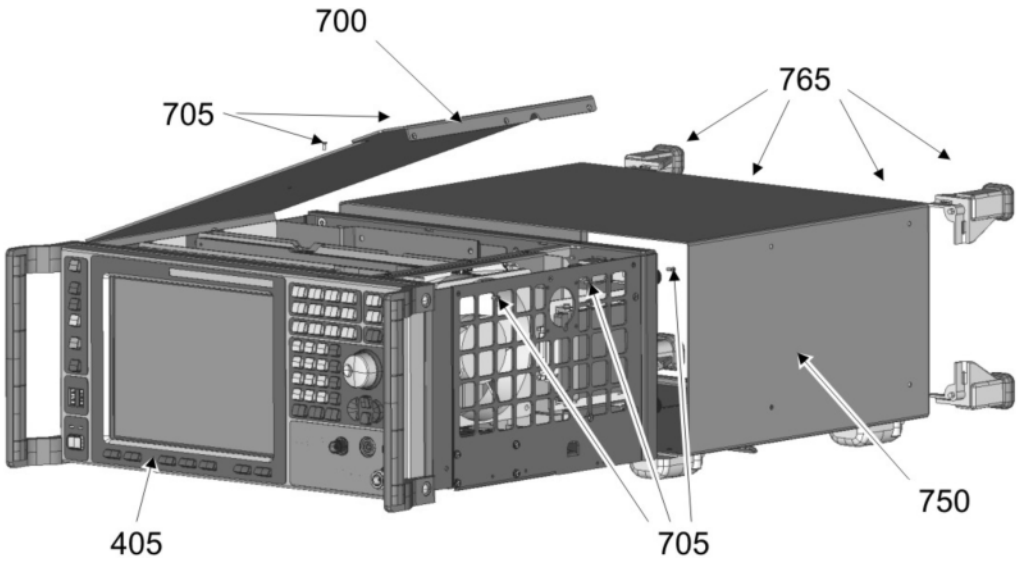
    [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.14 Power Supply Fan

See chapter "5.1 Spare Parts", item 58, and explosion drawing 1307.9002.01 sheet 2.

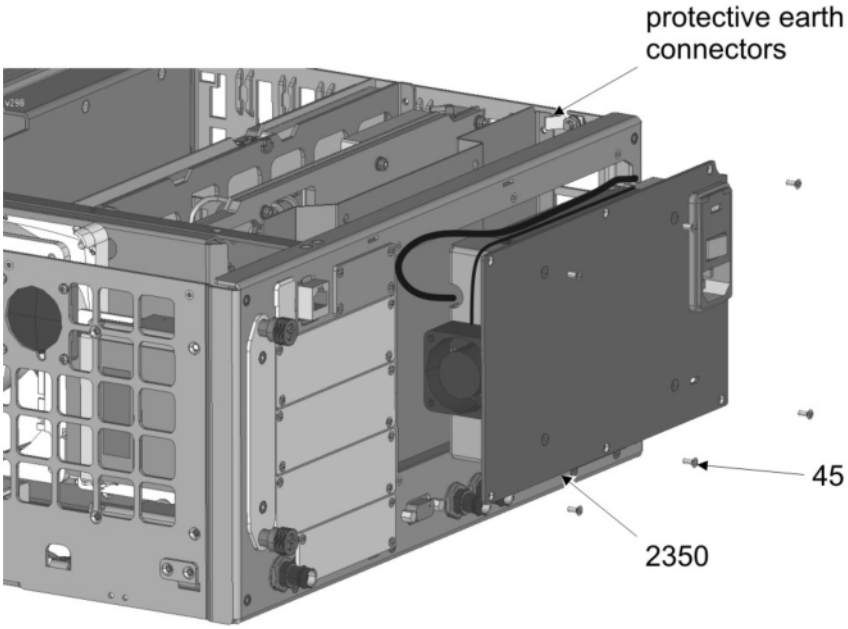
The fan is fitted at the rear of the instrument frame of the R&S FSV.

3.4.14.1 Removing the top cover



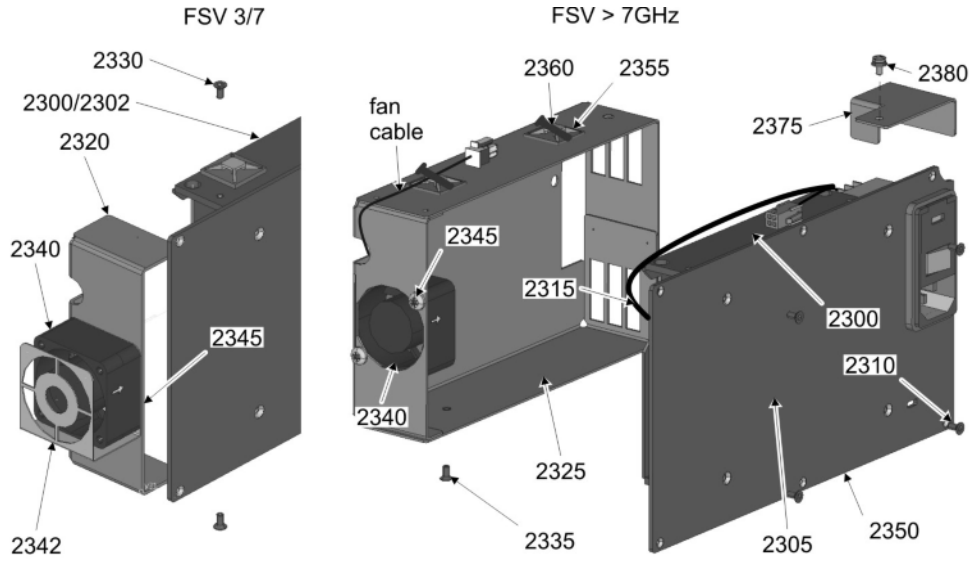
1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.

3.4.14.2 Removing the Power Supply Unit



1. Remove both protective earth conductors from the connector.
2. Unscrew six screws (45).
3. Carefully take the rear plate approx. 40 mm out of the instrument.
4. Disconnect the cable power supply motherboard (2350) from the motherboard.
5. Remove the unit completely.

3.4.14.3 Removing the Fan



1. Remove both cable ties (2360).
2. Disconnect the fan (2340).
3. R&S FSV4/7: Unscrew two screws (2330) and remove the bracket (2320) with the fan (2340) and the shielding (2342) completely.
4. R&S FSV > 7GHz: Disconnect and remove the cable power supply motherboard (2350) and the cable power input (2315).
5. R&S FSV > 7GHz: Unscrew two screws (2335/2380) and remove the touch-protection (2375) and the shielding (2325).
6. Unscrew two screws (2345) and remove the fan (2340).

3.4.14.4 Installing the New Fan

1. Mount the fan (2340) with two screws (2345).
2. R&S FSV4/7: The shielding (2342) is mounted between the fan and the fan bracket (2320). Mount the bracket with two screws (2330) to the power supply (2300/2302).
3. R&S FSV > 7GHz: Mount the shielding (2325) and the touch-protection (2375) with two screws (2335/2380).
4. R&S FSV > 7GHz: Connect the cable power supply motherboard (2350) and the cable power input (2315) to the power supply (2300).
5. Connect the fan (2340) to the cable power supply motherboard (2350).
6. Fix the cable power input (2315) and the fan cable together with two cable ties (2360) and the holder (2355).
7. Connect the cable power supply motherboard (2350) to the motherboard.

8. Carefully put the power supply (32/34/35/36) into the instrument.

   NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.

9. Mount the rear plate with six screws (45) to the instrument.
10. Connect the two protective earth conductors to their connector.
11. Fix the top cover (700) with five screws (705).
12. Mount the housing (750) and adjust it properly to the front unit(405).
13. Mount the rear wall feet (765).
14. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
15. Start selftest and check results:

    [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

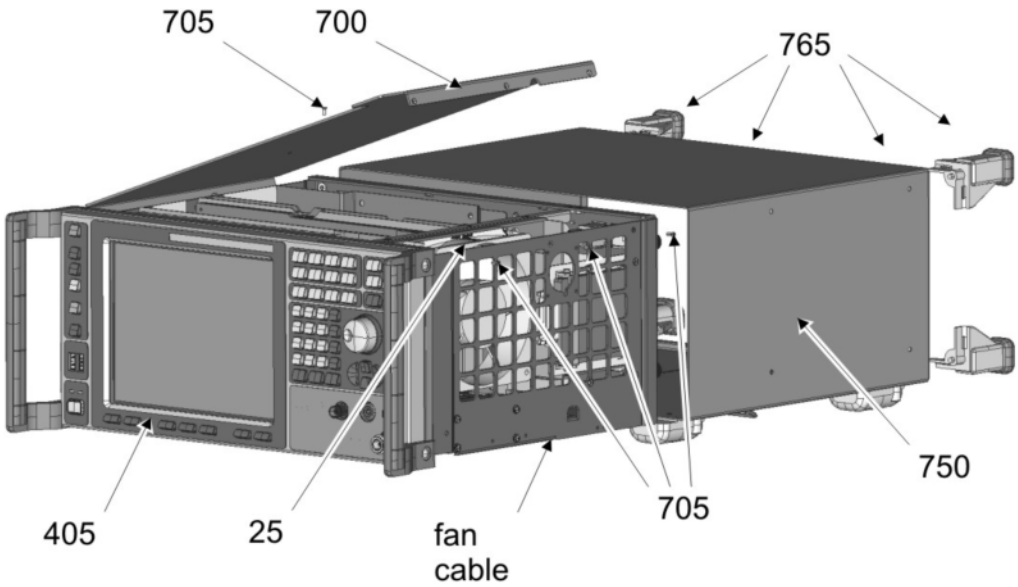
16. Start alignment and check the result:

    [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.15 Fan

See chapter "5.1 Spare Parts", item 25, and explosion drawings 1307.9002.01 sheet 1.

3.4.15.1 Removing the Fan



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).

4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Unplug the fan cable from the motherboard X83 (FAN).
6. Remove the fan (25) from the rubber sleeve.

3.4.15.2 Installing the New Fan

1. Insert the new fan (25) and mount it to the frame with the rubber sleeve.
2. Connect the fan cable to the motherboard connector X83 (FAN).

   Note: Note the direction of the airflow printed on the fan. The fan must blow the air into the instrument.

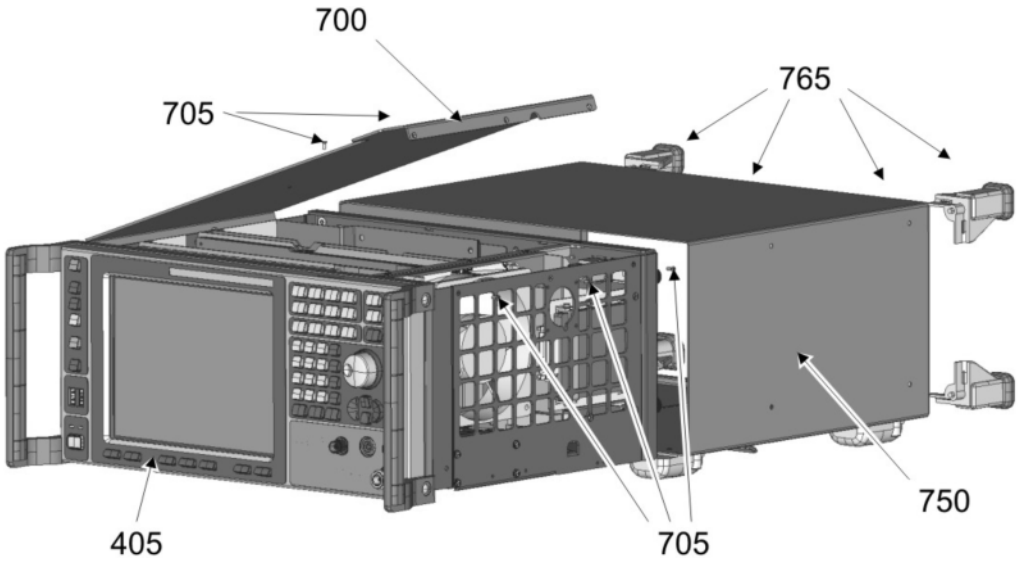
   Make sure you route the cables with enough distance to the fan.
3. Mount the top cover (700) on the instrument with five screws (705).
4. Mount the housing (750) and adjust it properly to the front unit(405).
5. Mount the rear wall feet (765).
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

3.4.16 Frontend A100

See chapter "5.1 Spare Parts", item 550 and explosion drawing 1307.9002.01 sheet 1.

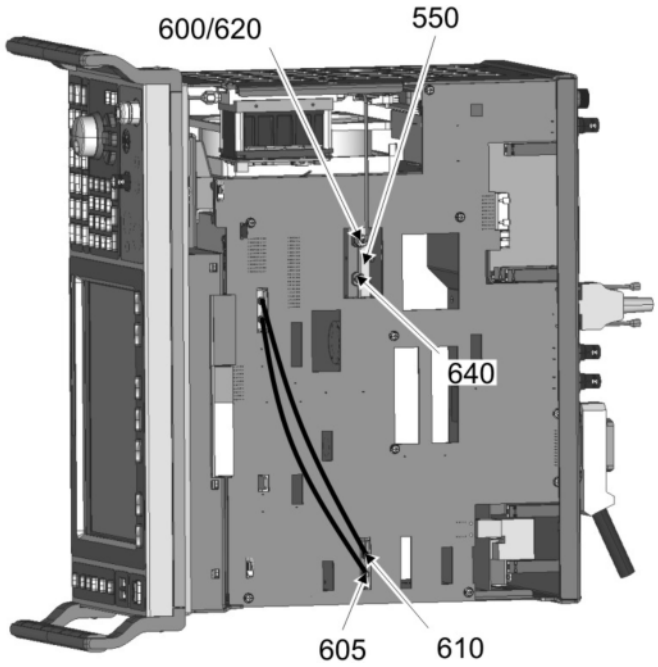
The frontend is installed in the middle of the instrument.

3.4.16.1 Removing the Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.

3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Place the instrument on the left side frame.



6. Disconnect all RF cables from the frontend (550).
7. Push out the frontend (550) to the top side of the instrument.

   Tip: The board can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

3.4.16.2 Installing the New Frontend

1. Plug the new frontend into the instrument and reconnect the RF cables formerly removed to the board.

   Note: Refer to the cable wiring drawing on the motherboard.
2. Mount the top cover (700) on the instrument with five screws (705).
3. Mount the housing (750) and adjust it properly to the front unit (405).
4. Mount the rear wall feet (765).
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. After starting the instrument check:

   [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
7. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

8. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

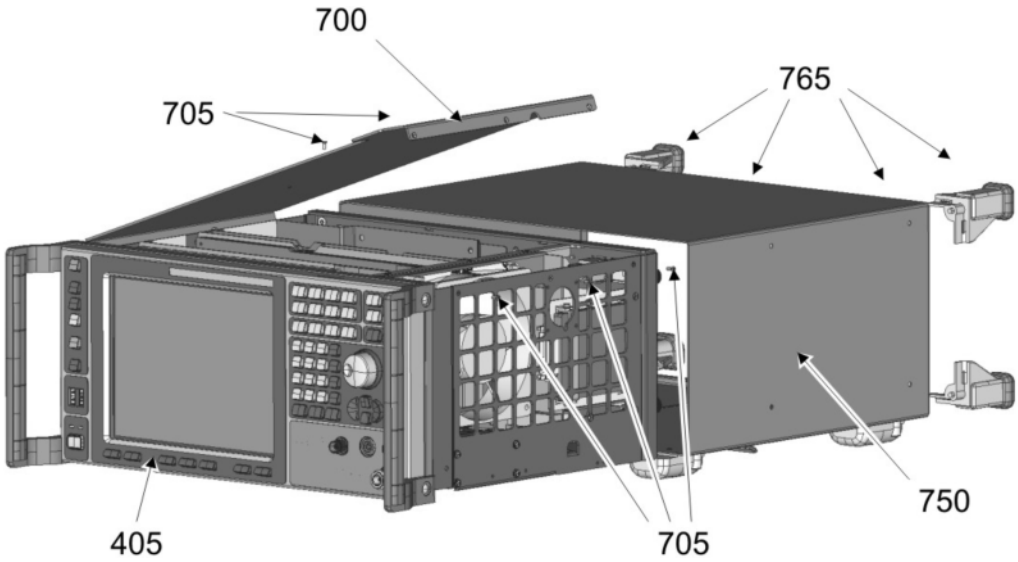
9. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.

10. Adjust the instrument as described in chapter 2.

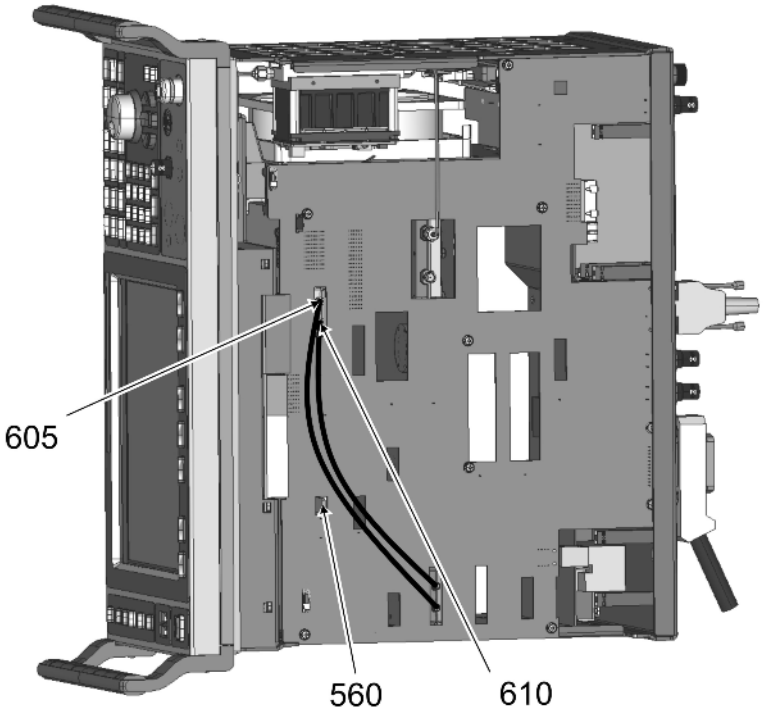
3.4.17 Detector Board A120

See chapter "5.1 Spare Parts", item 560 and explosion drawing 1307.9002.01 sheet 1.

3.4.17.1 Removing the Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Place the instrument on the left side frame.



6. Disconnect the RF cables W3 (605) and W4 (610) from the detector board (560).
7. Push out the detector board (560) to the top side of the instrument.

   Tip: The board can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

3.4.17.2 Installing the New Detector Board

1. Plug the new detector board into the instrument and reconnect RF cables W3 (605) and W4 (610) to the board.

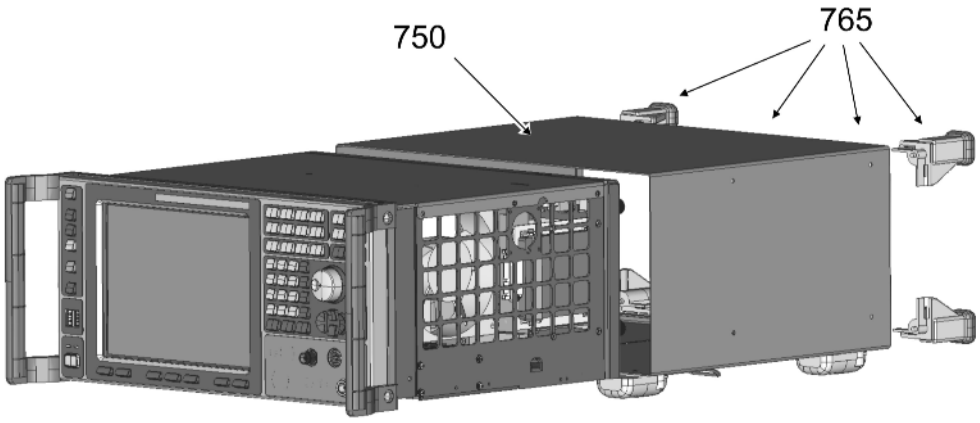
   Note: Refer to the cable wiring drawing on the motherboard.
2. Mount the top cover (700) on the instrument with five screws (705).
3. Mount the housing (750) and adjust it properly to the front unit (405).
4. Mount the rear wall feet (765).
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. Perform an instrument check:
   [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
7. Start selftest and check results:
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:
   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.18 Attenuator A40 (R&S FSV4/7)

See chapter "5.1 Spare Parts", item 500 and explosion drawing 1307.9002.01 sheet 3.

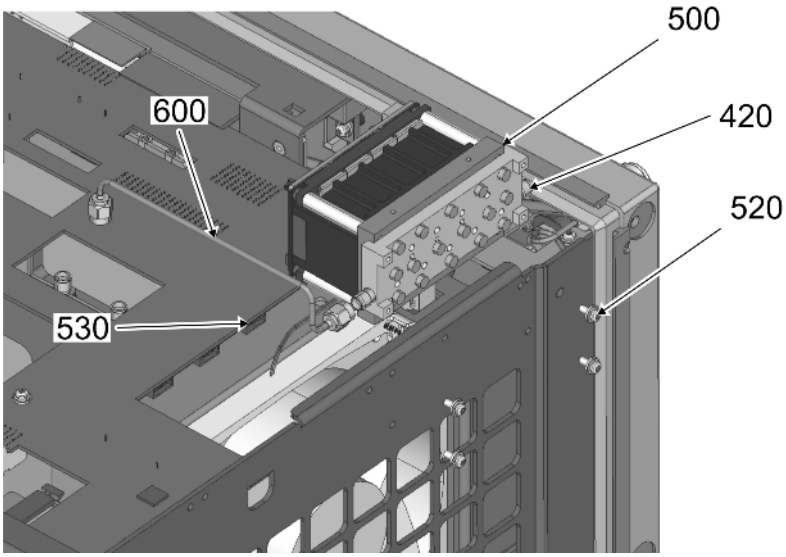
3.4.18.1 Removing the Attenuator

1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).



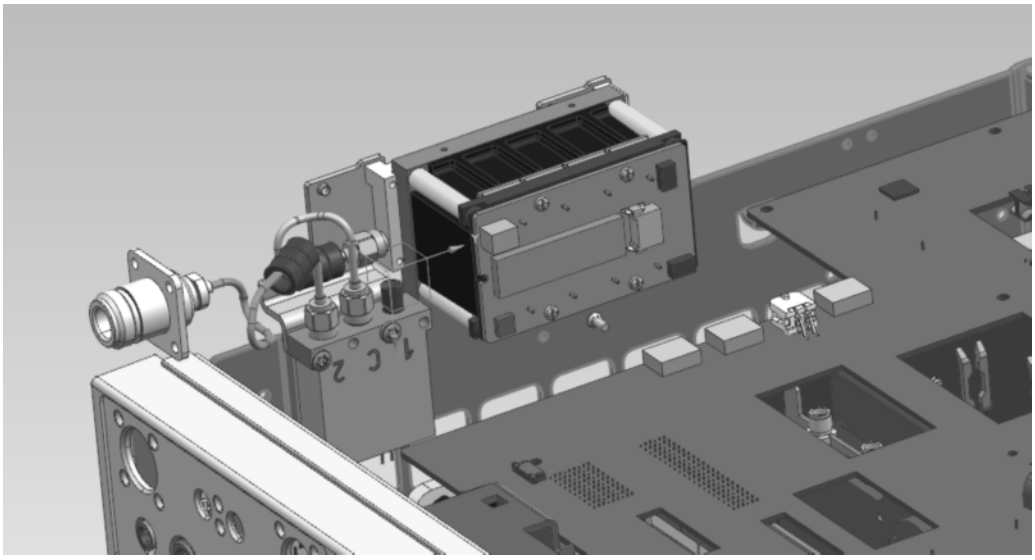
4. Place the instrument on the back side.

For instruments **without** option R&S FSV-B160 installed:



a. Remove RF cable W2 (600) completely from the instrument.
b. Disconnect the RF cable W1 (420) from the attenuator (500) and attenuator cable (530) from the motherboard.
c. Unscrew four screws (520) and remove the attenuator (500).

For instruments **with** option R&S FSV-B160 installed:



a. Remove the label R&S FSV connector (413/1271/1771/1851).
b. Unscrew the four screws fastening the RF input connector and disconnect the RF cable W1 (420) from the relay and remove the cable.
c. Unplug the cable W3 at the attenuator and the frontend.
d. Unplug the relay control cable from the bandwidth extension board and the calibration signal cable W100 from the relay.
e. Unscrew the four screws fastening the attenuator unit and unplug the cable to the motherboard
f. Remove the attenuator unit
g. Disconnect the cable W2 from the attenuator and the relay
h. Unscrew the four screws fastening the attenuator to the relay holder

5. Disconnect attenuator cable (530) from the attenuator (500).

3.4.18.2 Installing the New Attenuator

1. Connect the attenuator cable (530) to the attenuator (500).

For instruments **without** option R&S FSV-B160 installed:

a. Mount the new attenuator (500) with four screws (520).
b. Connect the RF cable W1 (420) to the attenuator (500), the attenuator cable (530) to the Motherboard X81 and the RF cable W2 (600) to the attenuator (500) and the frontend (550).

For instruments **with** option R&S FSV-B160 installed:

a. Mount the new attenuator (500) with four screws to the relay holder.
b. Connect cable W2 to the relay and the attenuator.
c. Insert the attenuator unit in the instrument and fasten it with four screws formerly removed
d. Reconnect the relay control cable to the bandwidth extension board and the calibration signal cable W100 to the relay

e. Connect the RF cable W1 to the relay , the attenuator cable (530) to the Motherboard X81 and the RF cable W3 to the attenuator (500) and the frontend (550).

2. Mount the housing (750) and adjust it properly to the front unit (405).
3. Mount the rear wall feet (765).
4. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
5. Start selftest and check results:

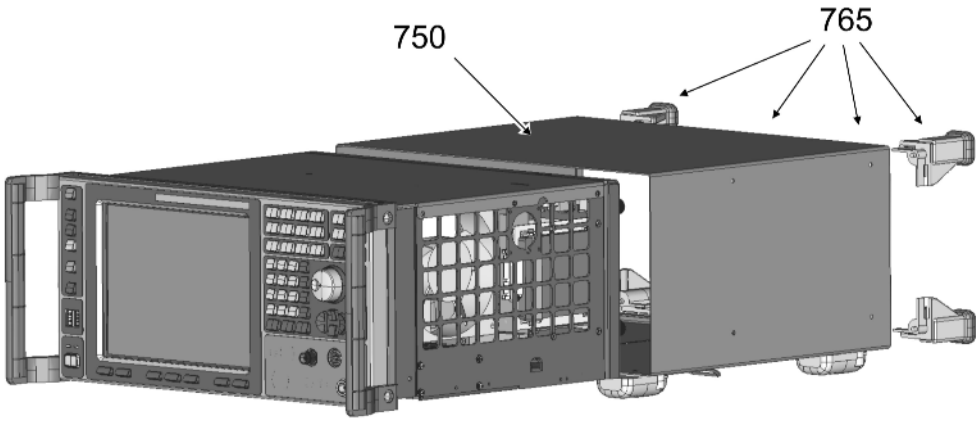
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
6. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
7. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
8. Adjust the instrument as described in chapter 2.

3.4.19 Attenuator A40 (R&S FSV13/30/40)

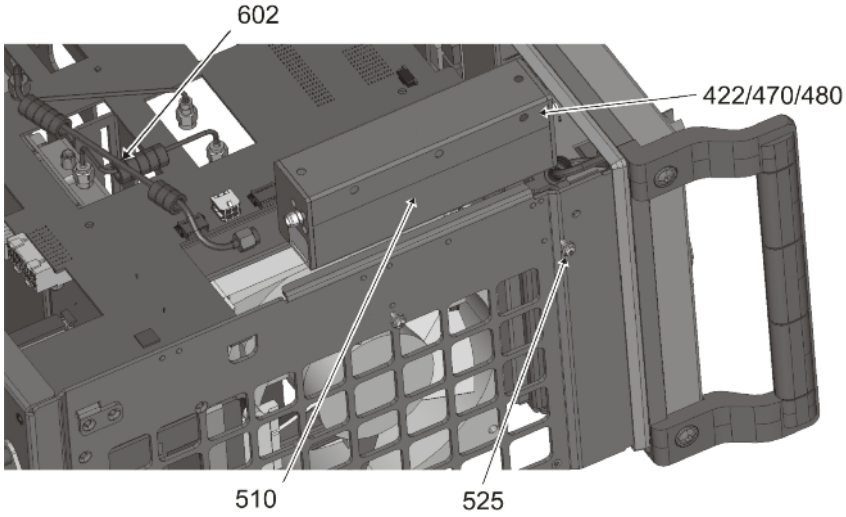
See chapter "5.1 Spare Parts", item 510 and explosion drawing 1307.9002.01 sheet 3.

3.4.19.1 Removing the Attenuator



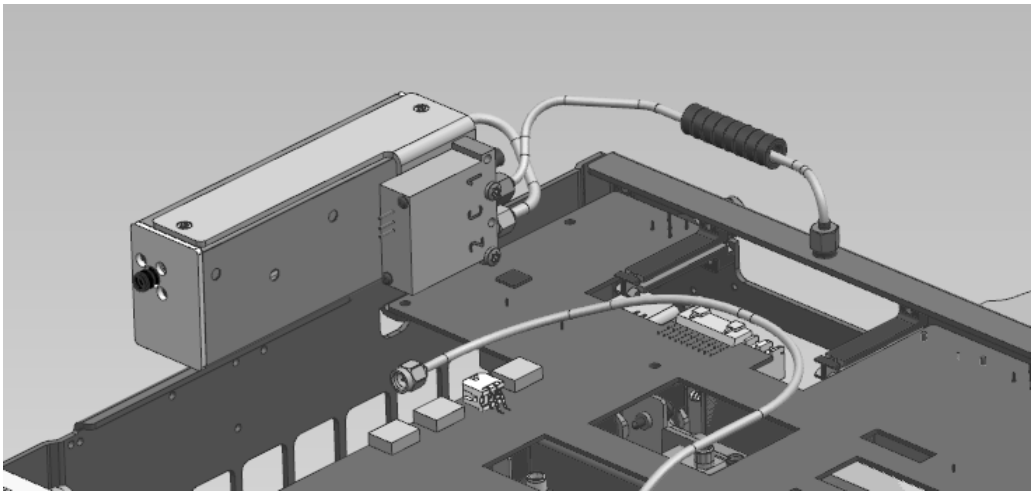
1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Place the instrument on the back side.

For instrument **without** option R&S FSV-B160 installed:



a. Remove RF cable W2 (602) completely from the instrument.
b. Disconnect the RF cable W1 (422/470/480) from the attenuator (510) and attenuator cable (530) from the motherboard.
c. Unscrew two screws (525) and remove the attenuator (510).

For instruments **with** option R&S FSV-B160 installed:



a. Unplug cable W2 at the relay and the microwave converter.
b. Disconnect the RF cable W1 (422/470/480) from the attenuator (510) and attenuator cable (530) from the motherboard.
c. Unplug the relay control cable from the bandwidth extension board and the calibration signal cable W100 from the relay
d. Unscrew two screws and remove the attenuator unit.
e. Disconnect the cable W301 from the attenuator and the relay
f. Unscrew the two screws fastening the attenuator to the relay holder

5. Disconnect attenuator cable (530) from the attenuator (510).

3.4.19.2 Installing the New Attenuator

1. Connect the attenuator cable (530) to the attenuator (510).

For instruments **without** option R&S FSV-B160 installed:

a. Mount the new attenuator (510) with two screws (525).
b. Connect the RF cable W1 (422/470/480) to the attenuator (510), the attenuator cable (530) to the Motherboard X81 and the RF cable W2 (602) to the attenuator (510) and the frontend (550).

For instruments **with** option R&S FSV-B160 installed:

a. Mount the new attenuator (500) with two screws to the relay holder
b. Connect cable W301 to the relay and the attenuator.
c. Insert the attenuator unit in the instrument and fasten it with two screws formerly removed
d. Reconnect the relay control cable to the bandwidth extension board and the calibration signal cable W100 to the relay
e. Connect the RF cable W1 (420) to the relay (500), the attenuator cable (530) to the Motherboard X81 and the RF cable W2 to the relay and the microwave converter.

2. Mount the housing (750) and adjust it properly to the front unit (405).
3. Mount the rear wall feet (765).
4. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
5. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

6. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

7. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
8. Adjust the instrument as described in chapter 2.

3.4.20 Motherboard A10

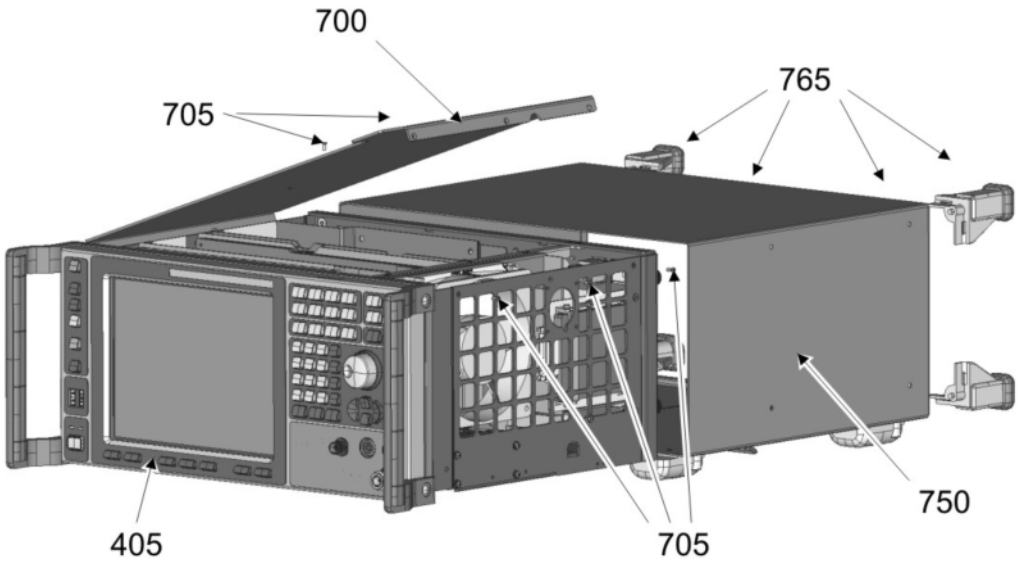
See chapter "5.1 Spare Parts", item 120/122, and explosion drawings 1307.9002.01 sheet 1.

NOTICE

Risk of losing important information

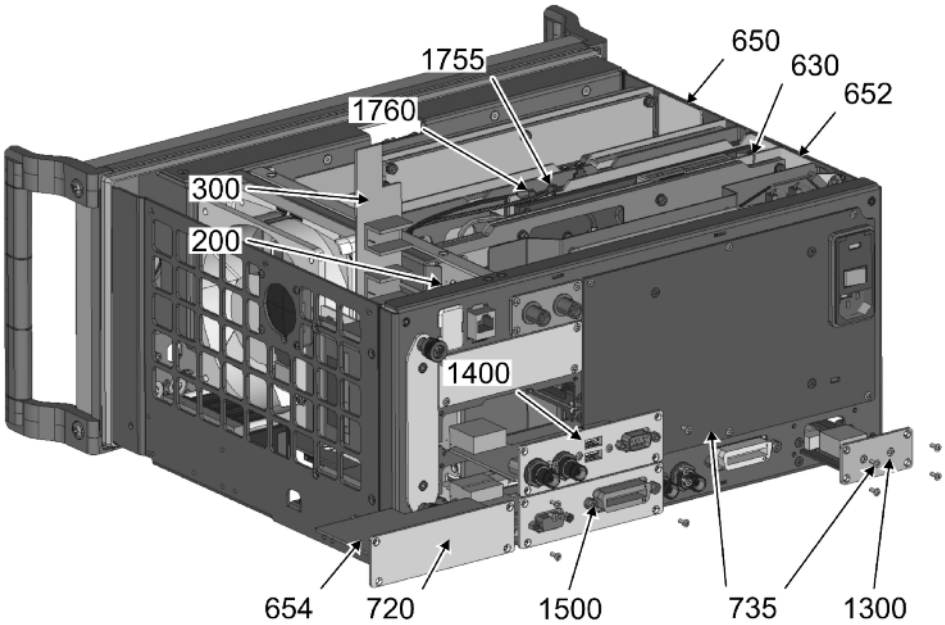
Important information about the type of instrument, installed hardware, options, etc., is stored both on the motherboard and on the hard drive. This information is required in order to restore the instrument in case of errors. Thus, do not replace the motherboard and the hard drive at the same time, as doing so will cause this information to be lost. If the instrument does not function after the hard drive has been replaced, do not replace the motherboard. Instead, re-install the old hard drive and then replace the motherboard.

3.4.20.1 Opening the Instrument



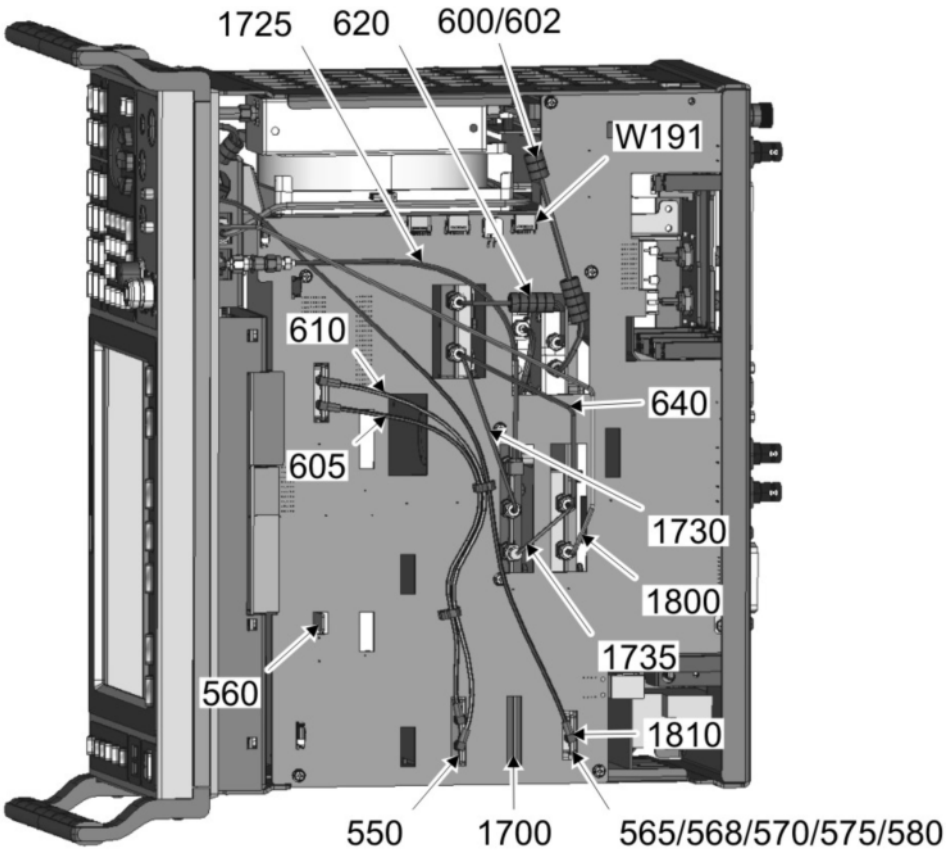
1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.

3.4.20.2 Removing the Hardware Options



1. Unscrew four screws (735) at option OCXO (1300), additional interfaces (1400) and external generator control (1500), if present and remove them to the rear of the instrument.
2. Disconnect the patch cable (200).
3. Carefully remove the adapter board R&S FSV (300).
4. Disconnect and remove RF cable W6 (630) completely (R&S FSV13,30,40).
5. For instruments with Option R&S FSV-B9: Disconnect RF cable W16 (1755) and RF cable W17 (1760).
6. If available, remove baffle plates (650) and (652) (R&S FSV4,7).

3.4.20.3 Removing the Frontend Board, the Detector Board, the MW Converter Unit (R&S FSV13,30,40), the Tracking Generator (R&S FSV-B9) and the Bandwidth Extension (R&S FSV-B160)

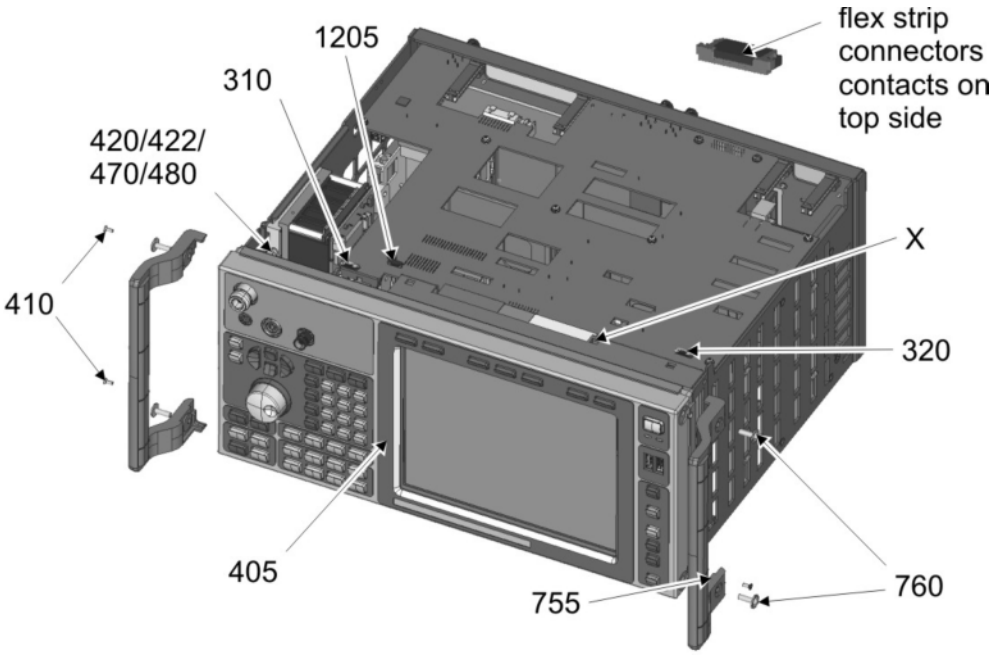


1. Remove RF cable W2 (600/602), RF cable W3 (605),RF cable W4 (610), RF cable W5 (620) (R&S FSV13,30,40), RF cable W7 (640) (R&S FSV13,30,40) completely from the instrument.
2. For instruments with Option R&S FSV-B9: Remove RF cable W13-2 (1725), RF cable W14 (1730), RF cable W15 (1735) (R&S FSV13,30,40) completely and push out tracking generator (1700).
3. For instruments with Option R&S FSV-B21: Disconnect RF cable W18 (1800) and RF cable W19 (1810) from the MW Converter Unit (565/570/575/580).
4. For instruments with Option R&S FSV-B24: Disconnect cable W191.
5. For instruments with option R&S FSV-B160:
   a) Unplug the relay control cable from the bandwidth extension board
   b) Unplug the calibration signal cable from the bandwidth extension board
   c) Disconnect the IF cable on the top of the board and remove it completely from the instrument
   d) Push out the bandwidth extension board
   e) Remove the attenuator unit according to chapter 3.4.18.1 or 3.4.19.1.

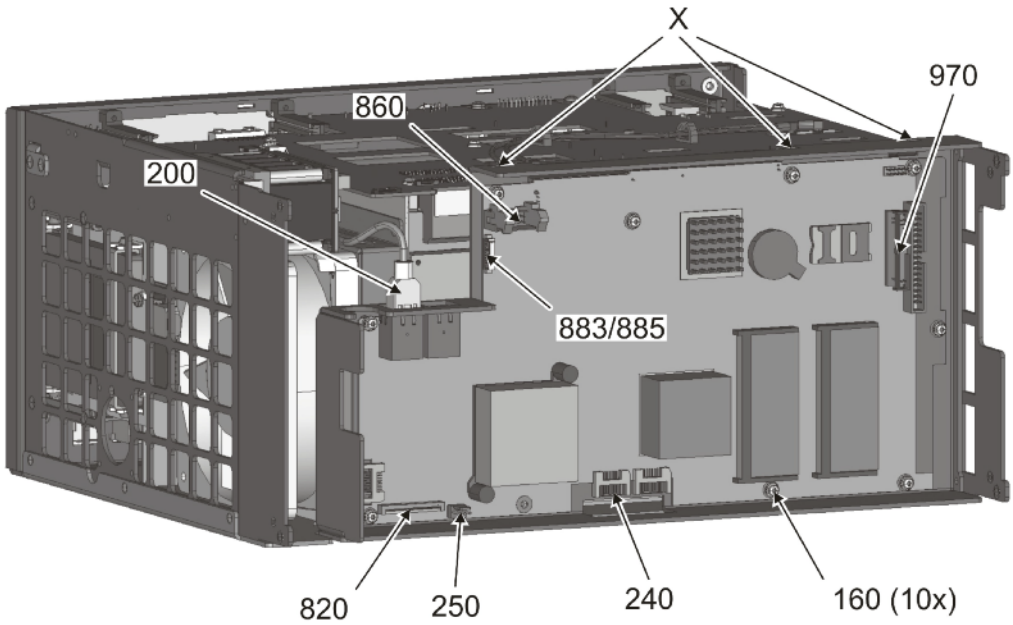
6. Push out detector board (550), frontend (560) and MW Converter Unit (565/568/570/575/580) (R&S FSV13,30,40) to the top side of the instrument.

   Tip: The boards can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

3.4.20.4 Removing the Controller



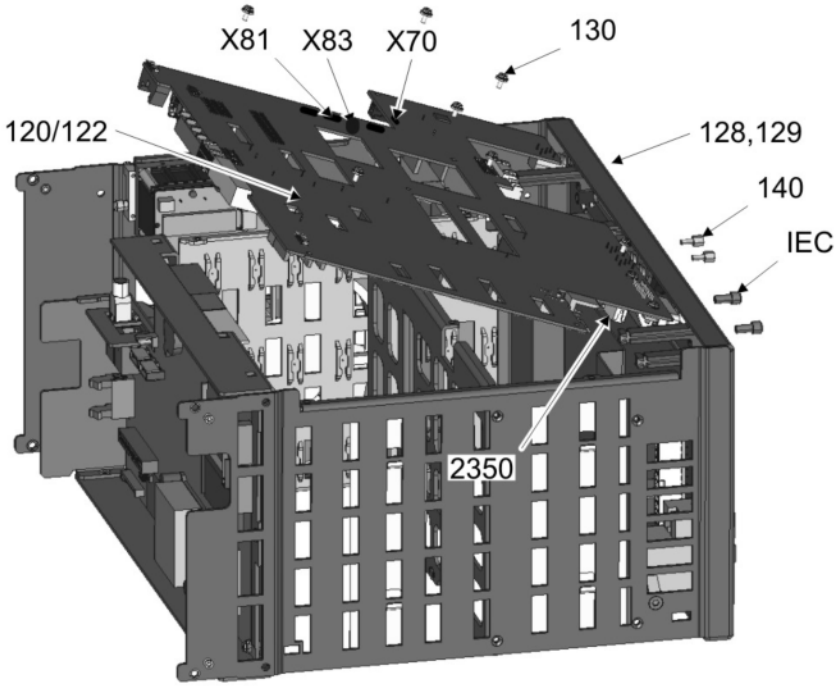
1. Unmount the front unit as described in 3.2.2.



2. Unscrew ten screws (160).

3. Remove the controller. If necessary, use a screwdriver to take it off. Push the screwdriver alternately into one of the three holes (indicated by an X on the graphic above) to press the controller out.

3.4.20.5 Removing the Motherboard



1. Disconnect the fan cable from the motherboard connector X83 (FAN) and the attenuator cable from connector X81.
2. For instruments with Option R&S FSV-B3: Disconnect the speaker cable from the motherboard connector X70 (SPEAKER).
3. Remove two screws (140), three nuts (129), three washers (128) and two bolts (IEC) with washers at the rear.
4. Unscrew and remove seven screws (130).

   Notice! The power supply is still connected to the motherboard.
5. Carefully take the motherboard (120/122) out of the frame as shown in the picture below. Disconnect the cable power supply-motherboard (2350) from the motherboard (120/122) before removing it completely.

3.4.20.6 Installing the New Motherboard

1. Insert the motherboard into the instrument in reverse order.

   Note: Move the motherboard carefully to the rear panel without causing damage to the parts on the board.

2. Connect the cable power supply-motherboard 2350 to the motherboard (120/122) and put the board in completely.
3. Fix two screws (140), three washers (128) with nuts (129) and two bolts (IEC) with washers at the rear.
4. Mount the motherboard with seven screws (130).
5. Connect the fan cable to the motherboard connector X83 (FAN) and the attenuator cable to connector X81.
6. For instruments with Option R&S FSV-B3: Connect the speaker cable to the motherboard connector X70 (SPEAKER).
7. Carefully place down the controller (150) and fasten it with ten screws (160).
8. Connect cable flex switch board R&S FSV (820), cable rotary pulse-generator (860), cable W31 LST board FMR (970), cable touch-controller-USB-board (883/885), patch cable (200), SATA data cable (240) and SATA power cable (250).

   NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.
9. Assemble the front unit (405) carefully.
10. For instruments **without** option R&S FSV-B160 installed: Connect RF cable W1 (420/422/470/480).
11. Connect cable flex strip (310) and (320).
12. For instruments with Option R&S FSV-B3: Connect cable flex strip (1205).

    Note: The flex strip connector contacts are on the top of the device.
13. Fasten the four screws (410) to screw the front unit (405) together with the unit frame (22/24).
14. Mount front handles (755) on both sides by using four screws (760).
15. Plug the detector board (560), the frontend (550) and the MW Converter Unit (565/568/570/575/580) (R&S FSV13/30/40) into the instrument and connect RF cable W2 (600/602), RF cable W3 (605), RF cable W4 (610), RF cable W5 (620) (R&S FSV13/30/40) and RF cable W7 (640) (R&S FSV13/30/40).

    Note: Refer to the cable wiring drawing on the motherboard.
16. For instruments with Option R&S FSV-B9: Plug the tracking generator (1700) into the instrument an connect RF cable W13-2 (1725), RF cable W14 (1730) and RF cable W15 (1735) (R&S FSV13/30/40).
17. For instruments **with** option R&S FSV-B160 installed:
    a. Install the attenuator unit according to chapter 3.4.18 or chapter 3.4.19
    b. Plug the bandwidth extension board into the instrument and reconnect the cables formerly removed according to chapter 3.4.41.
18. For instruments with Option R&S FSV-B21: Connect RF cable W18 (1800) and RF cable W19 (1810) to the MW Converter Unit (565/570/575/580).
19. For instruments with Option R&S FSV-B24: Connect cable W191.

20. If available, insert the baffle plates (650) and (652) (R&S FSV4,7).
21. For instruments with Option R&S FSV-9: Connect RF cable W16 (1755) and RF cable W17 (1760).
22. Connect RF cable W6 (630) (R&S FSV13,30,40).
23. Plug in the adapterboard R&S FSV (300).
24. Connect the patch cable (200).
25. If available, mount the options OCXO (1300), additional interfaces (1400) and external generator control (1500) at the rear of the instrument with four screws (735) each.
26. Mount the top cover (700) on the instrument with five screws (705).
27. Mount the housing (750) and adjust it properly to the front unit (405).
28. Mount the rear wall feet (765).

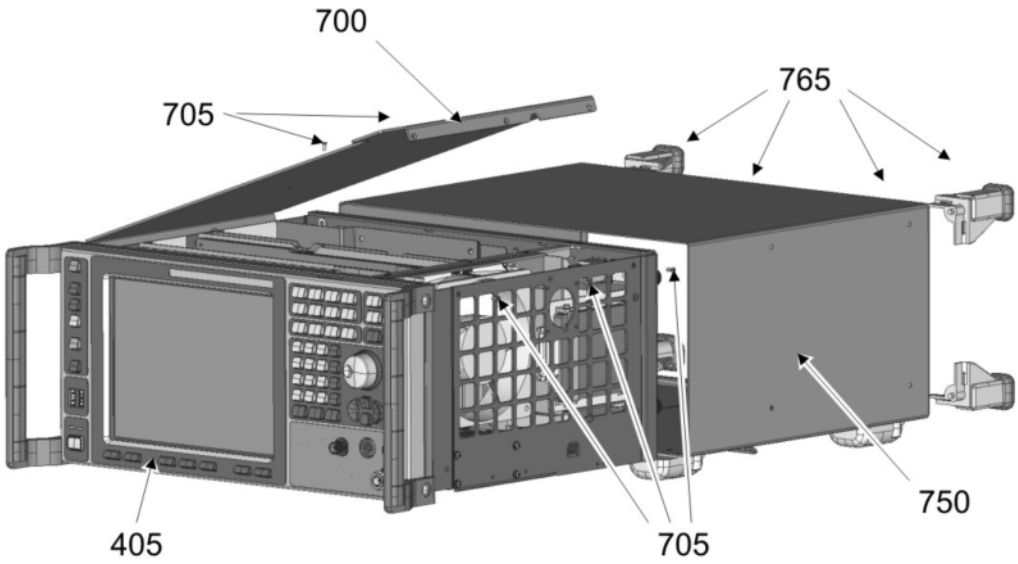
3.4.20.7 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. A backup of the EEPROM files must be made with the aid of a service function.
3. [SETUP : MORE : SERVICE : ENTER PASSWORD : 20122004 ENTER]
4. [SETUP : MORE : SERVICE : SERVICE FUNCTION : 10.0.3 ENTER]
5. Restart the instrument and wait for firmware to come up.
6. After starting the instrument, check hardware info:
   [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
7. Start selftest and check results:
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:
   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
10. Adjust the instrument as described in chapter 2.

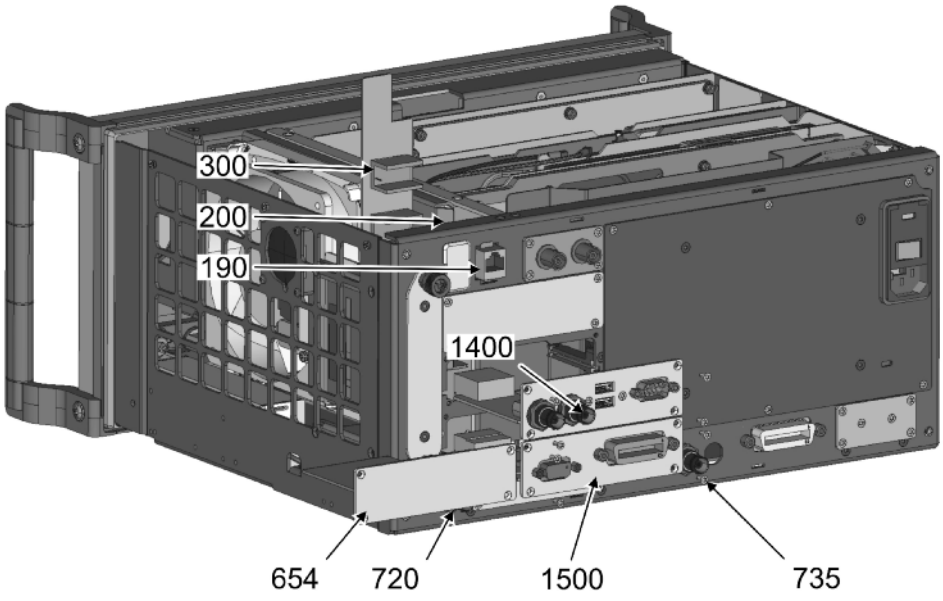
3.4.21 Adapter Board A11

See chapter "5.1 Spare Parts", item 300 and explosion drawing 1307.9002.01 sheet 2.

3.4.21.1 Removing the Adapter Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Unplug the patch cable (200) from the coupler (190) and put it to the left.



6. Unscrew four screws (735) at options additional interfaces (1400) and external generator control (1500), if present and remove them to the rear of the instrument.
7. Carefully remove the adapter board (300) from the motherboard.

3.4.21.2 Installing the New Adapter Board

1. Pull the new adapter board (300) carefully into the motherboard.
2. Connect the patch cable (200) with the coupler (190).
3. If available, mount the options additional interfaces (1400) and external generator control (1500) at the rear of the instrument with four screws (735) each.
4. Mount the top cover (700) on the instrument with five screws (705).
5. Mount the housing (750) and adjust it properly to the front unit(405).
6. Mount the rear wall feet (765).
7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
8. Start selftest and check results:

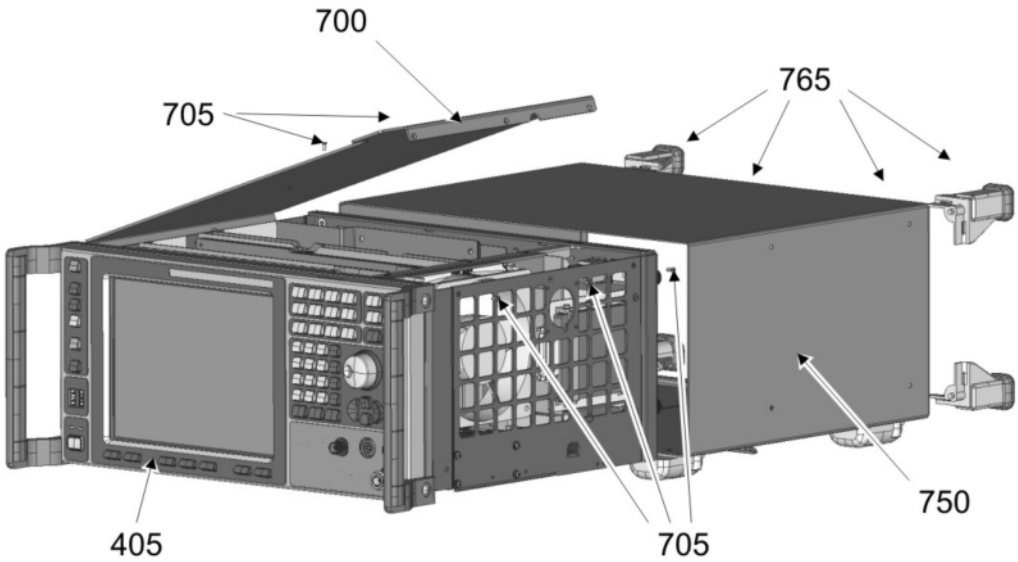
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
9. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.22 MWC Unit A150 (R&S FSV13/30/40)

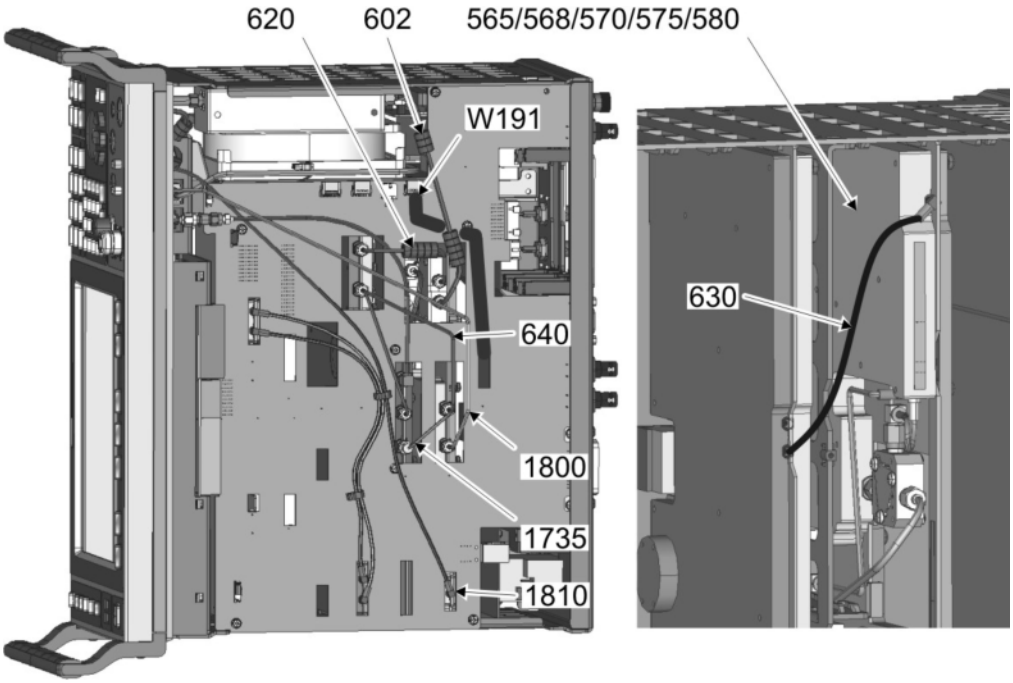
See chapter "5.1 Spare Parts", item 565/568/570/575/580 and explosion drawing 1307.9002.01 sheet 1.

3.4.22.1 Removing the Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).

4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Place the instrument on the right side frame.



6. Disconnect RF cable W6 (630) from the MW converter unit (565/568/570/575/580).
7. Disconnect RF cable W2, RF cable W5 (620) and RF cable W7 (640) (if available) completely.
8. For instruments with Option R&S FSV-B9: Remove RF cable W15 (1735).
9. For instruments with Option R&S FSV-B21: Disconnect RF cable W18 (1800) and RF cable W19 (1810) from the MW Converter Unit (565/570/575/580).
10. For instruments with Option R&S FSV-B24: Disconnect the preamplifier cable W191.
11. Push out the MW converter unit (565/568/570/575/580) to the top side of the instrument.

    Tip: The board can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

3.4.22.2 Installing the New MW Converter Unit

1. Plug the new MW converter unit (565/568/570/575/580) into the instrument and reconnect RF cable W2, RF cable W5 (620), RF cable W7 (640) and RF cable W6 (630), if available.

   Note: Refer to the cable wiring drawing on the motherboard.
2. For instruments with Option R&S FSV-B9: Connect RF cable W15 (1735).
3. For instruments with Option R&S FSV-B21: Connect RF cable W18 (1800) and RF cable W19 (1810) to the MW Converter Unit (565/570/575/580).

4. For instruments with Option R&S FSV-B24: Connect the preamplifier cable W191 to the motherboard.
5. Mount the top cover (700) on the instrument with five screws (705).
6. Mount the housing (750) and adjust it properly to the front unit(405).
7. Mount the rear wall feet (765).
8. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
9. Start selftest and check results:

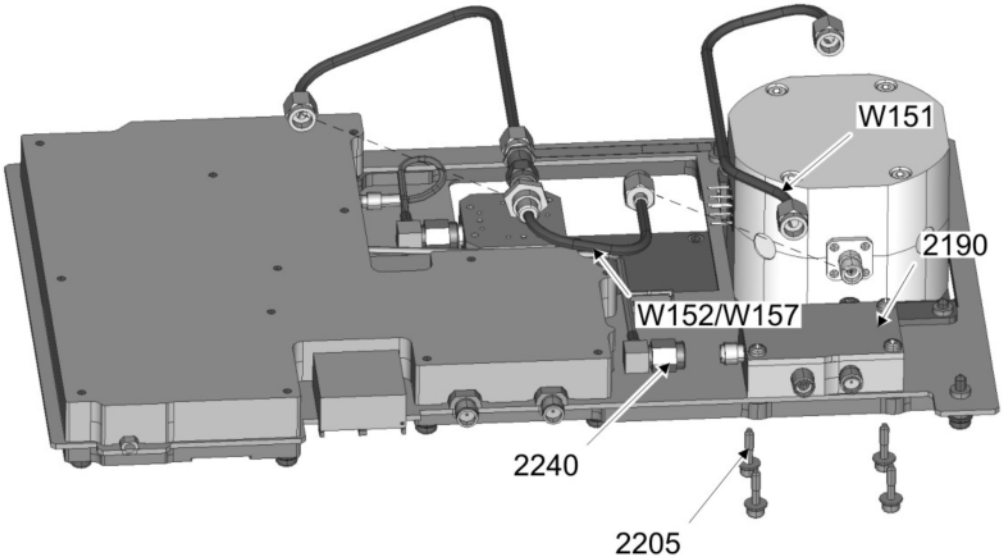
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
10. Start alignment and check the result:

    [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
11. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
12. Adjust the instrument as described in chapter 2.

3.4.23 Diplexer A151 (R&S FSV30/40)

See chapter "5.1 Spare Parts", item 2190 and explosion drawing 1307.9748.01, sheet 1.

3.4.23.1 Opening the Instrument, Removing the Board and Removing the Diplexer



1. Remove the MW converter unit as described in “3.4.22.1 Removing the Board”.
2. Disconnect RF cable W152/W157, W151 completely and RF cable W168 (2240) from the diplexer (2190).

3. Unscrew all screws from the cover (2210) and remove it.
4. Unscrew the two screws (2200) and remove the diplexer (2190).

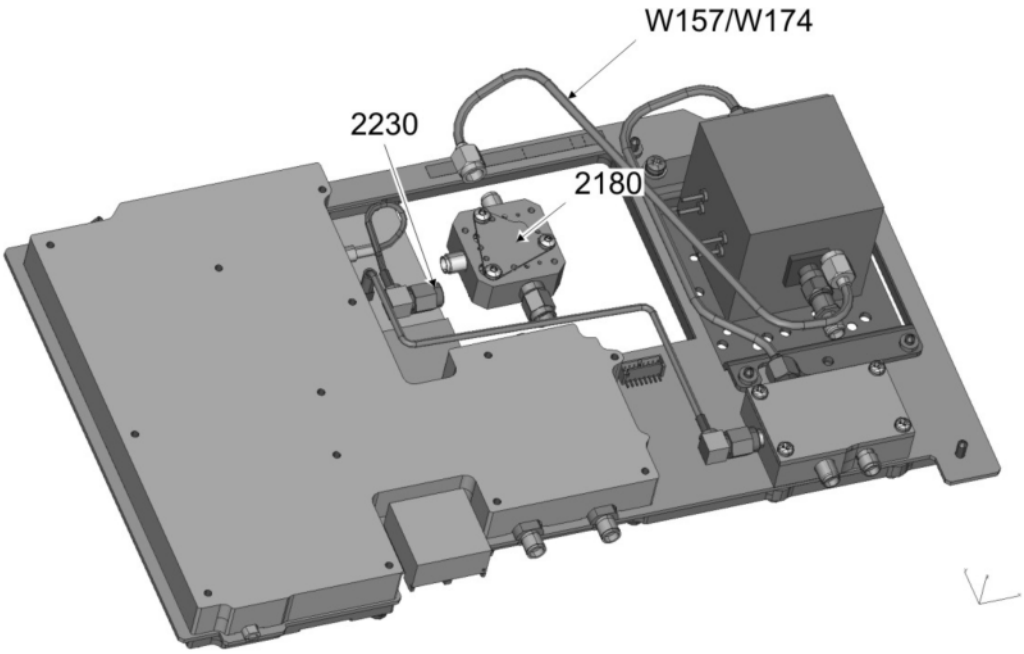
3.4.23.2 Installing the New Diplexer

1. Mount the new diplexer (2190) with two screws (2200).
2. Mount the cover (2210) and fix it with all screws.
3. Reconnect RF cable W15), W152/W157 and RF cable W168 (2240) with the diplexer (2190).
4. Continue with the procedure described in “3.4.22.2 Installing the New MW Converter Unit”.

3.4.24 Mixer A153 (R&S FSV30/40)

See chapter "5.1 Spare Parts", item 2180 and explosion drawing 1307.9748.01, sheet 1.

3.4.24.1 Opening the Instrument, Removing the Board and Removing the Mixer



1. Remove the MW converter unit as described in “3.4.22.1 Removing the Board.
2. Disconnect RF cable W174/W157 completely and RF cable W167 (2230) from the mixer (2180).
3. Unscrew and remove the mixer (2180) from the unit.

3.4.24.2 Installing the New Mixer

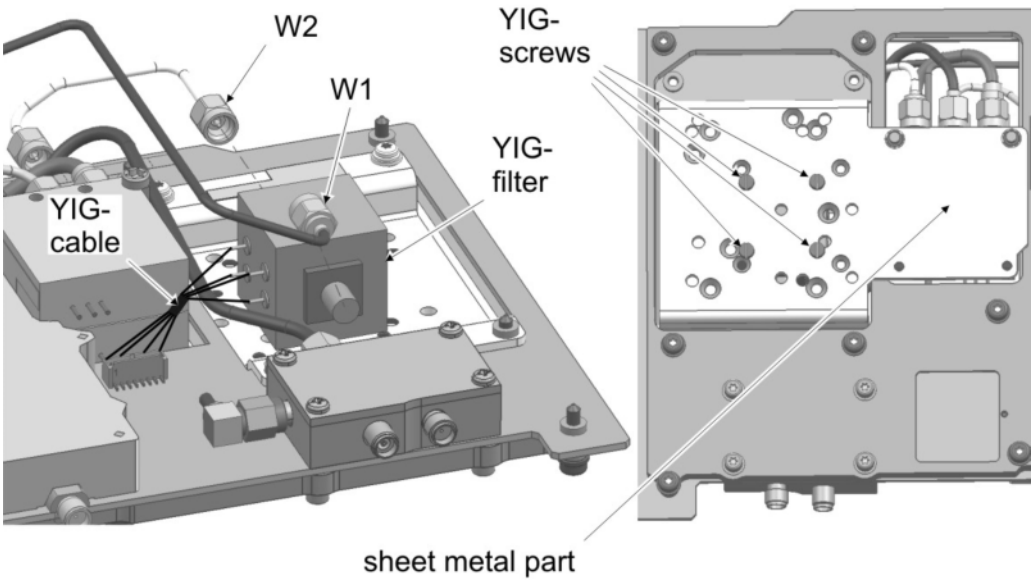
1. Mount the new mixer (2180).
2. Reconnect RF cable W174/W157 and RF cable W167 (2230) with the mixer (2180).
3. Continue with the procedure described in “3.4.22.2 Installing the New MW Converter Unit”.

3.4.25 YIG-Unit

See chapter "5.1 Spare Parts", item 2110/2115/2120/2125/2140/2145 and explosion drawing 1307.9748.01, sheet 1 and 2 for R&S FSV30/40 and item 2010/2015/2020/2025 and explosion drawing 1308.1192.01, sheet 1 and 2 for R&S FSV13.

The YIG Unit includes a sheet metal part on which the YIG filter is mounted. It is not necessary to replace it. How to position and mount the new filter can be seen from the provided unit.

3.4.25.1 Opening the Instrument, Removing the Board and Removing the YIG-Unit



1. Remove the MW converter unit as described in “3.4.22.1 Removing the Board.
2. Remove both RF cables (W1/W2) from the filter completely.
3. Unplug the cable W1 from the connector.
4. Unscrew four YIG screws and remove the filter.

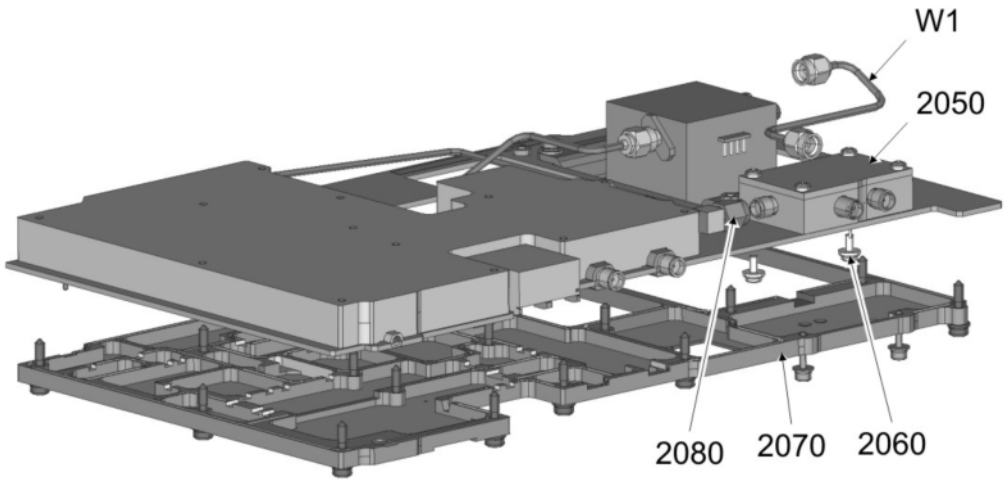
3.4.25.2 Installing the New YIG-Unit

1. Mount the new filter to the sheet metal part. Depending on which filter is provided with your unit use the appropriate screw holes to mount it.
2. Connect the RF cables (W1/W2) to the unit.
3. Connect the YIG cable to the connector.
4. Continue with the procedure described in “3.4.22.2 Installing the New MW Converter Unit”.

3.4.26 Diplexer A151 (R&S FSV13)

See chapter "5.1 Spare Parts", item 2050 and explosion drawing 1308.1192.01.

3.4.26.1 Opening the Instrument, Removing the Board and Removing the Diplexer



1. Remove the MW converter unit as described in “3.4.22.1 Removing the Board".
2. Disconnect RF cable W1 completely and RF cable W168 (2280) from the diplexer (2050).
3. Unscrew all screws from the cover (2070) and remove it.
4. Unscrew the two screws (2060) and remove the diplexer (2050).

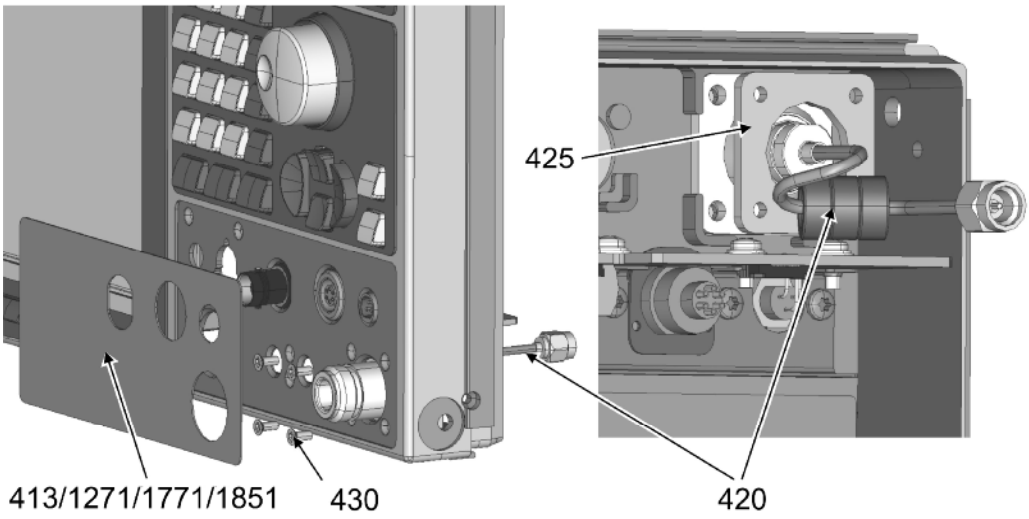
3.4.26.2 Installing the New Diplexer

1. Mount the new diplexer (2050) with two screws (2060).
2. Mount the cover (2070) and fix it with all screws.
3. Reconnect RF cable W1 and RF cable W168 (2280) with the diplexer (2050).
4. Continue with the procedure described in “3.4.22.2 Installing the New MW Converter Unit”.

3.4.27 RF Cable W1 (R&S FSV4/7)

See chapter "5.1 Spare Parts", item 420 and explosion drawing 1307.9002.01 sheet 3.

3.4.27.1 Removing the RF Cable



1. Open the instrument as described in chapter 3.2.1.
2. For instruments **without** option R&S FSV-B160 installed: Unmount the front unit as described in 3.2.2.
3. Remove the label R&S FSV connector (413/1271/1771/1851).
4. Unscrew four screws (430).
5. Remove the RF cable W1 carefully.
6. Disassemble the mounting plate (425) from the RF cable W1.

3.4.27.2 Installing the New RF Cable W1 and Putting into Operation

1. Mount the new RF cable W1 and the mounting plate (425) with four screws (430) to the front unit.
2. For instruments **with** option R&S FSV-B160 installed: connect RF cable W1 to the calibration signal relay.
3. Place the label R&S FSV connector (413/1271/1771/1851) on the front unit.
4. For instruments **without** R&S FSV-B160 installed: Mount the front unit as described in chapter 3.3.1.
5. Complete the instrument as described in chapter 3.3.2.
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. Start selftest and check results:

[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

8. Start alignment and check the result:

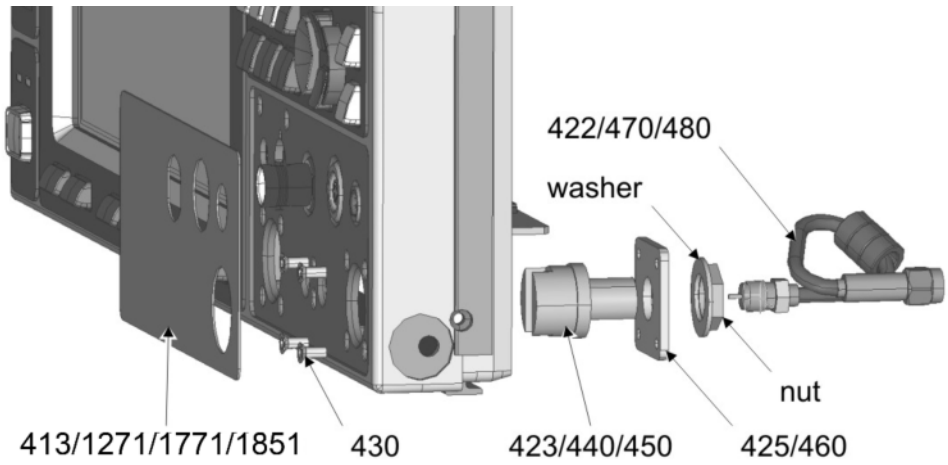
   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

9. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
10. Adjust the instrument as described in chapter 2.
11. Adjust the instrument as described in chapter 1.1.

3.4.28 Adaptor (R&S FSV13/30/40)

See chapter "5.1 Spare Parts", item 423/440/450 and explosion drawing 1307.9002.01 sheet 3.

3.4.28.1 Removing the Adaptor



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Remove the label R&S FSV connector (413/1271/1771/1851).
4. Unscrew four screws (430).
5. Remove the adaptor (423/440/450) together with the mounting plate (425/460) and the RF cable W1 (422/470/480).
6. Disassemble the RF cable W1 (422/470/480) from the adaptor (423/440/450).
7. Unscrew the nut and disassemble the washer and the mounting plate (425/460) from the adaptor (423/440/450).

3.4.28.2 Installing the New Adaptor and Putting into Operation

1. Assemble the new adaptor (423/440/450) together with the mounting plate (425/460), the washer, nut and the RF cable W1 (422/470/480).
2. Mount the adaptor (423/440/450) with four screws (430) to the front unit.
3. Place the label R&S FSV connector (413/1271/1771/1851) on the front unit.
4. Mount the front unit as described in chapter 3.3.1.
5. Complete the instrument as described in chapter 3.3.2.
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:

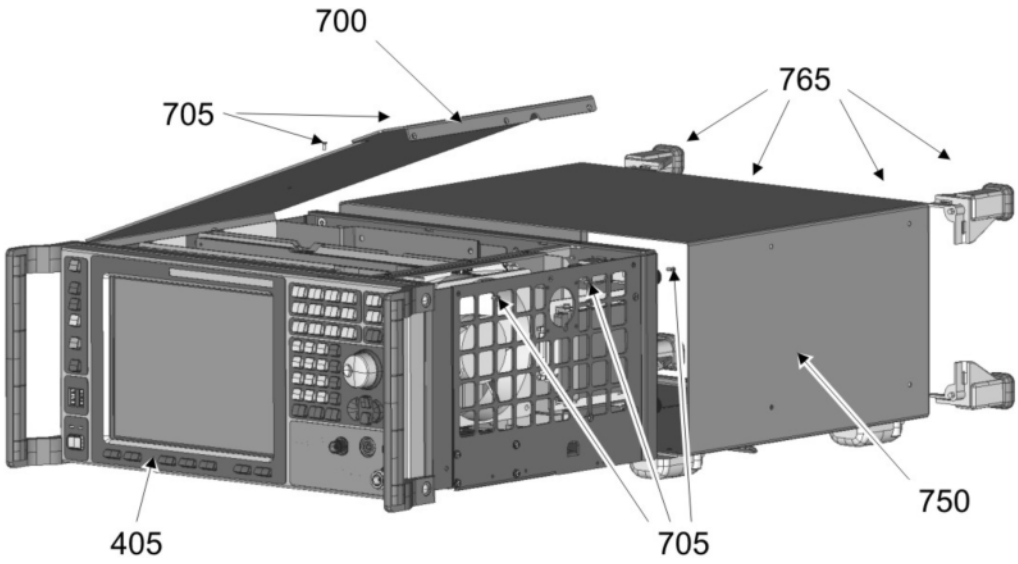
   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
10. Adjust the instrument as described in chapter 2.

3.4.29 Speaker B1

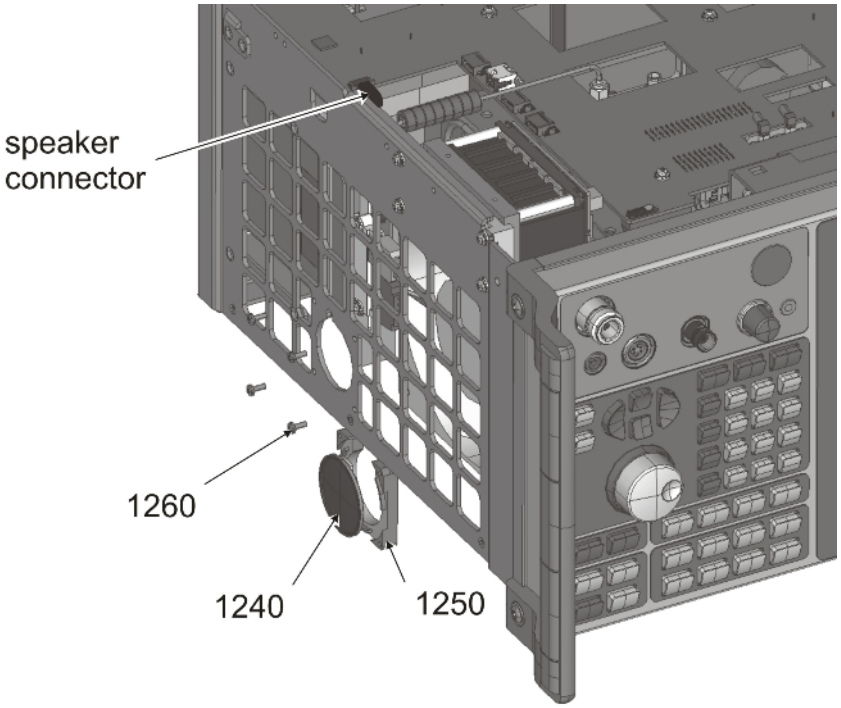
See chapter "5.1 Spare Parts", item 1240 and explosion drawing 1310.9700.00 sheet 1.

The speaker is installed on the right side of the instrument.

3.4.29.1 Removing the Speaker



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Unplug the speaker connector from motherboard.



6. Unscrew the four screws (1260).
7. Remove the holder (1250) together with the speaker (1240).
8. Pull the speaker (1240) out of the holder (1250)

3.4.29.2 Installing the New Speaker

1. Pull the new speaker (1240) carefully into the holder (1250).
2. Mount the holder (1250) with four screws (1260) on the frame.
3. Connect the speaker with the motherboard.

   Note: Refer to the cable wiring drawing on the motherboard.
4. Mount the top cover (700) on the instrument with five screws (705).
5. Mount the housing (750) and adjust it properly to the front unit(405).
6. Mount the rear wall feet (765).
7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
8. Start selftest and check results:

[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

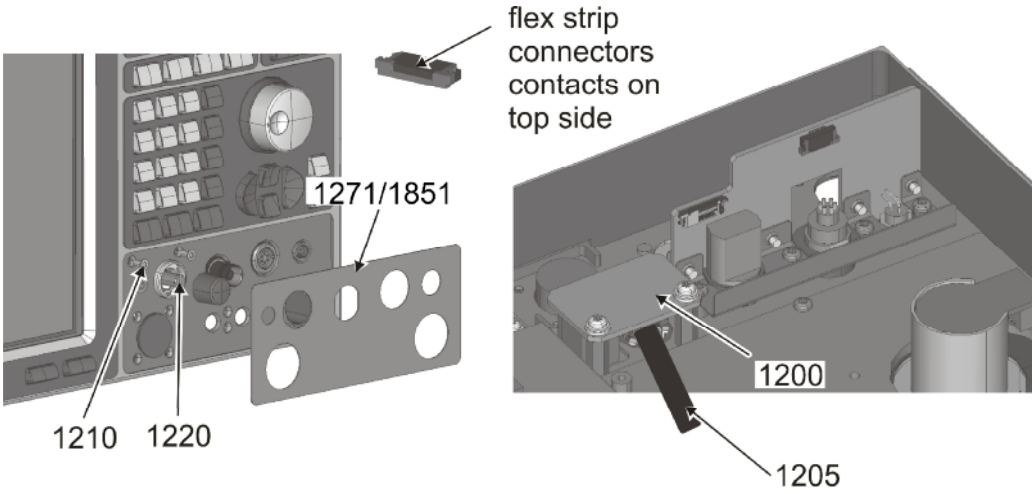
9. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.30 AF Output A71

See chapter "5.1 Spare Parts", item 1200, and explosion drawing 1310.9700.00.

3.4.30.1 Removing the AF Output



1. Open the instrument as described in chapter 3.2.1.
2. Unmount the front unit as described in chapter 3.2.2.
3. Remove the label R&S FSV connector (1271/1851).
4. Remove the knob (1220).
5. Unscrew two screws (1210).
6. Remove the AF output (1200) carefully.
7. Disconnect flex-strip (1205) from the AF output (1200).

3.4.30.2 Installing the New AF Output

1. Connect the flex-strip (1205) to the new AF output (1200).

   Note: The flex strip connector contacts are on the top of the device.
2. Mount the new AF output (1200) with two screws (1210) to the front unit.
3. Place the label R&S FSV connector (1271/1851) on the front unit.
4. Assemble the knob (1220).
5. Mount the front unit as described in chapter 3.3.1.

6. Complete the instrument as described in chapter 3.3.2.

3.4.30.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:

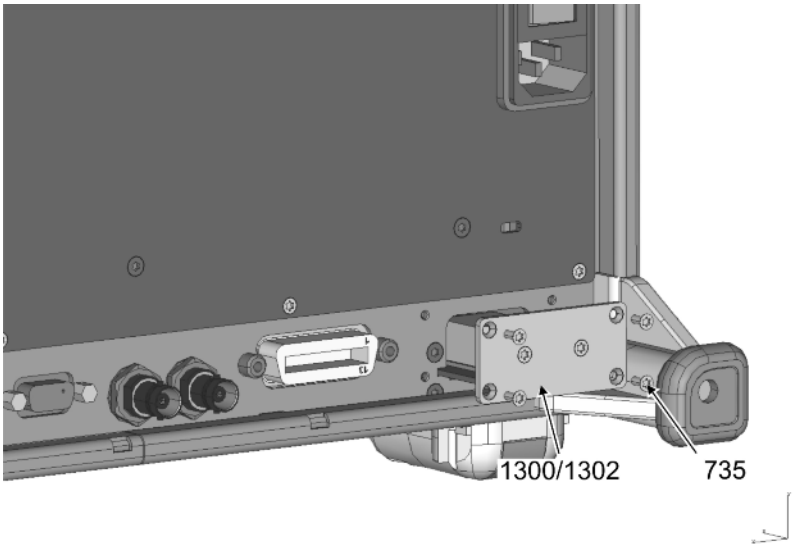
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
3. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
4. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
5. Adjust the instrument as described in chapter 2.

3.4.31 OCXO A250

See chapter "5.1 Spare Parts", item 1300/1302, and explosion drawing 1310.9716.00.

3.4.31.1 Removing the OCXO



1. Unscrew four screws (735).
2. Carefully remove the OCXO (1300/1302).

3.4.31.2 Installing the New OCXO and Putting into Operation

1. Insert the new OCXO (1300/1302) carefully and mount it with four screws (735).

2. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
3. Start selftest and check results:

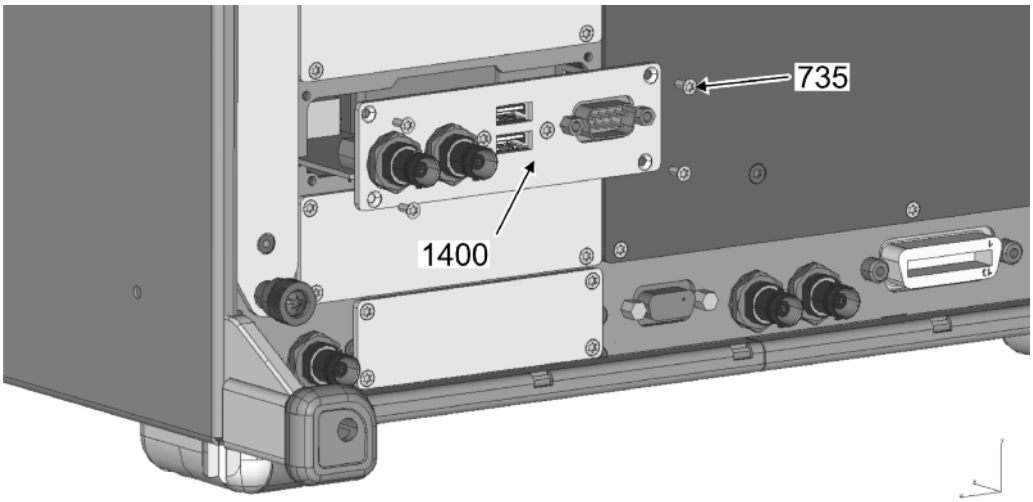
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.32 Additional Interface A220

See chapter "5.1 Spare Parts", item 1400, and explosion drawing 1310.9716.00.

3.4.32.1 Removing the Additional Interface



1. Unscrew four screws (735).
2. Carefully remove the additional interface (1400).

3.4.32.2 Installing the New Additional Interface and Putting into Operation

1. Insert the new additional interface (1400) carefully and mount it with four screws (735).
2. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
3. Start selftest and check results:

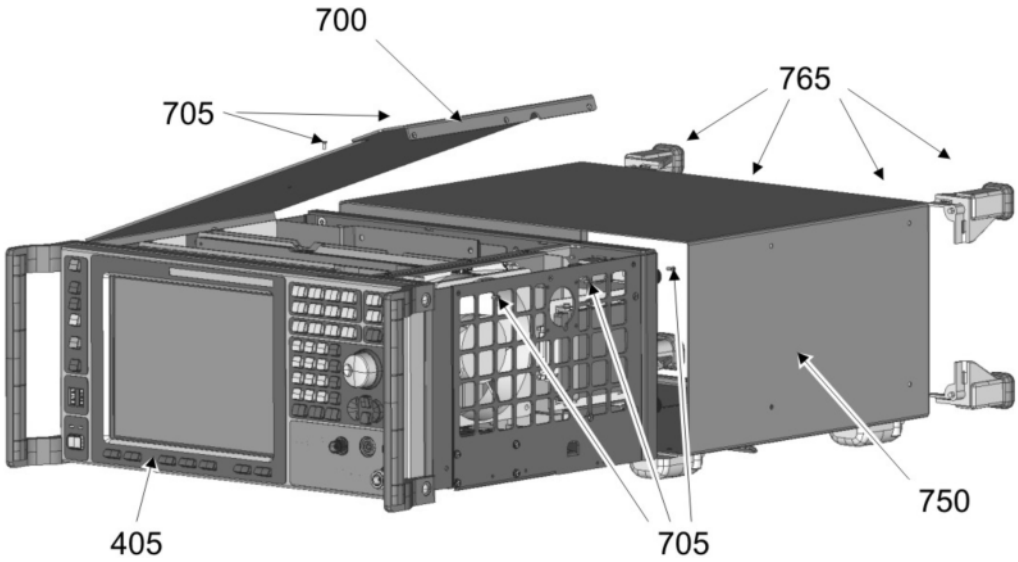
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

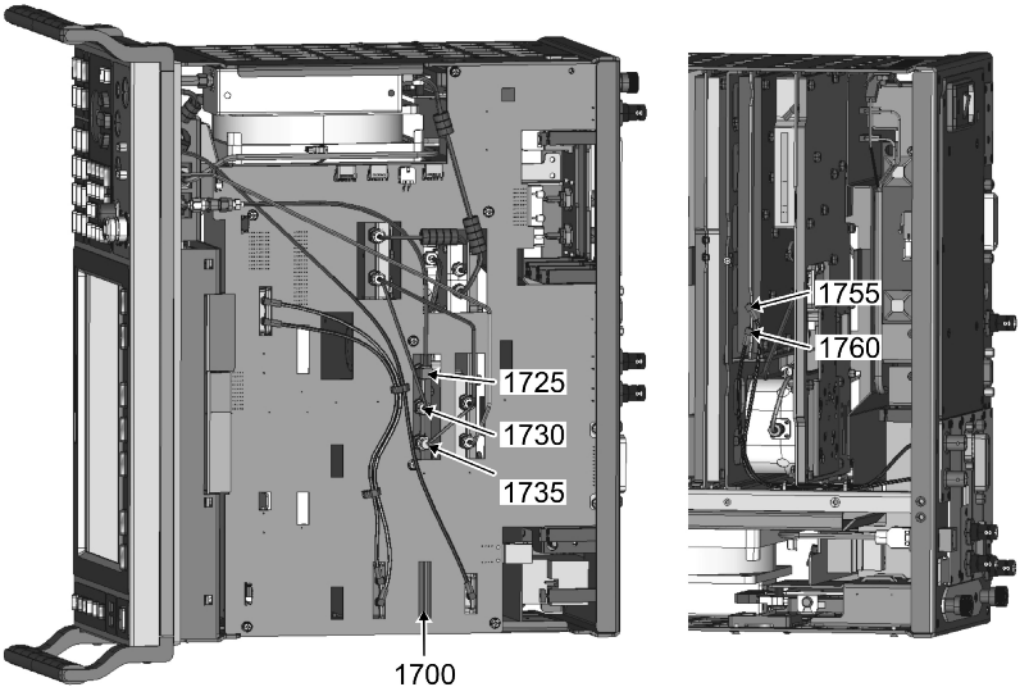
3.4.33 Tracking Generator A140

See chapter "5.1 Spare Parts", item 1700, and explosion drawing 1310.9774.00.

3.4.33.1 Removing the Tracking Generator



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.



5. Disconnect RF cable W13-2 (1725), RF cable W14 (1730), RF cable W16 (1755), RF cable W17 (1760) and if available RF cable W15 (1735) from the tracking generator (1700).
6. Carefully push out the tracking generator (1700).

3.4.33.2 Installing the New Tracking Generator and Putting into Operation

1. Insert the new tracking generator (1700) carefully.
2. Connect RF cable W13-2 (1725), RF cable W14 (1730), RF cable W16 (1755), RF cable W17 (1760) and if available RF cable W15 (1735) to the tracking generator (1700).
3. Mount the top cover (700) on the instrument with five screws (705).
4. Mount the housing (750) and adjust it properly to the front unit (405).
5. Mount the rear wall feet (765).
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. Start selftest and check results:

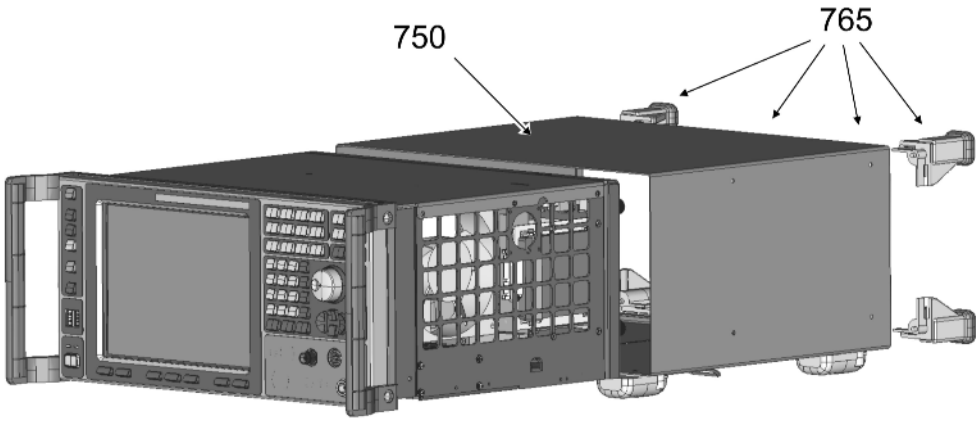
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
10. Adjust the instrument as described in chapter 2.

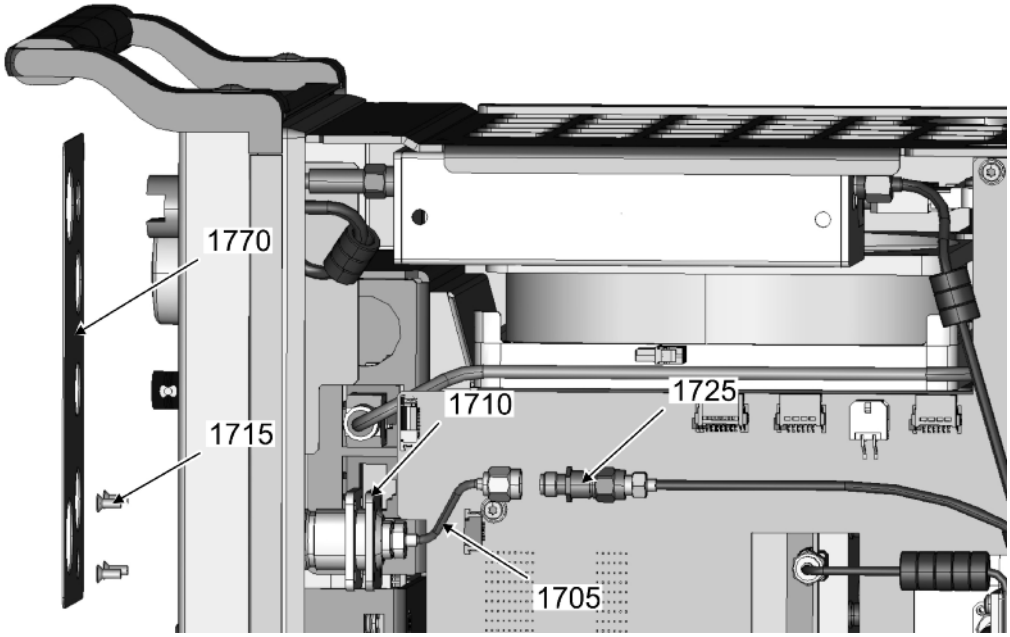
3.4.34 RF Cable W13

See chapter "5.1 Spare Parts", item 1705, and explosion drawing 1310.9774.00.

3.4.34.1 Removing the RF Cable W13



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).



4. Carefully remove the label R&S FSV connector (1771).
5. Disconnect RF cable W13-2 (1725) from RF cable W13 (1705).
6. Unscrew and remove four screws (1715).
7. Remove the RF cable W13 (1705) and disassemble the mounting plate (1710).

3.4.34.2 Installing the New RF Cable W13 and Putting into Operation

1. Insert the new RF cable W13 (1705) together with the mounting plate (1710).

2. Mount the RF cable W13 (1705) with four screws (1715).
3. Carefully connect RF cable W13-2 (1725) to RF cable W13 (1705).
4. Mount the housing (750) and adjust it properly to the front unit (405).
5. Mount the rear wall feet (765).
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. Start selftest and check results:

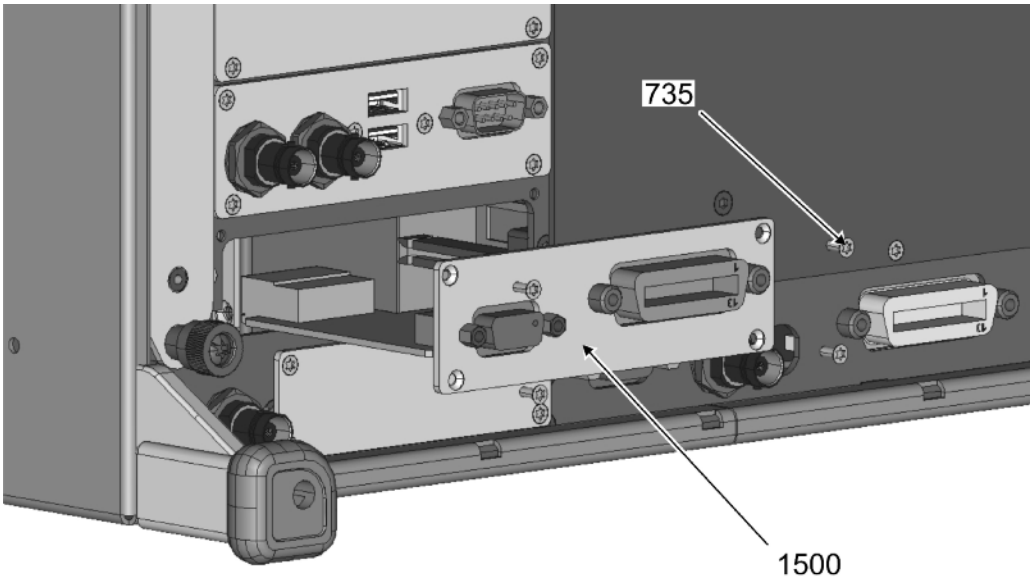
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
10. Adjust the instrument as described in chapter 2.

3.4.35 Ext. Generator Control A230

See chapter "5.1 Spare Parts", item 1500, and explosion drawing 1310.9716.00.

3.4.35.1 Removing the Ext. Generator Control



1. Unscrew four screws (735).
2. Carefully remove the ext. generator control (1500).

3.4.35.2 Installing the New Ext. Generator Control and Putting into Operation

1. Insert the new ext. generator control (1500) carefully and mount it with four screws (735).
2. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
3. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.35.3 Functional Check

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Connect a generator, e.g. R&S SMU200A, with the R&S FSV via IEC/IEEE-bus cable (IEC2 interface) and a TTL cable (AUX CONTROL interface). Connect the generator output with the RF input.
3. Analyzer settings:

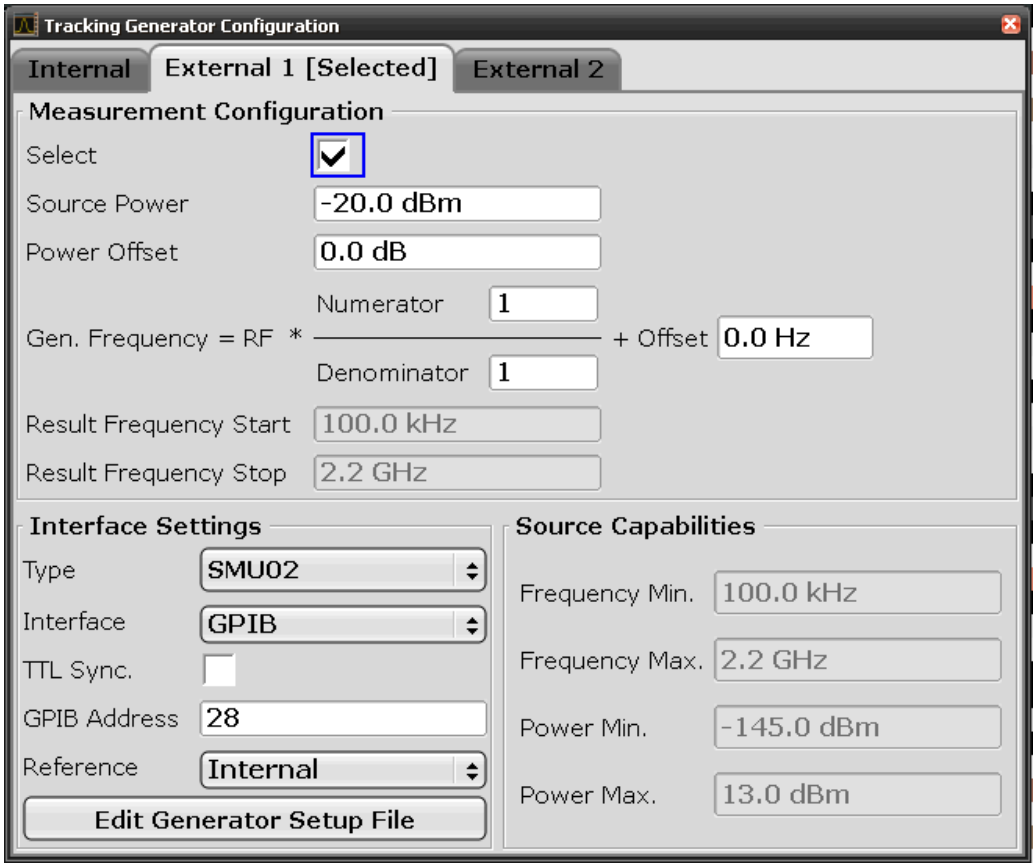
   [PRESET]

   [FREQ : CENTER : 100 MHz]

   [FREQ : SPAN : 10 MHz]
4. Configure the generator:

   [INPUT/OUTPUT : TRACKING GENERATOR : SOURCE CONFIG]

   Enter the source power, select the generator type and interface, and activate TTL sync.



5. Activate the generator:

   [INPUT/OUTPUT : TRACKING GENERATOR : SOURCE RF ON]

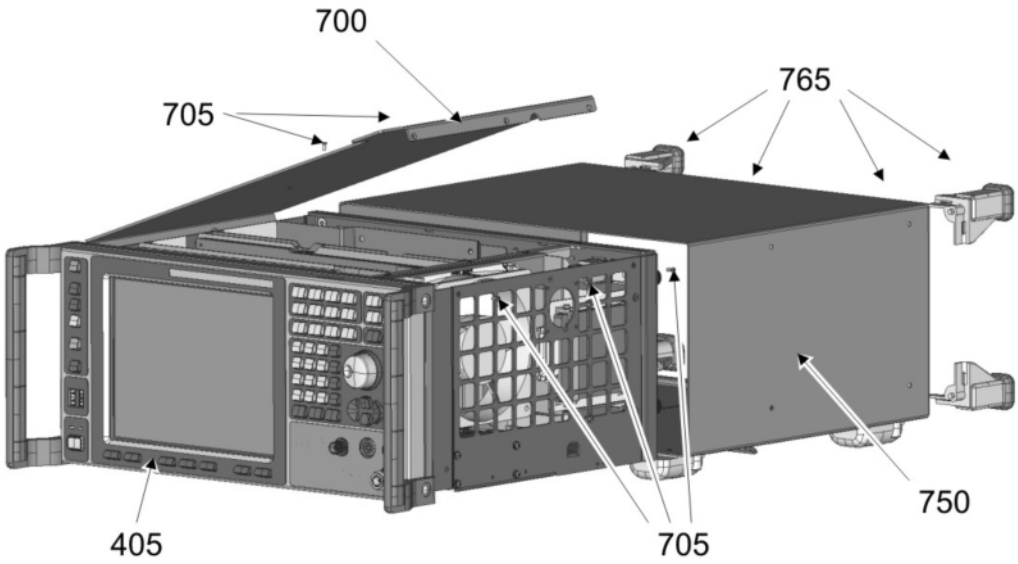
6. Check the displayed level:

   The resulting trace is displayed as a horizontal line at -20 dBm.

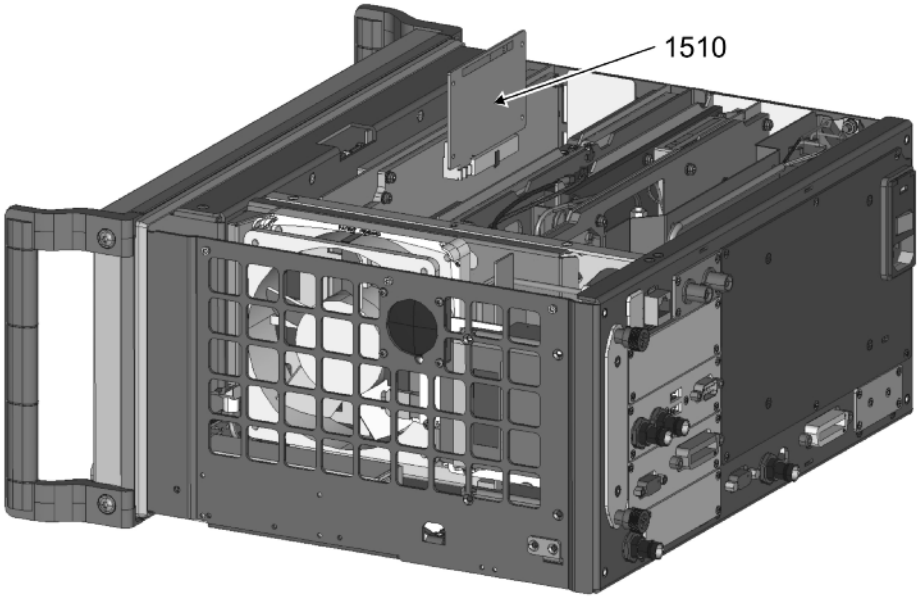
3.4.36 IEC-Bus Control A210

See chapter "5.1 Spare Parts", item 1510, and explosion drawing 1310.9716.00.

3.4.36.1 Removing the IEC-Bus Control



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.



5. Remove the IEC-bus control (1510) from the instrument.

3.4.36.2 Installing the New IEC-Bus Control and Putting into Operation

1. Insert the new IEC-bus control (1510) carefully.
2. Mount the top cover (700) on the instrument with five screws (705).

3. Mount the housing (750) and adjust it properly to the front unit (405).
4. Mount the rear wall feet (765).
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. Start selftest and check results:

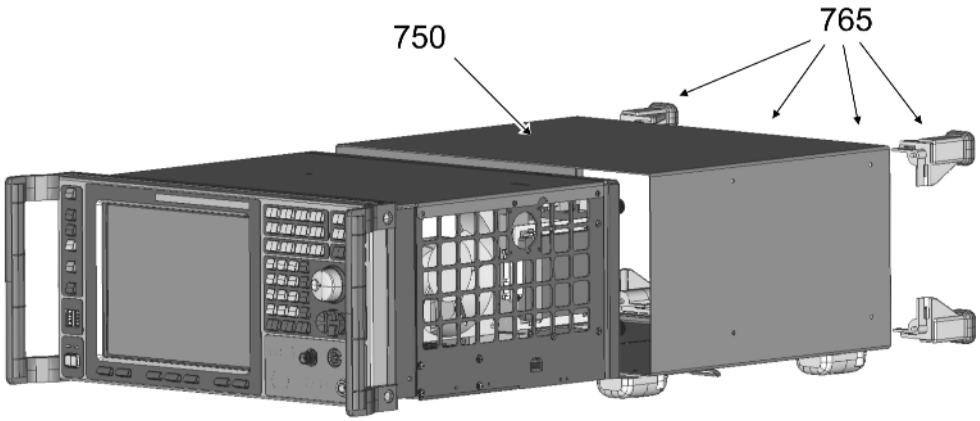
   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
7. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

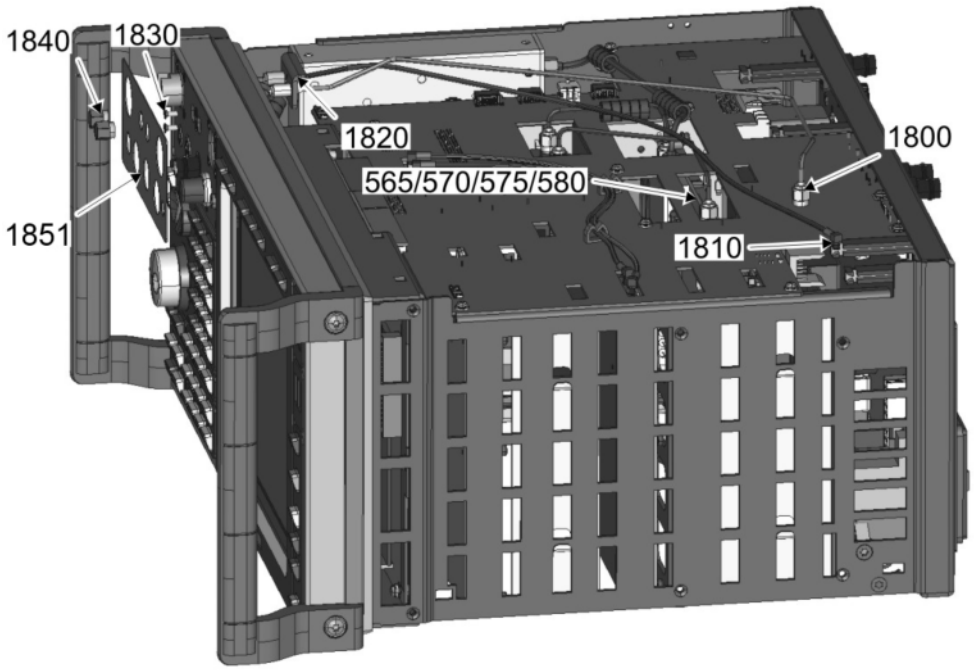
3.4.37 RF Cable W18 and RF Cable W19

See chapter "5.1 Spare Parts", item 1800/1810 and explosion drawing 1308.1963.00.

3.4.37.1 Removing the RF Cable W18/19



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).



4. Disconnect RF cable W18 (1800) and W19 (1810) from the MW converter unit (565/570/575/580).
5. Remove two protection caps (1840).
6. Remove the label R&S FSV connector (1851).
7. Unscrew and remove two screws (1830).
8. Carefully remove RF cable W18 (1800) and RF cable W19 (1810) together with the holder (1820) from the instrument.
9. Disassemble RF cable W18 (1800) or RF cable W19 (1810) from the holder (1820).

3.4.37.2 Installing the New RF Cable W18/W19 and Putting into Operation

1. Mount the new RF cable W18 (1800) or RF cable W19 (1810) on the holder (1820).
2. Carefully put both cables with the holder into the instrument and fix it with two screws (1830).
3. Connect the RF cables to the MW converter unit (565/570/575/580).
4. Assemble the label R&S FSV connector (1851) and two protection caps (1840).
5. Mount the housing (750) and adjust it properly to the front unit(405).
6. Mount the rear wall feet (765).
7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

8. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

9. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

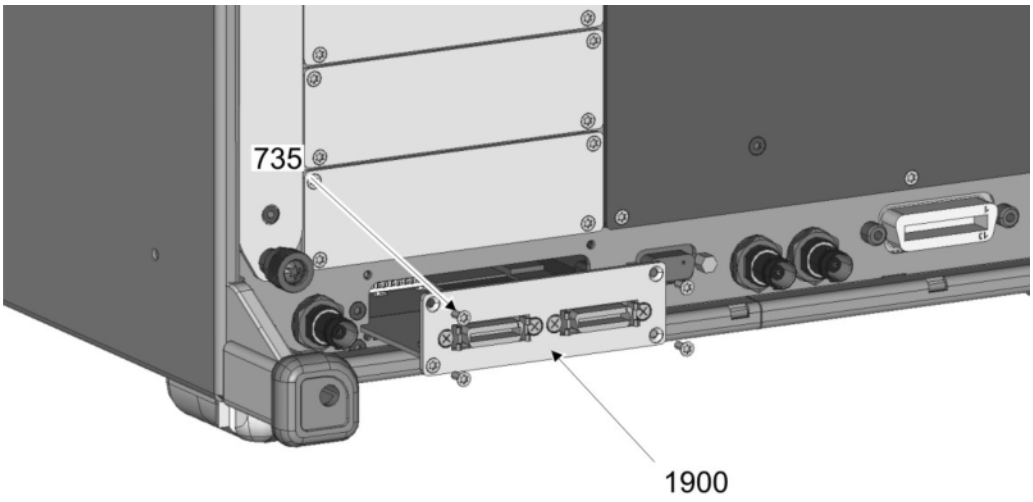
10. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.

11. Adjust the instrument as described in chapter 2.

3.4.38 Digital I/Q LVDS A240

See chapter "5.1 Spare Parts", item 1900, and explosion drawing 1310.9716.00.

3.4.38.1 Removing the Digital I/Q LVDS



1. Unscrew four screws (735).
2. Carefully remove the additional interface (1900).

3.4.38.2 Installing the New Digital I/Q LVDS and Putting into Operation

1. Insert the new digital I/Q LVDS (1900) carefully and mount it with four screws (735).
2. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
3. Connect the digital baseband output with the digital baseband input via LVDS cable R&S®SMU-Z6 (stock number 1415.0201.02).
4. Activate the B17 selftest:

   [SETUP : MORE : SERVICE : PASSWORD : 894129]

[SETUP : MORE : SERVICE : SERVICE FUNKTION 2.13.0.1]

5. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

6. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

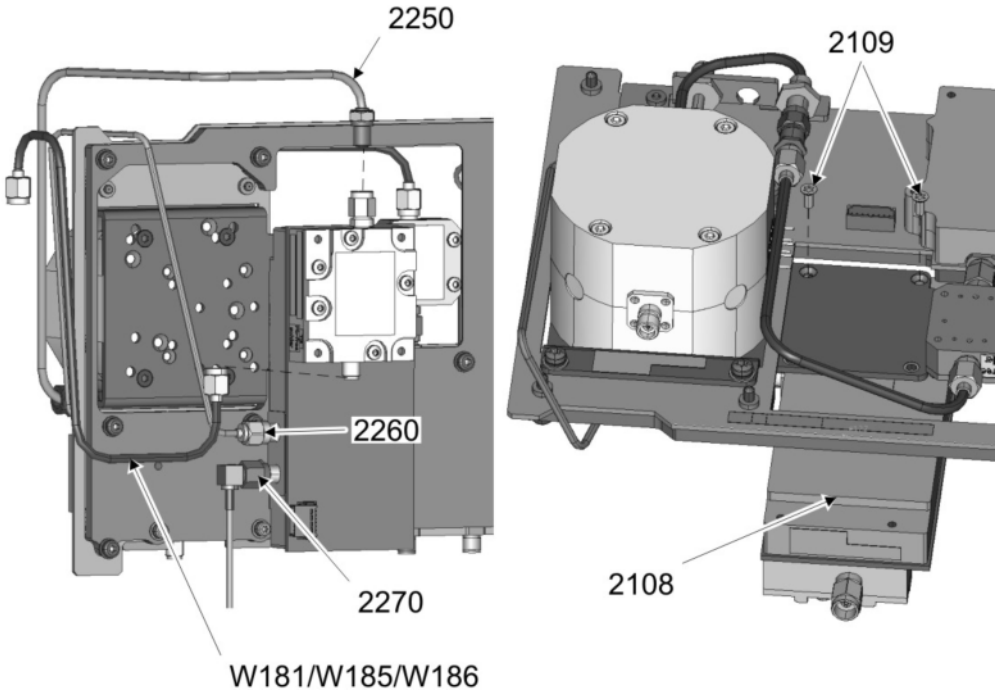
7. Deactivate the B17 selftest:

   [SETUP : MORE : SERVICE : SERVICE FUNKTION 2.13.0.0]

3.4.39 Preamplifier Unit (R&S FSV13/30/40)

See chapter "5.1 Spare Parts", item 2108 and explosion drawing 1307.9748.01 sheet 2.

3.4.39.1 Removing the Board and the Preamplifier Unit



1. Remove the MW converter unit as described in "3.4.22.1Removing the Board".
2. Remove RF cable W181/W185/W186 and RF cable W180 (2250) completely from the board.
3. Disconnect RF cable W190 (2270) and RF cable W184 (2260) from the preamplifier unit (2108).
4. Unscrew and remove two screws (2109).
5. Remove the preamplifier unit (2108) from the board.

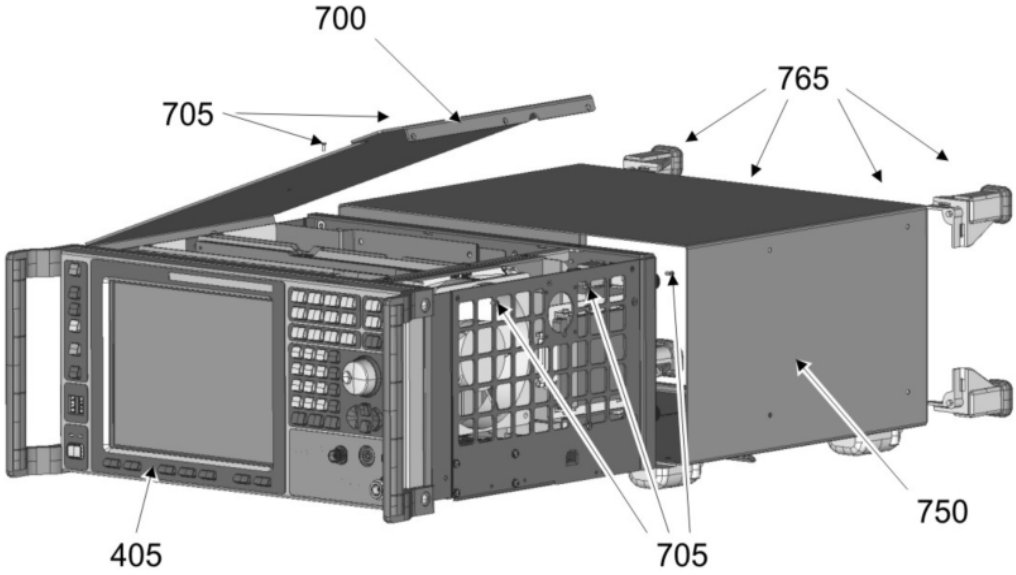
3.4.39.2 Installing the New Preamplifier Unit

1. Mount the new preamplifier unit (2108) with two screws (2109).
2. Assemble RF cable W181/W185/W186 and RF cable W180 (2250).
3. Connect RF cable W190 (2270) and RF cable W184 (2260).
4. Continue with the procedure described in “3.4.22.2 Installing the New MW Converter Unit”.

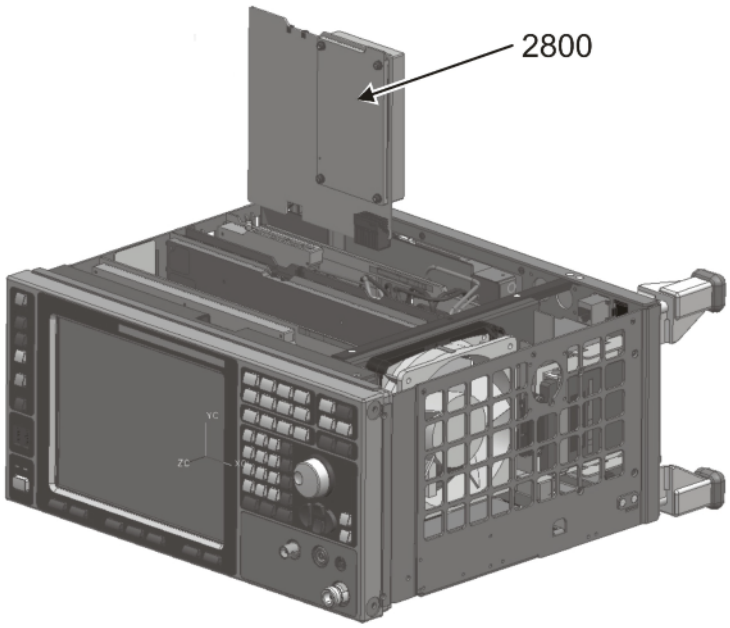
3.4.40 Ultra High Precision Ref A160

See chapter "5.1 Spare Parts", item 2800

3.4.40.1 Removing the Ultra High Precision Ref



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.



5. Remove the Ultra High Precision Ref (2800) from the instrument.

3.4.40.2 Installing the New Ultra High Precision Ref and Putting into Operation

1. Insert the new Ultra High Precision Ref (2800) carefully.
2. Mount the top cover (700) on the instrument with five screws (705).
3. Mount the housing (750) and adjust it properly to the front unit (405).
4. Mount the rear wall feet (765).
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
7. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

3.4.40.3 Functional Test for Option Ultra High Precision Ref R&S FSV-B14

1. Connect the instrument to the mains and switch on its power switch. The instrument is now in standby mode.
2. After starting the instrument, check hardware info if R&S FSV-B14 is recognized:

   [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
3. Start selftest and check results:

[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

4. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]

5. Change to analyzer firmware and enter the service password:

   [SETUP : MORE : SERVICE : PASSWORD : 894129]

6. Enter service function to enable USB access to R&S FSV-B14:

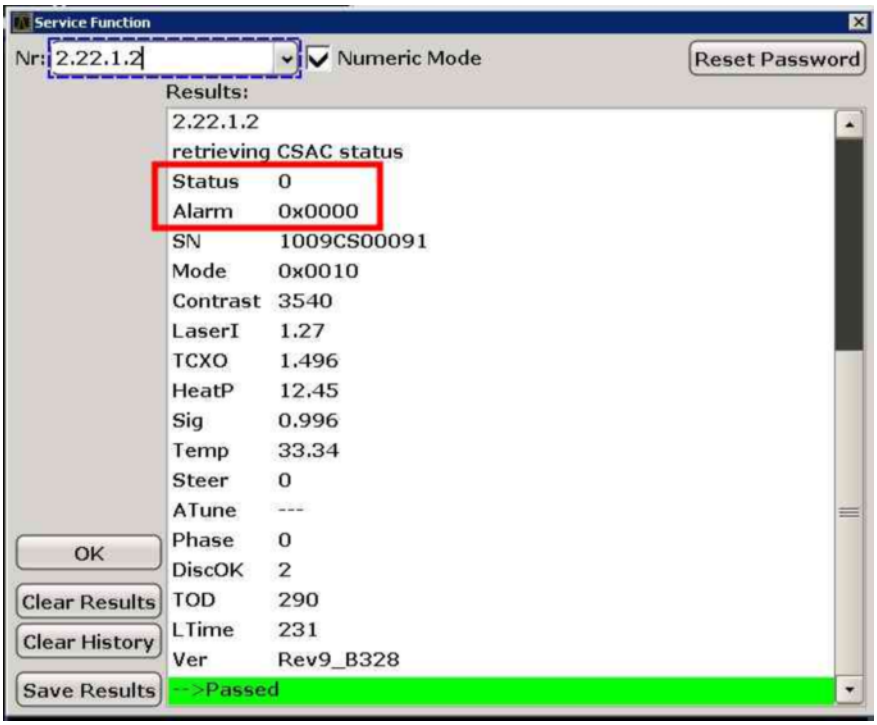
   [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.22.1.0.1]

7. Wait for about 30s.

8. Enter service function to get status info of R&S FSV-B14:

   [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.22.1.2]

9. Evaluate the result of the former service function:



The marked entries in the picture above must be as shown. All other values may differ to the picture shown. This is no malfunction of R&S FSV-B14.

10. Enter service function to disable USB access to R&S FSV-B14:

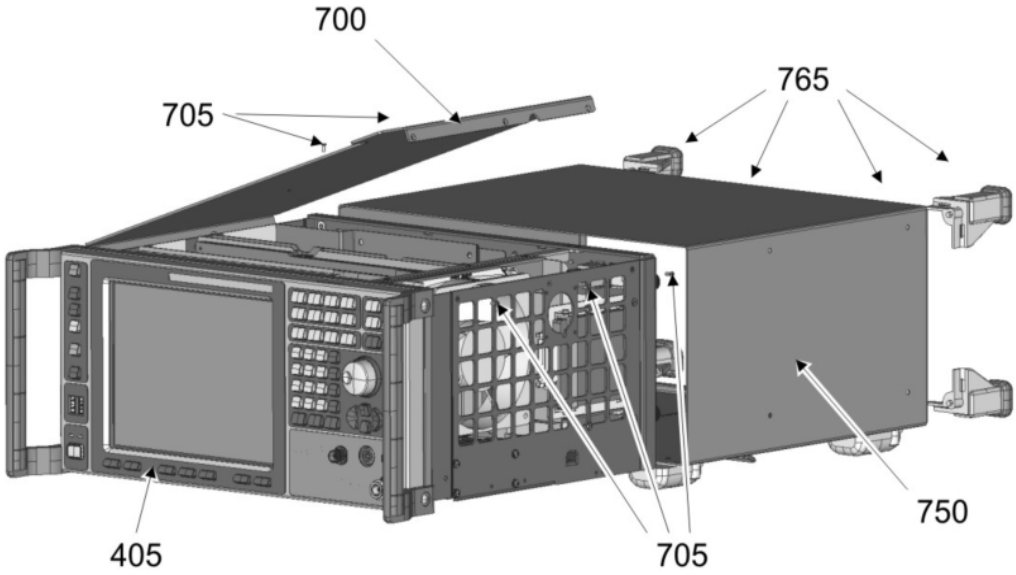
    [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.22.1.0.0]

11. Adjust the instrument, if necessary, according to chapter 2 of service manual.

12. Check performance of instrument according to performance test in chapter 1 of service manual

3.4.41 Bandwidth Extension R&S FSV-B160

3.4.41.1 Removing the Bandwidth Extension Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove the cover.
5. Disconnect the calibration signal cable W100 at the top of the bandwidth extension board. The attenuator must remain on the cable!
6. Disconnect the relay control cable at the bandwidth extension board.
7. Disconnect the IF cable on the top of the board.
8. Remove the bandwidth extension board from the instrument.

3.4.41.2 Installing the new Bandwidth Extension Board and Putting into Operation

1. Insert the new bandwidth extension board carefully.
2. Reconnect all cables formerly removed.
3. Mount the top cover (700) on the instrument with five screws (705).
4. Mount the housing (750) and adjust it properly to the front unit (405).
5. Mount the rear wall feet (765).
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. Check the hardware info whether the new board is recognized by the firmware by checking the serial number:

[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]

8. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

9. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS

3.4.41.3 Removing the calibration signal relay FSV

1. Open the instrument as described in 3.2.1
2. Remove the attenuator unit as described in 3.4.18.1 for FSV4/7 or 3.4.19.1 for FSV13/30/40
3. Disconnect the cable W2 for FSV4/7 or W301 for FSV13/30/40
4. Unscrew the two screws fastening the relay

3.4.41.4 Installing the new calibration signal relay and Putting into Operation

1. Reinstall the new relay to the holder by fastening the two screws formerly removed
2. Reinstall the cable formerly removed
3. Reinstall the attenuator unit to the instrument as described in 3.4.18.2 for FSV4/7 or 3.4.19.2 for FSV13/30/40
4. Complete the instrument as described in 3.3.2.
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. Start selftest and check results:

   [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]

7. Start alignment and check the result:

   [SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS

8. Perform a frequency response correction using the correction software. Further information can be found in chapter 2.4 Frequency Response Correction.
9. Adjust the instrument as described in chapter 2.

3.4.42 Li-Ion Battery Pack R&S FSV-B32

See chapter "5.1 Spare Parts", item , and drawing 1321.3750.01 sheet 2 and 3.

3.4.42.1 Removing the Battery Pack Board

1. Remove all batteries from battery pack.

2. Unscrew six screws (160) in the cover (150) and remove the cover.
3. Disconnect the power supply cable (130) at X7, X8 and the switch cable (120) at X6.
4. Unsrew two screws (140) at the rear panel.
5. Remove the power supply cable (130).
6. Remove the rocker switch with cable (120).
7. Unscrew seven screws (50) and remove the battery pack board (40).
8. Remove four thermal gap pads (30).

3.4.42.2 Installing the new Battery Pack Board and Putting into Operation

1. Place four new thermal gap pads (30).
2. Insert the new battery pack board (40) carefully.
3. Mount the board with seven screws (50).
4. Mount the power supply cable (130) and rocker switch with cable (120).
5. Reconnect all cables formerly removed.
6. Mount the over (150) with six screws (160).
7. Insert the batteries.
8. Connect the battery pack to the DC supply R&S FSV-B30.
9. Connect the mains output of the DC power supply to the instrument.
10. Switch on the battery pack, DC supply and instrument power switch and switch on the instrument with the ON/OFF key.
11. Check if the instrument starts up.

3.5 Troubleshooting

Malfunctions may have simple causes but also may be caused by faulty components.

These troubleshooting instructions enable you to locate error causes down to board level and make the instrument ready for use again by means of board replacement.

We recommend that the instrument be shipped to our experts in the service centers (see address list) for module replacement and further error elimination.

WARNING

Shock hazard

Before opening the casing, 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!

NOTICE

Risk of damage to the boards

Be careful not to cause short circuits when measuring voltages at pins placed close together!

Utilities provided in the R&S FSV for diagnostic purposes:

- Permanent monitoring of levels and frequencies in the instrument
- Self test
- System error correction

Frequent cause of problems: connections

When problems occur, first check whether any cables, plug-in connections of boards, etc are damaged and whether they are connected properly.

3.5.1 Measuring Equipment and Accessories

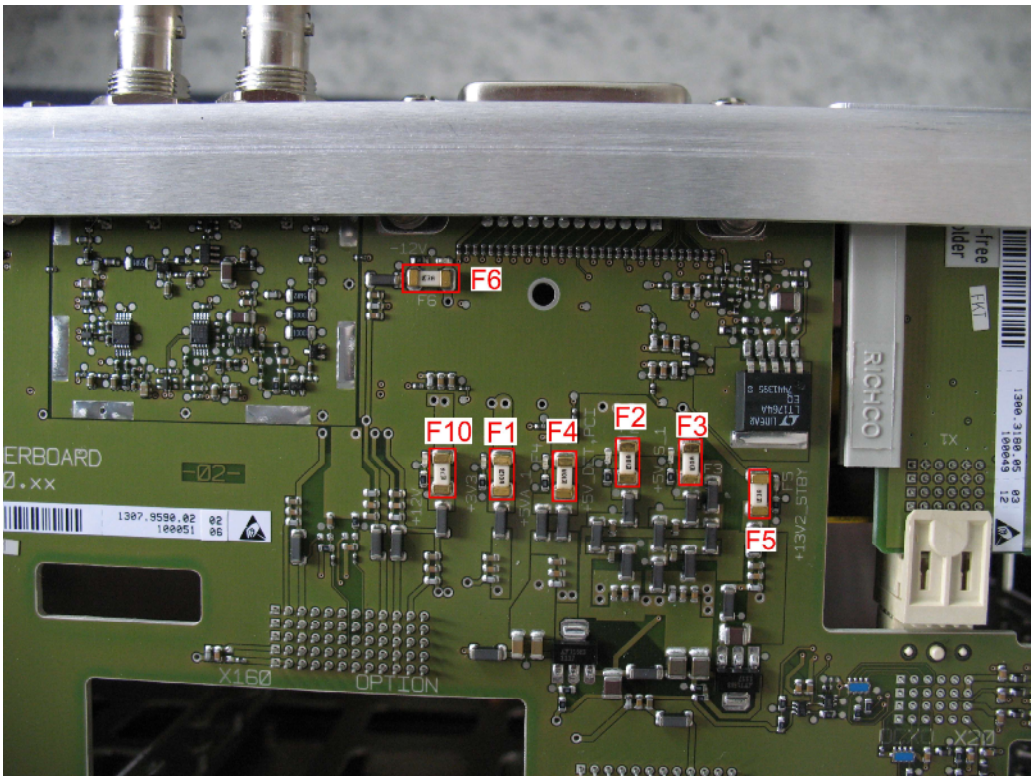
Item	Type of equipment	Specifications recommended	Equipment recommended	R&S-Order No.	Use
1	DC meter		R&S URE	0350.5315.02	Troubleshooting Start Up
2	Spectrum Analyzer		R&S FSP	1164.4391.07	Troubleshooting Frontend
3	Signal Generator		R&S SMR40	1104.0002.20	Troubleshooting Frontend

3.5.2 Troubleshooting Start-up Problems

Error: R&S FSV cannot be switched on

- Check power-on switch at the rear.
- If the power switch is OFF: Switch on power supply.

- Measure voltages on the motherbaord, if the power supply starts, but the screen remains dark:



F1 nominal value: +3.3 V

F2 nominal value: +5.55 V

F3 nominal value: +5.55 V

F4 nominal value: +5.55 V

F5 rated value: 13.5 V

F6 rated value: -12 V

F10 rated value:

R&S FSV4/7/13/30: +12.2 V

R&S FSV40: +13.2 V

If a fuse is blown, the corresponding red LED lights up.

Error: Fan does not work

- Check voltage at connector:
- X83 pins 1+ 2 : rated value 6 V to 12 V
- voltage o.k.: fan is defective
- voltage too low: fan is blocked or power consumption too high

3.5.3 Troubleshooting Problems with the Boot Process

Error: R&S FSV does not start the measurement application

.Following switch-on, the R&S FSV first boots the computer BIOS. After successful initialization of the computer, the Windows XP operating system starts up. Subsequently, the test application is loaded as start-up program. Simultaneously, self tests are performed at various locations and error messages, if any, are output. For troubleshooting, it is advisable to connect a keyboard to the keyboard socket.

Starting the device

► Start R&S FSV

Subsequent to switching on the R&S FSV, the following BIOS message is displayed:

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2003, Phoenix Technologies, LTD.
R&S ANALYZER BIOS V5.1-22-3
Main Processor : Intel (R) Celeron (R) 1.50GHz (100x15.0)
Memory Testing :
```

Hardware test

The computer starts the hardware test. The test results are displayed on the screen. If errors occur during the boot procedure, these messages may indicate defects.

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2003, Phoenix Technologies, LTD.
R&S ANALYZER BIOS V5.1-22-3
Main Processor : Intel (R) Celeron (R) 1.50GHz (100x15.0)
Memory Testing : 1015808K OK + 32M shared memory
Memory Frequency : DDR333
```

If no result of the memory test is indicated, the memory is defective.

Memory test

The memory test issues the memory capacity of the controller. The basic version of the R&S FSV provides 1 Gbyte.

Hardware check

Subsequently, BIOS starts the hardware check and displays all PC boards found.

This procedure can be interrupted using the ESC key on the connected external keyboard; any other key continues the boot process.

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2003, Phoenix Technologies, LTD.
R&S ANALYZER BIOS V5.1-22-3
Main Processor : Intel (R) Celeron (R) 1.50GHz (100x15.0)
Memory Testing : 1015808K OK + 32M shared memory
Memory Frequency : DDR333
```

```
Detecting IDE drives…
IDE Channel 2 Master : FUJITSU MHV2040H (depending on the hard drive installed)
IDE Channel 3 Master: NONE
```

If this hard drive entry is missing, the hard drive may be faulty.

Operating system start

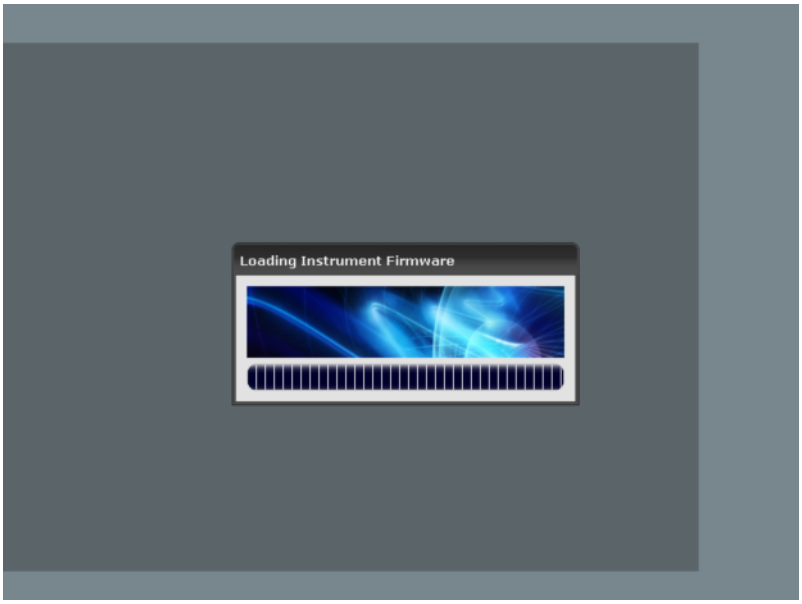
After this test, the BIOS has been loaded and the operating system is started.

If the message "No System Disk or Disk error ..." is displayed at this point, the contents of the hard drive are not correct. Replace the hard drive.

If the operating system on the hard drive has been destroyed and cannot be loaded correctly, Windows XP reacts by displaying a "blue screen". This blue screen contains all essential information on the internal states of the computer. Windows XP and the instrument firmware must be updated. Contact the service to perform the update.

Application start

Subsequent to starting the operation system, the application for the R&S FSV is loaded in a start-up program. The program start is initiated automatically and generates a window that displays information on the start-up procedure.



3.5.4 Troubleshooting Problems with the Frontend

Error:

No level is displayed or the level is too small.

Test equipment:

Generator, spectrum analyzer

R&S FSV setting:

Frequency: 10MHz, Span: 0Hz

Input:

Generator: 10MHz , -20dBm at X101

Output:

90MHz, X103: Spectrum analyzer

Check level:

>-16dBm at X103

Repeat measurement with output at X104

Check level on several frequencies:

Frequency	100MHz	1000MHz	3000MHz	7000MHz
Output level	> -18dBm	>-18dBm	>-20dBm	>-24dBm

If the level is ok, check the attenuator or the input cable.

3.5.5 Troubleshooting Problems with the Microwave Converter Unit

Error:

No level is displayed or the level is too small (f > 7 GHz).

Test equipment:

Generator, spectrum analyzer

R&S FSV setting:

Frequency: 7001MHz, Span: 0 Hz

Input:

Generator: 7001 MHz , -20 dBm at X168 (Diplexer)

Output:

729.9 MHz, X159: Spectrum analyzer

Check level:

>-15 dBm at X159

Check level on several frequencies:

Frequency	10 GHz	13.5 GHz	22 GHz *)	29 GHz *)	39 GHz **)
Output level	> -15 dBm	>-15 dBm	>-15 dBm	>-15 dBm	>-15 dBm

If the level is ok, check the attenuator ,input cable or frontend.

*) only models >13 GHz

**) only models >30 GHz

3.5.5.1 Level conditions at the diplexer

Test equipment:

Generator, spectrum analyzer

f>7 GHz:

R&S FSV setting:

Frequency: 7001MHz, Span: 0 Hz

Input:

Generator: 7001 MHz , -20 dBm at X168

Output:

7001 MHz, X7: Spectrum analyzer

Check level:

>-23 dBm at X7

Check level on several frequencies:

Frequency	10 GHz	13.5 GHz	22 GHz *)	29 GHz *)	39 GHz **)
Output level	> -23 dBm	>-23 dBm	>-23 dBm	>-23 dBm	>-24 dBm

*) only models >13 GHz
**) only models >30 GHz

f<7 GHz:

R&S FSV setting:

Frequency: 6999 MHz, Span: 0 Hz

Input:

Generator: 6999 MHz , -20 dBm at X168

Output:

6999 MHz, X169: Spectrum analyzer

Check level:

>-23 dBm at X169

3.5.5.2 Level conditions at the YIG filter unit

Test equipment:

Generator, spectrum analyzer

R&S FSV setting:

Frequency: 7001MHz, Span: 0 Hz

Input:

Generator: 7001 MHz , -20 dBm at IN (YIG filter)

Output:

7001 MHz, OUT (YIG filter): Spectrum analyzer

Check level:

>-30 dBm at X2

Check level on several frequencies:

Frequency	10 GHz	13.5 GHz	22 GHz *)	29 GHz *)	39 GHz **)
Output level	> -30 dBm	>-30 dBm	>-30 dBm	>-30 dBm	>-30 dBm

*) only models >13 GHz
**) only models >30 GHz

3.5.5.3 Level conditions at the mixer (only models >13 GHz)

Test equipment:

Generator, spectrum analyzer

R&S FSV setting:

Frequency: 7001MHz, Span: 0 Hz

Input:

Generator: 7001 MHz , -20 dBm at RF (mixer)

Output:

729.9 MHz, IF (mixer): Spectrum analyzer

Check level:

>-30 dBm at IF

LO > 11 dBm at X1501

Check level on several frequencies:

Frequency	10 GHz	13.5 GHz	22 GHz	29 GHz	39 GHz *)
Output level	>-30 dBm	>-30 dBm	>-30 dBm	>-30 dBm	>-35 dBm

LO level at X1501

Frequency	10 GHz	13.4 GHz	22 GHz	29 GHz	39 GHz *)
LO frequency	10.7299 GHz	14.1299 GHz	22.7299 GHz	28.2701 GHz	38.2701 GHz
LO level	> 11 dBm	>11 dBm	>6 dBm	>8 dBm	>0 dBm

*) only models >30 GHz

3.5.5.4 Level conditions at the IF signal path (only models >13 GHz)

Test equipment:

Generator, spectrum analyzer

R&S FSV setting:

Frequency: 7001 MHz, Span: 0 Hz

Input:

Generator: 729.9 MHz , -30 dBm at X1508

Output:

729.9 MHz, X159 : Spectrum analyzer

Check level:

>-15 dBm at X159

Check level on several frequencies:

Frequency	10 GHz	13.5 GHz	22 GHz	29 GHz	39 GHz *)
Output level	> -15 dBm	>-15 dBm	>-15 dBm	>-15 dBm	>-15 dBm

4 Software Update / Installing Options

This chapter contains information on updating software, restoring the operating-system installation and installing options to the R&S FSV. Additional manuals obtained together with a software/firmware update or with subsequently acquired options can be filed here.

4.1 Installation of new R&S FSV Software

For information on updating software refer to the release notes. The most recent version is provided on our Internet site at www.rohde-schwarz.com. You can also follow the link on the CD supplied with the instrument.

4.2 Installing the Options

A list of all available hardware and software options is provided on our Internet site at 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!

NOTICE

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 that part of the rear-panel where the option has to be inserted.
3. Plug in the option and fix it using the screws you previously removed.

4. Switch on the R&S FSV.
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.

5 Documents

This chapter provides information on the ordering of spare parts and contains the spare part list and the documents for the complete R&S FSV unit.

5.1 Spare Parts

The stock numbers necessary for ordering replacement parts and modules can be found in the spare part list further down.

NOTICE

Risk of damaging a module

When shipping a module, observe the instructions provided in the section titled "Procedure in Case of Service and Ordering of Spare Parts" at the beginning of this document.

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
Drawing 1307.9002.01 (R&S FSV Signal and Spectrum Analyzer)					
7	R&S FSV-B29 FREQUENCY EXTENSION	1310.9639.02	1		
22	UNIT FRAME FSV (R&S FSV4/7)	1164.4940.02	1		
24	UNIT FRAME FSV (R&S FSV13/30/40)	1164.4940.03	1		
25	FAN 119X119X32	1307.9431.00	1		X
32	POWER SUPPLY UNIT (R&S FSV4/7)	1164.5423.02	1		
34	POWER SUPPLY UNIT (R&S FSV13/30)	1164.5423.03	1		
36	POWER SUPPLY UNIT (R&S FSV40)	1164.5423.04	1		
34	POWER SUPPLY UNIT (R&S FSV13/30) For FSV30 with serial number 102000 to 102999	1164.5423.07	1		
45	SCREW	1148.3288.00	6		
120	MOTHERBOARD FSV (R&S FSV4/7/13/30)	1307.9590.02	1	A10	X
122	MOTHERBOARD FSV (R&S FSV40)	1307.9590.03	1	A10	X
128	SERRATED LOCK WASHER	3583.1578.00	3		
129	NUT	3583.1561.00	3		
130	SCREW	1148.3059.00	8		
140	LOCKING SCREW	1093.9180.00	2		
155	FRONTMODUL CONTR. 9/6	1206.0198.00	1	A90	X

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
155	FRONTMODUL CONTR. 11/6 For FSV 30 with serial number 102000 to 102999	1206.3422.00	1	A90	X
159	3.0V 230MAH LI-MNO2 CR2032	0858.2049.00	1		X
160	SCREW	1148.3059.00	9		
175	BIOS FOR FMR9	1308.2324.00	1		
190	2XRJ45 COUPLER JACK STRAIGHT	1093.9122.00	1	X90	X
192	SILICONE CORD RD4X8MM	1130.0164.00	1		
200	PATCHCABLE CAT.6. 0.5M	0041.9283.00	1	W90	
210	SATA ADAPTOR	1308.0280.00	1	A92	X
220	SCREW	1304.9199.00	2		
240	SATA DATACABLE 420	1091.3456.00	1	W91	
250	SATA POWERCABLE 440	1091.3433.00	1	W92	
260	GROMMET 14X24X7	0099.1440.00	1		
273	REMOVABLE HARD DRIVE FSV	1307.9248.06	1		
273	REMOVABLE HARD DRIVE FSV For FSV 30 with serial number 102000 to 102999	1307.9448.10	1		
274	SOLID STATE DRIVE FSV	1307.9248.07	1		
274	SOLID STATE DRIVE FSV For FSV 30 with serial number 102000 to 102999	1307.9448.11			
276	SATA HARD DRIVE WITH SOFTWARE FSV	1307.9448.08	1	A91	X
278	HOLDER	1201.8161.00	2		X
280	OPERATING SYSTEM	3586.9834.00	1		
290	IMAGE SOFTWARE	0048.7540.00	1		
300	ADAPTERBOARD	1307.9919.02	1	A11	X
310	FLEX-STRIP.16P. R=0.5 L=75	1308.1034.00	1	W20	
320	FLEX-STRIP.16P. R=0.5 L=150	1308.1040.00	1	W61	
405	FRONT UNIT FSV	1307.9025.05	1		
410	SCREW	1148.3288.00	4		
411	LABEL FSV 10HZ … 4GHZ (R&S FSV4)	1321.3050.00	1		
412	LABEL FSV 10HZ ... 7GHZ (R&S FSV 7)	1311.1319.00	1		
413	LABEL FSV CONNECTOR STANDARD	1321.3043.00	1		X
414	LABEL FSV 10HZ ... 13GHZ (R&S FSV13)	1311.1325.00	1		
415	LABEL FSV 10HZ ... 30GHZ (R&S FSV30)	1311.1331.00	1		
416	LABEL FSV 10HZ ... 40GHZ (R&S FSV40)	1311.1348.00	1		
420	RF CABLE W1 (R&S FSV4/7)	1308.0321.00	1	W1	X

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
422	RF CABLE W1 (13GHZ) (R&S FSV13)	1308.0880.00	1	W1	
423	ADAPTOR (R&S FSV13)	0343.0257.00	1		X
425	MOUNTING PLATE (R&S FSV4/7/13)	1093.4750.00	1		
430	SCREW	1148.3288.00	4		
440	TESTPORT-ADAPTOR (R&S FSV30)	1021.0493.00	1	X1	X
450	TESTPORT-ADAPTOR (R&S FSV40)	1036.4702.00	1	X1	X
460	MOUNTING PLATE (R&S FSV30/40)	1093.4772.00	1		
470	RF CABLE W1 (30 GHZ) (R&S FSV40)	1308.0838.00	1	W1	
480	RF CABLE W1 (40 GHZ) (R&S FSV40)	1308.0896.00	1	W1	
500	ATTENUATOR 7GHZ (R&S FSV4/7)	1137.1408.02	1	A40	X
510	ATTENUATOR (R&S FSV13/30/40)	1046.5101.05	1	A40	X
520	SCREW (R&S FSV4/7)	1148.3059.00	4		
525	SCREW (R&S FSV13/30/40)	1148.3059.00	2		
530	ATTENUATOR CABLE	1308.0815.00	1	W40	
550	FRONTEND	1311.0512.03	1	A100	X
560	DETECTOR BOARD	1307.9554.03	1	A120	X
565	R&S FSV4-B21 LO/IF PORTS (R&S FSV4, MOD21)	see Table 5-1	1	A150	
568	MW CONVERTER UNIT 13.6GHZ (R&S FSV13)	see Table 5-1	1	A150	
570	MW CONVERTER UNIT 30 GHZ (R&S FSV30)	see Table 5-1	1	A150	
575	MWC UNIT 40 GHZ (R&S FSV40, MOD39)	see Table 5 1	1	A150	
580	MW CONVERTER UNIT 40 GHZ (R&S FSV40)	see Table 5-1	1	A150	
600	RF CABLE W2 (R&S FSV4/7)	1311.1177.00	1	W2	X
602	RF CABLE W2 (R&S FSV13/30/40)	1308.0844.00	1	W2	
605	RF CABLE W3/4	1164.6271.00	1	W3	
610	RF CABLE W3/4	1164.6271.00	1	W4	
620	RF CABLE W5 (R&S FSV13/30/40)	1308.0850.00	1	W5	
630	RF CABLE W6 (R&S FSV13/30/40)	1308.0867.00	1	W6	
640	RF CABLE W7 (R&S FSV13/30/40)	1308.0873.00	1	W7	
650	BAFFLE PLATE	1308.1363.00	1		
652	BAFFLE PLATE (R&S FSV4/7)	1308.1370.00	1		
700	TOP COVER	1308.0567.00	1		
705	SCREW	1148.3288.00	5		
710	COVER	0852.0467.00	1		

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
720	REAR PLATE OPTION	1307.9519.00	3		
725	REAR PLATE LVDS	1307.9525.00	1		
730	REAR PLATE OCXO	1307.9531.00	2		
735	SCREW	1148.3288.00	24		
750	BW2 CASE 4HU 7/8 D350 SPEC	1308.2147.00	1		
755	FRONT HANDLE	1096.1480.00	2		
760	SCREW	1096.4896.00	4		
765	REAR WALL FOOT	1096.2493.00	4		
770	BW2 LABEL F. REAR PANEL FOOT	1096.2435.00	1		
780	ACCESSORIES FSV4/7/13 (R&S FSV4/7/13)	1321.3120.00	1		
785	ACCESSORIES FSV30 (R&S FSV30)	1321.3137.00	1		
790	ACCESSORIES FSV40 (R&S FSV40)	1321.3143.00	1		
Drawing 1307.9025.01 (Frontpanel R&S FSV)					
801	FRONT COVER FSV	1321.3014.00	1		
805	SEALING	0396.1035.00	1		
810	PUSH-BUTTON BOARD SET	1307.9083.00	1	A80	X
820	FLEX. SWITCH BOARD	1307.9090.00	1	A81	X
830	SHROUD	0852.1234.00	1		
845	KEYBOARD HOLDER	1311.0764.00	1		
846	KEYBOARD HOLDER DISPLAY AUO	1311.1525.00	1		
850	SCREW	1300.4457.00	12		
855	SCREW	1300.4457.00	10		
860	ROTARY PULS-GENERATOR	0852.2799.00	1	A70	X
865	CABLE TIE	0015.9038.00	1		
871	COLLER WITH NUT	0852.0896.00	1		
876	KNOB	0852.0921.00	1		
884	HOLDER TOUCHCONTROLLER	1308.1628.00	1		
885	TOUCH-CONTROLLER-USB-BOARD-3	1313.2364.03	1	A60	X
888	SCREW	1148.3059.00	4		
890	SCREW	1300.4457.00	2		
892	CABLE	2085.4350.00	1	W60	
902	DISPLAY WITH TOUCHSCREEN	1311.0787.00	1	A30	X
903	LED BACKLIGHT CABLE	1308.2201.00	1		
904	DISPLAY CABLE 100MM	1308.1657.00	1		

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
905	RUBBER SEAL 2.0MM. BLACK	1308.1011.00	0,7 M		
910	DISPLAY AUO WITH TOUCH 8.4INCH	1311.1519.00	1	A30	X
911	LED BACKLIGHT CABLE AUO DISPLAY	1311.1560.00	1		
912	DISPLAY CABLE L270	1311.1554.00	1		
945	HOLDER	0794.5214.00	1		
946	CABLE TIE	0015.9038.00	1		
970	CABLE W31 LST BOA–D - FMR	1307.9425.00	1	W31	
980	FRONTCONNECTOR BOARD	1307.9890.02	1	A20	X
990	SCREW	1300.4457.00	4		
1005	DISPLAY SHIELDING	1311.0770.00	1		
1007	DISPLAY SHIELDING AUO	1311.1548.00	1		
1010	SCREW	1148.3059.00	4		
1020	SCREW	0041.1682.00	4		
Drawing 1308.1192.01 (MWC Unit 13 GHz) (R&S FSV13)					
2000	MW CONVERTER13	1308.1157.02	1	A150	
2005	PREAMPLIFIER UNIT	1164.5481.02	1		
2006	SCREW	1148.2769.00	2		
2010	YIG UNIT 13.6 GHZ (MICRO LAMBDA)	1308.1205.13	1	A152	X
2015	YIG UNIT 13.6 GHZ (MICRO LAMBDA)	1308.1205.15	1	A152	X
2020	YIG UNIT 13.6 GHZ (TELEDYNE)	1308.1205.14	1	A152	X
2025	YIG UNIT 13.6 GHZ (TELEDYNE)	1308.1205.16	1	A152	X
2030	SCREW	1148.3059.00	3		
2050	DIPLEXER 46	1162.1120.05	1	A151	X
2055	HOLDING PLATE	1308.2299.00	1		
2060	SCREW	1096.5205.00	2		
2065	SCREW	1096.5205.00	2		
2070	A SIDE COVER MWC13 (BOTTOM)	1313.0090.00	1		
2075	B SIDE COVER MWC13 (TOP)	1308.1228.00	1		
2080	RF CABLE W168	1308.1334.00	1		
2083	RF CABLE W180	1308.2218.00	1		
2086	RF CABLE W184	1308.2253.00	1		
2090	RF CABLE W190	1308.2424.00	1		
2099	BAR CODE LABEL	0071.7714.00	1		
Drawing 1307.9748.01 (MWC Unit) (R&S FSV30/40)					

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
2100	MW CONVERTER2	1308.0721.02	1	A150	
2102	MW CONVERTER2	1308.0721.04	1	A150	
2104	MW CONVERTER2	1308.0721.06	1	A150	
2105	MW CONVERTER2	1308.0721.03	1	A150	
2106	MW CONVERTER2	1308.0721.07	1	A150	
2107	MW CONVERTER2	1308.0721.05	1	A150	
2108	PREAMPLIFIER UNIT	1164.5481.02	1		X
2109	SCREW	1148.2769.00	2		
2110	YIG UNIT 30GHZ (R&S)	1308.1292.30	1		X
2115	YIG UNIT 30GHZ + PREAMP (R&S)	1308.1292.33	1		X
2120	YIG UNIT 30GHZ (MICRO LAMBDA)	1308.1292.31	1		X
2125	YIG UNIT 30GHZ + PREAMP (MICRO LAMBDA)	1308.1292.34	1		X
2130	ATTENUATOR 3dB	1127.9441.00	1		
2140	YIG UNIT 40GHZ (R&S)	1308.1305.40	1		X
2145	YIG UNIT 40GHZ + PREAMP (R&S)	1308.1305.43	1		X
2164	HOLDING PLATE	1308.1970.00	1		
2167	VELCRO-STRIP ONE-WRAP 16MM	5500.8537.00	0.04M		
2170	SCREW	1148.3059.00	3		
2180	MIXER M1	1307.1501.02	1	A153	X
2185	TERMINATION 50OHM	0249.7823.00	1		
2190	DIPLEXER 46	1162.1120.05	1	A151	X
2192	HOLDING PLATE	1308.2299.00	1		
2205	SCREW	1096.5205.00	4		
2207	SCREW	1096.5205.00	2		
2210	A SIDE COVER MWC	1313.0084.00	1		
2220	B SIDE COVER MWC	1308.1186.00	1		
2230	RF CABLE W167	1308.1328.00	1		
2233	TERMINATION SMP	0048.6767.00	1		
2240	RF CABLE W168	1308.1334.00	1		
2250	RF CABLE W180	1308.2218.00	1		
2260	RF CABLE W184	1308.2253.00	1		
2270	RF CABLE W190	1308.2424.00	1		
2290	BAR CODE LABEL	0071.7714.00	1		
Drawing 1164.5423.01 (Power Supply Unit)					

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
2300	AC/DC POWER SUPPLY (R&S FSV4/7/30/40)	1400.1307.00	1	A50	X
2305	REAR PLATE POWER SUPPLY 2 PRINTED	1308.1592.00	1		
2305	REAR PLATE POWER SUPPLY PRINTED For FSV 30 with serial number 102000 to 102999	1321.3420.00	1		
2310	SCREW	1148:2781.00	4		
2315	CABLE POWER INPUT	1308.0744.00	1	W10	
2320	BRACKET FAN (R&S FSV4/7)	1308.1663.00	1		
2325	POWER SUPPLY SHIELDING (R&S FSV13/30/40)	1308.2482.00	1		
2330	SCREW (R&S FSV4/7)	1148.2781.00	2		
2335	SCREW (R&S FSV13/30/40)	1148.2781.00	1		
2340	FAN	1308.1711.00	1		X
2342	FAN SHEET	1313.0032.00	1		
2345	SCREW	1096.4838.00	2		
2350	CABLE POWER SUPPLY TO MOTHERBOARD	1308.1728.00	1	W11	
2355	HOLDER	0794.5214.00	2		
2360	CABLE TIE	0015.9038.00	2		
2365	CONNECTOR	2100.3610.00	1	A51	X
2370	TIME LAG FUSE	0099.6729.00	2		
2375	TOUCH-PROTECTION	1308.2124.00	1		
2380	SCREW	0041.1682.00	1		
2385	PROTECTIVE EARTH CONDUCTOR	1308.1734.00	1		
2390	LABEL POWER SUPPLY UNIT	1164.5446.00	1		
2395	BAR CODE LABEL	0071.7714.00	1		
Option R&S FSV-B1 1310.9500.02					
1110	SHOCK MOUNT.FR.LE.4HU	1096.6553.00	1		X
1120	SHOCK MOUNT.FR.RI.4HU	1096.6560.00	1		X
1130	SHOCK MOUNT.REAR 4HU	1096.6576.00	2		X
1140	PROTEC. COVER 4HU 7/8	1096.6582.00	1		X
1150	CARRY HANDLE	1096.6118.00	1		X
1160	HOUSING FSV	1308.1357.00	1		X
Drawing 1310.9700.00 (Option R&S FSV-B3 1310.9516.02)					
1200	AF OUTPUT	1308.0144.02	1	A71	X
1205	FLEX-STRIP 10P. R=0.5 L=150	3584.6696.00	1	W71	
1210	SCREW	1148.3288.00	2		

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
1221	KNOB	0852.0880.00	1		
1230	SHROUD	0852.1228.00	1		
1240	SPEAKER	1308.0809.00	1	B1	X
1250	SPEAKER BRACKET	1308.0580.00	1		
1260	SCREW	1300.4457.00	4		
1271	LABEL FSV CONNECTOR (OPTION)	1321.3037.00	1		
1280	COVER RD 15.9	0009.9200.00	1		
Drawing 1310.9716.00 (Option R&S FSV-B4 1310.9522.02)					
1300	OCXO	1300.3180.05	1	A250	X
1302	OCXO HIGH PERFORMANCE	1300.3180.07	1	A250	X
Drawing 1310.9716.00 (Option R&S FSV-B5 1310.9539.02)					
1400	ADDITIONAL INTERFACE	1307.9831.02	1	A220	X
Drawing 1310.9774.00 (Option R&S FSV-B9 1310.9545.02)					
1700	TRACKING GENERATOR	1308.0196.02	1	A140	X
1705	RF CABLE W13	1308.1892.00	1	W13	X
1710	MOUNTING PLATE	1093.4750.00	1		
1715	SCREW	1148.3294.00	4		
1725	RF CABLE W13-2	1308.1928.00	1	W13-2	
1730	RF CABLE W14	1308.1740.00	1	W14	
1735	RF CABLE W15	1308.1757.00	1	W15	
1740	TERMINATION 50 OHM	0249.7823.00	1		
1745	REAR PLATE TRACKING GENERATOR	1308.1934.00	1		
1750	SCREW	1148.3288.00	4		
1755	RF CABLE W16	1308.1905.00	1	W16	
1760	RF CABLE W17	1308.1911.00	1	W17	
1765	CABLE HOLDER	1093.9045.00	2		
1271	LABEL FSV CONNECTOR (OPTION)	1321.3037.00	1		X
1775	COVER	0009.9181.00	1		
1780	COVER	3585.4545.00	1		
1785	BUFFLE PLATE	1308.1363.00	1		
Drawing 1310.9716.00 (Option R&S FSV-B10 1310.9551.02)					
1500	EXT. GEN. CONTROL	1307.9854.02	1	A230	X
1510	IEC-BUS CONTR.	1164.5200.02	1	A210	X
1570	ACCESSORIES FSV-B10	1310.9780.00	1		

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
Option R&S FSV-B14 1310.9980.02					
2800	ULTRA STABLE REF	1311.1390.02	1		X
2810	TOP COVER	1308.0567.00	1		X
Drawing 1310.9716.00 (Option R&S FSV-B17 1310.9568.02)					
1900	DIGITAL I/O LVDS	1307.9877.02	1	A240	X
Drawing 1310.9716.00 (Option R&S FSV-B18 1310.9697.03)					
2515	SSD WITH SOFTWARE	1307.9448.09	1		X
2515	SSD WITH SOFTWARE For FSV 30 with serial number 102000 to 102999	1307.9448.11	1		
2530	HOLDER	1201.8161.00	2		X
2540	HOLDER HARD DRIVE	1307.9460.00	1		
Drawing 1310.9716.00 (Option R&S FSV-B19 1310.9574.03)					
1615	SATA HARD DRIVE WITH SOFTWARE	1307.9448.08	1		X
1615	SATA HARD DRIVE WITH SOFTWARE For FSV 30 with serial number 102000 to 102999	1307.9448.11	1		
1607	HOLDER	1201.8161.00	2		X
1609	HOLDER HARD DRIVE	1307.9460.00	1		
Drawing 1308.1963.00 (Option R&S FSV-B21 1310.9597.02)					
1800	RF CABLE W18	1308.1940.00	1	W18	X
1810	RF CABLE W19	1308.1957.00	1	W19	X
1820	HOLDER EXT. MIXER	1157.1103.00	1		
1830	SCREW	1148.3288.00	2		
1840	PROTECTION CAP	1066.2095.00	2		
1851	LABEL FSV CONNECTOR	1321.3020.00	1		X
1860	COVER	0009.9200.00	1		
1870	COVER	0009.9181.00	1		
1880	COVER	3585.4545.00	1		
1895	ACCESSORIES FSV-B21	1164.6307.00	1		
Drawing 1307.9748.01, sheet 2 (Option R&S FSV-B24 1310.9616.13/30/40)					
	MW CONVERTER UNIT 13.6/30/40 GHZ	see Table 5-1		A150	X
Drawing 1310.9897.01, sheet 1 (Option R&S FSV-B30 1310.9897.02)					
2610	A301-300-F3 POWER INV 12V/230V 300W	1311.1683.00			X
Drawing 1321.3750.01, sheet 2 (Option R&S FSV-B32 1321.3750.02)					
30	THERMAL GAP PAD 15X15X1	1412.5560.00			X

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
40	BATTERY PACK	1316.3810.02			X
80	ROCKER SWITCH 1POL. 6A BK	3586.0250.00			
120	CABLE ON-OFF	1321.3850.00			
130	POWER SUPPLY INTERN	1321.3866.00			
170	BATTERY PACK 14.4V 6.2AH LI-ION	1321.3772.00			X
180	POWER SUPPLY EXTERN	1321.3872.00			
Option R&S FSV-B34 1321.3950.02)					
20	MULTI-BAY BATTERY CHARGER	1321.3966.00			X
Drawing 1311.2015.01, sheet 1 (Option R&S FSV-B160 1315.2015.02/13/40)					
2900	BW-EXTENSION	1311.1631.02		A110	X
2915	RELAY UNIT B160 4/7/16 GHZ	1313.7537.00		A115	X
2916	RELAY UNIT B160 30/40GHZ	1321.3250.00		A115	X
2920	RF-CABLE W100	1313.3277.00		W100	X
2921	RF-CABLE W2 B160 13/30/40GHZ	1321.3237.00		W2	X
2925	RF-CABLE W01 4/7GHZ	1321.3150.00		W1	X
2928	RF-CABLE W02 4/7GHZ	1321.3166.00		W2	X
2930	RF-CABLE W03 4/7GHZ	1321.3108.00		W3	X
2932	RF-CABLE W301 13/30/40GHZ	1321.3243.00		W301	X
2935	ATTENUATOR 6DB 2W	3583.1610.00			X

MWC Unit Overview

Depending on if your R&S FSV has the option B21, B24, both or none of them, you will need a certain MWC Unit as shown in the table below.

R&S FSV Model	Option R&S FSV-B21	Option R&S FSV-B24	Stock No.	No.	Elect.desig.	Rec. spare parts
R&S FSV13			1308.1192.13	1	A150	X
R&S FSV13		X	1308.1192.14	1	A150	X
R&S FSV30			1307.9748.34	1	A150	X
R&S FSV30	X		1307.9748.30	1	A150	X
R&S FSV30		X	1307.9748.35	1	A150	X
R&S FSV30	X	X	1307.9748.31	1	A150	X
R&S FSV40			1307.9748.44	1	A150	X
R&S FSV40	X		1307.9748.40	1	A150	X
R&S FSV40		X	1307.9748.45	1	A150	X

R&S FSV40	X	X	1307.9748.41	1	A150	X
R&S FSV40, K39			1307.9748.54	1	A150	X
R&S FSV40, K39	X		1307.9748.50	1	A150	X
R&S FSV40, K39		X	1307.9748.55	1	A150	X
R&S FSV40, K39	X	X	1307.9748.51	1	A150	X

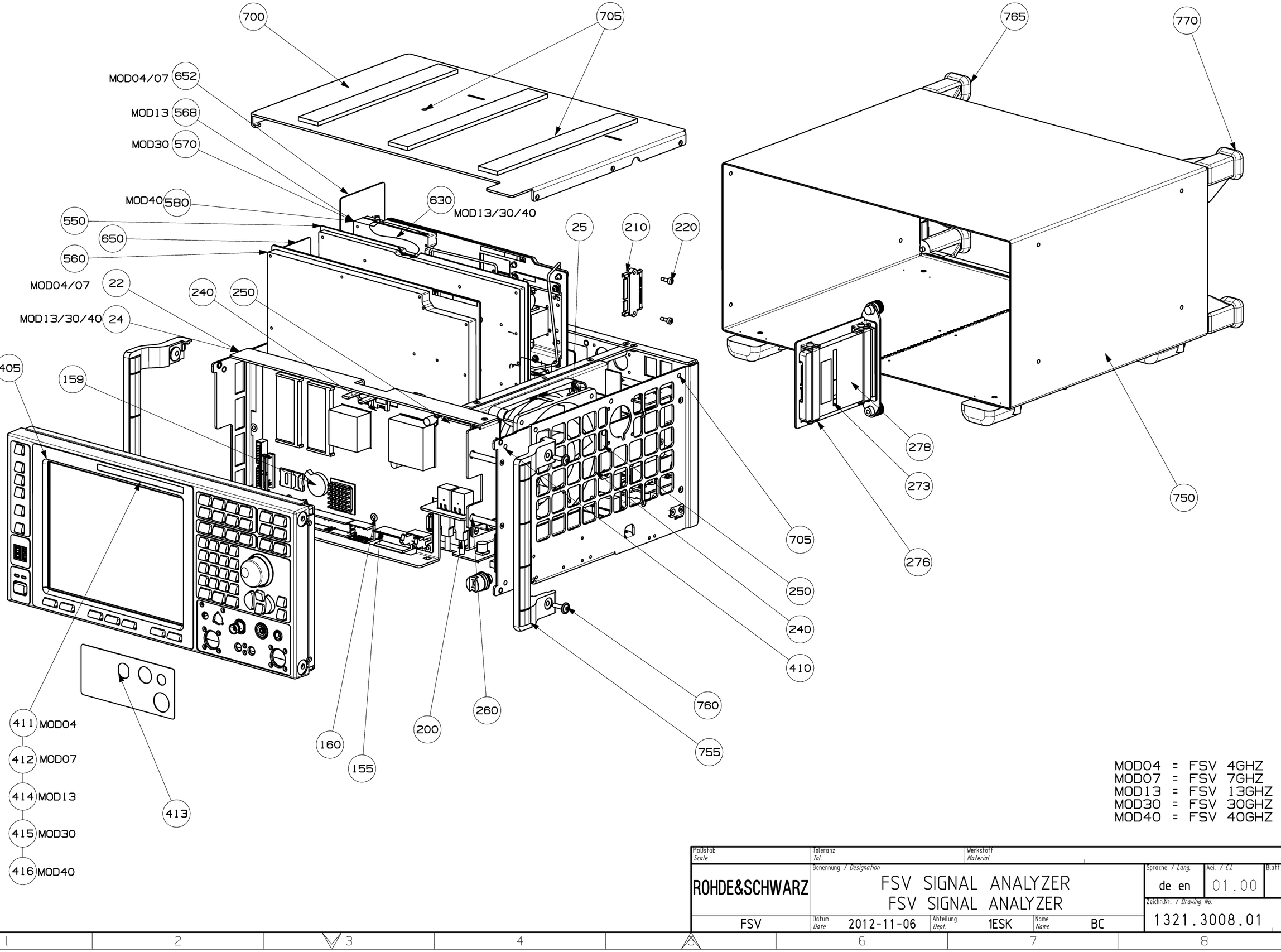
Table 5-1: MWC Unit Overwiew

5.2 Available Power Cables

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, 125 V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3, 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365.00 DS 0086.4400.00	DIN 49 441, 10 A, 250 V, straight DIN 49 441, 10 A, 250 V, angular approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	Europe (except Switzerland)

5.3 Mechanical Drawings

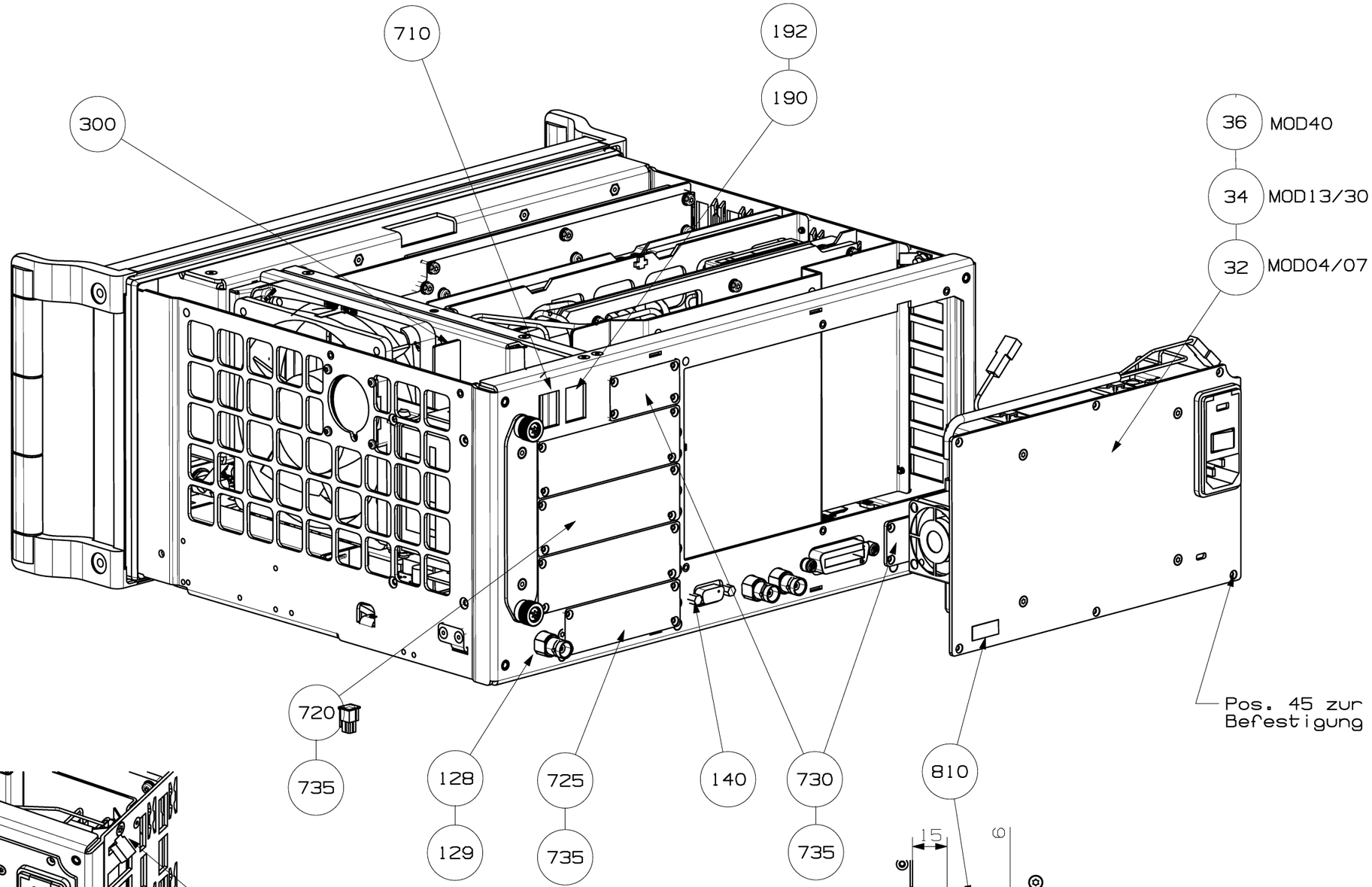
NX

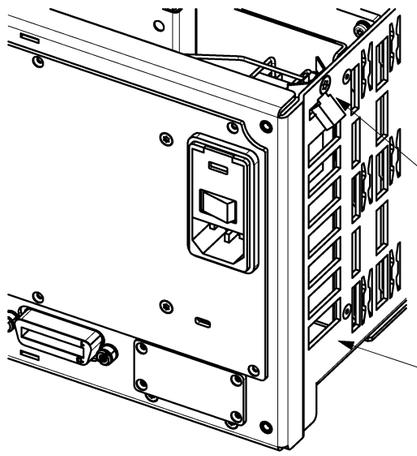


MOD04 = FSV 4GHZ
MOD07 = FSV 7GHZ
MOD13 = FSV 13GHZ
MOD30 = FSV 30GHZ
MOD40 = FSV 40GHZ

Projektions-methode
Projection Method

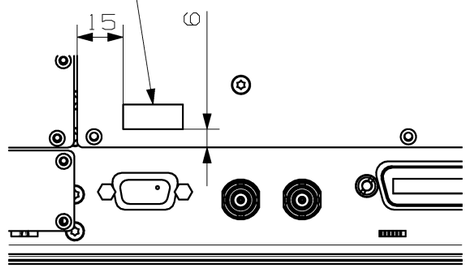
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation* FSV SIGNAL ANALYZER FSV SIGNAL ANALYZER	Sprache / *Lang.* de en	Aei. / *C.I.* 01.00 / Blatt / *Sh.* 1
FSV	Datum *Date* 2012-11-06 / Abteilung *Dept.* 1ESK / Name *Name* BC	Zeichn.Nr. / *Drawing No.* 1321.3008.01	D





PE (protective earth)

280 licence label



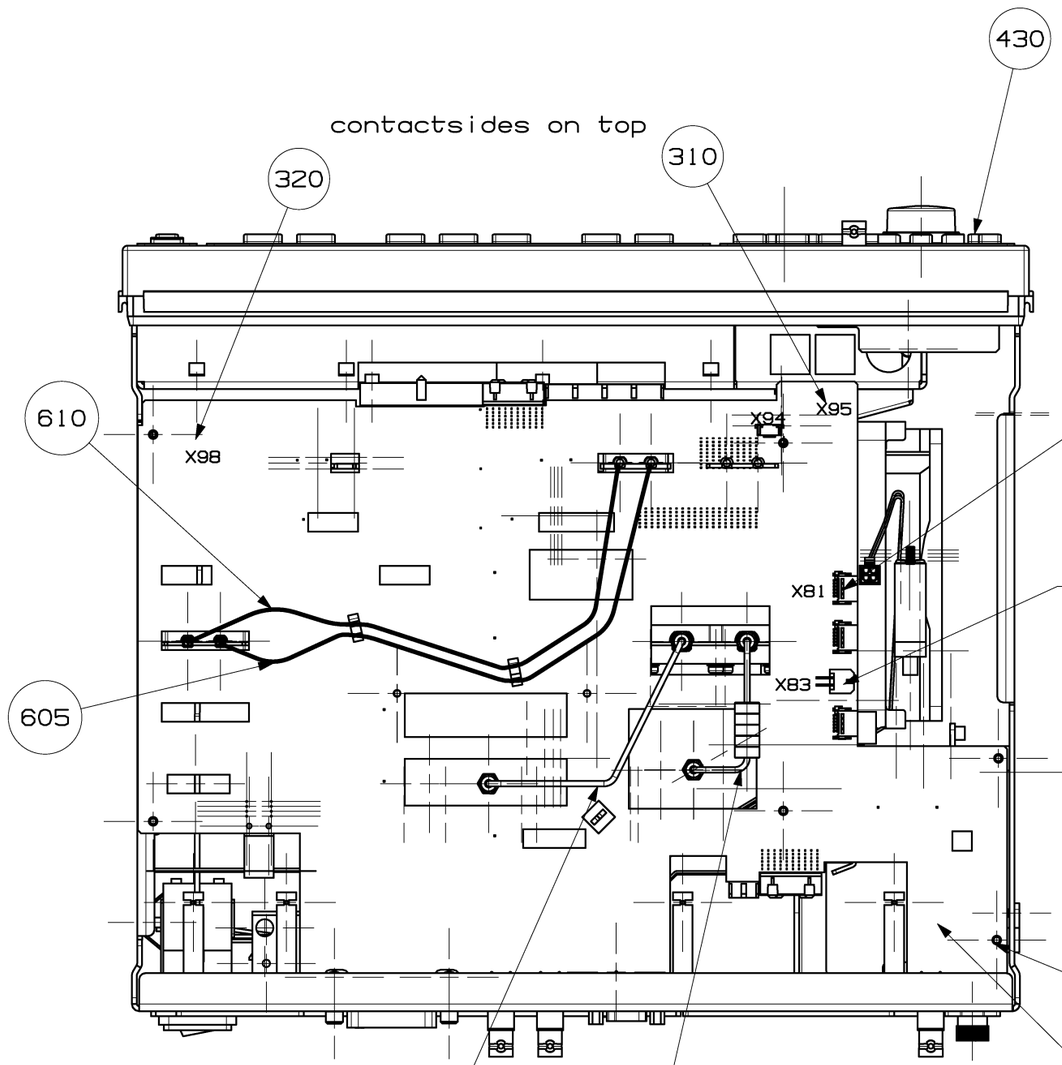
MOD04 = FSV 4GHZ
MOD07 = FSV 7GHZ
MOD13 = FSV 13GHZ
MOD30 = FSV 30GHZ...
MOD40 = FSV 40GHZ

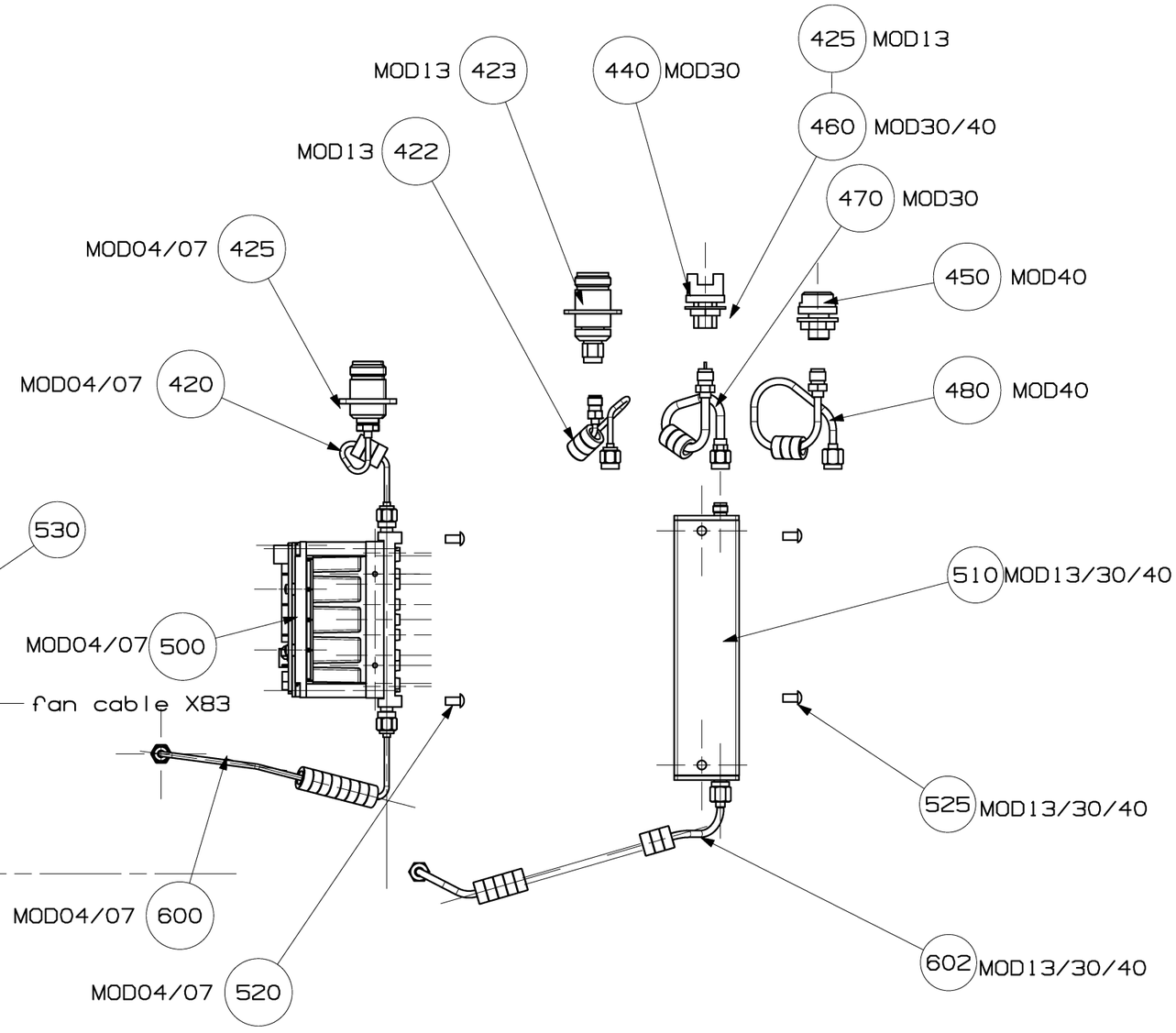
Projektions-methode
Projection Method

Maßstab *Scale*		Toleranz *Tol.* ISO2768-m		Werkstoff *Material*			
ROHDE&SCHWARZ		Benennung / *Designation* FSV SIGNAL ANALYZER FSV SIGNAL ANALYZER				Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 2
FSV		Datum *Date* 2012-11-06	Abteilung *Dept.* 1ESK	Name *Name* BC		Zeichn.Nr. / *Drawing No.* 1321.3008.01		D

NX

contactsides on top

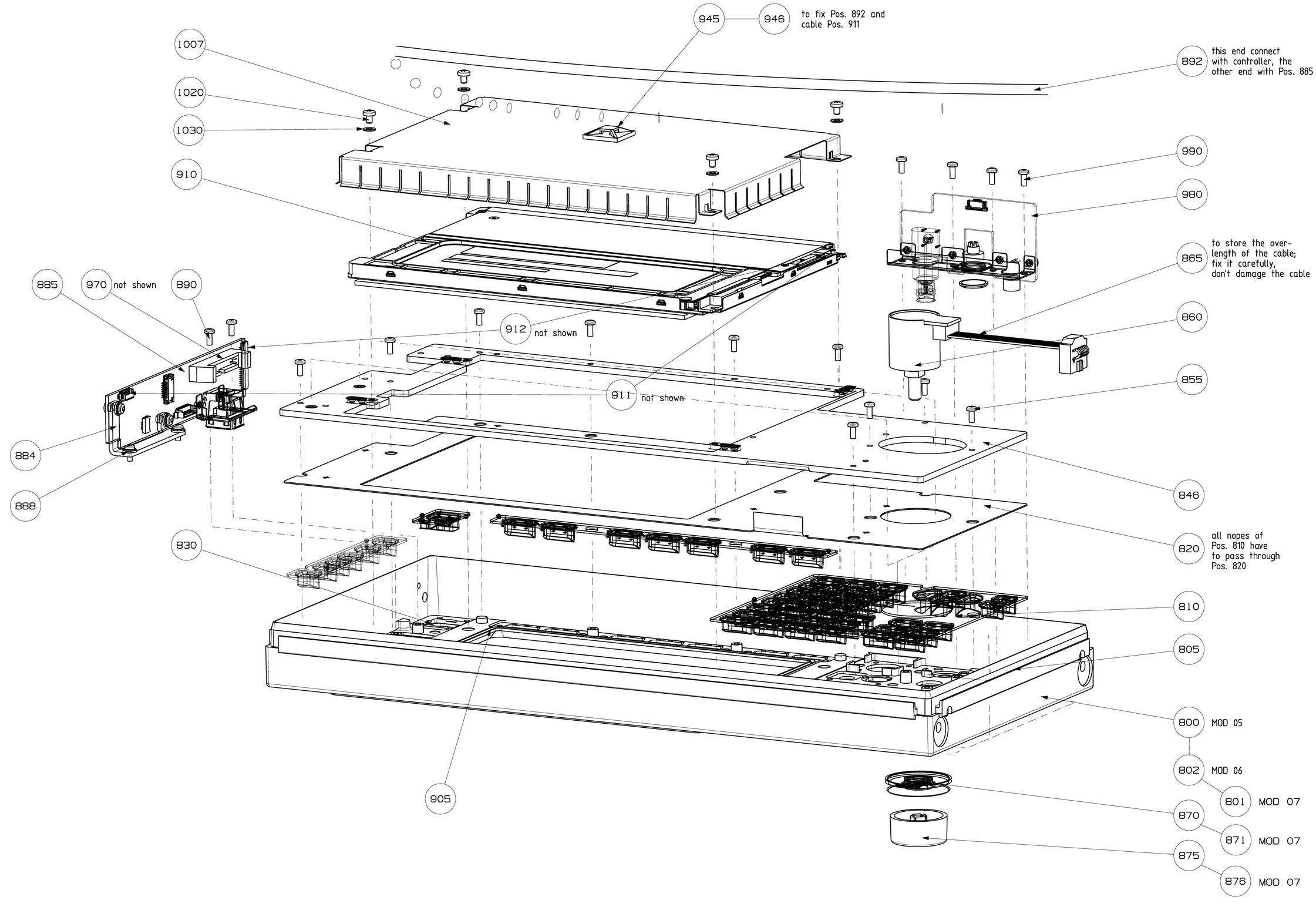




MOD04 = FSV 4GHZ
MOD07 = FSV 7GHZ
MOD13 = FSV 13GHZ
MOD30 = FSV 30GHZ
MOD40 = FSV 40GHZ

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*					
ROHDE&SCHWARZ	Benennung / *Designation* FSV SIGNAL ANALYZER FSV SIGNAL ANALYZER				Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 3
FSV	Datum *Date* 2012-11-06	Abteilung *Dept.* 1ESK	Name *Name* BC		Zeichn.Nr. / *Drawing No.* 1321.3008.01		D



Versions:
MOD 05: FSV with LED backlight display AUO
MOD 06: FSVR with LED backlight display AUO

Maßstab / Scale: –	Toleranz / Tol.: ISO2768-m	Werkstoff / Material:				
ROHDE&SCHWARZ	Benennung / Designation: FRONTEINHEIT FSV / FRONT UNIT FSV				Sprache / Lang.: de en	Änd. / C.I.: 03.00	Blatt / Sh.: 3
FSV	Datum / Date: 2012-12-17	Abteilung / Dept.: 1ESK	Name / Name: BC		Zeichn.Nr. / Drawing No.: 1307.9025.01		D

Projektionsmethode / Projection Method

NX

2390 MOD02/05

2300 MOD02/03/04

2325 MOD03/04

MOD03/04/06 2335

2302 MOD05/06

2326 MOD06

2380

2375 MOD02/03/04/05

MOD02/05 2320

2376 MOD06

2345

2390

2340

2342 MOD02/05

assembled between
Pos. 2340 and
Pos. 2320

2365

2310

2370

2305 MOD02/03/04/05

2330 MOD02/05

2306 MOD06

2360

2355

2395

2315

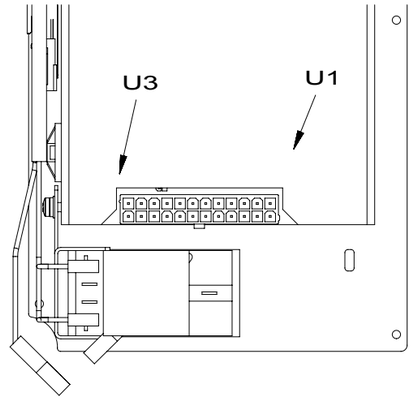
2350

2385

adjust the voltages:

MOD 02/03/04/05/06 U1 = +5,55V +/- 10mV

MOD 02/03/05: U3 = +12,2V +/- 10mV
MOD 04/06: U3 = +13,2V +/- 10mV

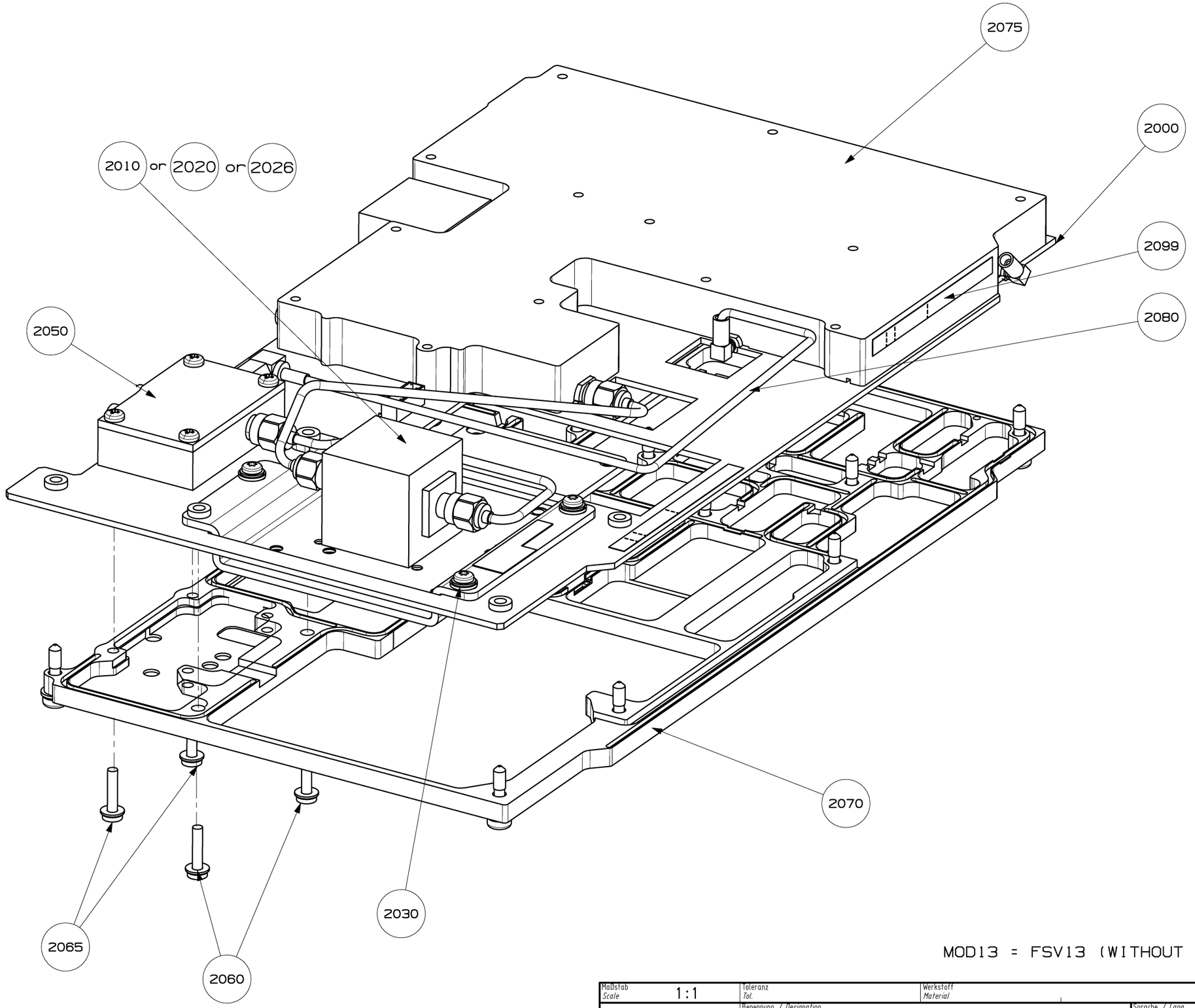


MOD 02 = FSV 3/7
MOD 03 = FSV 13/30
MOD 04 = FSV 40
MOD 05 = FSV 3 MOD21
MOD 06 = FSV 40-N

Projektions-methode

Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.*	Werkstoff *Material*					
ROHDE&SCHWARZ	Benennung / *Designation* NETZTEIL UNIT POWER SUPPLY UNIT				Sprache / *Lang.* de en	Aei. / *C.I.* 07.00	Blatt / *Sh.* 1
					Zeichn.Nr. / *Drawing No.* 1164.5423.01		D
FSV	Datum *Date* 2010-10-22	Abteilung *Dept.* 1ESK	Name *Name* Wn				

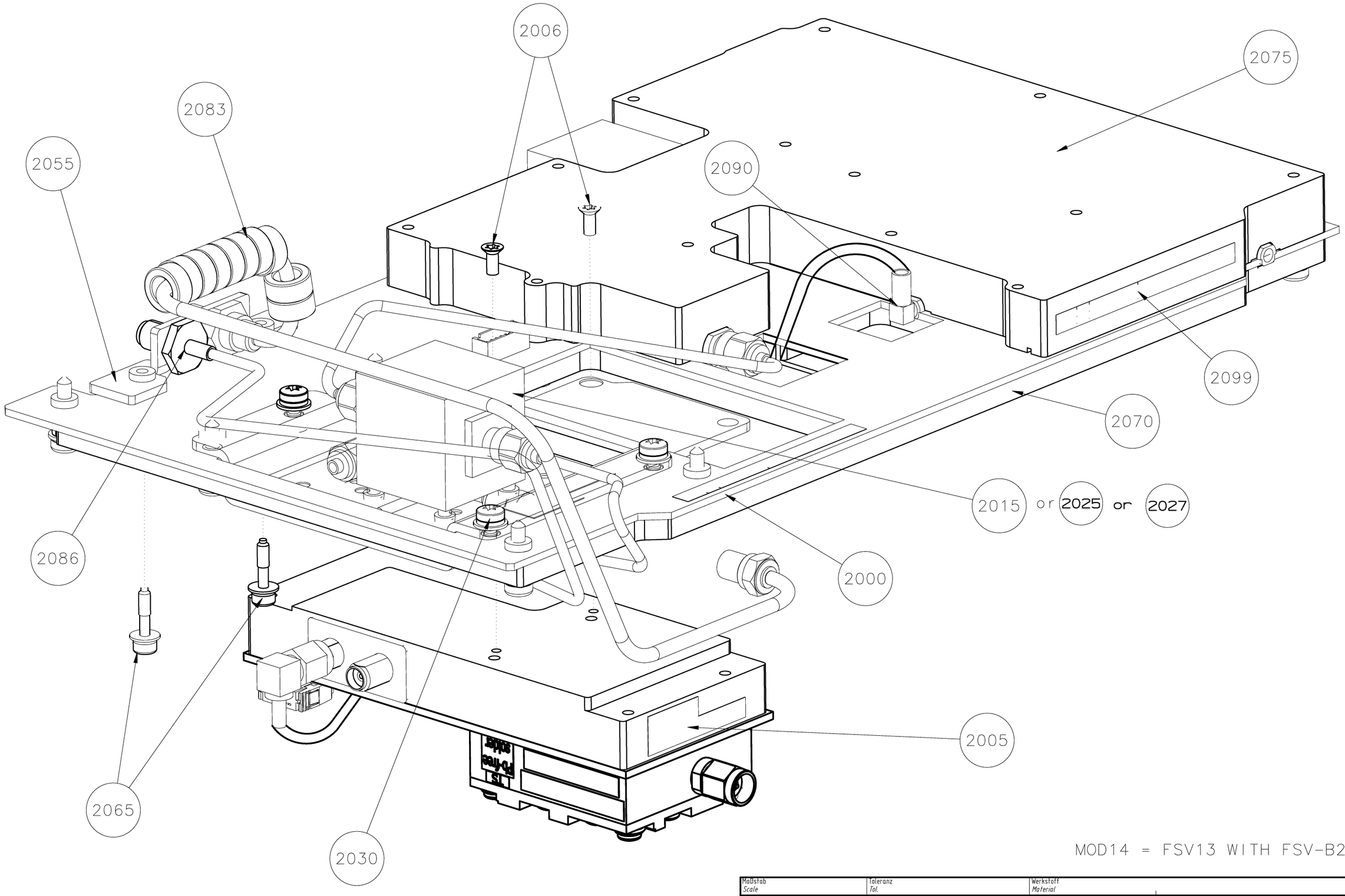


MOD13 = FSV13 (WITHOUT OPTION)

Projektions-methode
Projection Method

Maßstab *Scale* 1:1	Toleranz *Tol.*	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung */ Designation* MW-CONVERTER UNIT MW CONVERTER UNIT	Sprache */ Lang.* de en	Aei. */ C.I.* 06.00 / Blatt */ Sh.* 1
FSV	Datum *Date* 2012-04-16 / Abteilung *Dept.* MTEK / Name *Name* mk	Zeichn.Nr. */ Drawing No.* 1308.1192.01	D

NX

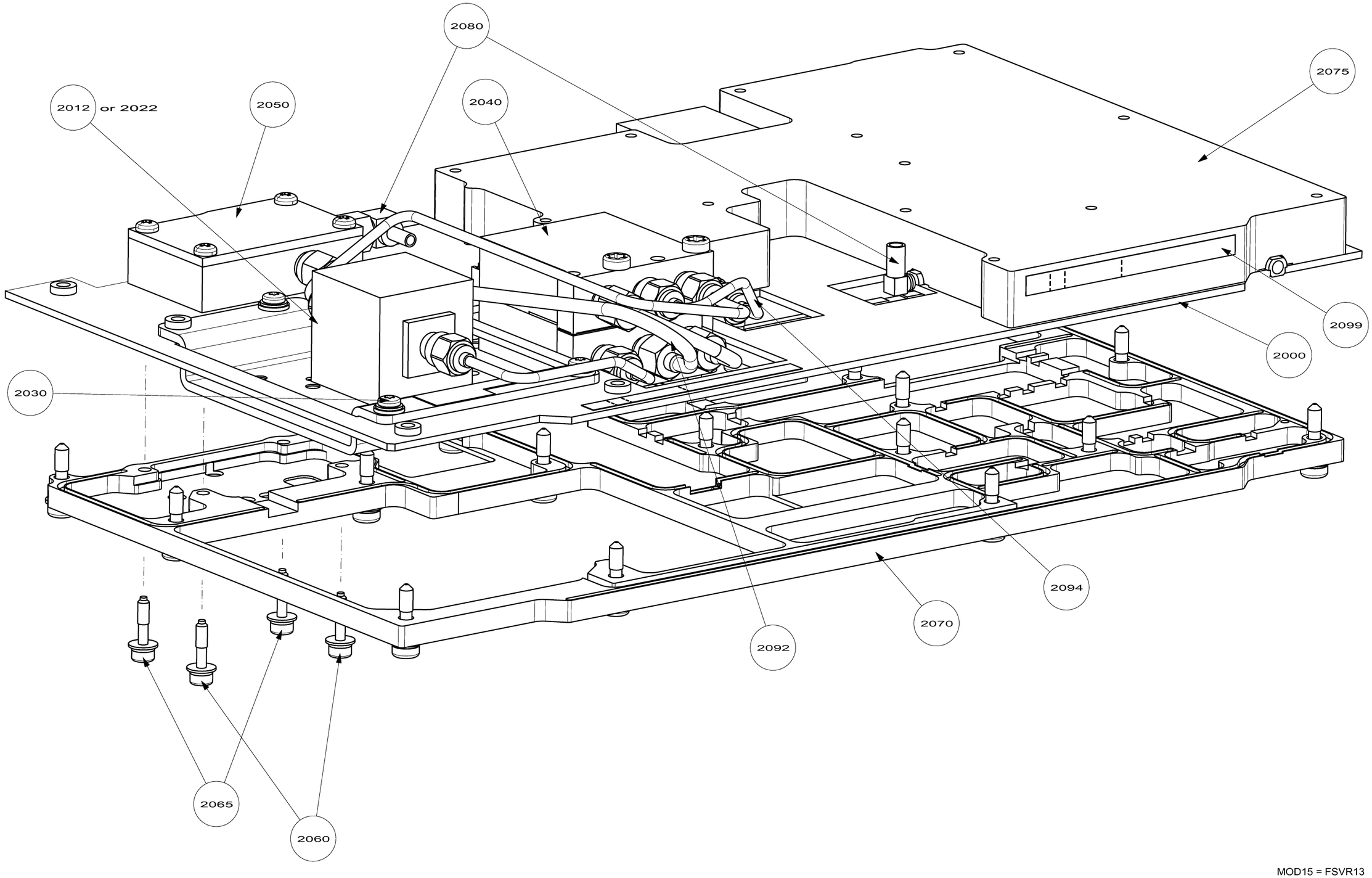


Projektions-methode

Projection Method

MOD14 = FSV13 WITH FSV-B24

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*	MW-CONVERTER UNIT MW CONVERTER UNIT		Sprache / *Lang.* de en	Aei. / *C.I.* 03.00	Blatt / *Sh.* 2
				Zeichn.Nr. / *Drawing No.* 1308.1192.01		D
FSV	Datum *Date* 2012-04-17	Abteilung *Dept.* MTEK	Name *Name* mk			

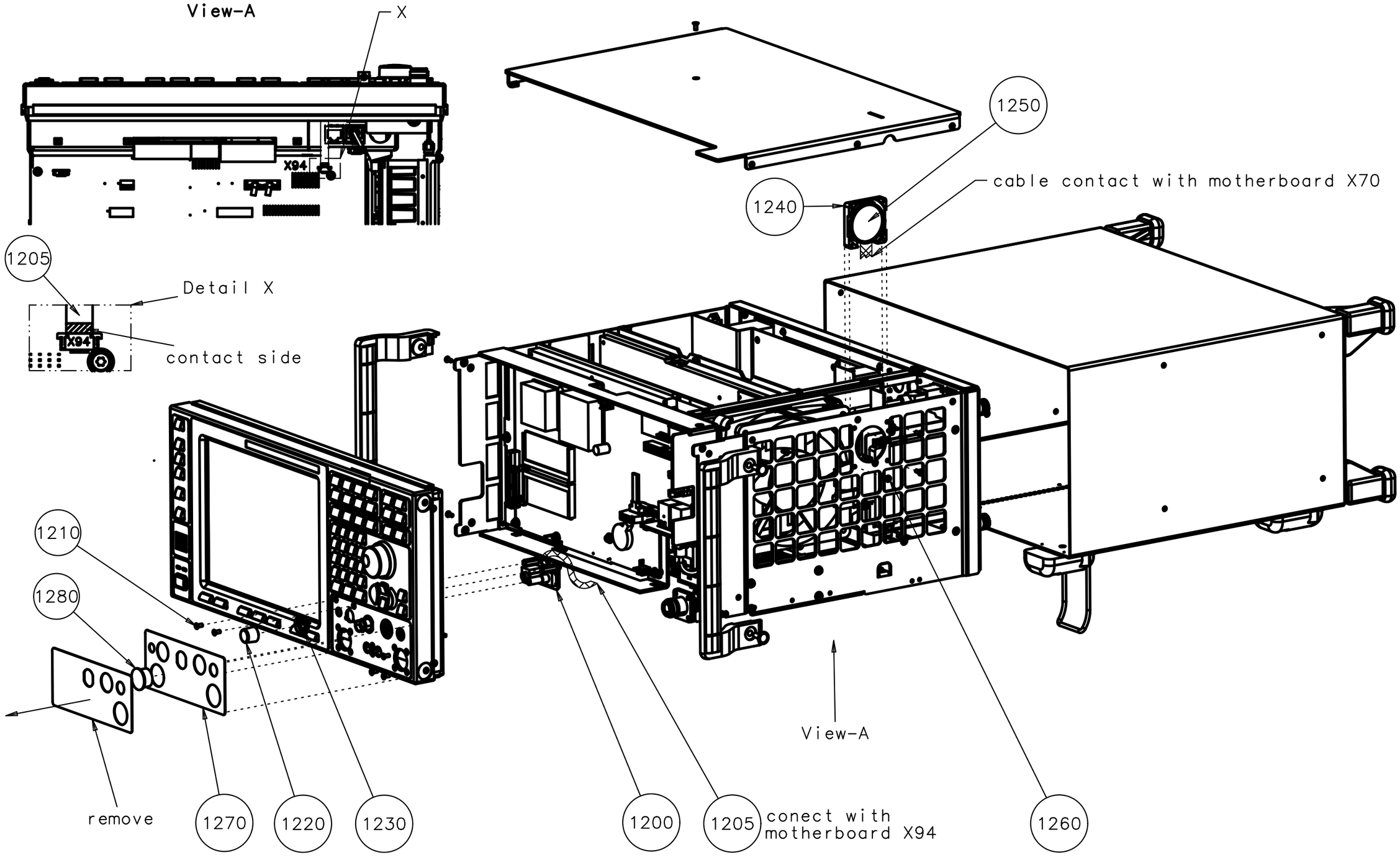


MOD15 = FSVR13

Projektions-methode

Projection Method

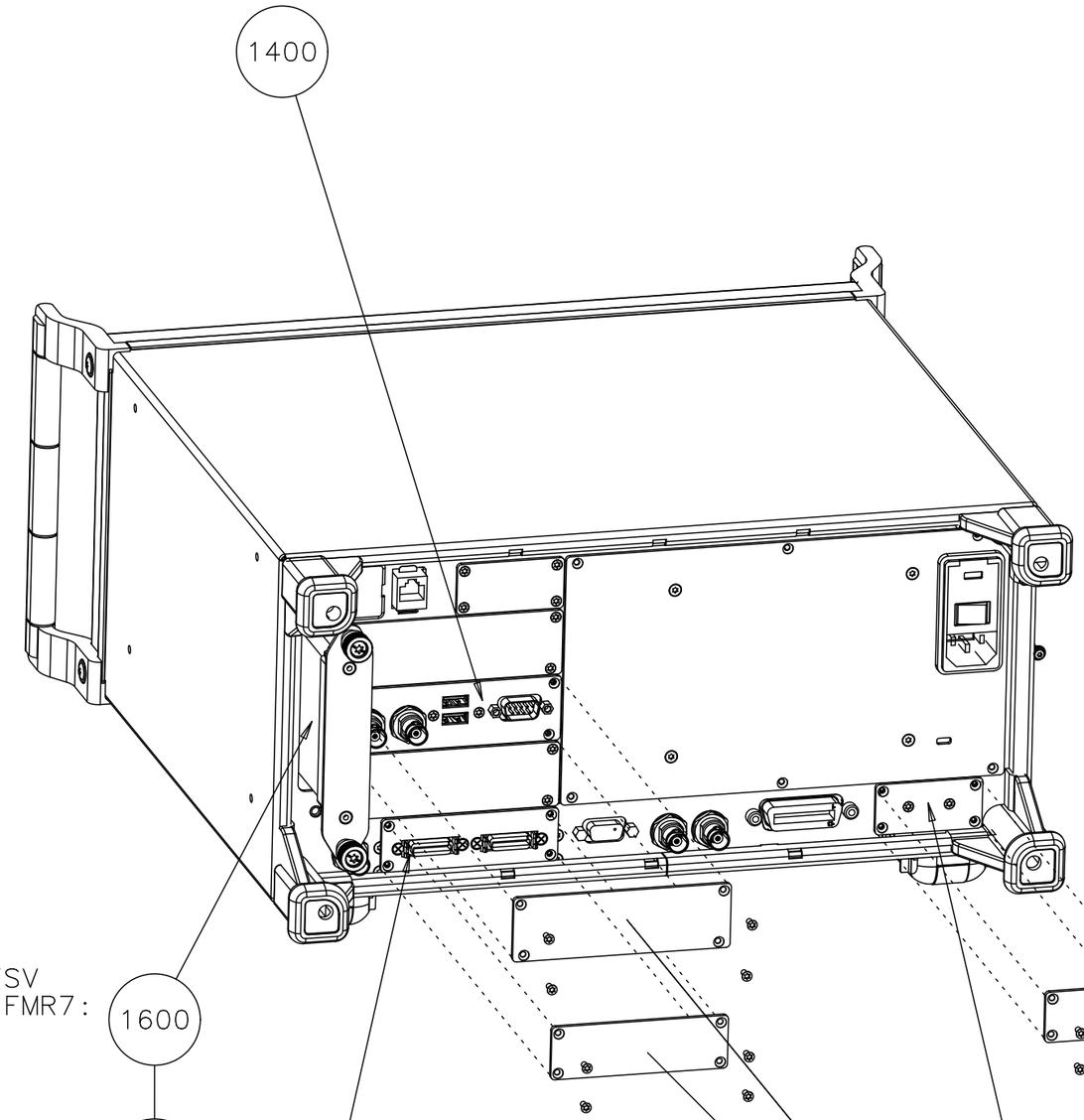
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* MW-CONVERTER UNIT MW CONVERTER UNIT			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 3
				Zeichn.Nr. / *Drawing No.* 1308.1192.01		D
FSV	Datum *Date* 2011-03-24	Abteilung *Dept.* 1ESK	Name *Name* Wn			

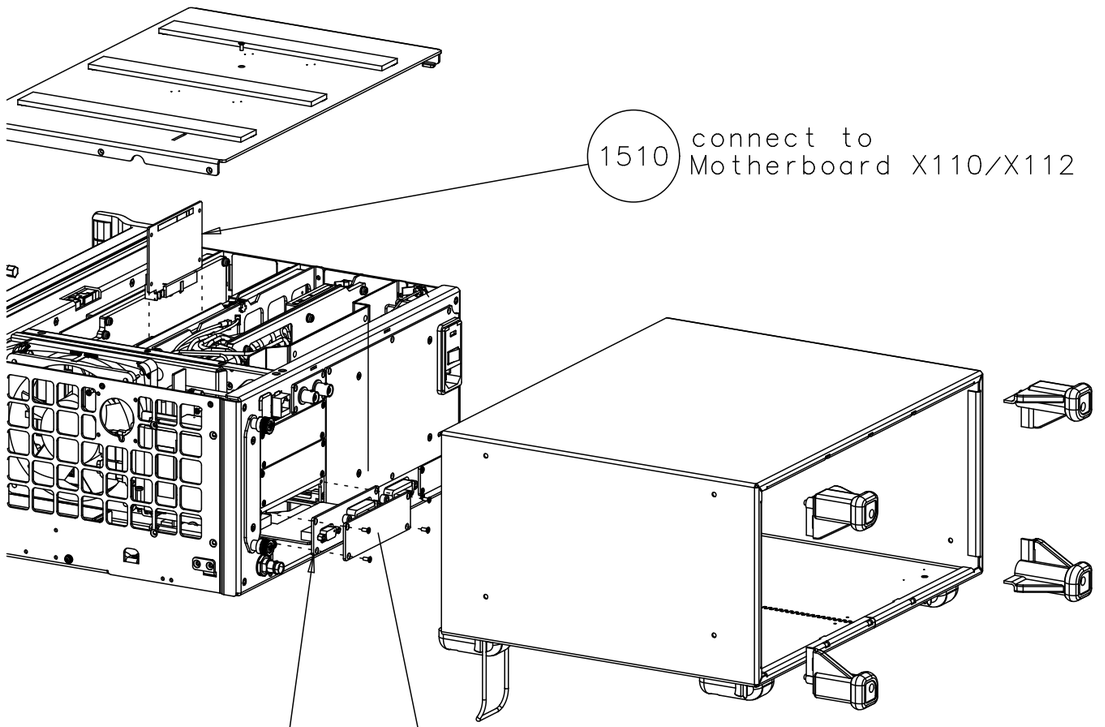


Assembly instruction FSV for
B3

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEISUNG FSV-B3 ASSEMBLY INSTRUCTION FSV-B3			Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 1
FSV-B3	Datum *Date* 2008-05-16	Abteilung *Dept.* 1ESK	Name *Name* PA/WM	Zeichn.Nr. / *Drawing No.* 1310.9700.00		D

Projektionsmethode
Projection Method





for FSV with FMR7: 1600

for FSV with FMR9: 1605

2510

FSVR: 1606

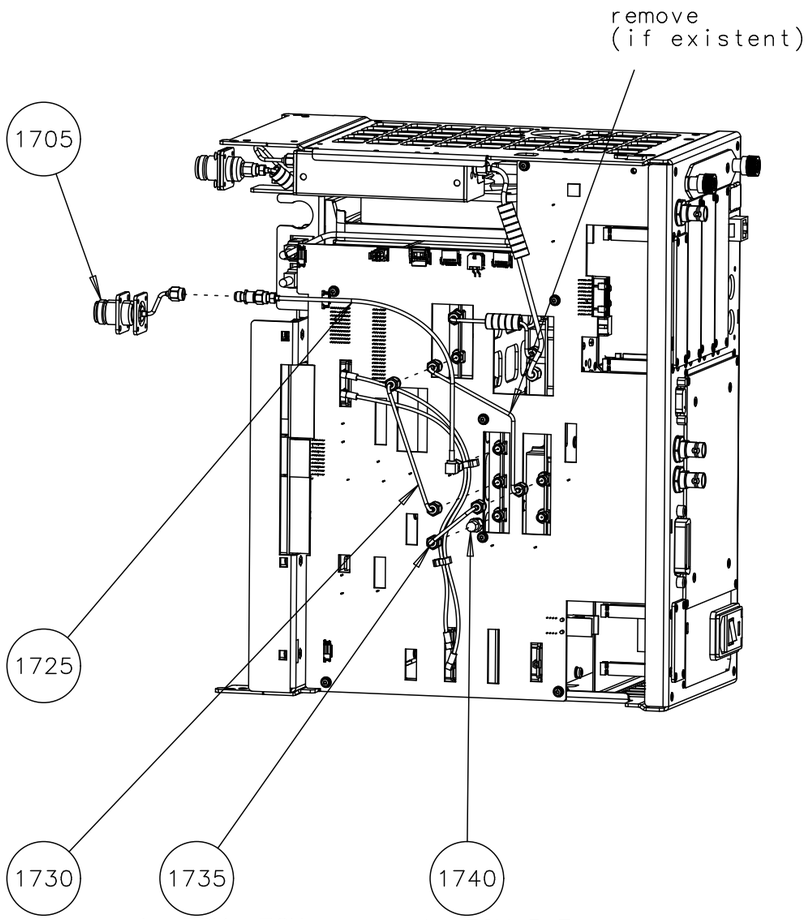
1300 VAR 02

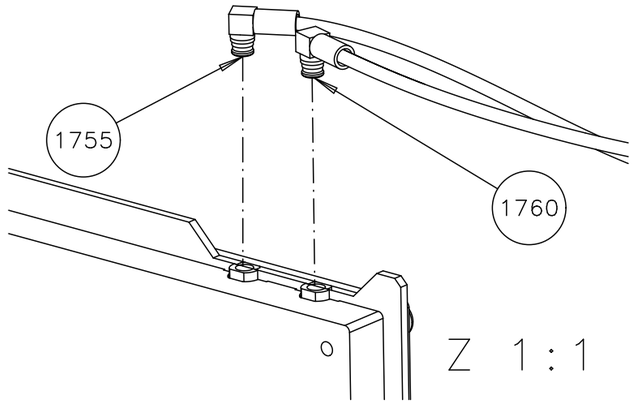
1302 VAR 03

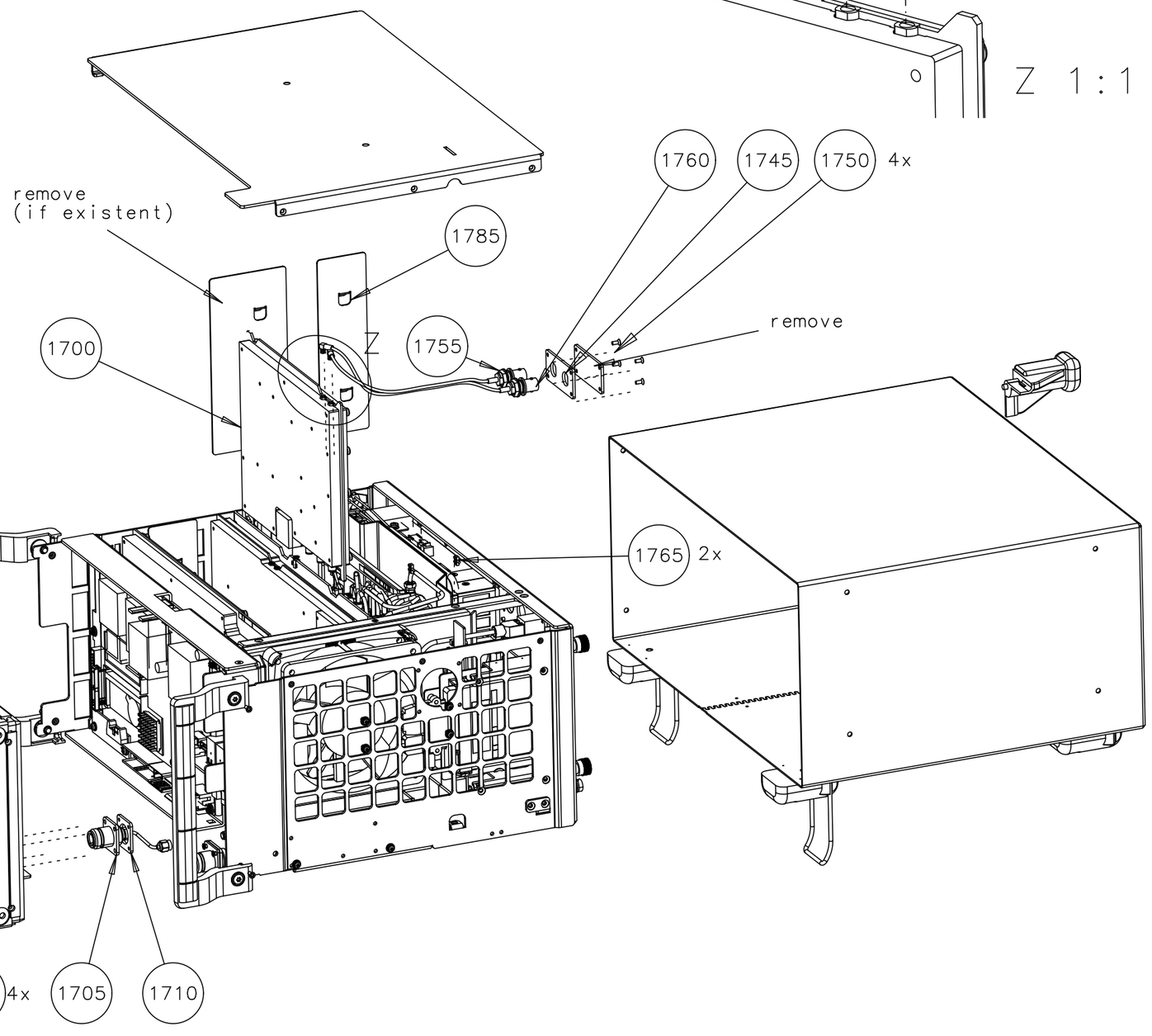
Assembly instruction for
FSV- B4 (1300/1302)
FSV- B5 (1400)
FSV-B10 (1500/1510)
FSV-B17 (1900)
FSV-B18 (2510)
FSV-B19 (1600/1605)
FSVR-B19 (1606)

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: EINBAUANWEISUNG FSV / ASSEMBLY INSTRUCTION FSV			Sprache / *Lang.*: de en	Aei. / *C.I.*: 05.00	Blatt / *Sh.*: 1
FSV	Datum *Date*: 2010-06-14	Abteilung *Dept.*: 1ESK	Name *Name*: WM	Zeichn.Nr. / *Drawing No.*: 1310.9716.00		D





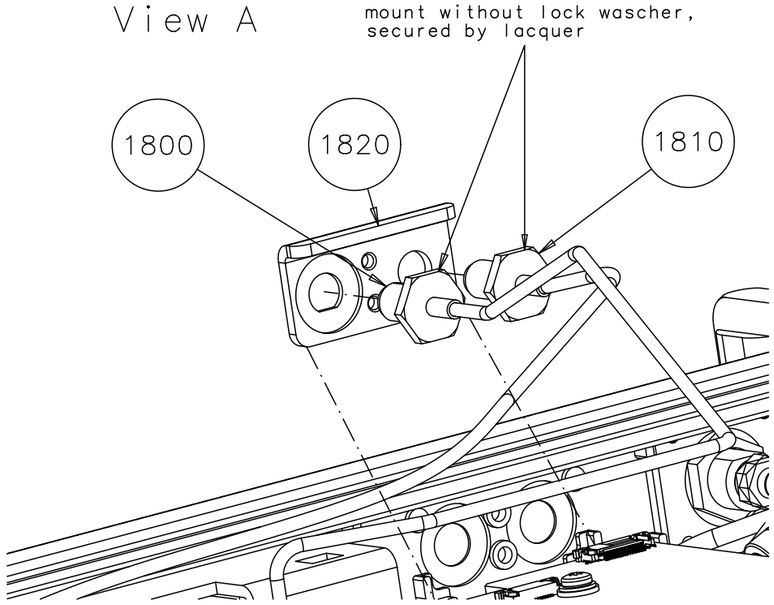


Projektions-methode

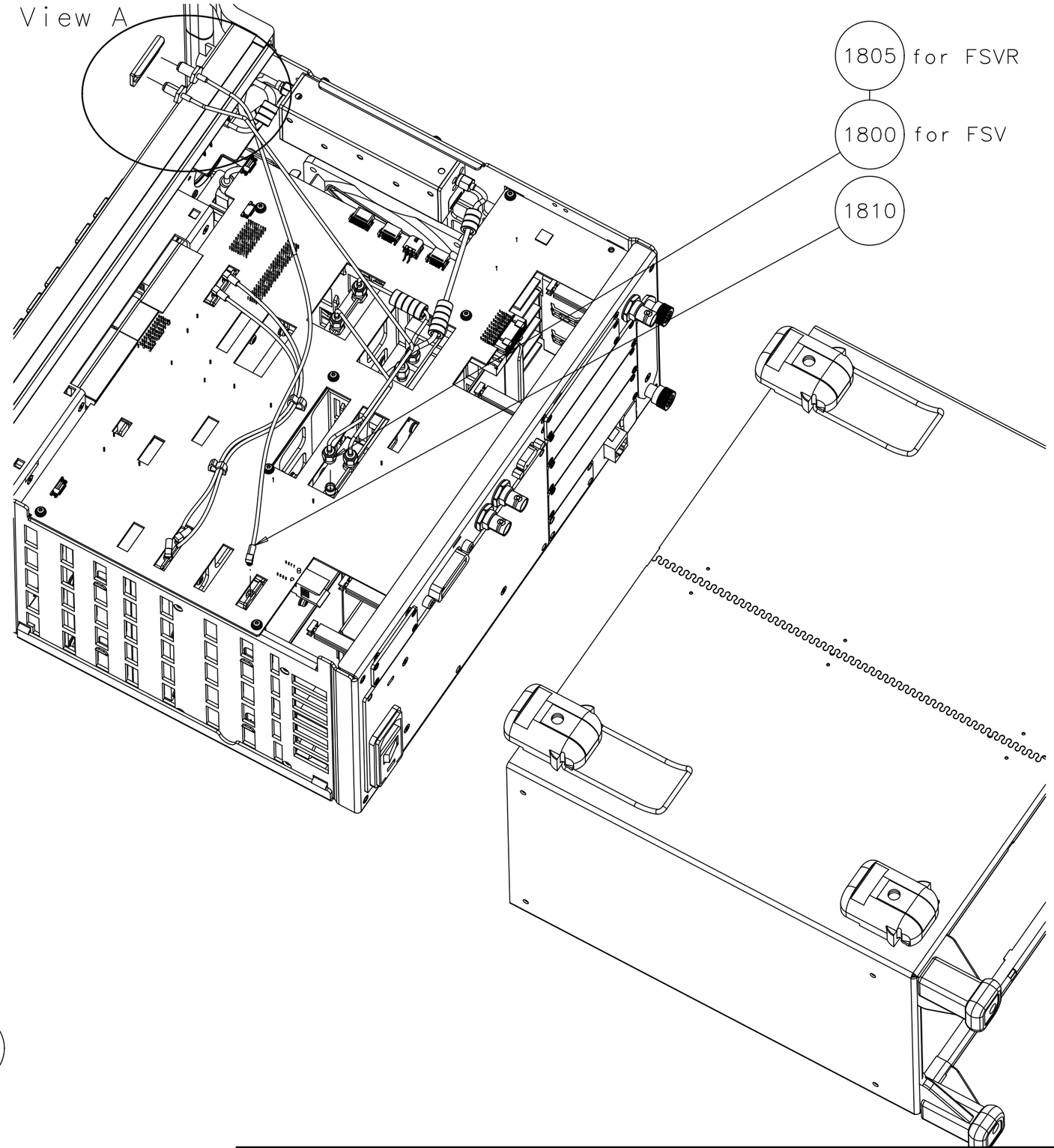
Projection Method

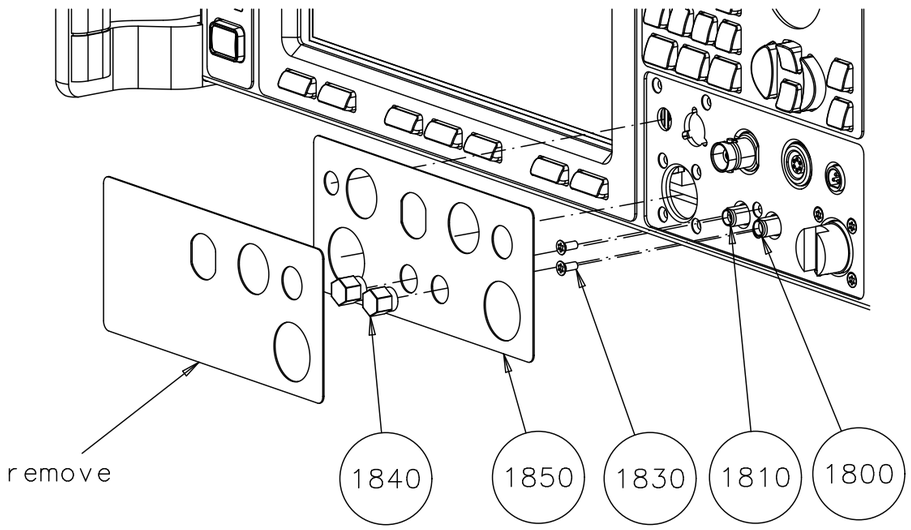
Maßstab *Scale* 1:5(1:1)	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEISUNG FSV-B9 ASSEMBLY INSTRUCTION FSV-B9			Sprache / *Lang.* de en	Aei. / *C.I.* 05.00	Blatt / *Sh.* 1
FSV-B9	Datum *Date* 2009-05-14	Abteilung *Dept.* 1ESK	Name *Name* WM	Zeichn.Nr. / *Drawing No.* 1310.9774.00		D

View A



View A





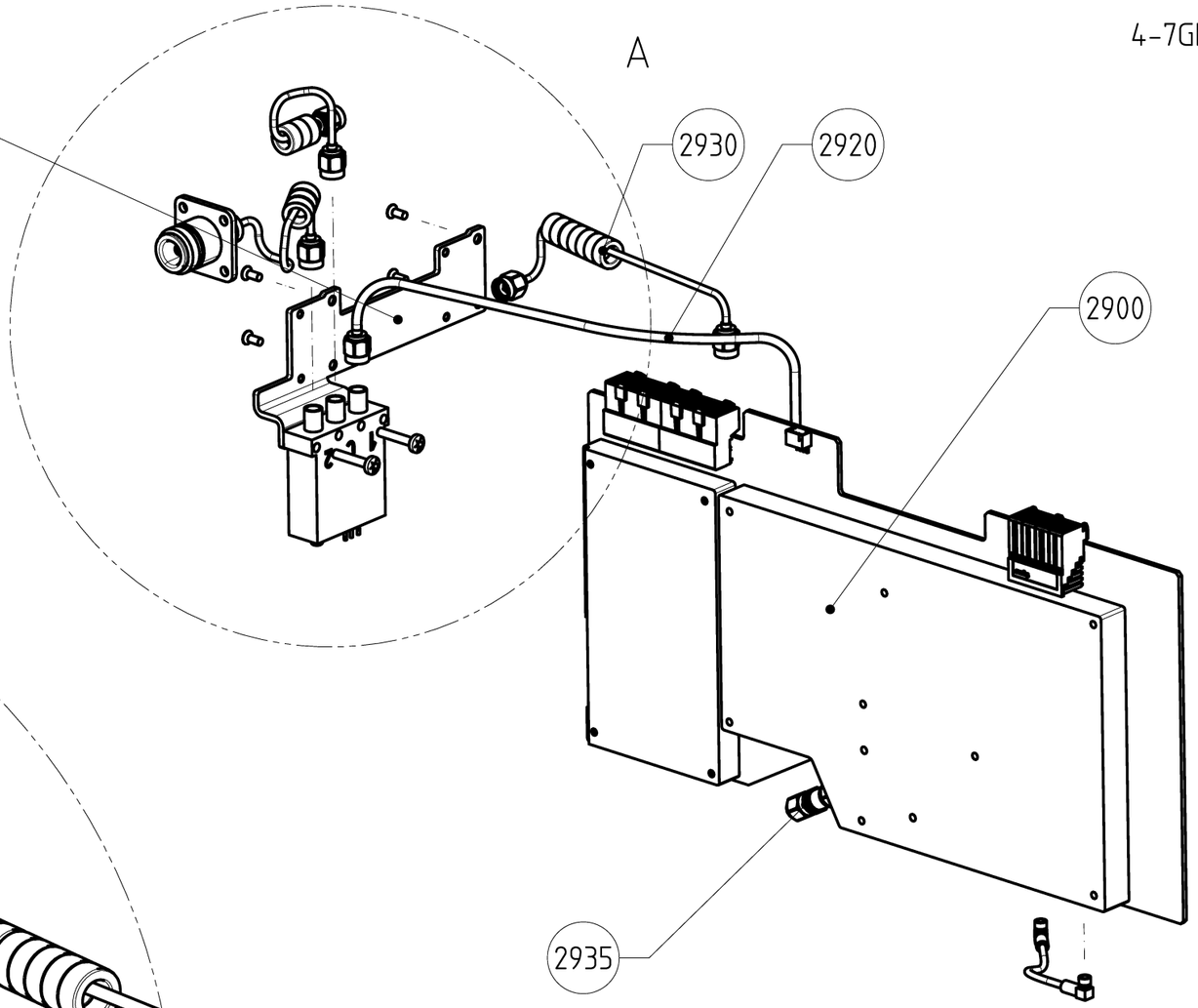
Projektions-methode

Projection Method

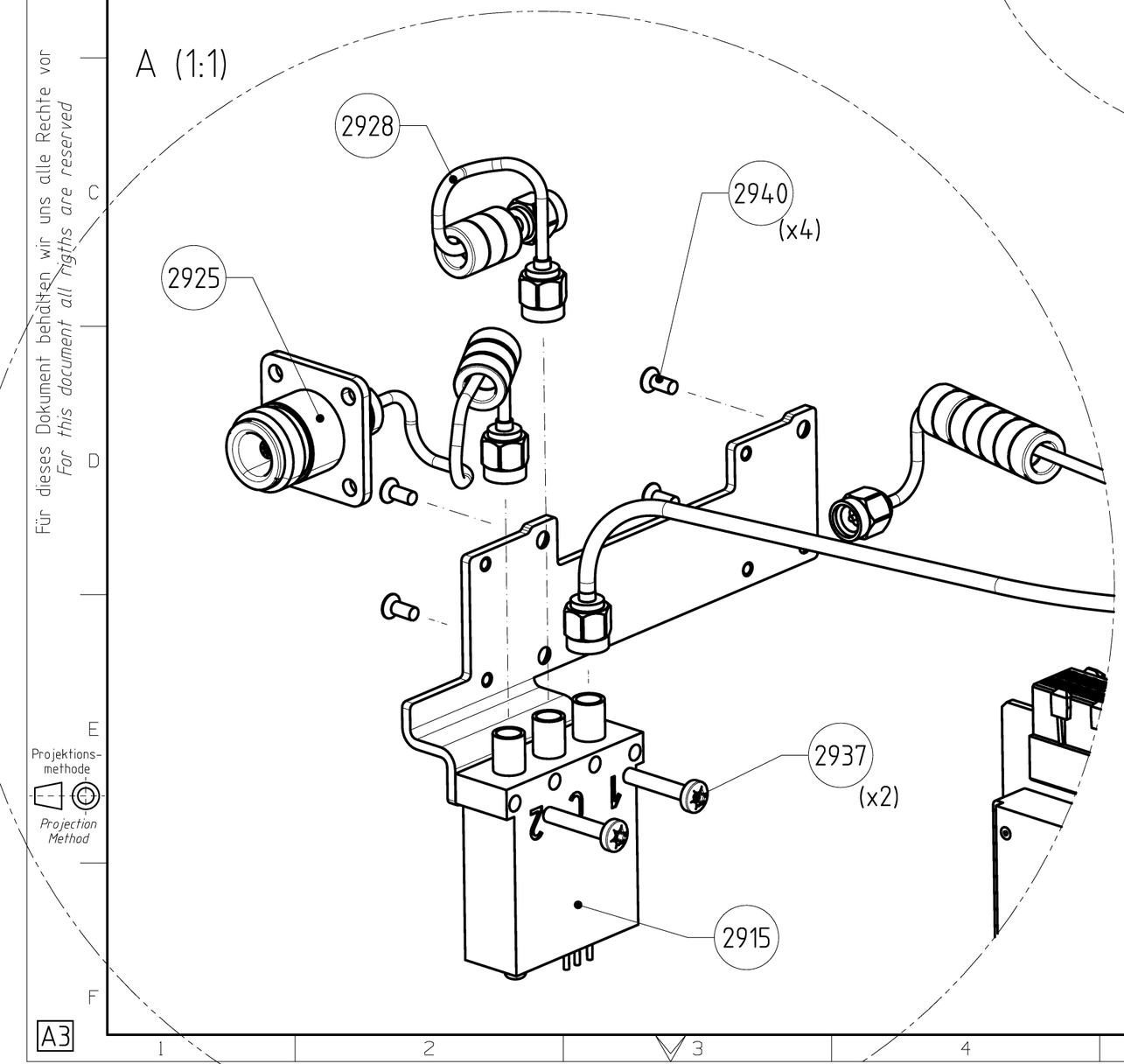
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation*: EINBAUANWEISUNG FSV-B21 / ASSEMBLY INSTRUCTION FSV-B21	Sprache / *Lang.*: de en; Aei. / *C.I.*: 02.00; Blatt / *Sh.*: 1	
FSV-B21	Datum *Date*: 2010-07-27; Abteilung *Dept.*: 1ESK; Name *Name*: Welz	Zeichn.Nr. / *Drawing No.*: 1308.1963.00 D	

4-7GHz-Gerät

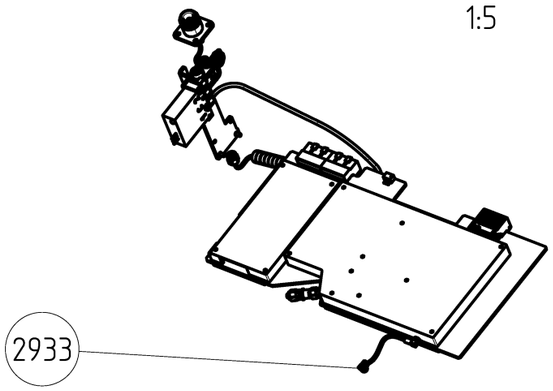
A



A (1:1)



1:5

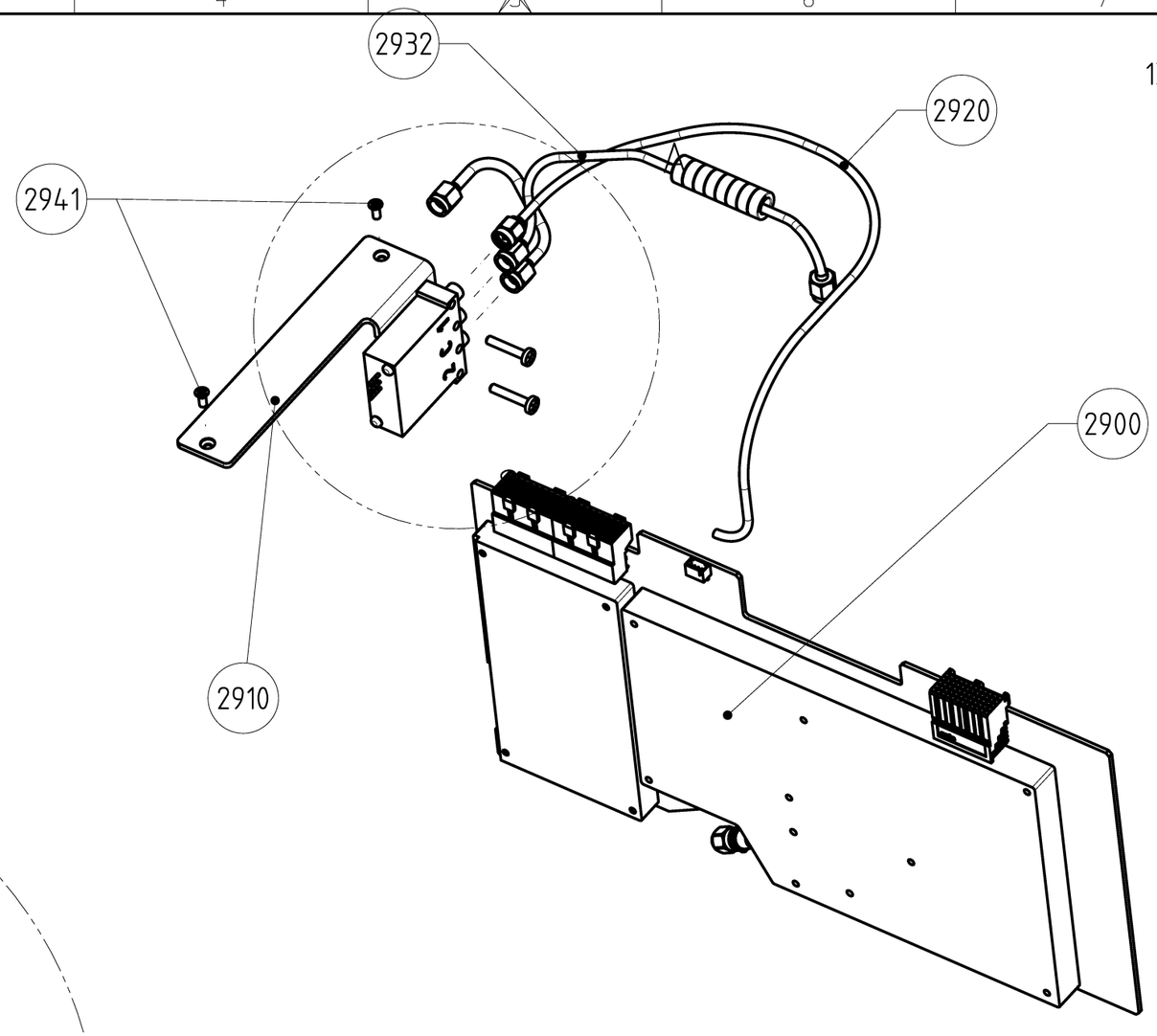


Projektions-methode
Projection Method

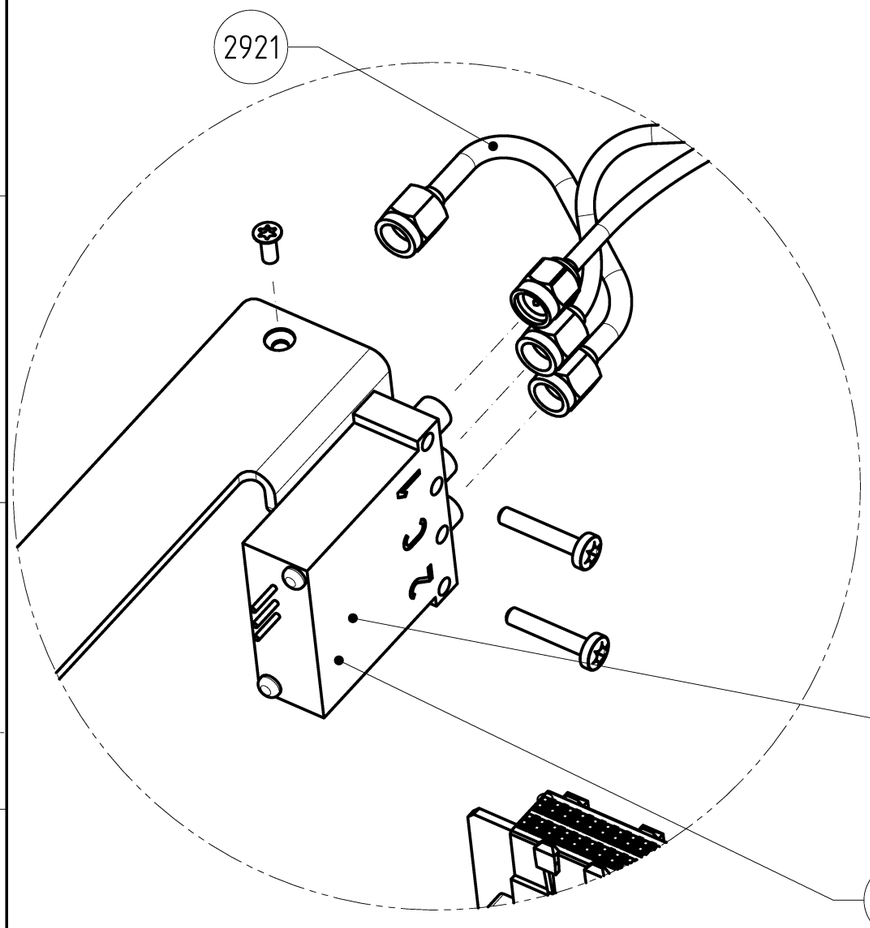
Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation* FSV-B160 BANDWIDTH EXTENSION FSV-B160 BANDWIDTH EXTENSION	Sprache / *Lang.* de en	Aei. / *C.I.* 01.00
FSV-B72	Datum *Date* 2013-04-19 / Abteilung *Dept.* 1ESK / Name *Name* BC/bu	Zeichn.Nr. / *Drawing No.* 1311.2015.01	Blatt / *Sh.* 1 D

A3

13 bis 40 GHz- Varianten

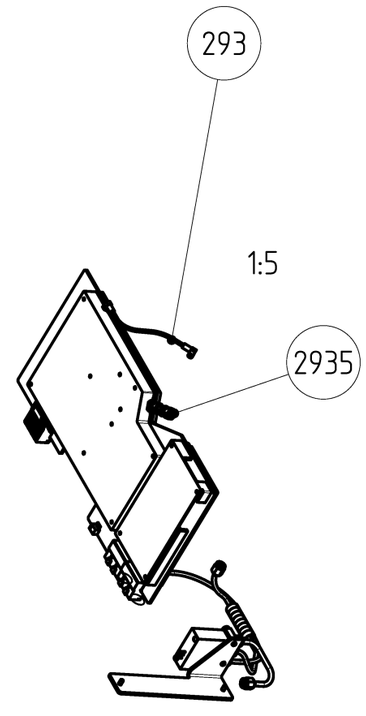


A (1:1)



2916 (30-40 GHz-Varianten)

2915 (13 GHz-Variante)



Projektions-methode
Projection Method

Maßstab *Scale* 1:2	Toleranz *Tol.* ISO2768-m	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation*: FSV-B160 BANDWIDTH EXTENSION FSV-B160 BANDWIDTH EXTENSION	Sprache / *Lang.* de en	Aei. / *C.I.* 01.00
FSV-B72	Datum *Date* 2013-04-19 · Abteilung *Dept.* 1ESK · Name *Name* BC/bu	Zeichn.Nr. / *Drawing No.* 1311.2015.01	Blatt / *Sh.* 2 D

A3

FSV MODELS			
1321.3008.04	FSV	4GHZ	sheet 1
1321.3008.07	FSV	7GHZ	sheet 1
1321.3008.13	FSV	13.6GHZ	sheet 1
1321.3008.30	FSV	30GHZ	sheet 1
1321.3008.39	FSV	40GHZ EMBARGO	sheet 1
1321.3008.40	FSV	40GHZ	sheet 1

A60 USB / Touch
A30 Display
A80 / A81 Keyboard
A70
A92 Controller (FMR)
A92 SATA Adapter
A91 Harddisk
X90 LAN
TG I
TG Q
(FSV-B9)
A11 Adapter Board
A220 Additional Interface FSV-B5
Noise Source Control
IF/Video /Demod Output
2xUSB
Aux Port
A230 Ext. Gen. Control FSV- B10
SCPI IEC 625
Aux Control
A160 Ultra Stable Ref
A120 Detector
A245 Bridge LVDS
A110 BW-Extension
A210 Ext. Gen. FSV-B10
A100 Frontend
A150 MW Converter
A140 Tracking Gen. FSV-B9
A10 Motherboard
A240 I/Q Data FSV-B17
Digital Baseband Input
Digital Baseband Output
A250 OCXO FSV-B4
A20 Front Connector Board
Noise Source
Power Sensor
Probe Power
A71 VOL / Phones FSV-B3
Phone
Volume
VGA IEC-1
IN OUT Trigger REF
Option FSV-B3
B1
FAN1
M
A50 Power Supply
A51 Power Filter
Power Line
Chassis GND
RFIn
TG Out
A300 Relais FSV 4/7
A40 RF Attenuator
A300 Relais FSV 13/30/40

Bindende Angaben ueber Varianten, Trimmwerte, Bauteile und nicht bestueckte Bauteile siehe SA.
For binding information on models, trimming, component values and not fitted components see SA.

ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: FSV SIGNAL ANALYZER			Spr.:/Lang.: de en	Aei:/C.I.: 01.00	Blatt:/Sh.: 1 -
	FSV SIGNAL ANALYZER			Zeichn.Nr.:/Drawing No.: 1321.3008.01 S		
FSV	Datum: Date: 2013-04-29	Abteilung: Dept.: 1ESK	Name: Name: iliev			