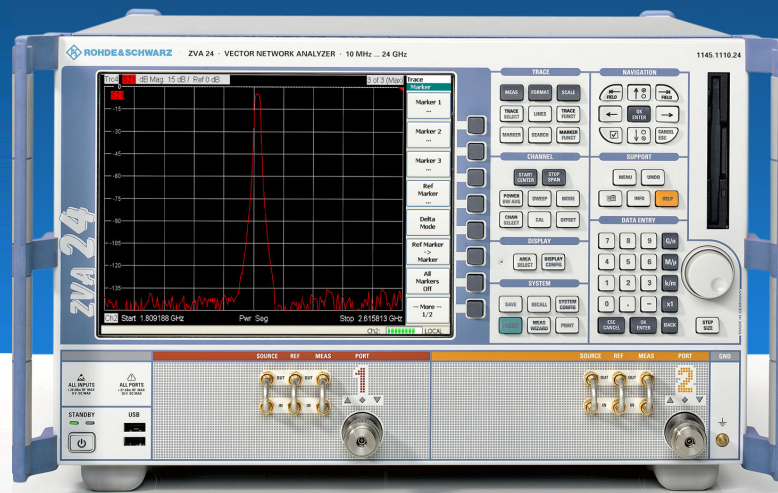


## Service Manual Instrument



## Vector Network Analyzers

**R&S<sup>®</sup> ZVA 8 / ZVA 24**

**1145.1110.08 / 24/26**

Printed in Germany



R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.  
Trade names are trademarks of the owners.

This product includes software developed by the OpenSSL Project for use in the  
OpenSSL Toolkit (<http://www.openssl.org>).

## Chapter Overview

Safety Instructions

Spare Parts Express Service  
List of R&S Representatives

Contents of Manuals for Vector Network Analyzers R&S ZVA  
Service and Repair

**Chapter 1:            Performance Test**

**Chapter 2:            Alignment**

**Chapter 3:            Repair**

**Chapter 4:            Software Update / Installation of Options**

**Chapter 5:            Documents**





Before putting the product into operation for the first time, make sure to read the following



## Safety Instructions

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz 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 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 an intention 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 operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

### Symbols and safety labels

Observe operating instructions	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

Supply voltage ON/OFF	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double/reinforced insulation

## Safety Instructions

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 putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in other parts of the documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by Rohde & Schwarz, including instruments, systems and all accessories.

### Tags and their meaning

<b>DANGER</b>	This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries.
<b>WARNING</b>	This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries.
<b>CAUTION</b>	This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries.
<b>ATTENTION</b>	This tag indicates the possibility of incorrect use that can cause damage to the product.
<b>NOTE</b>	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

### Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the instrument must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel 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
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.
4. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.

## Safety Instructions

5. Operating the products requires special training and intense concentration. Disabled persons should not use the products unless it is made certain that their disability has no adverse effects while they are operating the products.
6. Prior to switching on the product, it must be ensured 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.
7. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
8. Intentionally breaking the protective earth connection 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.
9. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
10. Never use the product if the power cable is damaged. 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 e.g. tripping over the cable or suffering an electric shock.
11. The product may be operated only from TN/TT supply networks fused with max. 16 A.
12. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.
13. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
14. For measurements in circuits with voltages  $V_{\text{rms}} > 30 \text{ V}$ , suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
15. Ensure that the connections with information technology equipment comply with IEC950/EN60950.
16. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.
17. If a product is to be permanently installed, the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made. The product may be installed and connected only by a skilled electrician.
18. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.
19. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
20. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.

## Safety Instructions

21. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.
22. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.
23. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
24. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
25. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.
26. Please be aware that in the event of a fire, toxic gases that may be hazardous to your health may escape from the product.
27. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.
28. 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).
29. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.
30. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.



## Informaciones de seguridad



**Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes informaciones de seguridad**



## Informaciones de seguridad

Es el principio de Rohde&Schwarz de tener a sus productos siempre al día con los standards de seguridad y de ofrecer a sus clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. Este producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los standards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, deberá el usuario atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. 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 solamente fue elaborado para ser utilizado en la industria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del maluso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones del correspondiente manual del uso y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso de los productos hace necesarios conocimientos profundos y el conocimiento del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso de los productos a personas péritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

## Símbolos y definiciones de seguridad

Ver manual de instrucciones del uso	Informaciones para maquinaria con un peso de > 18kg	Peligro de golpe de corriente	¡Cuidado! Superficie caliente	Conexión a conductor protector	Conexión a tierra	Conexión a masa conductora	¡Cuidado! Elementos de construcción con peligro de carga electrostática

potencia EN MARCHA/PARADA	Indicación Stand-by	Corriente continua DC	Corriente alterna AC	Corriente continua/alterna DC/AC	El aparato está protegido en su totalidad por un aislamiento de doble refuerzo

## Informaciones de seguridad

Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en otro capítulo de esta documentación y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por Rohde&Schwarz bajo la denominación de „producto“, entre ellos también aparatos, instalaciones así como toda clase de accesorios.

### Palabras de señal y su significado

PELIGRO	Indica un punto de peligro con gran potencial de riesgo para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas.
ADVERTENCIA	Indica un punto de peligro con un potencial de riesgo mediano para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas .
CUIDADO	Indica un punto de peligro con un potencial de riesgo pequeño para el usuario. Punto de peligro que puede llevar hasta heridas leves o pequeñas
ATENCIÓN	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.
INFORMACIÓN	Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo.

### Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue:  
modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).
3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el aluminio). Si se produjeran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averiguar los motivos de estas reacciones.

## Informaciones de seguridad

4. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar áreas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.
5. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Personas minusválidas solamente deberán utilizar estos productos si está por seguro de que a causa de su handicap no podrá surgir ninguna restricción en el manejo del producto.
6. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la de la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso de cambio cambiar los fusibles correspondientes del producto.
7. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
8. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.
9. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurarse de que el enchufe sea de fácil acceso y manejo (medida del cable de distribución aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en construcciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.
10. No utilice nunca el producto si está dañado el cable eléctrico. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
11. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A.
12. 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. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
13. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
14. En las mediciones en circuitos de corriente con una tensión de entrada de  $U_{eff} > 30 \text{ V}$  se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
15. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.
16. Nunca abra la tapa o parte de ella si el producto está en funcionamiento. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
17. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.

## Informaciones de seguridad

18. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, deberá la toma de corriente estar protegida de manera que los productos o los usuarios estén suficientemente protegidos.
19. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego heridas.
20. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.
21. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente o de daños en el producto lo cual también puede llevar al peligro de personas.
22. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.
23. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.
24. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.
25. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención células de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Baterías y acumuladores son desechos problemáticos. Por favor tirelos en los recipientes especiales para este fin. Por favor tengan en cuenta las prescripciones nacionales de cada país referente al tratamiento de desechos. Nunca sometan a las baterías o acumuladores a un corto circuito.
26. Tengan en consideración de que en caso de un incendio pueden escaparse gases tóxicos del producto, que pueden causar daños a la salud.
27. Por favor tengan en cuenta el peso del producto. Muevanlo cuidadosamente ya que el peso puede causar lesiones de la espalda u otros daños físicos.
28. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).
29. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo y el fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
30. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

## Safety Instructions

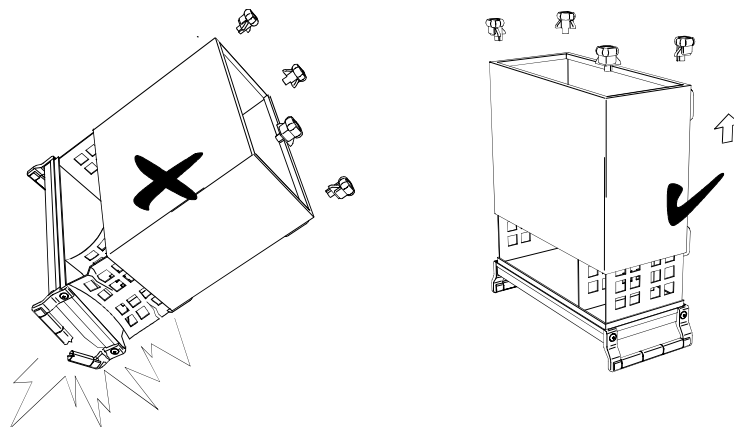
### WARNING



*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.*

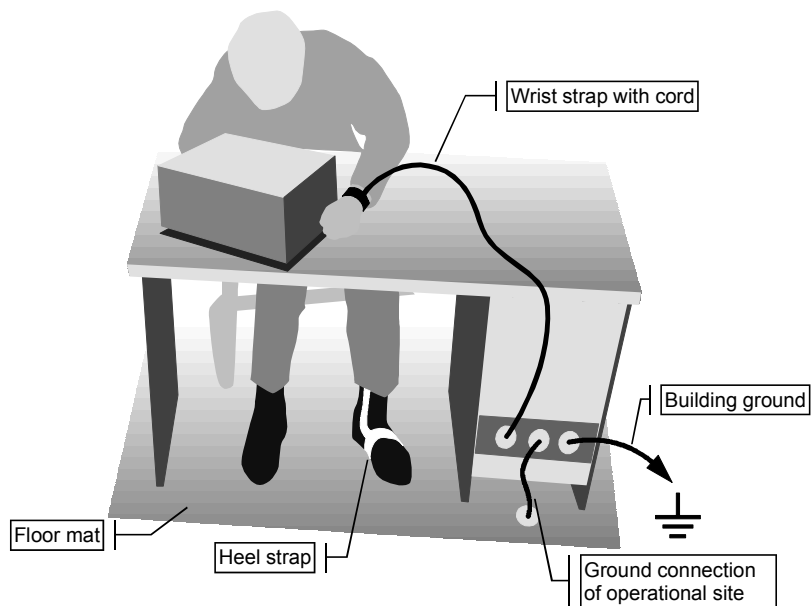


*When mounting the cabinet take care not to pen in the fingers. Also pay attention not to damage or pull off cables. Screw the rear feet back on immediately after mounting the cabinet. Do not move the unit with the rear feet missing.*

### ATTENTION



*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*

# Index

## A

Alignment .....	2.3
Frequency accuracy .....	2.6
Frequency response correction .....	2.7, 2.9
Level accuracy .....	2.9
Manual .....	2.4
Reference frequency .....	2.6
Test equipment .....	2.4

## B

Battery	
Replacement .....	3.20
Block circuit	
diagram .....	4
Block diagram	
Explanation .....	3.2
Board replacement	
DC/AC converter .....	3.24
Detector A120 .....	3.46
Disk drive .....	3.29
Fan .....	3.33
Front hood .....	3.28
Front module processor A90 .....	3.17
Frontend A100 .....	3.43
LCD .....	3.24
Motherboard A10 .....	3.34
MW converter unit A160 .....	3.48
Power supply .....	3.32
Power supply .....	3.31
Switching foil .....	3.26
Synthesizer A110 .....	3.47
Board Replacement	
Battery .....	3.20
Boards	
Overview .....	3.16
Boot problems	
Troubleshooting .....	3.51

## D

Detector	
Replacement .....	3.46
Disk drive	
Replacement .....	3.29
Documents .....	1

## E

..... 4, 20

## F

Fan	
Replacement .....	3.33
Frequency accuracy	
Alignment .....	2.6
Check .....	1.3, 1.8, 1.10, 1.11, 1.12, 1.13, 1.14
Frequency response	
Correction .....	2.7, 2.9
Front hood .....	3.28
Front module processor	
Function .....	3.11
Replacement .....	3.17

Front unit .....	3.11
Frontend	
Replcement .....	3.43
Function description .....	3.1

## I

Instrument construction .....	3.1
-------------------------------	-----

## K

Keyboard	
Function .....	3.11
Replacement .....	3.26

## L

LC display .....	3.11
LCD	
Replacement .....	3.24
Level accuracy	
Alignment .....	2.9
Lithium battery	
Replacement .....	3.20

## M

Manual alignment .....	2.4
Mechanische Zeichnungen .....	20
Menu, service .....	2.3
Motherboard	
Function .....	3.13
Replacement .....	3.34

## N

Netzkabel .....	3
-----------------	---

## O

OCCO	
Function .....	3.7
Option	
B4	
Function .....	3.7
FSU-B9	
Function .....	3.14
Installation .....	4.2
List .....	4.2

## P

Password .....	2.3
Performance test	
Frequency accuracy .....	1.3, 1.8, 1.10, 1.11, 1.12, 1.13, 1.14
Harmonics suppression .....	1.4
Level accuracy .....	1.5, 1.6
Level linearity .....	1.4, 1.7
Protocol Fehler! Textmarke nicht definiert .....	1.15
Performance Test .....	1.1
Power supply	
Function .....	3.12
Replacement .....	3.32
Replacement .....	3.31
Power-up problems .....	3.50
Precision attenuator	
Function .....	3.4, 3.5

**R**

*Refurbished Modules* ..... 2  
*Repairs* ..... 3.1  
*Replacement*  
     *Boards* ..... 3.14  
*Replacing*  
     *Boards* ..... 3.14

**S**

*Shipping*  
     *Instrument* ..... 1  
     *Module* ..... 1  
*Software update* ..... 4.1  
*Spare parts*  
     *list of all parts* ..... 6  
     *Ordering* ..... 2  
     *Refurbished Modules* ..... 2

*Synthesizer*  
     *Replacement* ..... 3.47

**T**

*Test equipment*  
     *Alignment* ..... 2.4  
     *Performance test* ..... 1.2  
*Test equipment*  
     *Troubleshooting* ..... 3.49  
*Tracking generator*  
     *Function* ..... 3.14  
*Troubleshooting*  
     *Power-up problems* ..... 3.50  
*Troubleshooting*  
     *Boot problems* ..... 3.51  
     *Selftest* ..... 3.58, 3.63  
     *Selftest* ..... 3.53

## Table of Contents - Chapter 1 "Performance Test"

<b>1 Performance Test</b> .....	<b>1.1</b>
<b>Preliminary Remarks</b> .....	<b>1.1</b>
<b>Test Equipment and Accessories</b> .....	<b>1.2</b>
<b>Performance Test</b> .....	<b>1.3</b>
Checking the Frequency Uncertainty.....	1.3
Checking the Harmonics.....	1.4
Checking the Maximum Output Power.....	1.5
Checking the Accuracy of Output Power.....	1.6
Checking the Output Linearity.....	1.7
Checking the Power Measurement Uncertainty.....	1.8
Checking the Input Linearity.....	1.9
Checking the Input Noise Level.....	1.10
Checking the Matching (raw).....	1.11
Checking the Dynamic Range.....	1.12
Checking the Receiver Attenuator (only with Option Receiver Attenuator).....	1.13
Checking the DC Measurement Inputs.....	1.14
<b>Performance Test Report</b> .....	<b>1.15</b>





# 1 Performance Test

## Preliminary Remarks

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

[<KEY>]            Press a front-panel key, e.g. [**SPAN**]

[<SOFTKEY>]      Press a softkey, e.g. [MARKER -> PEAK]

[<nn unit>]        Enter a value + terminate the entry with a unit, e.g. [**12 kHz**]

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

## Test Equipment and Accessories

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1	Spectrum analyzer	a) Counter mode: Min. resolution: 100 Hz Max. rel. frequency deviation: $10^{-6}$ b) Linearity Max. departure from linearity ( $2\sigma$ ): 0.06 dB c) Frequency response: 50 MHz to 4 GHz: < 1 dB 4 GHz to 8 GHz: < 1.5 dB 8 GHz to 26 GHz: < 2 dB	FSU 26	1129.9003.26	Frequency uncertainty Harmonics Output linearity Input linearity
2	Power meter	300 kHz to 8 GHz 10MHz to 24 GHz	NRVD + Sensor NRV-Z51 NRV-Z52	0857.8008.02 0857.9004.02 0857.9204.02	Max output power Accuracy of output power Power measurement uncertainty
4	Calibration kit	N, 50 $\Omega$ . 300 kHz to 8 GHz.	ZV-Z21	1085.7099.02	Input linearity Matching port 1 to port 4 Input noise level on ZVA8
4	Calibration kit	3.5mm, 50 $\Omega$ . 10 MHz to 20 GHz.	ZV-Z32	1128.3501.02	Input linearity Matching port 1 to port 4 Input noise level on ZVA24
5	Signal generator	300 kHz to 24 GHz, Power = -40 dBm to 10 dBm	SML01 SMR27 with Option SMR-B15	1090.3000.11 1104.0002.27 1104.4989.02	Power measurement uncertainty
6	Power splitter	N, 50 Ohm, $\Gamma_{eq} < 0.05$ (50 MHz to 8 GHz) Output tracking < 0.15 dB	Weinschel 1870A	-	Power measurement uncertainty
6	Power splitter	3.5mm, 50 Ohm, Output tracking < 0.25 dB	Weinschel 1593	-	Power measurement uncertainty
7	Test cable	Test cable N (m) to N (m).	ZV-Z11	1085.6505.03	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement uncertainty Input linearity on ZVA8
7	Test cable	Test cable 3,5mm (m) to 3,5mm (f).	ZV-Z14	1134.4093.02	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement uncertainty Input linearity on ZVA24
8	BNC cable	Male – male, approx. 1.5 m			General: Device synchronisation
9	DC power supply	-12 V to +12 V	NGSM 32/10	0192.0810.31	DC meas inputs
10	Multimeter	MU < 0.2%, DC range 1 V, 10 V	URE3	0350.5315.03	DC meas inputs
11	Conn. Cables for DC inputs		ZV-Z71	1164.1005.02	DC meas inputs

## Performance Test

Compare with data sheet

### Checking the Frequency Uncertainty

Instrument:	Spectrum analyzer (see Chapter "Test Equipment", Item1) Test cable (see Chapter "Test Equipment", Item7)
Test setup:	Connect the spectrum analyzer to port 1
Spectrum analyzer settings:	- [ <b>PRESET</b> ] - [ <b>FREQ : 1 GHz</b> ] - [ <b>SPAN : 50 kHz</b> ] - [ <b>BW : MANUAL RES BW : 10 kHz</b> ] - [ <b>MARKER : MARKER MODE : FREQ COUNT</b> ] - [ <b>AMPT : REF LEVEL : 10 dBm</b> ]
R&S® ZVA settings	- Select [ <b>System</b> : Internal Reference ]  - [ <b>Preset</b> ] - [ <b>Meas</b> :Wave Quantities: a1 Src Port 1] - [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : <b>1 GHz</b> ; Power : <b>0 dBm</b> ] - [ <b>Sweep</b> : Single : <b>Restart</b> ]
Measurement:	Read off the frequency indicated by the marker.  Frequency deviation = marker value – 1 GHz Max. frequency deviation ..... see Performance Test Report

## Checking the Harmonics

Instrument:	Spectrum analyzer (see Chapter "Test Equipment", Item1) Test cable (see Chapter "Test Equipment", Item7)
Test setup:	Connect the spectrum analyzer to port1 (port 2 to port 4)
Spectrum analyzer settings:	<p><b>Note:</b> Synchronize the reference oscillators in the spectrum analyzer and in the R&amp;S®ZVA.</p> <ul style="list-style-type: none"> <li>- [ <b>PRESET</b> ]</li> <li>- [ <b>FREQ</b> : <math>f_{GEN}</math>, <math>2 * f_{GEN}</math>, <math>3 * f_{GEN}</math> *]</li> <li>- [ <b>SPAN</b> : ZERO SPAN ]</li> <li>- [ <b>BW</b> : MANUAL RES BW : <b>100 Hz</b> ]</li> <li>- [ <b>MARKER</b> : DETECTOR : RMS ]</li> <li>- [ <b>AMPT</b> : REF LEVEL : <b>10 dBm</b> ]</li> </ul> <p>* For measurement frequencies, see Performance Test Report {fGEN}.</p>
R&S® ZVA settings:	<ul style="list-style-type: none"> <li>- [ <b>Preset</b> ]</li> <li>- [ <b>Meas</b> : Wave Quantities: a1 Src Port 1 (a2 Src Port 2, a3 Src Port 3, a4 Src Port 4)]</li> <li>- [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {<b>fGEN*</b>} ; Power : <b>8 dBm</b> ]</li> <li>- [ <b>Sweep</b> : Single : <b>Restart</b> ]</li> </ul> <p>* For measurement frequencies, see Performance Test Report {fGEN}.</p>
Measurement:	Read off the levels $L_{n * f_{gen}}$ ( $n = 1, 2, 3$ ) indicated by the spectrum analyzer's markers.
Calculation:	$\text{Harmonics} = L_{n * f_{gen}} - L_{f_{gen}} - \text{cable loss (in dB)}$ <p>The cable loss corresponds to the <math>S_{21}</math> of the test cable used between the fundamental and the measured harmonic (<math>S_{21}</math> is negative).</p>

## Checking the Maximum Output Power

Instrument:	Power sensor or Power meter with power sensor (see Chapter "Test Equipment", Item2)
Test setup:	Connect power sensor to port1 (port 2 to port 4)
Power sensor settings:	For measurement frequencies, see Performance Test Report { $f_{GEN}^*$ }.
R&S®ZVA settings:	<ul style="list-style-type: none"> <li>- [ <b>Preset</b> ]</li> <li>- [ <b>Meas</b> : Wave Quantities: a1 Src Port 1 (a2 Src Port 2 to a4 Src Port 4)]</li> <li>- [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {<math>f_{GEN}^*</math>}; Power : <b>16 dBm</b>]</li> <li>- [ <b>Sweep</b> : Single : <b>Restart</b>]</li> </ul> <p>* For measurement frequencies see the Performance Test Report {<math>f_{GEN}^*</math>}.</p>
Measurement:	<p>Read off the level indicated by the power meter.</p> <p>Max. power ..... see Performance Test Report</p>

## Checking the Accuracy of Output Power

Instrument:	Power sensor or Power meter with power sensor (see Chapter "Test Equipment", Item2)
Test setup:	Connect the power sensor to port 1 (port 2 to port 4)
Power sensor settings:	For measurement frequencies, see Performance Test Report {f <sub>GEN</sub> *}.
R&S®ZVA settings:	- [ <b>Preset</b> ] - [ <b>Meas</b> :Wave Quantities: a1 Src Port 1 (a2 Src Port 2, a3 Src Port 3, a4 Src Port 4)] - [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {f <sub>GEN</sub> *} ; Power : <b>-10 dBm</b> ] - [ <b>Sweep</b> : Single : <b>Restart</b> ]  * For measurement frequencies, see Performance Test Report {f <sub>GEN</sub> }.
Measurement:	Read off the levels indicated by the power sensor  Level deviation = L <sub>SENSOR</sub> – (-10 dBm)

## Checking the Output Linearity

Instrument:	Spectrum analyzer (see Chapter "Test Equipment", Item1) Test cable (see Chapter "Test Equipment", Item7)
Test setup:	Connect the spectrum analyzer to port 1(port 2 to port 4)
Spectrum analyzer settings:	<p><b>Note:</b> Synchronize the reference oscillators in the spectrum analyzer and in the R&amp;S®ZVA :</p> <ul style="list-style-type: none"> <li>- [ <b>PRESET</b> ]</li> <li>- [ <b>FREQ</b> : <math>f_{GEN}^*</math> ]</li> <li>- [ <b>SPAN</b> : ZERO SPAN ]</li> <li>- [ <b>BW</b> : MANUAL RES BW : <b>100 Hz</b> ]</li> <li>- [ <b>MARKER</b> : DETECTOR : RMS ]</li> <li>- [ <b>AMPT</b> : REF LEVEL : <b>5 dBm</b> ]</li> </ul> <p>* For measurement frequencies, see Performance Test Report {fGEN}.</p>
R&S®ZVA settings:	<ul style="list-style-type: none"> <li>- [ <b>Preset</b> ]</li> <li>- [ <b>Meas</b> : Wave Quantities: a1 Src Port 1 (a2 Src Port 2, a3 Src Port 3, a4 Src Port 4)]</li> <li>- [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {<math>f_{GEN}^*</math>} ; Power : {<math>I_{GEN}^*</math>}]</li> <li>- [ <b>Sweep</b> : Single : <b>Restart</b> ]</li> </ul> <p>* For measurement frequencies {fGEN} and levels {<math>I_{GEN}</math>}, see Performance Test Report</p>
Measurement:	Read the spectrum analyzer's marker values (level L) .
Calculation:	<p>The measured values are referred to the level at the ZVA setting of -10 dBm. Calculating the generator level linearity:</p> <p>Level linearity = <math>L - L_{@-10dBm} - \text{step width (in dB)}</math></p> <p>Step width = <math>I_{gen} - (-10 \text{ dBm})</math> (reference)</p>



## Checking the Power Measurement Uncertainty

Instrument:	<p>Power sensor or Power meter with power sensor (see Chapter "Test Equipment", Item2)</p> <p>Signal generator (see Chapter "Test Equipment", Item5)</p> <p>Power splitter (see Chapter "Test Equipment", Item6)</p> <p>Calibration kit (see Chapter "Test Equipment", Item4)</p> <p>Test cable (see Chapter "Test Equipment", Item7)</p>
Preparation/ test setup:	<p>Connect the signal generator to the power-splitter input using the test cable.</p> <p>Connect the power sensor to a power-splitter output</p> <p>Connect the other power-splitter output to port1 (port2 to port 4) using an adapter from the calibration kit</p>
R&S®ZVA settings:	<p>The reference oscillators in the signal generator and in the ZVA must be synchronized.</p> <ul style="list-style-type: none"> <li>- [ <b>Preset</b> ]</li> <li>- [ <b>Meas</b> : Wave Quantities: b1 Src Port 1 (b2 Src Port 2, b3 Src Port 3, b4 Src Port 4)]</li> <li>- [ <b>Power</b> : RF Off ]</li> <li>- [ <b>Meas Bandwidth</b> : 100 Hz ]</li> <li>- [ <b>Marker</b> ]</li> <li>- [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {<b>f<sub>GEN</sub>*</b>} ]</li> <li>- [ <b>Sweep</b> : Single : <b>Restart</b> ]</li> </ul> <p>* For the measurement frequencies, see Performance Test Report {f<sub>GEN</sub>}.</p>
Measurement:	<p>Signal generator : CW Mode, Frequency: <math>f_{gen}</math> Signal-generator level: -5 dBm</p> <p>Adjust the signal-generator level so that the power meter reads 0 dB +/- 0.2 dB</p> <p>Read off the power meter display and the ZVA marker values.</p> <p>Level error = <math>L_{ZVA} - L_{PS}</math></p>

## Checking the Input Linearity

Instrument: Calibration kit (see Chapter "Test Equipment", Item4)

R&S®ZVA settings:

- [ **Preset** ]
- [ **Meas** : Ratios: b1/a1 Src Port 1 ]
- [ **Meas** : Ratios: b2/a2 Src Port 2 ]
- [ **Meas** : Ratios: b3/a3 Src Port 3 ]
- [ **Meas** : Ratios: b4/a4 Src Port 4 ]
- [ **Meas Bandwidth** : 10 Hz ]
- [ **Marker** ]
- [ **Sweep** : Sweep Type : Power : Start -40dBm : Stop 10dBm :  
  CW Frequency : {f<sub>GEN</sub>\*} ]
- [ **Sweep** : Single : **Restart** ]

\* For measurement frequencies, see Performance Test Report {f<sub>GEN</sub>}

Test setup: Connect a short male to port 1 (port 2 to port 4)

Measurement: Set **Ref Marker** to -10dBm  
Select **Delta Mode**  
Set **Marker1** to -40dBm up to +10dBm by 5dB steps

Read off the differences of the Marker Values displayed by the ZVA

## Checking the Input Noise Level

Test equipment	Calibration kit (see Chapter "Test Equipment", Item4)
Test setup:	Connect the Match Male from the calibration kit to port 1 (port 2 to port 4)
R&S®ZVA settings:	<ul style="list-style-type: none"><li>- [ <b>Preset</b> ]</li><li>- [ <b>Meas</b> : Wave Quantities: b1 Src Port 1 (b2 Src Port 2, b3 Src Port 3, b4 Src Port 4)]</li><li>- [ <b>Power</b> : RF Off ]</li><li>- [ <b>Meas Bandwidth</b> : 10 Hz ]</li><li>- [ <b>Marker</b> ]</li><li>- [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {<b>f<sub>GEN</sub>*</b>}]</li><li>- Service Function 1.0.0.1.1 (see chapter 3 'Service Functions', Service Level 2)</li><li>- [ <b>Measure</b> : Wave Quantities : More Wave Quantities... : Properties : Detector : <b>RMS</b> ]</li><li>- [ <b>Sweep</b> : Single : <b>Restart</b>]</li></ul> <p>* For measurement frequencies, see Performance Test Report {fGEN}.</p>
Measurement:	Read off the noise level indicated by the markers on the DUT.

## Checking the Matching (raw)

Instrument:	Calibration kit (see Chapter "Test Equipment", Item4) Test cable (see Chapter "Test Equipment", Item7)
1. Preparation/ test setup:	Connect the test cable to port 1 on the R&S®ZVA and perform a 1-port calibration at the end of the cable.  Connect the test cable to port 2 (port3, port 4) on the R&S®ZVA.
R&S®ZVA settings:	- [ <b>Preset</b> ] - [ <b>Meas</b> : S11] - [ <b>Power</b> : -40 dBm ] on the ports to be measured - [ <b>Marker</b> ]
1. Measurement	Read off the network analyzer's marker values (for marker frequencies see Performance Test Report)
2. Preparation/ test setup:	Set port 2 power to -10 dBm  Connect the test cable to port 2 on the R&S®ZVA and perform a 1-port calibration at the end of the cable.  Connect the test cable to port 1 on the R&S®ZVA.
R&S®ZVA settings:	- [ <b>Meas</b> : S22] - [ <b>Power</b> : -40 dBm ] on port 1 - [ <b>Marker</b> ]
2. Measurement	Read off the network analyzer's marker values (for marker frequencies see Performance Test Report)

## Checking the Dynamic Range

Test equipment:	Calibration kit N (see Chapter "Test Equipment", Item4)
Test setup:	Connect Short Male to port1 and port 2 (port 3 and port 4) (use Short Female with Through Male as a second Short Male)
R&S®ZVA settings:	<ul style="list-style-type: none"> <li>- [ <b>Preset</b> ]</li> <li>- [ <b>Meas</b> : Ratios : b1/a2 Drive Port 2]</li> <li>  [ <b>Meas</b> : Ratios: b2/a1 Drive Port 1]</li> <li>  [ <b>Meas</b> : Ratios: b3/a4 Drive Port 4]</li> <li>  [ <b>Meas</b> : Ratios: b4/a3 Drive Port 3]</li> <li>- [ <b>Power</b> : 16 dBm ]</li> <li>- [ <b>Meas Bandwidth</b> : 10 Hz ]</li> <li>- [ <b>Marker</b> ]</li> <li>- [ <b>Sweep</b> : Sweep Type : CW Mode : CW Frequency : {f<sub>GEN</sub>*}]</li> <li>- Service Function 1.0.0.1.1 (see chapter 3 "Service Functions", Service Level 2)</li> <li>- [ <b>Measure</b> : Wave Quantities : More Wave Quantities... : Properties : Detector : <b>RMS</b> ]</li> <li>- [ <b>Sweep</b> : Single : <b>Restart</b>]</li> </ul> <p>* For measurement frequencies, see Performance Test Report {f<sub>GEN</sub>}.</p>
Measurement:	Read off marker value
Calculation:	Nominal dynamic range: ..... see Performance Test Report

## Checking the Receiver Attenuator (only with Option Receiver Attenuator)

Test equipment:	Calibration kit N (see Chapter "Test Equipment", Item4)
Test setup:	Connect Short Male to port1 (port to port 4)
R&S®ZVA settings:	<ul style="list-style-type: none"><li>- [ <b>Preset</b> ]</li><li>- [ <b>Meas</b> : Wave Quantities : b1/ Src Port 1 ]</li><li>  [ <b>Meas</b> : Wave Quantities : b2/ Src Port 2 ]</li><li>  [ <b>Meas</b> : Wave Quantities : b3/ Src Port 3 ]</li><li>  [ <b>Meas</b> : Wave Quantities : b4/ Src Port 4 ]</li><li>- [ <b>Power</b> : 0 dBm ]</li><li>- [ <b>Meas Bandwidth</b> : 100 Hz ]</li><li>- [ <b>Trace Funct</b> : Data -&gt; Mem : Math = Data/Mem : Show Mem off ]</li><li>- [ <b>Pwr BW AVG</b> : Receiver Step Atten : Port 1 (Port 2 to Port 4) {a Rec Att}* ]</li><li>- [ <b>Trace Funct</b> : Shift Response Value : Magnitude { -a Rec Att} ]</li><li>- [ <b>Marker</b> ]</li></ul> <p>* For attenuator settings {a Rec Att}, see Performance Test Report.</p>
Measurement:	Read off the network analyzer's marker values (for marker frequencies see Performance Test Report)

## Checking the DC Measurement Inputs

Test equipment:	DC Power Supply NGSM 32/10 (see Chapter "Test Equipment", Item9) Multimeter URE3 (see Chapter "Test Equipment", Item10) DC cable (see Chapter "Test Equipment", Item11)
Test setup:	Connect the Power Supply to the Input DC MEAS 1V (DC MEAS 10V) of the ZVA using the DC cable
R&S®ZVA settings:	- [ <b>Preset</b> ]  For DC Meas 1 V: - [ <b>Meas</b> : More : DC Inputs : DC Meas ±1 V] - [ <b>Format</b> : Real] - [ <b>Scale</b> : Scale/Div : .25 x1] - [ <b>Marker</b> ]  For DC Meas 10 V: - [ <b>Meas</b> : More : DC Inputs : DC Meas ±10 V] - [ <b>Format</b> : Real] - [ <b>Scale</b> : Scale/Div : 2.5 x1] - [ <b>Marker</b> ]
Measurement:	Set Power Supply to DC values $U_{DC}$ using Multimeter URE (DC values see Performance Test Report) and connect it to pos. and neg. input  Read off the DC level $U_{DC ZVA}$ indicated by the marker.
Calculation:	Deviation = $U_{DC} - U_{DC ZVA}$

# Performance Test Report

Table 1-1: Performance Test Report

ROHDE & SCHWARZ	Performance Test Report	ZVA	Version 18.11.05
Model (ZVA8/ZVA24) Item number: 1145.1110. Serial number  Tested by:  Date:  Signature:			

General: All Tables apply to port1; values for ports 2 to 4 are identical.

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Frequency deviation @ 1 GHz	Page 1.3	- 8000	_____	+ 8000	Hz	1 Hz
With Option ZVAB-B4		- 100		+ 100		



Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Harmonics</b> <b>Source power +8dBm</b> <b>Freq. Harmonics</b>	Page 1.5				dBc	1 dB
50 MHz 100 MHz 150 MHz			_____	-20		
			_____	-20		
100 MHz 200 MHz 300 MHz			_____	-20		
			_____	-20		
200 MHz 400 MHz 600 MHz			_____	-20		
			_____	-20		
500 MHz 1000 MHz 1500 MHz			_____	-20		
			_____	-20		
750 MHz 1500 MHz 2250 MHz			_____	-20		
			_____	-20		
1 GHz 2 GHz 3 GHz			_____	-20		
			_____	-20		
1.5 GHz 3 GHz 4.5 GHz			_____	-20		
			_____	-20		
2 GHz 4 GHz 6 GHz			_____	-20		
			_____	-20		
2.1 GHz 4.2 GHz 6.3 GHz			_____	-20		
			_____	-20		
2.5 GHz 5.0 GHz 7.5 GHz			_____	-20		
			_____	-20		
3.0 GHz 6.0 GHz 9.0 GHz			_____	-20		
			_____	-20		
3.5 GHz 7 GHz 10.5 GHz			_____	-20		
			_____	-20		
4.0 GHz 8.0 GHz 12.0 GHz			_____	-20		
			_____	-20		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Harmonics</b> <b>Source power +8 dBm</b> <b>Freq. Harmonics</b>	Page 1.5				dBc	2 dB
4.1 GHz 8.2 GHz 12.3 GHz			_____	-20		
5.0 GHz 10.0 GHz 15.0 GHz			_____	-20		
5.04 GHz 10.08 GHz 15.12 GHz			_____	-20		
5.05 GHz 10.10 GHz 15.15 GHz			_____	-20		
6.0 GHz 12.0 GHz 18.0 GHz			_____	-20		
6.35 GHz 12.70 GHz 19.05 GHz			_____	-20		
6.36 GHz 12.72 GHz 19.08 GHz			_____	-20		
7.0 GHz 14.0 GHz 21.0 GHz			_____	-20		
8.0 GHz 16.0 GHz 24.0 GHz			_____	-20		
<b>ZVA24:</b>						
8.1 GHz 16.2 GHz 24.3 GHz			_____	-20		
9.0 GHz 18.0 GHz			_____	-20		
10.0 GHz 20.0 GHz			_____	-20		
10.2 GHz 20.4 GHz			_____	-20		
10.6 GHz 21.2 GHz			_____	-20		
11.0 GHz 22.0 GHz			_____	-20		
12.7 GHz 25.4 GHz			_____	-20		
12.8 GHz 25.6 GHz			_____	-20		
13.0 GHz 26.0 GHz			_____	-20		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ Max. output power	Page 1.6				dBm	0.5 dB
Test frequency						
ZVA8:						
300 kHz		10	_____			
1 MHz		10	_____			
2 MHz		10	_____			
5 MHz		10	_____			
ZVA8, (ZVA24):						
10 MHz		10 (13)	_____			
20 MHz		10 (13)	_____			
50 MHz		13 (13)	_____			
100 MHz		13 (13)	_____			
200 MHz		13 (13)	_____			
500 MHz		13 (13)	_____			
750 MHz		13 (13)	_____			
1.0 GHz		13 (13)	_____			
1.5 GHz		13 (13)	_____			
2.0 GHz		13 (13)	_____			
2.1 GHz		13 (13)	_____			
2.5 GHz		13 (13)	_____			
3.0 GHz		13 (13)	_____			
3.5 GHz		13 (13)	_____			
4.0 GHz		10 (13)	_____			
4.1 GHz		10 (13)	_____			
4.5 GHz		10 (13)	_____			
5.0 GHz		10 (13)	_____			
5.05 GHz		10 (13)	_____			
5.7 GHz		10 (13)	_____			
6.0 GHz		10 (13)	_____			
6.35 GHz		10 (13)	_____			
6.36 GHz		10 (13)	_____			
7.0 GHz		10 (13)	_____			
7.5 GHz		8 (13)	_____			
8.0 GHz		8 (13)	_____			
ZVA24:						
8.1 GHz		13	_____			
9.0 GHz		13	_____			
10.0 GHz		13	_____			
10.1 GHz		13	_____			
11.0 GHz		13	_____			
12.0 GHz		13	_____			
12.6 GHz		13	_____			
12.7 GHz		13	_____			
13.0 GHz		13	_____			
14.0 GHz		10	_____			
15.0 GHz		10	_____			
16.0 GHz		10	_____			
16.1 GHz		10	_____			

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
17.0 GHz 18.0 GHz 19.0 GHz 20.0 GHz 21.0 GHz 22.0 GHz 23.0 GHz 24.0 GHz	Page 1.6	10 10 10 10 10 10 10 10	_____ _____ _____ _____ _____ _____ _____ _____		dBm	0.5 dB

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ Power Uncertainty output power -10 dBm	Page 1.7				dB	0.2 dB
Test frequency						
<b>ZVA8:</b>						
300 kHz		- 2	_____	2		
1 MHz		- 2	_____	2		
2 MHz		- 2	_____	2		
5 MHz		- 2	_____	2		
<b>ZVA8, (ZVA24):</b>						
10 MHz		- 0.8 (- 3)	_____	0.8 (3)		
20 MHz		- 0.8 (- 3)	_____	0.8 (3)		
50 MHz		- 0.8 (- 3)	_____	0.8 (3)		
100 MHz		- 0.8 (- 3)	_____	0.8 (3)		
200 MHz		- 0.8 (- 3)	_____	0.8 (3)		
<b>ZVA8, ZVA24:</b>						
500 MHz		- 0.8	_____	0.8		
750 MHz		- 0.8	_____	0.8		
1.0 GHz		- 0.8	_____	0.8		
1.5 GHz		- 0.8	_____	0.8		
2.0 GHz		- 0.8	_____	0.8		
2.1 GHz		- 0.8	_____	0.8		
2.5 GHz		- 0.8	_____	0.8		
3.0 GHz		- 0.8	_____	0.8		
3.5 GHz		- 0.8	_____	0.8		
4.0 GHz		- 0.8	_____	0.8		
4.1 GHz		- 0.8	_____	0.8		
4.5 GHz		- 0.8	_____	0.8		
5.0 GHz		- 0.8	_____	0.8		
5.05 GHz		- 0.8	_____	0.8		
5.7 GHz		- 0.8	_____	0.8		
6.0 GHz		- 0.8	_____	0.8		
6.35 GHz		- 0.8	_____	0.8		
6.36 GHz		- 0.8	_____	0.8		
7.0 GHz		- 0.8	_____	0.8		
7.5 GHz		- 0.8	_____	0.8		
8.0 GHz		- 0.8	_____	0.8		
<b>ZVA24:</b>						
8.1 GHz		- 0.8	_____	0.8		
9.0 GHz		- 0.8	_____	0.8		
10.0 GHz		- 0.8	_____	0.8		
10.1 GHz		- 0.8	_____	0.8		
11.0 GHz		- 0.8	_____	0.8		
12.0 GHz		- 0.8	_____	0.8		
12.6 GHz		- 0.8	_____	0.8		
12.7 GHz		- 0.8	_____	0.8		
13.0 GHz		- 0.8	_____	0.8		
14.0 GHz		- 0.8	_____	0.8		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
15.0 GHz	Page 1.7	-0.8	_____	0.8	dB	0.2 dB
16.0 GHz		-0.8	_____	0.8		
16.1 GHz		-0.8	_____	0.8		
17.0 GHz		-0.8	_____	0.8		
18.0 GHz		-0.8	_____	0.8		
19.0 GHz		-0.8	_____	0.8		
20.0 GHz		-0.8	_____	0.8		
21.0 GHz		-0.8	_____	0.8		
22.0 GHz		-0.8	_____	0.8		
23.0 GHz		-0.8	_____	0.8		
24.0 GHz		-0.8	_____	0.8		



Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (without Opt. Gen Att) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq.    Level 51 MHz    20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8    -25 dB</b> <b>only    -30 dB</b>		- 0.8	_____	0.8		
-30 dB		- 0.8	_____	0.8		
500MHz    20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8    -25 dB</b> <b>only    -30 dB</b>		- 0.8	_____	0.8		
-30 dB		- 0.8	_____	0.8		
1 GHz    20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8    -25 dB</b> <b>only    -30 dB</b>		- 0.8	_____	0.8		
-30 dB		- 0.8	_____	0.8		
2 GHz    20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8    -25 dB</b> <b>only    -30 dB</b>		- 0.8	_____	0.8		
-30 dB		- 0.8	_____	0.8		



Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (without Opt. Gen Att) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq. Level		- 0.8	_____	0.8		
2.1 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8 -25 dB</b>		- 0.8	_____	0.8		
<b>only -30 dB</b>						
3 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8 -25 dB</b>		- 0.8	_____	0.8		
<b>only -30 dB</b>						
4 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8 -25 dB</b>		- 0.8	_____	0.8		
<b>only -30 dB</b>						
4.1 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
<b>ZVA8 -25 dB</b>		- 0.8	_____	0.8		
<b>only -30 dB</b>						

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (without Opt. Gen Att) <b>Reference -10 dBm</b>  <b>ZVA8, ZVA24:</b> Freq. Level 6 GHz 20 dB 15 dB 10 dB 5 dB -5 dB -10 dB -15 dB -20 dB <b>ZVA8 -25 dB</b> <b>only -30 dB</b>  8 GHz 18 dB 15 dB 10 dB 5 dB -5 dB -10 dB -15 dB -20 dB <b>ZVA8 -25 dB</b> <b>only -30 dB</b>  <b>ZVA24 only:</b> 10 GHz 20 dB 15 dB 10 dB 5 dB -5 dB -10 dB -15 dB -20 dB  13 GHz 20 dB 15 dB 10 dB 5 dB -5 dB -10 dB -15 dB -20 dB	Page 1.8	-0.8	_____	0.8	dB	0.1 dB



Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (with Opt. Gen Atten) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq.    Level 51 MHz   20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		
500MHz   20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (with Opt. Gen Atten) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq. Level		- 0.8	_____	0.8		
1 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
-25 dB		- 0.8	_____	0.8		
-30 dB		- 2	_____	2		
-35 dB		- 2	_____	2		
-40 dB		- 2	_____	2		
-45 dB		- 2	_____	2		
-50 dB		- 2	_____	2		
-55 dB		- 2	_____	2		
-60 dB		- 3	_____	3		
-65 dB		- 3	_____	3		
-70 dB		- 3	_____	3		
-75 dB		- 3	_____	3		
-80 dB		- 3	_____	3		
-85 dB		- 3	_____	3		
-90 dB		- 0.8	_____	0.8		
2 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
-25 dB		- 0.8	_____	0.8		
-30 dB		- 2	_____	2		
-35 dB		- 2	_____	2		
-40 dB		- 2	_____	2		
-45 dB		- 2	_____	2		
-50 dB		- 2	_____	2		
-55 dB		- 2	_____	2		
-60 dB		- 3	_____	3		
-65 dB		- 3	_____	3		
-70 dB		- 3	_____	3		
-75 dB		- 3	_____	3		
-80 dB		- 3	_____	3		
-85 dB		- 3	_____	3		
-90 dB		- 3	_____	3		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (without Opt. Gen Atten) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq.    Level 2.1 GHz   20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		
3 GHz    20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (with Opt. Gen Atten) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq. Level						
4 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
-25 dB		- 0.8	_____	0.8		
-30 dB		- 0.8	_____	0.8		
-35 dB		- 2	_____	2		
-40 dB		- 2	_____	2		
-45 dB		- 2	_____	2		
-50 dB		- 2	_____	2		
-55 dB		- 2	_____	2		
-60 dB		- 2	_____	2		
-65 dB		- 3	_____	3		
-70 dB		- 3	_____	3		
-75 dB		- 3	_____	3		
-80 dB		- 3	_____	3		
-85 dB		- 3	_____	3		
-90 dB		- 3	_____	3		
4.1 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
-25 dB		- 0.8	_____	0.8		
-30 dB		- 0.8	_____	0.8		
-35 dB		- 2	_____	2		
-40 dB		- 2	_____	2		
-45 dB		- 2	_____	2		
-50 dB		- 2	_____	2		
-55 dB		- 2	_____	2		
-60 dB		- 2	_____	2		
-65 dB		- 3	_____	3		
-70 dB		- 3	_____	3		
-75 dB		- 3	_____	3		
-80 dB		- 3	_____	3		
-85 dB		- 3	_____	3		
-90 dB		- 3	_____	3		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (with Opt. Gen Atten) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq.    Level 6 GHz    20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		
8 GHz    20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		





Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power linearity</b> (with Opt. Gen Atten) <b>Reference -10 dBm</b>	Page 1.8				dB	0.1 dB
Freq.    Level 16 GHz    20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		
20 GHz    20 dB		-0.8	_____	0.8		
15 dB		-0.8	_____	0.8		
10 dB		-0.8	_____	0.8		
5 dB		-0.8	_____	0.8		
-5 dB		-0.8	_____	0.8		
-10 dB		-0.8	_____	0.8		
-15 dB		-0.8	_____	0.8		
-20 dB		-0.8	_____	0.8		
-25 dB		-0.8	_____	0.8		
-30 dB		-0.8	_____	0.8		
-35 dB		-2	_____	2		
-40 dB		-2	_____	2		
-45 dB		-2	_____	2		
-50 dB		-2	_____	2		
-55 dB		-2	_____	2		
-60 dB		-2	_____	2		
-65 dB		-3	_____	3		
-70 dB		-3	_____	3		
-75 dB		-3	_____	3		
-80 dB		-3	_____	3		
-85 dB		-3	_____	3		
-90 dB		-3	_____	3		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port</b> ____ <b>Power linearity</b> (with Opt. Gen Atten) <b>Reference -10 dBm</b>  Freq.    Level 24 GHz    20 dB 15 dB 10 dB 5 dB -5 dB -10 dB -15 dB -20 dB -25 dB -30 dB -35 dB -40 dB -45 dB -50 dB -55 dB -60 dB -65 dB -70 dB -75 dB -80 dB -85 dB -90 dB	Page 1.8				dB	0.1 dB
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 0.8	_____	0.8		
		- 2	_____	2		
		- 2	_____	2		
		- 2	_____	2		
		- 2	_____	2		
		- 2	_____	2		
		- 2	_____	2		
		- 2	_____	2		
		- 2	_____	2		
		- 3	_____	3		
		- 3	_____	3		
		- 3	_____	3		
		- 3	_____	3		
		- 3	_____	3		
		- 3	_____	3		
		- 3	_____	3		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Power measurement uncertainty</b>	Page 1.9				dB	0.3 dB
<b>Test frequency</b>						
10 MHz		- 1	_____	1		
20 MHz		- 1	_____	1		
50 MHz		- 1	_____	1		
100 MHz		- 1	_____	1		
200 MHz		- 1	_____	1		
500 MHz		- 1	_____	1		
750 MHz		- 1	_____	1		
1 GHz		- 1	_____	1		
1.5 GHz		- 1	_____	1		
2 GHz		- 1	_____	1		
2.1 GHz		- 1	_____	1		
2.5 GHz		- 1	_____	1		
3 GHz		- 1	_____	1		
3.5 GHz		- 1	_____	1		
4 GHz		- 1	_____	1		
4.1 GHz		- 1	_____	1		
4.5 GHz		- 1	_____	1		
5.0 GHz		- 1	_____	1		
5.05 GHz		- 1	_____	1		
5.7 GHz		- 1	_____	1		
6.0 GHz		- 1	_____	1		
6.35 GHz		- 1	_____	1		
6.36 GHz		- 1	_____	1		
7.0 GHz		- 1	_____	1		
7.5 GHz		- 1	_____	1		
8.0 GHz		- 1	_____	1		
<b>ZVA24:</b>						
8.1 GHz		- 1	_____	1		
9.0 GHz		- 1	_____	1		
10.0 GHz		- 1	_____	1		
10.2 GHz		- 1	_____	1		
11.0 GHz		- 1	_____	1		
12.0 GHz		- 1	_____	1		
12.7 GHz		- 1	_____	1		
12.8 GHz		- 1	_____	1		
13.0 GHz		- 1	_____	1		
14.0 GHz		- 2	_____	2		
15.0 GHz		- 2	_____	2		
16.0 GHz		- 2	_____	2		
16.1 GHz		- 2	_____	2		
18.0 GHz		- 2	_____	2		
19.0 GHz		- 2	_____	2		
20.0 GHz		- 2	_____	2		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
21.0 GHz	Page 1.9	- 2	_____	2	dB	0.3 dB
22.0 GHz		- 2	_____	2		
23.0 GHz		- 2	_____	2		
24.0 GHz		- 2	_____	2		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ Input linearity Reference -10 dBm	Page 1.10				dB	0.01 dB
50 MHz 20 dB		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
700 MHz 20 dB		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
1 GHz 20 dB (ZVA24)		-0.3	_____	0.3		
20 dB (ZVA8)		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
2 GHz 20 dB (ZVA24)		-0.3	_____	0.3		
20 dB (ZVA8)		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ Input linearity Reference -10 dBm	Page 1.10				dB	0.01 dB
4 GHz 20 dB (ZVA24)		-0.3	_____	0.3		
20 dB (ZVA8)		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
8 GHz 20 dB (ZVA24)		-0.3	_____	0.3		
20 dB (ZVA8)		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
8.1 GHz 20 dB (ZVA24)		-0.3	_____	0.3		
20 dB (ZVA8)		-0.1	_____	0.1		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ Input linearity Reference -10 dBm	Page 1.10				dB	0.01 dB
<b>ZVA24:</b>						
10.6 GHz 20 dB		-0.3	_____	0.3		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
16 GHz 20 dB		-0.3	_____	0.3		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
20 GHz 20 dB		-0.3	_____	0.3		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		
24 GHz 20 dB		-0.3	_____	0.3		
15 dB		-0.1	_____	0.1		
10 dB		-0.1	_____	0.1		
5 dB		-0.1	_____	0.1		
-5 dB		-0.1	_____	0.1		
-10 dB		-0.1	_____	0.1		
-15 dB		-0.1	_____	0.1		
-20 dB		-0.1	_____	0.1		
-25 dB		-0.1	_____	0.1		
-30 dB		-0.1	_____	0.1		



Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance	
<b>Port __</b>	Page 1.11				dBm		
<b>Input noise level</b>							
<b>Test frequency</b>							
<b>ZVA8:</b>							
303 kHz				_____		-100	-
1.12 MHz				_____		-100	-
2.12 MHz				_____		-100	-
5.12 MHz				_____		-100	-
<b>ZVA8, (ZVA24):</b>							
10.12 MHz				_____		-100 (---)	-
20.12 MHz				_____		-100 (---)	-
50.12 MHz				_____		-100 (---)	-
100.12 MHz				_____		-115 (-80)	-
200.12 MHz				_____		-115 (-80)	-
500.12 MHz				_____		-115 (-80)	-
700.12 MHz				_____		-115 (-110)	-
750.12 MHz				_____		-115 (-110)	-
1.00012 GHz				_____		-115 (-110)	-
1.50012 GHz				_____		-115 (-110)	-
2.00012 GHz				_____		-115	-
2.10012 GHz				_____		-115	-
2.50012 GHz				_____		-115	-
3.00012 GHz				_____		-115	-
3.50012 GHz				_____		-115	-
4.00012 GHz				_____		-115	-
4.10012 GHz				_____		-115	-
4.50012 GHz				_____		-115	-
5.00012 GHz				_____		-115	-
5.05012 GHz				_____		-115	-
5.70012 GHz				_____		-115	-
6.00012 GHz				_____		-115	-
6.35012 GHz				_____		-115	-
6.36012 GHz				_____		-115	-
7.00012 GHz				_____		-115	-
7.50012 GHz				_____		-115	-
7.99988 GHz			_____	-115	-		
<b>ZVA24 only:</b>							
8.10012 GHz			_____	-115	-		
9.00012 GHz			_____	-115	-		
10.00012 GHz			_____	-115	-		
10.20012 GHz			_____	-115	-		
11.00012 GHz			_____	-115	-		
12.00012 GHz			_____	-115	-		
12.70012 GHz			_____	-115	-		
12.80012 GHz			_____	-115	-		
12.99988 GHz			_____	-115	-		
14.00012 GHz			_____	-110	-		
15.00012 GHz			_____	-110	-		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
16.00012 GHz	Page 1.11		_____	-110	dBm	-
16.10012 GHz		_____	-110	-		
18.00012 GHz		_____	-110	-		
19.00012 GHz		_____	-110	-		
20.00012 GHz		_____	-110	-		
21.00012 GHz		_____	-110	-		
22.00012 GHz		_____	-110	-		
23.00012 GHz		_____	-110	-		
23.99988 GHz		_____	-110	-		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ Matching (raw)	Page 1.12				dB	1 dB
Test frequency						
<b>ZVA8:</b>						
300 kHz		16	_____			
1 MHz		16	_____			
2 MHz		16	_____			
5 MHz		16	_____			
<b>ZVA8, (ZVA24):</b>						
10 MHz		16 (10)	_____			
20 MHz		16 (10)	_____			
50 MHz		16 (12)	_____			
100 MHz		16 (12)	_____			
200 MHz		16 (12)	_____			
500 MHz		16 (12)	_____			
750 MHz		16 (12)	_____			
1.0 GHz		16 (12)	_____			
1.5 GHz		16 (12)	_____			
2.0 GHz		16 (8)	_____			
2.5 GHz		16 (8)	_____			
3.0 GHz		16 (8)	_____			
3.5 GHz		16 (8)	_____			
4.0 GHz		16 (8)	_____			
4.5 GHz		16 (8)	_____			
5.0 GHz		16 (8)	_____			
5.5 GHz		16 (8)	_____			
6.0 GHz		16 (8)	_____			
6.5 GHz		16 (8)	_____			
7.0 GHz		16 (8)	_____			
7.5 GHz		14 (8)	_____			
8.0 GHz		14 (8)	_____			
<b>ZVA24:</b>						
9.0 GHz		8	_____			
10.0 GHz		8	_____			
11.0 GHz		8	_____			
12.0 GHz		8	_____			
13.0 GHz		8	_____			
14.0 GHz		8	_____			
15.0 GHz		8	_____			
16.0 GHz		8	_____			
17.0 GHz		8	_____			
18.0 GHz		8	_____			
19.0 GHz		8	_____			
20.0 GHz		8	_____			
21.0 GHz		8	_____			
22.0 GHz		8	_____			
23.0 GHz		8	_____			
24.0 GHz		8	_____			

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __ to Port __</b> <b>Dynamic range ZVA8</b> (without options step attenuator and direct generator/receiver access)	Page 1.13				dB	
<b>Test frequency</b>						
303 kHz		100	_____			-
1.12 MHz		100	_____			-
2.12 MHz		100	_____			-
5.12 MHz		120	_____			-
10.12 MHz		120	_____			-
20.12 MHz		120	_____			-
50.12 MHz		120	_____			-
100.12 MHz		130	_____			-
200.12 MHz		130	_____			-
500.12 MHz		130	_____			-
700.12 MHz		130	_____			-
750.12 MHz		130	_____			-
1.00012 GHz		130	_____			-
1.50012 GHz		130	_____			-
2.00012 GHz		130	_____			-
2.10012 GHz		130	_____			-
2.50012 GHz		130	_____			-
3.00012 GHz		130	_____			-
3.50012 GHz		130	_____			-
3.99988 GHz		130	_____			-
4.10012 GHz		125	_____			-
4.50012 GHz		125	_____			-
5.00012 GHz		125	_____			-
5.05012 GHz		125	_____			-
5.70012 GHz		125	_____			-
6.00012 GHz		125	_____			-
6.35012 GHz		125	_____			-
6.36012 GHz		125	_____			-
6.99988 GHz		125	_____			-
7.50012 GHz		120	_____			-
7.99988 GHz		120	_____			-

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __ to Port __</b> <b>Dynamic range ZVA8</b> (with option step attenuator and without option direct generator/receiver access)	Page 1.13				dB	
<b>Test frequency</b>						
303 kHz		99	_____			-
1.12 MHz		99	_____			-
2.12 MHz		99	_____			-
5.12 MHz		119	_____			-
10.12 MHz		119	_____			-
20.12 MHz		119	_____			-
50.12 MHz		119	_____			-
100.12 MHz		129	_____			-
200.12 MHz		129	_____			-
500.12 MHz		129	_____			-
700.12 MHz		129	_____			-
750.12 MHz		129	_____			-
1.00012 GHz		129	_____			-
1.50012 GHz		129	_____			-
2.00012 GHz		129	_____			-
2.10012 GHz		129	_____			-
2.50012 GHz		129	_____			-
3.00012 GHz		129	_____			-
3.50012 GHz		129	_____			-
3.99988 GHz		129	_____			-
4.10012 GHz		124	_____			-
4.50012 GHz		124	_____			-
5.00012 GHz		124	_____			-
5.05012 GHz		124	_____			-
5.70012 GHz		124	_____			-
6.00012 GHz		124	_____			-
6.35012 GHz		124	_____			-
6.36012 GHz		124	_____			-
6.99988 GHz		124	_____			-
7.50012 GHz		119	_____			-
7.99988 GHz		119	_____			-



Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
20.00012 GHz	Page 1.13	125	_____		dBm	-
21.00012 GHz		125	_____			-
22.00012 GHz		125	_____			-
23.00012 GHz		125	_____			-
23.99988 GHz		125	_____			-





Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
19.00012 GHz	Page 1.13	123	_____		dBm	-
20.00012 GHz		123	_____			-
21.00012 GHz		123	_____			-
22.00012 GHz		123	_____			-
23.00012 GHz		123	_____			-
23.99988 GHz		123	_____			-

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Port __</b> <b>Receiver Step Atten.</b> <b>Attenuation Accuracy</b> <b>Reference 0 dB</b>	Page 1.14				dB	0.1 dB
Atten.    Frequ. 5 dB    10 MHz		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
<b>ZVA24 only:</b>						
10.0 GHz		-2	_____	2		
12.0 GHz		-2	_____	2		
14.0 GHz		-2	_____	2		
16.0 GHz		-2	_____	2		
18.0 GHz		-2	_____	2		
20.0 GHz		-2	_____	2		
22.0 GHz		-2	_____	2		
24.0 GHz		-2	_____	2		
10 dB    10 MHz		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
<b>ZVA24 only:</b>						
10.0 GHz		-2	_____	2		
12.0 GHz		-2	_____	2		
14.0 GHz		-2	_____	2		
16.0 GHz		-2	_____	2		
18.0 GHz		-2	_____	2		
20.0 GHz		-2	_____	2		
22.0 GHz		-2	_____	2		
24.0 GHz		-2	_____	2		
20 dB    10 MHz		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		
		-2	_____	2		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance			
<b>ZVA24 only:</b>	Page 1.14				dB	0.1 dB			
10.0 GHz		-2	_____	2					
12.0 GHz		-2	_____	2					
14.0 GHz		-2	_____	2					
16.0 GHz		-2	_____	2					
18.0 GHz		-2	_____	2					
20.0 GHz		-2	_____	2					
22.0 GHz		-2	_____	2					
24.0 GHz		-2	_____	2					
35 dB 10 MHz		-2	_____	2					
1.0 GHz		-2	_____	2					
2.0 GHz		-2	_____	2					
4.0 GHz		-2	_____	2					
5.8 GHz		-2	_____	2					
8.0 GHz		-2	_____	2					
<b>ZVA24 only:</b>									
10.0 GHz		-2	_____	2					
12.0 GHz		-2	_____	2					
14.0 GHz		-2	_____	2					
16.0 GHz		-2	_____	2					
18.0 GHz		-2	_____	2					
20.0 GHz		-2	_____	2					
22.0 GHz		-2	_____	2					
24.0 GHz		-2	_____	2					

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
<b>Accuracy</b> <b>DC meas 1 V</b>  <b>Pos. Input</b> -1000 m V -300 mV -10 mV 10 mV 300 mV 1000 m V  <b>Neg. Input</b> -1000 m V -300 mV -10 mV 10 mV 300 mV 1000 m V	Page 1.15	- 27.5 - 10.0 - 2.75 - 2.75 - 10.0 - 27.5  - 27.5 - 10.0 - 2.75 - 2.75 - 10.0 - 27.5	_____ _____ _____ _____ _____ _____  _____ _____ _____ _____ _____ _____	+ 27.5 + 10.0 + 2.75 + 2.75 + 10.0 + 27.5  + 27.5 + 10.0 + 2.75 + 2.75 + 10.0 + 27.5	mV	1 mV
<b>Accuracy</b> <b>DC meas 10 V</b>  <b>Pos. Input</b> -10.0 V -3.0 V -0.1 V 0.1 V 3.0 V 10.0 V  <b>Neg. Input</b> -10.0 V -3.0 V -0.1 V 0.1 V 3.0 V 10.0 V	Page 1.15	- 0.275 - 0.10 - 0.0275 - 0.0275 - 0.10 - 0.275  - 0.275 - 0.10 - 0.0275 - 0.0275 - 0.10 - 0.275	_____ _____ _____ _____ _____ _____  _____ _____ _____ _____ _____ _____	+ 0.275 + 0.10 + 0.0275 + 0.0275 + 0.10 + 0.275  + 0.275 + 0.10 + 0.0275 + 0.0275 + 0.10 + 0.275	V	0.01 V



## Table of Contents - Chapter 2 "Alignment"

<b>2 Alignment</b> .....	<b>2.3</b>
Service Menu .....	2.3
<b>Manual Alignment and Recording Correction Values</b> .....	<b>2.4</b>
Test Equipment .....	2.4
Aligning the Frequency Accuracy .....	<b>Fehler! Textmarke nicht definiert.</b>
Aligning the DC Inputs .....	<b>Fehler! Textmarke nicht definiert.</b>
Correction Value Recording .....	2.9
Installation of the Alignment Program .....	2.9
Factory System Error Calibration .....	2.9

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## 2 Alignment

This chapter describes the alignment of the frequency reference and the recording of correction data after a board has been replaced.

The following manual alignments or corrections can be performed on the ZVA:

- Alignment of the 10-MHz reference oscillator which determines the frequency accuracy of the ZVA
- Recording the correction values for the generators and the receivers which determine the measurement accuracy of the ZVA's absolute values.

By performing the alignment and recording the correction values, it is possible to ensure that the ZVA is meeting its specifications by correcting any deviations.

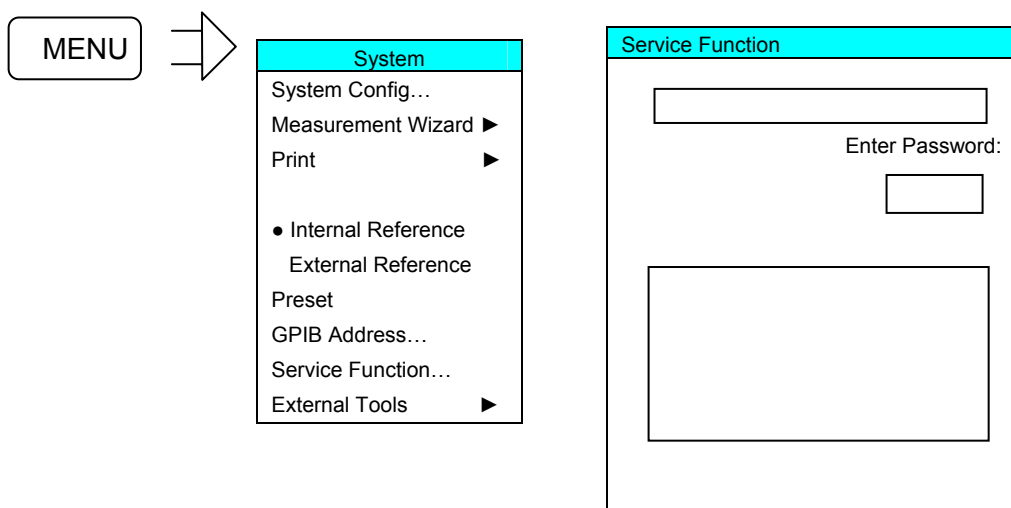
The alignments must be performed within an ambient temperature range of +22 °C to +24 °C after the appropriate warm-up time.

The ZVA meets its specs and is ready for operation when the alignment has been performed and/or correction values have been recorded and a system error calibration carried out.

### Service Menu

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

#### Entering the password



- Enter password 30473035.



#### **Caution**

*The alignment shall be performed only by appropriately trained personnel because any changes made have a profound effect on the measurement accuracy of the instrument*



## Manual Alignment and Recording Correction Values

In the sequel, the test equipment and the instrument preparations required to manually align the ZVA and each of the alignments are described.

### Preliminary remarks

The analyzer must be allowed to warm up for at least 30 minutes before alignment. This is the only way of ensuring that the guaranteed data are met.

## Test Equipment

Table 2-1 Test equipment for manually aligning the ZVA

Item	Type of equipment	Recommended specifications	Recommended model	R&S Order No.	Application
1	Spectrum analyzer	Counter mode: Min. resolution: 0.1 Hz Max. rel. frequency deviation: $10^{-9}$	FSU 26 w. option FSU-B4	1129.9003.26	Frequency accuracy of the reference oscillator
2	Signal generator	300 kHz to 24 GHz, Power = -40 dBm to 10 dBm	SML01 SMR27 with Option SMR-B15	1090.3000.11 1104.0002.27 1104.4989.02	Recording correction values on ZVA24
3	Power meter	300 kHz to 24 GHz	NRVD	0857.8008.02	Recording correction values
4	Power sensor	300 kHz to 8 GHz	NRV-Z51	0857.9004.02	Recording correction values on ZVA8
4	Power sensor	10 MHz to 24 GHz	NRV-Z52	0857.9204.02	Recording correction values on ZVA24
5	Power splitter	N, 50 Ohm, $\Gamma_{eq} < 0.05$ (50 MHz to 8 GHz) Output tracking < 0.15 dB	Weinschel 1870A	-	Recording correction values
5	Power splitter	3.5mm, 50 Ohm, Output tracking < 0.25 dB	Weinschel 1593	-	Recording correction values
6	PC with GPIB-Interface	Pentium, WinXP, WinNT  GR AT-GPIB IEEE488 IF PCI National Instruments	NI-488 PCI- GPIB	1072.6101.00	Recording correction values
7	Alignment Software	ZVAB-Service		1302.4460.00	Recording correction values
8	Power supply	2x 0 to 10 V			Aligning the DC inputs
9	DC meter		URE	0350.5315.02	Aligning the DC inputs

<b>Item</b>	<b>Type of equipment</b>	<b>Recommended specifications</b>	<b>Recommended model</b>	<b>R&amp;S Order No.</b>	<b>Application</b>
10	Calibration kit	N calibration kit	ZV-Z21	1085.7099.02	Recording correction values on ZVA8
10	Calibration kit	3.5mm calibration kit	ZV-Z32	1128.3501.02	Recording correction values on ZVA24
11	Test cable	Test cable N (m) to N (m).	ZV-Z11	1085.6505.03	Recording correction values on ZVA8
11	Test cable	Test cable 3,5mm (m) to 3.5mm (f).	ZV-Z14	1134.4093.02	Recording correction values on ZVA24
12	Conn. Cables for DC Inputs	4-pin mini-DIN plug	ZV-Z71	1164.1005.02	Aligning the DC inputs

## Aligning the Frequency Accuracy

Test equipment	Spectrum analyzer (section "Test Equipment", item 1): Error $<1 \times 10^{-9}$
Test setup:	Connect the spectrum analyzer to the 10-MHz reference output at the rear of the ZVA.
ZVA settings:	Select internal reference MENU : System: Reference Internal
Spectrum analyzer settings:	Center frequency: 10 MHz Span: 200 Hz

**Note:** *Before the following measurement is performed, the ZVA must have been switched on for at least 30 minutes to give the reference oscillator time to warm up.*

Measurement:	Measure the frequency with the spectrum analyzer: Nominal frequency: Model <b>without</b> OCXO (Option B4) 10 MHz $\pm$ 80 Hz Model <b>with</b> OCXO (Option B4) 10 MHz $\pm$ 1 Hz
--------------	---

### Alignment without Option ZVAB-B4:

- Enter Service Function 2.1.1.6.209.0x000000
- Read off the frequency, e.g. 10.000050 MHz.
- Change the **right-hand segment** (corresponding to bit 0 to bit 11) of the data word - e.g. to 000**400** - instead of 000**000**.
- Read off the frequency again, e.g. 10.000010 MHz.
- Change the left-hand segment of the data word, until the counter indicates precisely 10.000000 MHz.

### Alignment with Option ZVAB-B4:

- Enter Service Function 2.1.1.6.209.0x**800000**.
- Read off the frequency, e.g. 10.000005 MHz.
- Change the **left-hand segment** (corresponding to bit 12 to bit 23) of the data word - e.g. to **400000** - instead of **800000**.
- Read off the frequency again, e.g. 10.000001 MHz.
- Change the left-hand segment of the data word, until the counter indicates precisely 10.000000 MHz.

### Aligning the DC Inputs

At the outset, ensure that the correction parameters "Multiplier" M and "Offset" F have been preset to M=1 and F=0 for both inputs. This can be done using the Service Functions 3.1.2.5 and 3.1.2.2 which are described below under **Service Functions**.

Test equipment:

Power supply 2 x 0 to 10 V

DC meter (URE)

Test setup:

DC Meas ± 1 V

DC Meas ± 10 V

Connect DC voltage

Connect DC voltage:

+ 1 V.....pin 6, pin 3 (Gnd)

+ 10 V.....pin 6, pin 3 (Gnd)

- 1 V.....pin 8, pin 5 (Gnd)

- 10 V.....pin 8, pin 5 (Gnd)

Check voltages with the URE and correct if necessary.

ZVA settings:

**Measure** : DC Inputs : DC Meas ± 1V

**Measure** : DC Inputs: DC Meas ± 10V

Measurement

Read off the voltages displayed by the ZVA:

V1 = positive voltage

V2 = negative voltage

Calculating the corrections:

M -> scaling factor

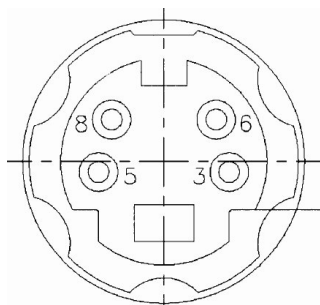
F -> offset

$$M = (V1-V2)/2$$

$$M = (V1-V2)/20$$

$$F = (V1+V2)/(V1-V2)$$

$$F = 10x (V1+V2)/(V1-V2)$$



Pin assignment for DC MEAS connector

The values that have been obtained in this way are now written to the hard disk using the Service Functions described below and then transferred to the EEPROM of network controller1.

**Example illustrating DC Meas 1 V:**

When +1 V is applied,  $V_1 = 1.023$  V is displayed by the ZVA; when -1 V is applied,  $V_2 = -1.011$  V is displayed. The results of the calculation are  $M = 1.017$  and  $F = 0.0059$ . The following entries are, therefore, made:

- Select Service Level 2 (see Service Functions).
- Set Service Functions (Writing to the hard disk)
  - 3.1.2.5.dc\_meas\_1V.DcMeasMultiplier.1.017
  - 3.1.2.5.dc\_meas\_1V.DcMeasOffset.0.0059
- etc. for the second measurement input.
- Set Service Function (Writing to the EProm)
  - 3.1.2.2

When correction value programming for the two DC voltage measurement inputs has been completed, end the NWA application and restart.

Check the alignment by applying the four voltages +1 V, -1 V, +10 V and -10 V and, as a further check, 0 V.

**Reading the previous DC values:**

- Select **Read** in the Service Function Menu
- Set Service Functions:
  - 3.1.2.5.dc\_meas\_1V.DcMeasMultiplier
  - 3.1.2.5.dc\_meas\_1V.DcMeasOffset
  
  - 3.1.2.5.dc\_meas\_10V.DcMeasMultiplier
  - 3.1.2.5.dc\_meas\_10V.DcMeasOffset

## Correction Value Recording

Required test equipment (see Table 2-1):

- PC with IEC/IEEE bus interface
- ZVAB service program
- Power meter with power sensor
- Signal generator
- Short and match included in the calibration kit
- N-connector test cable

### Installation of the Alignment Program

- Install the program by double-clicking the setup.exe file.  
If you install the program for the second time the install shield will only remove the old installation. You will have to start the setup.exe again to perform the installation. The tool has been tested with Windows XP and Windows NT. Connect the PC, ZVA, power meter and signal generator via the IEC/IEEE-bus interface.
- For a detailed operating description e.g. dealing with “Configuration of the Program”, “Writing Synthesizer Mapping and Shift Data to the Motherboard”, “Recording Correction Values”, “Factory System Error Calibration” see the “Usermanual.doc” or “Usermanual.pdf” file that comes with the installation packet and is installed in the directory “C:\Program Files\Rohde&Schwarz\ZVAB-Service” on the PC.

## Factory System Error Calibration

A complete factory N-port system-error calibration is performed on all the network analyzer's measurement ports. This involves directly connecting the O, S and M calibration standards to each port and then connecting the ports together in pairs using a cable as a T standard. All port pairs must be considered. If the analyzer has four ports, this means that there are six ways of connecting the ports together in pairs, i.e. port pairs 1-2, 1-3, 1-4 then 2-3, 2-4 and finally 3-4. The number of connection pairs for a 3-port instrument goes down to three and there is only one way of pairing off the ports of 2-port analyzer.

The TOSM method is used for calibration. The procedure is illustrated using a 4-port instrument, but the principle is the same for other port numbers:

PRESET

SWEEP : NUMBER OF POINTS : 1000

POWER BW AVG : MEAS BANDWIDTH : 100 HZ

CAL : START CAL : FOUR PORT P1 P2 P3 P4

The SELECT PORT CONNECTOR(S) dialog, which can be skipped with NEXT, is displayed. The MEASURE STANDARDS dialog then appears. The “Standards to be measured” list then shows the calibration standards. When the calibration standards have been connected, the calibration measurement is started by clicking the appropriate button.

Finally, click the APPLY CAL button.

When you click on the CAL button again, CAL MANAGER appears with a dialog in which the "Channel Cal" calibration must be copied to the CAL POOL under the name "Factory". Then, the Windows Explorer is used to copy the file Factory.cal which is now in the directory C:\Rohde&Schwarz\Nwa\Calibration\Data to the directory C:\Documents and Settings\All Users\Application Data\Rohde&Schwarz\Nwa\Data\Eeprom\Mbt. Service Function 3.5.0.2 then uses this file to program the MB-EEPROM. This can take about a minute.

Restart the network analyzer to check that it is functioning properly.

## Table of Contents - Chapter 3 "Repairs"

<b>3</b>	<b>Repairs.....</b>	<b>3.1</b>
	<b>Instrument Construction and Function Description.....</b>	<b>3.1</b>
	Block Diagram .....	3.2
	Description of the Block Diagram .....	3.4
	<b>Board Replacement.....</b>	<b>3.14</b>
	Board Overview .....	3.16
	Replacing Front Module Controller A90 .....	3.17
	Replacing the Lithium Battery on the Front Module Controller.....	3.20
	Replacing Hard Disk A60.....	3.23
	Replacing LCD A70 and the DC/AC Converter.....	3.24
	Replacing Flexible switch board (Keyboard) A16 / Key Pad A15.....	3.26
	Replacing the Front Cover.....	3.28
	Replacing Disk Drive A30 .....	3.29
	Replacing USB Board A40 .....	3.30
	Replacing Power Supply A20 .....	3.31
	Replacing Fuse board A21 .....	3.32
	Replacing a Fan.....	3.33
	Replacing Motherboard A10.....	3.34
	Replacing a Reflectometer RM8 A510 to 540 .....	3.37
	Replacing a Reflectometer RM8 A510 to 540 .....	3.37
	Replacing Generator Board (ZVA8 only).....	3.38
	Replacing Receiver Board (ZVA8 only).....	3.37
	Replacing Generator and Receiver Cover (ZVA8 only) .....	3.38
	Replacing the Inner Conductor of a Port Connector (ZVA8 only) .....	3.39
	Replacing the Bridge Unit (ZVA8 only).....	3.42
	Replacing a Reflectometer RM24 A510 to 540 .....	3.41
	Replacing the Coupler Unit (ZVA24 only).....	3.44
	Replacing the Reflectometer Fan .....	3.43
	Replacing Network Controller Board A130, A140 .....	3.46
	Replacing Synthesizer Board A150, A160 .....	3.47
	Replacing Frequency Reference Board A100.....	3.46
	<b>Troubleshooting.....</b>	<b>3.49</b>
	Test Equipment and Accessories .....	3.49
	Troubleshooting - Power-up Problems .....	3.50
	Troubleshooting Boot Problems .....	3.51
	Troubleshooting - Boot Error .....	3.52
	Troubleshooting with the Selftest .....	3.53
	Checking the Temperature Sensors.....	3.58
	Service Functions .....	3.59
	Determining which Boards are defective .....	3.63
	Board Test .....	3.64





## **3 Repairs**

This chapter describes the ZVA's construction, simple procedures for repairs, troubleshooting and board replacement. A selftest which checks the diagnostic voltages of the board and indicates limit violations is provided for troubleshooting and diagnostics.

Chapter 4 of this service manual describes the installation of options and firmware updates.

## **Instrument Construction and Function Description**

The ZVA's construction is shown schematically by the following block diagrams and the exploded drawings (see Chapter 5).

The block diagram will help clarify the following function description of the instrument.

### Block Diagram

See also Chapter 5, Annex and Drawings.

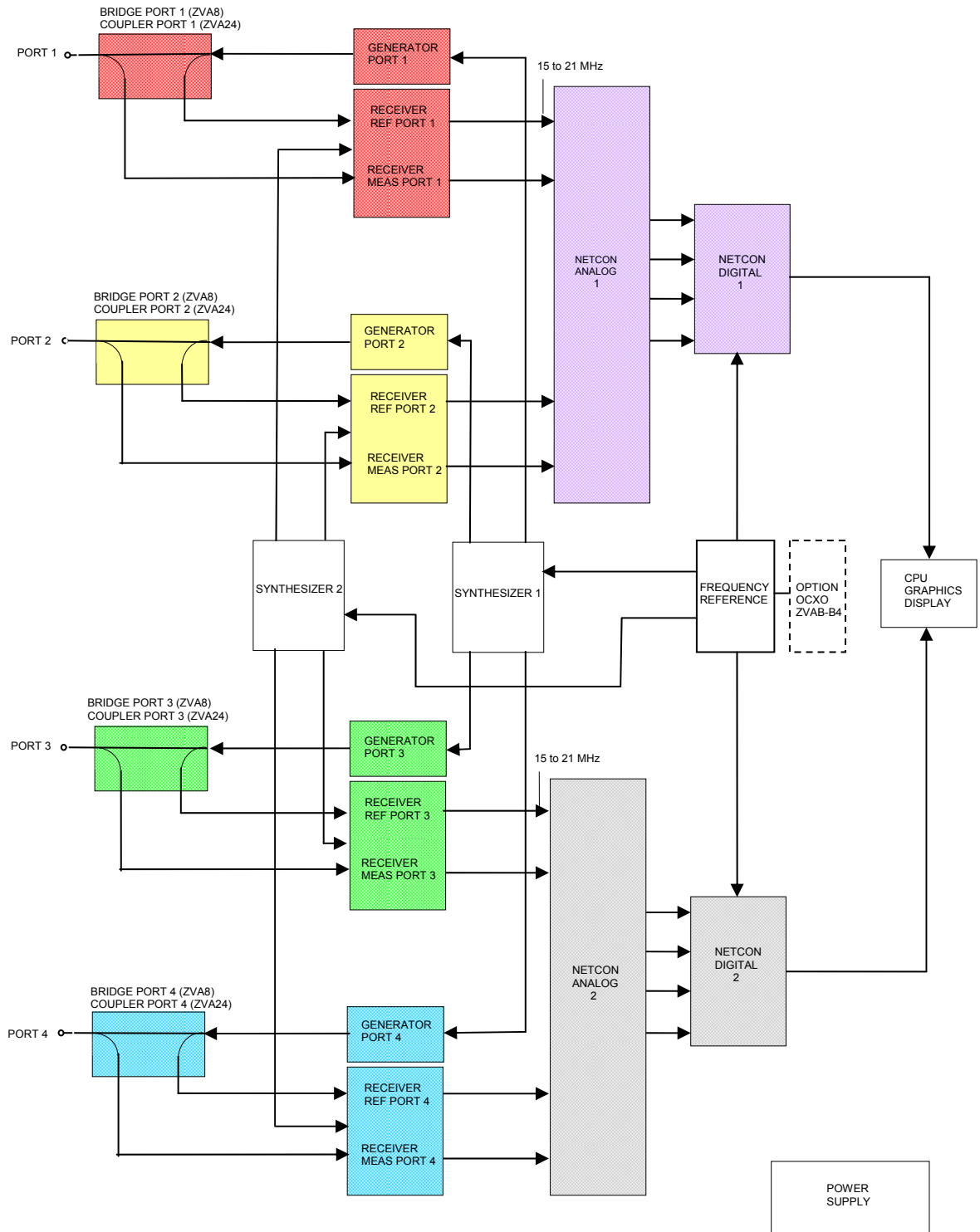


Fig. 3-1 Block diagram of the ZVA8 and the ZVA24 four ports

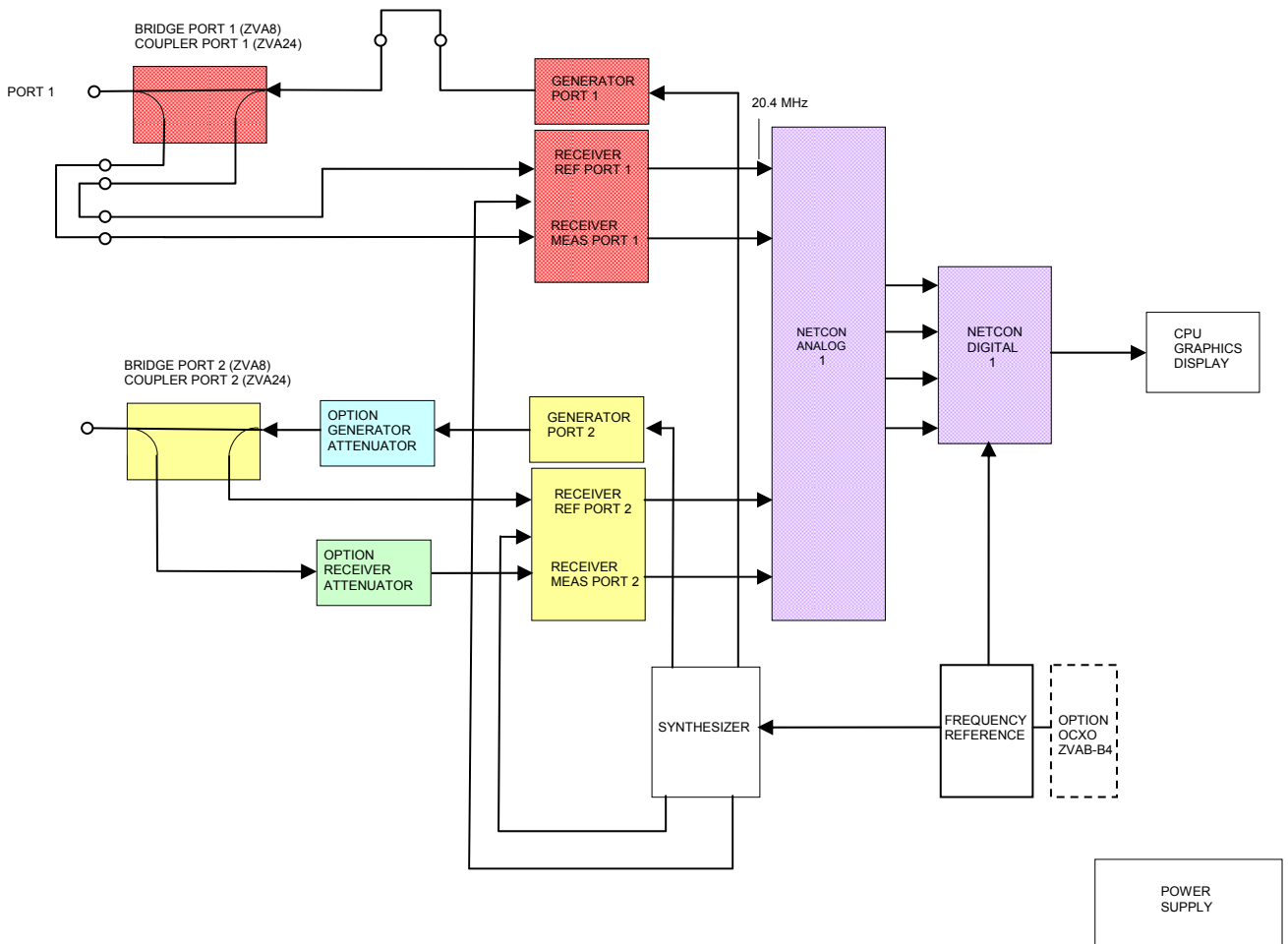


Fig. 3-2 Block diagram of the ZVA8 and ZVA24 two ports  
 Option **Direct Generator/Receiver Access** is shown with Port 1  
 Options **Generator Attenuator** and **Receiver Attenuator** are shown with Port 2

## Description of the Block Diagram

The block diagrams shown in Fig. 3-1 and Fig. 3-2 apply to the R&S ZVA8 and the R&S ZVA24 two-ports and four-ports.

The ZVA is a vector network analyzer covering 300 kHz to 8 GHz (R&S ZVA8) or 10 MHz to 24 GHz (R&S ZVA24). The R&S ZVA8 and the R&S ZVA24 are available in a two-port or four-port version. The signals (including the LO signal for the receiver) are generated using one or two synthesizer boards, depending on the number of ports. The signal processing path comprises a reflectometer board, an IF board, a network controller and a processor section, comprising a Pentium-PC, I/O interface and graphics board. The instrument can be expanded to handle future digital and analog requirements by retrofitting options.

The generator signal on R&S ZVA8 (300 kHz to 8 GHz) is generated on synthesizer board 1, amplified in the generator section of the reflectometer board and then passes via the bridge to the port (port1 to 4) and thus to the DUT. The reference signal (Ref1 to 4) is split in the bridge and fed to the receiver section (Receiver Ref1 to 4) on the reflectometer board.

The generator signal on R&S ZVA24 (10 MHz to 24 GHz) is generated on synthesizer board 1, frequency multiplied, filtered and amplified in the generator section of the reflectometer board and then passes via the coupler to the port (port1 to 4) and thus to the DUT. The reference signal (Ref1 to 4) is split in the coupler and fed to the receiver section (Receiver Ref1 to 4) on the reflectometer board.

The signal reflected or transmitted by the DUT (Meas1 to 4) is fed to the port, coupled out in the bridge or coupler unit and fed to the receiver section (Receiver Meas 1 to 4) on the reflectometer board.

The internal reference frequencies are generated on the frequency reference board. The 128-MHz reference frequency is generated there as an internal device reference.

The following sections describe the various boards in greater detail.

### Reflectometer ZVA8

A reflectometer board comprising a **bridge unit**, a **generator section (Generator)** and a **receiver section (Receiver)** is incorporated in every port (Port1 to 4). These three components are screwed together to form a compact unit.

#### Bridge unit

The bridge unit is a resistive coupler which is used to separate the signal going to the DUT from the signal coming from the DUT. The reference signal (= measure of the signal to the DUT) is also obtained from the bridge unit. The reference signal provides a reference for relative measurements.

#### Generator

The generator contains three broadband amplifier stages which boost the signal coming from the synthesizer to a level > 20 dBm. Limiter diodes protect the output stage from ESDs. A total of three adjustable attenuators form the setting element to keep the output level constant and to attenuate it electronically.

#### Receiver

The receiver section has two channels (measurement channel and reference channel) and uses single conversion. Every channel contains a buffer amplifier, for each of the frequency ranges 300 kHz to 4 GHz and 4 GHz to 8 GHz, a mixer with LO amplifiers and an IF amplifier. In the mixer, the input signal is directly converted to the IF range, approx 15 to 21 MHz. The inputs are protected by limiter diodes.

## Reflectometer Unit ZVA24

A reflectometer unit comprising a **coupler unit**, a **generator section (Generator)** and a **receiver section (Receiver)** is incorporated in every port (Port1 to 4). The Generator and the Receiver are screwed together to form a compact unit.

### Coupler unit

The coupler unit contains a bias-T and two directional couplers. One coupler is used to separate the signal going to the DUT from the signal coming from the DUT. The reference signal (= measure of the signal to the DUT) is obtained from the second coupler. The reference signal provides a reference for relative measurements.

### Generator

The generator contains a frequency doubler for the range 8 GHz to 16 GHz, a switchable filter unit, a second frequency doubler with filter for the range 16 GHz to 24 GHz and a broadband amplifier for the frequency range 10 MHz to 24 GHz with two adjustable attenuators to keep the output level constant and to attenuate it electronically.

Range	Basic frequency range from synthesizer	Doubler 1	Frequency	Doubler 2	Output frequency
1	10 MHz to 8.0 GHz	---	10 MHz to 8.0 GHz	---	10 MHz to 8.0 GHz
2	4 GHz to 5.05 GHz	x	8.0 GHz to 10.1 GHz	---	8.0 GHz to 10.1 GHz
3	5.05 GHz to 6.35 GHz	x	10.1 GHz to 12.7 GHz	---	10.1 GHz to 12.7 GHz
4	6.35 GHz to 8.0 GHz	x	12.7 GHz to 16.0 GHz	---	12.7 GHz to 16.0 GHz
5	4.0 GHz to 5.0 GHz	x	8.0 GHz to 10.0 GHz	x	16.0 GHz to 20 GHz
6	5.0 GHz to 6.0 GHz	x	10.0 GHz to 12.0 GHz	x	20.0 GHz to 24 GHz

### Receiver

The receiver section has two channels (measurement channel and reference channel) and uses single conversion. The measurement channel contains a buffer amplifier, two mixers for each of the frequency ranges 10 MHz to 2.5 GHz and 2.5 GHz to 24 GHz, LO amplifiers and an IF amplifier. The reference channel is identical to the measurement channel without the buffer amplifier. In the mixers, the input signal is directly converted to the IF range, approx. 15 to 21 MHz. The mixers are used as basic wave mixers.

The LO signal section contains a frequency doubler for the range 8 GHz to 16 GHz, a switchable filter unit, a second frequency doubler with filter for the range 16 GHz to 24 GHz and a broadband amplifier for the frequency range 30 MHz to 24 GHz.

Range	Basic frequency range from synthesizer	Doubler 1	Frequency	Doubler 2	Output frequency
1	30 MHz to 8.0 GHz	---	30 MHz to 8.0 GHz	---	30 MHz to 8.0 GHz
2	4 GHz to 8.0 GHz	x	8.0 GHz to 16.0 GHz	---	8.0 GHz to 16.0 GHz
3	4.0 GHz to 6.0 GHz	x	8.0 GHz to 12.0 GHz	---	16.0 GHz to 24.0 GHz

Each of the reflectometers contains a voltage-controlled fan to perform optimum cooling.

## **Network controller**

The network controller comprises two boards, the **netcon analog** and the **netcon digital** which are screwed together to form a single unit. The boards are four-channel – in other words, one network controller is required for two ports (2 measurement channels + 2 reference channels). After A/D conversion, the network controller performs high-speed digital processing on the IF signals from the reflectometers.

### **Netcon analog**

The netcon analog board is a 4-channel IF amplifier and one 14-bit A/D converter per channel. The transmission bandwidth is 13 MHz to 26 MHz. A dither generator is used to linearize the A/D-converter characteristic. The board also accommodates a temperature sensor which is only used for general temperature checks and not to correct measurement results.

### **Netcon digital**

The netcon digital board further processes the digitized raw data from the netcon analog board. Speed considerations mean that digital signal processing is performed in an ASIC which has a clock frequency of 80 MHz.

The main functions on the board are:

- Mixing to the baseband
- Filter with bandwidths from 1 Hz to 100 kHz in 1/3/5 sequence
- Detectors, PCI interface
- Setting and routine control

The current measured value (sample), the average, the RMS and the Max can be recorded simultaneously and passed on to the main processor via the PCI-bus. The connection to the PCI-bus is made via the PCINT-FPGA. A further FPGA "FCON" contains the central section of the procedure control from measurement point to measurement point and the trigger control. This FPGA is configured by the main processor.

The A/D converters for ext. DC measurements are also accommodated on the netcon digital board.

## Frequency reference

The **frequency reference** board generates the highly stable and spectrally pure clock signals, required by the ZVA, which can be phase-locked to external synchronisation signals.

The various function blocks are:

The 128 MHz VCXO (voltage-controlled crystal oscillator) which generates a stable, low-noise reference frequency for the synthesisers, for the A/D converters and for digital signal processing.

The PLL for phase locking the VCXO signal to an external reference signal or to a 10 MHz OCXO (oven-controlled crystal oscillator) option.

The VCO and PLL which generate the clock for the netcon digital board (locked to the 128 MHz VCXO). The frequency can be varied from 75 MHz to 86 MHz. The VCO frequency is programmable;-the nominal clock frequency is 80 MHz.

A reference frequency of 10 MHz is standard. If the OCXO is fitted, the OCXO signal is brought out at the ZVAB's rear panel (10 MHz REF) so that further instruments can be synchronised.

The free-running VCXO (no OCXO, no external reference) can be calibrated using a pre-tune voltage.

If no OCXO is fitted, a 10 MHz signal is still output at the instrument's rear panel. It is derived from the 80 MHz signal which is divided down to 10 MHz by the divider for the OCXO.

The following are also accommodated on the board:

- A control-CPLD to act as an interface between the serial bus and the board,
- Register for storing divider values,
- D/A converter for pre-tuning the VCXO and OCXO
- An on-board EEPROM for storing board-specific data
- Selftest facilities

## OCXO reference (option B4)

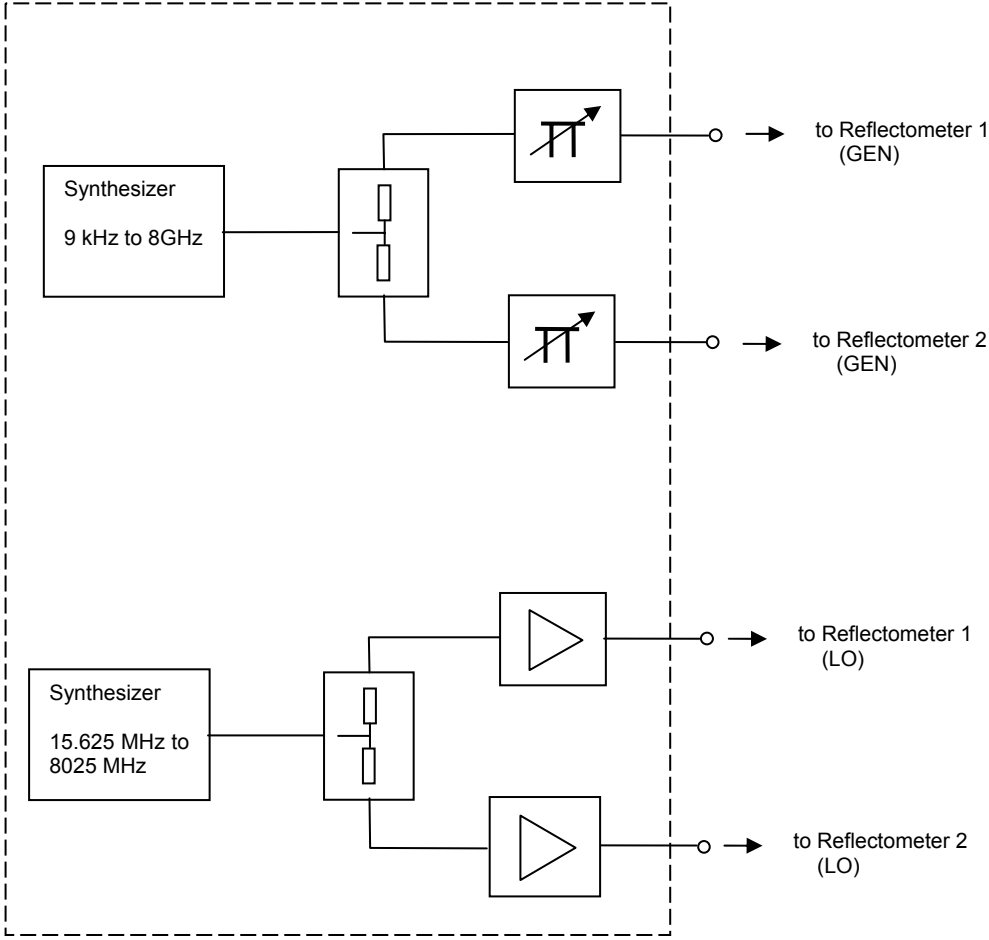
As an option, the frequency reference board can be fitted to an OCXO (oven-controlled crystal oscillator) which considerably improves the phase noise of the reference signal close to the carrier, short-term stability and long-term stability.



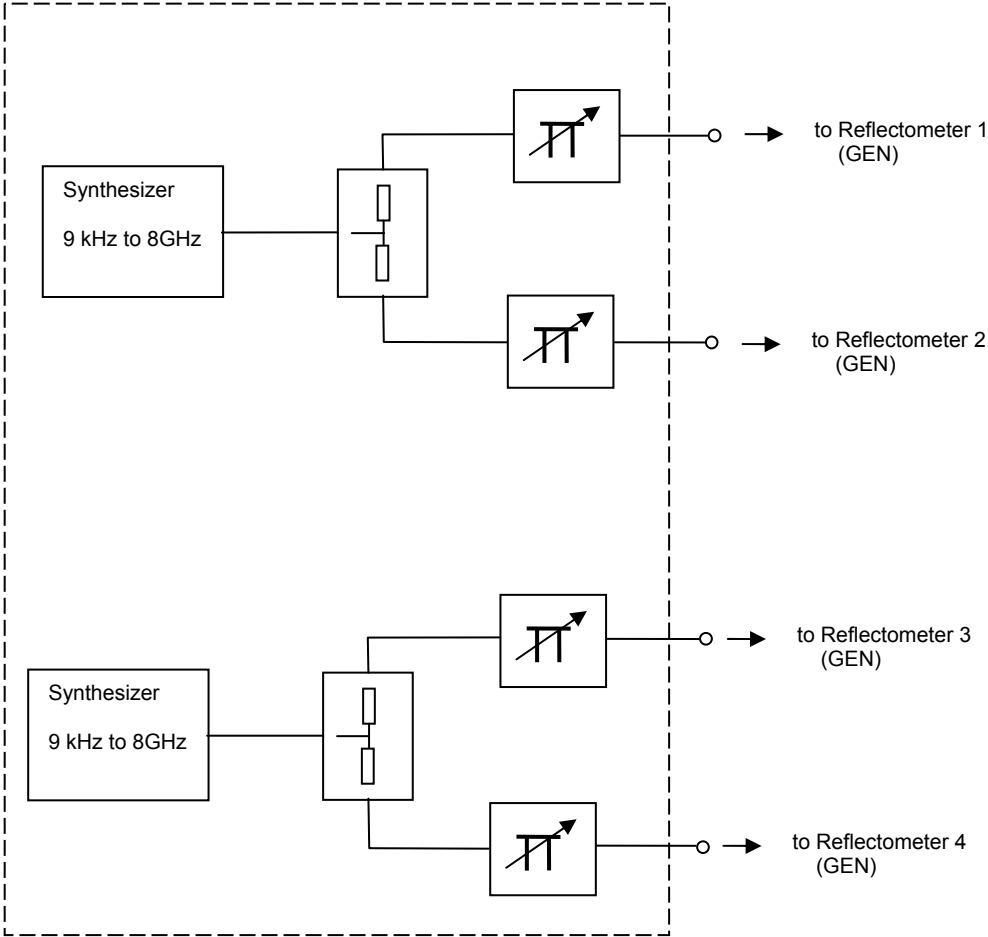
### Synthesizers

The source signals for the generator signals associated with each port and the LO signal for the mixers on the receiver boards for each of the reflectometers are generated on the synthesizer board. One or two individual synthesizers are accommodated on a synthesizer board. There are three different synthesizer types used in the ZVA models:

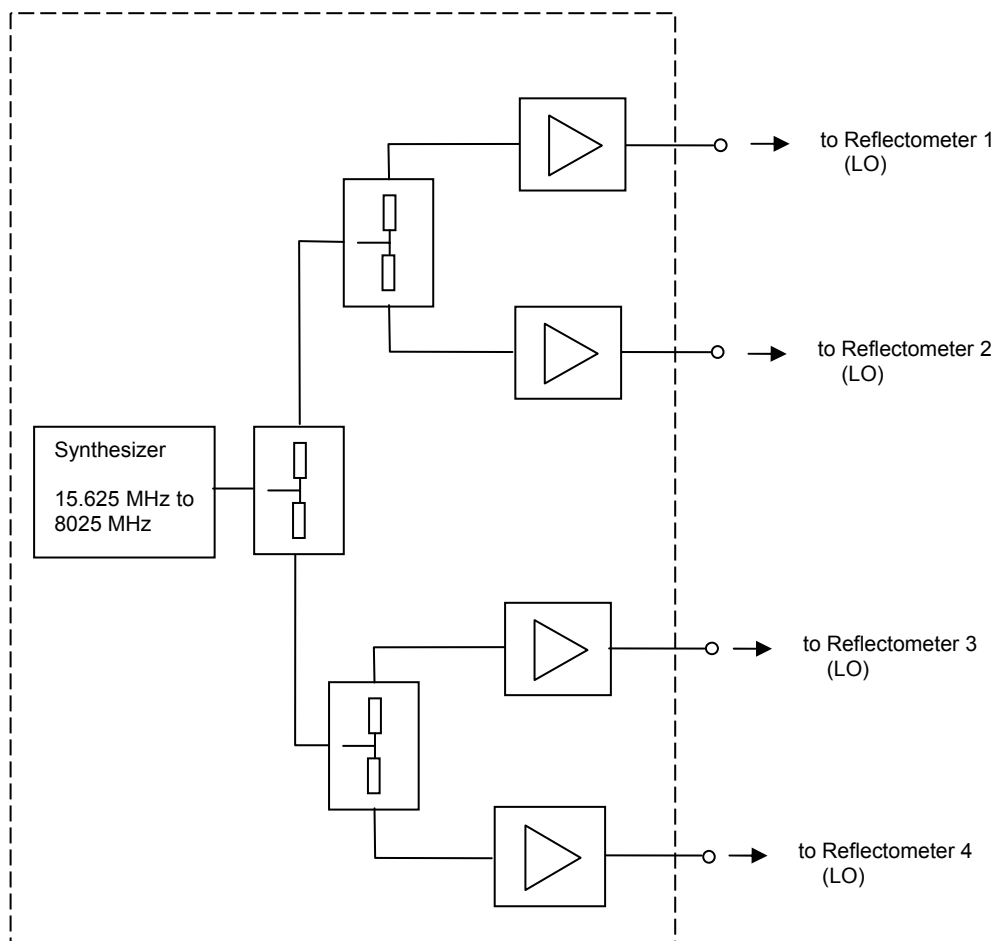
#### Synthesizer-LS



Synthesizer-DS



Synthesizer-LO



The synthesizer models are incorporated as follows in the various ZVA models:

Synthesizer-	LS 1302.4290.02	LS 1302.4290.24	DS 1302.5180.02	LO 1302.4248.02
ZVA8 two-port	2x SRC, 2x LO	-----	-----	-----
ZVA8 four-port	-----	-----	4x SRC	4x LO
ZVA24 two-port	-----	2x SRC, 2x LO	-----	-----
ZVA24 four-port	-----	-----	4x SRC	4x LO

**Front unit**

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

The front module controller is mounted in the controller tray in the instrument frame.

**LC display**

All results and setting information the user requires is displayed on the colour LCD.

The resolution of the LCD is 800 x 600 pixels (SVGA).

The display has an integral cold-cathode tube to provide illumination. The high voltage that is required is provided by a dedicated DC/AC converter. The converter is mounted on the mounting plate next to the display and connected to both the display and the controller board via a cable.

**Keyboard**

The keyboard comprises a flexible switch board and a key pad. They make contact whenever a rubber key is pressed. The two LEDs for the status display associated with the Standby/On key (yellow for standby/green for on) are also accommodated on the key pad.

Key detection and LED control are performed via a foil cable connection on the controller board. They are controlled by means of a matrix method implemented by a special microprocessor on the controller board; the two LEDs are controlled accordingly. When the instrument is turned off at the mains switch, the microprocessor saves the status of the Standby/On key.

**Front module controller**

The front module controller accommodates all the components that are required on one board - for example, the processor, memory chips (SIMMs), I/O chips (ISA bus), the lithium battery, IEC/IEEE bus controller, two serial interfaces (COM1/2), a parallel interface (LPT), LCD graphics controller, external VGA-monitor graphics interface (Monitor) and a connector for an external keyboard (keyboard PS/2). Also integrated on the controller board are a floppy controller for an external disk drive and an IDE hard-drive controller.

In the case of the FMR6, the LAN interface is also integrated on the controller board.

**Hard disk**

The hard disk is screwed to the rear of the tray for the front module controller with a holder and connected to the board with a flat cable.

**Power supply**

The power supply produces all the voltages required to power the ZVA. It can be turned off with a switch on the instrument's rear panel.

The power supply is a primary-switched power supply with power factor correction (PFC) and standby circuit (+12 V standby).

On the secondary side, it outputs DC voltages (+3.4 V, +5.2 V, +6.5 V, +8.25 V, +12.25 V, +12 V standby, -12.25 V).

The control signal RS\_PS\_ON which is controlled by the front module controller (via the *STANDBY/ON* key at the front of the instrument frame), activates the power supply. In the standby mode, the power supply generates only the 12-V standby voltage to supply a crystal oven and the *STANDBY* status display on the front panel.

The secondary voltages are open-proof and short-proof to ground and mutually open-proof and short-proof.

A circuit that prevents overheating is also provided. Overheating is indicated to the front module controller via a status signal (*OT*).

## Motherboard

The motherboard supplies power to the boards and connects them to the control and data buses. A number of RF connections are also routed via the motherboard.

As well as straight connections, a number of circuits are accommodated on the motherboard:

Motherboard controller (MBCON)  
28 V supply  
Preamplifier for the DC measurement inputs  
Supply voltage fuses  
Rear panel interfaces  
Fan control

The **MBCON** unit acts as an FSU bus-slave:

- to drive the LEDs (instrument front-panel)
- to drive the fan in five stages
- for two temperature sensors on the motherboard
- for an SPI-EEPROM on the motherboard
- Furthermore, the software can detect which device (ZVA8 or ZVA24) is present using the MBCON.

In addition to the voltages delivered by the power supply, +28 V is produced from +12 V on the motherboard by means of a boosting switching regulator. This voltage is required to operate the OCXO on the reference board when option B4 is fitted.

Each board has its own fuses for the supply voltages. These fuses are soldered into position on the board.

All external supply voltages (USB etc.) are protected to prevent shorts.

## Board Replacement

The following section is a detailed description of board replacement. Chapter 5 tells you how to order spare parts. It contains a list of mechanical parts and their order numbers as well as drawings relating to board replacement.

**Note:** *The numbers in brackets are the item numbers in the list of mechanical parts in Chapter 5. In turn, these item numbers are the same as the item numbers in the drawings relating to board replacements (also in Chapter 5):*

*1145.1110 sheet 1 (ZVA Network Analyzer, Items 10-130, 240-473)*

*1145.1110 sheet 2, 3, 4, 5 (ZVA Network Analyzer, Items 141-263)*

*1145.1310 sheet 1 (ZVA base instrument, Items 500-792)*

*1145.1390 sheet 1 (ZVA display unit, Items 800-1070)*

*1164.1770 sheet 1 (ZVA Option B4)*

*1145.3593 sheet 1 (8GHz Bridge)*

*1145.4177 sheet 1 (RM8)*

*1145.4283 sheet 1 (RM24)*

*1164.0250 sheet 1 to 5 (ZVA8 Option B16)*

*1164.0267 sheet 1 to 5 (ZVA24 Option B16)*

*1164.0215 sheet 1 (ZVA8 Option B21 to B24 and B31 to B34)*

*1164.0221 sheet 1 (ZVA24 Option B21 to B24 and B31 to B34)*

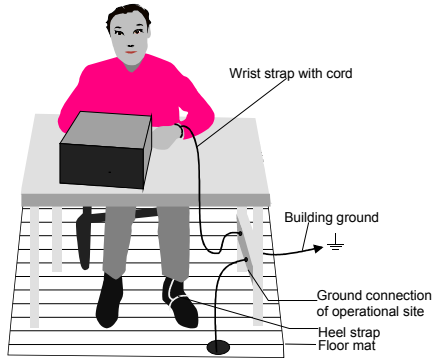
*The terms “left” and “right” always mean left and right as seen looking at the front of the instrument.*

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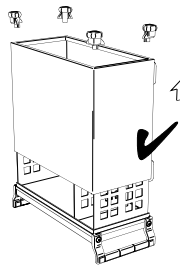
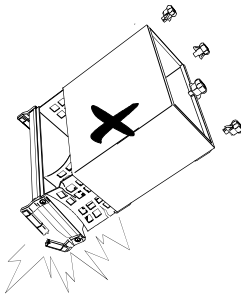
**Caution**

- Follow the additional safety instructions at the beginning of this manual.
- Disconnect the instrument from the mains before removing the enclosure.
- To prevent damage to electronic components, only open the instrument on an anti-static workbench.



*The following methods can be used singly or in any combination to prevent damage from electrostatic discharges:*

- *Grounded bracelet*
- *Conducting floor surface and grounded ankle bracelet*



- Before removing the rear-panel feet and pulling off the shell, stand the instrument on its front handles to prevent damage being caused by slipping.
- When replacing the shell, ensure that no cables are trapped or pulled out.



## Board Overview

Table 3-1 Overview: Board Replacement

Board	Measures taken after replacement		
	Function test	Alignment Recording of correction values System error calibration	Other
Front module controller	Check error log		BIOS update
Lithium battery	Check error log		
Hard disk	Check error log	System error calibration	FW update
LC display / DC/AC converter	Functional test		
Flexible switch board (keyboard)/ key pad	Functional test		
Front cover			
Disk drive	Check the directory structure		
USB board	Test with mouse, keyboard		
Power supply	Check error log		
Fan			
Motherboard	Check error log	System error calibration Alignment DC measurement inputs	
Reflectometer	Check error log	Record correction values System error calibration	
Input connector port 1 to 4 (ZVA8 only)	Check error log	System error calibration	
Bridge unit (ZVA8 only)	Check error log	Record correction values System error calibration	
Coupler unit (ZVA24 only)	Check error log	Record correction values System error calibration	
Reflectometer fan	Check error log		
Network controller	Check error log	Record correction values System error calibration Alignment DC measurement inputs	
Synthesizer	Check error log	Record correction values System error calibration	
LO divider	Check error log	Record correction values System error calibration	
Frequency reference	Check error log	Alignment Frequency accuracy	

## Replacing Front Module Controller A90

(See Chapter 5, Spare Parts List, Item 580, and drawings 1145.1110, 1145.1310)

The front module controller is located behind the front unit.

### Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains.
- Remove termination and 3.5mm connection cables (only with option ZVAX-B16)
- Remove the 4 screws from the front handles (410), left and right, and take off the front handles.
- Remove the countersunk screw (390) next to the display and pull off the front cover (300, 303, 306, 310, 313, 316) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- ZVA8: Remove the countersunk screws (168) (2), (153), (154), (163), (164)
- Pull out the front unit together with the keyboard and display (600, 604) forwards.



#### Caution

*The cables to the front module controller are still connected.*

- Disconnect the cables to the LCD, the DC/AC illumination converter, the key pad (keyboard), the tachogenerator and, if necessary, the network connection on the front module controller.

**N.B.:** *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

### Removing the front module controller

- Remove the 10 sems screws (590) in the front module controller and remove the front module controller in the following way (see Fig. 3-2):

**Note:** *The insertion force for the front module controller on the motherboard is very large. The slot in the bottom of the controller tray is provided to facilitate pushing out the front module controller forwards. Using a blunt, flat tool, carefully edge the board forwards.*



#### Caution

*Do not insert the tool too far into the slot; only apply pressure to the board. To ease the board out, apply light pressure to each and every slot. Do not bend the board.*

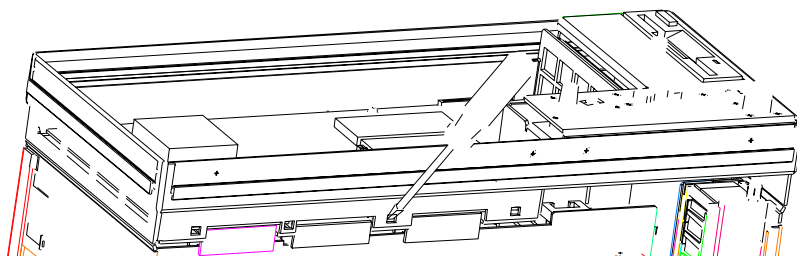


Fig. 3-2 Removing the front module controller

## Installing the new front module controller and putting the instrument back together

- Carefully insert the new front module controller on the motherboard and screw into place with 10 semi screws (590).

**Caution:** With type FMR6 1091.2520.00, there is a danger of shorting between board components, tracks and screws (590). Use suitable insulation.

- Reconnect the cables to the front module controller, ensuring correct polarity.

### Front Module Controller Typ FMR6

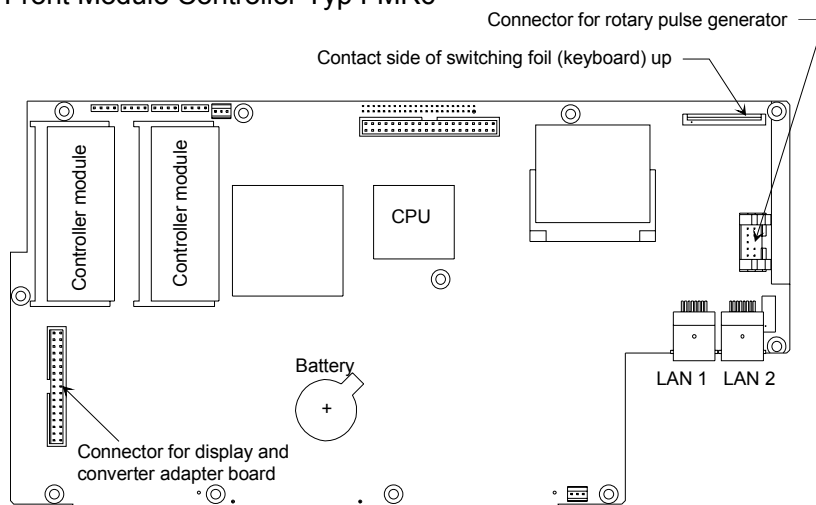


Fig. 3-3 Location of the edge connectors on the front module controller

- Re-insert the front unit into the instrument and secure to the front frame with 4 countersunk screws. (610).
- Fit the following countersunk screws (168) (2 ), (153), (154), (163), (164).



### Caution

Avoid trapping cables and ensure cabling is tidy.

- Replace the front cover (300 to 316) and secure with the countersunk screw (390).
- Secure the 2 front handles (410) with the 4 screws.
- Fit the termination and the 3.5mm connection cables (only with option ZVAX-B16)

### Putting into operation

- Connect the mains cable and turn on at the power on switch. The instrument is now in standby mode.
- Prepare a BIOS disk downloading the required file from <https://gloris.rohdeschwarz.com> (Document link: Firm- \ Software) on a floppy disk.
- Insert the BIOS disk into the floppy disk drive.
  
- Turn on the instrument and wait for the first beep. Press the DEL key. The instrument should now display the setup menu.
  - Select Advanced BIOS Features
  - Enter
  - Select First Boot Device
  - Select Floppy using page up/down key
  - Press F10 key (save)
  - Enter
- BIOS has now been programmed.  
Do not turn the instrument off when the program is running.
- Follow the instructions on the screen.
- Select Service Level 2 (see Service Functions).
- Check the protocol file for errors:  
[ INFO : Error Log ]

## Replacing the Lithium Battery on the Front Module Controller

(See Chapter 5, Spare Parts List, Item (582), and drawings 1145.1110, 1145.1290)

The lithium battery is located on the front module controller behind the front unit.

### Caution



*Do not expose lithium batteries to high temperatures or naked flames.*

*Keep batteries away from children.*

*If the battery is not replaced correctly, there is a risk of explosion. Only use R&S-type replacement batteries (See Chapter 5, Spare Parts List, Item 776 for type FMR6).*

*Lithium batteries are classified as special waste – only use designated containers for disposal.*

## Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains.
- Remove termination and 3.5mm connection cables (only with option ZVAx-B16)
- Remove the 4 screws from the front handles (410), left and right, and take off the front handles.
- Remove the countersunk screw (390) next to the display and pull off the front cover (300, 303, 306, 310, 313, 316) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- ZVA8: Remove the countersunk screws (168) (2), (153), (154), (163), (164)
- Pull out the front unit together with the keyboard and display (600, 604) forwards.



### Caution

*The cables to the front module controller are still connected.*

- Disconnect the cables to the LCD, the DC/AC illumination converter, the key pad (keyboard), the tachogenerator and, if necessary, the network connection on the front module controller.

**Note:** *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

## Removing the lithium battery

- Carefully lift up and pull out the battery.

**Note:** Lithium battery 3.4 V (dia. 20 mm \* 3 mm) R&S Item No. 0858.2049.00

### Front Module Controller Typ FMR6

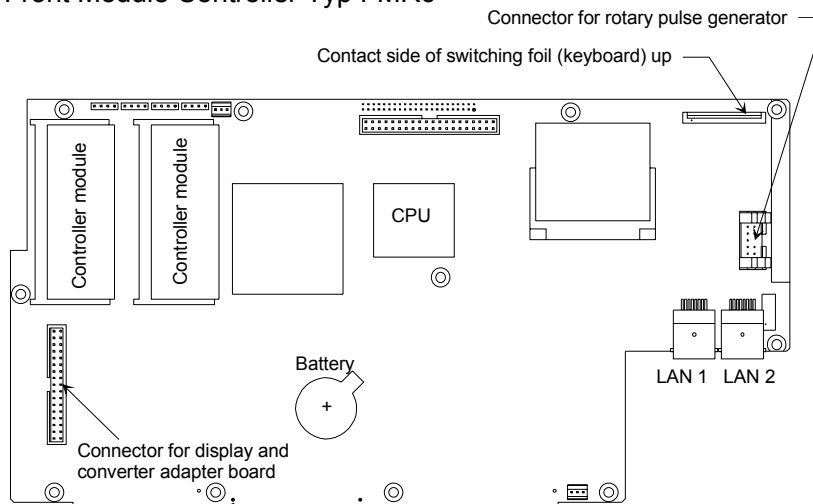


Fig. 3-4 Location of the lithium battery on the front module controller

## Installing the new battery and reassembling the instrument



### Caution

*Never short circuit the battery*

- Insert the battery under the spring in the holder.  
*N.B.: The positive pole of the battery (+) must be uppermost.*
- Reinsert the front unit in the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (168) (2), (153), (154), (163), (164).



### Caution

*Avoid trapping cables and ensure cabling is tidy.*

- Replace the front cover (300, 303, 306, 310, 313, 316) and screw in the countersunk screw (390).
- Refit the 2 front handles (410) using 4 screws.
- Fit the termination and the 3.5mm connection cables (only with option ZVAX-B16).

**Putting into operation**

- Connect the mains cable and turn on at the power switch. The instrument is now in standby mode.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]

## Replacing Hard Disk A60

(See Chapter 5, Spare Parts List, Item 710, and drawings 1145.1110 and 1145.1310)

The hard disk is located between the controller tray and the boards. The spare disk is delivered with the software pre-installed.

### Before removal:

Whenever possible, back up the user data on an external data storage medium.

## Opening the instrument and replacing the hard disk

Turn off the instrument, disconnect from the mains, unscrew the 4 rear-panel feet (460) and pull off the enclosure (400) backwards

- Lift off the instrument cover (296) at the top after undoing the countersunk screws (298).
- Disconnect the flat cable (715) at the hard disk drive.

**Note:** Do not pull or push on the flat cable – instead, carefully lever out the connector strip with a small screwdriver.

- Remove the 2 countersunk screws (725) in the hard disk holder (720).
- Remove the hard disk (710) and holder (720).
- Undo the 4 countersunk screws (730), remove the old hard disk and screw the new hard disk to the holder (720).

## Installing and putting the new hard disk into operation

- Refit the hard disk and holder into the instrument using 2 countersunk screws (725).

**Note:** The bottom of the holder is inserted into a sheet-metal wall.

- Connect the flat cable (715) to the hard disk.
- Replace the instrument's top cover (296) and screw back into position with 23 or 28 countersunk screws (298).
- Slide on the enclosure (400) and screw the 4 rear-panel feet (460) back into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode
- Select Service Level 2 (see Service Function)
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Perform the factory system error calibration (see **Factory System Error Calibration**).



## Replacing LCD A70 and the DC/AC Converter

(See Chapter 5, Spare Parts List Items 910, 930 and drawings 1145.1110, 1145.1390)

The LCD and the associated DC/AC converter are accommodated on a mounting plate. The connection to the front module controller is made with cables which should also be replaced individually. The replacement procedure is as follows:

### Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains.
- Remove termination and 3.5mm connection cables (only with option ZVAx-B16)
- Remove the 4 screws from the front handles (410), left and right, and take off the front handles.
- Remove the countersunk screw (390) next to the display and pull off the front cover (300, 303, 306, 310, 313, 316) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- ZVA8: Remove the countersunk screws (168) (2 ), (153), (154), (163), (164)
- Pull out the front unit together with the keyboard and display (600, 604) forwards.



#### **Caution**

*The cables to the front module controller are still connected*

- Disconnect the cables to the LCD, the DC/AC illumination converter, the key pad (keyboard), the tachogenerator and, if necessary, the network connection to the front module controller.

**Note:** *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector has been released.*

- Place the key-side of the front unit on a clean surface.

### Removing the DC/AC converter

- Disconnect the cable from the display (910) to the DC/AC converter (930).
- Disconnect the converter cable (950) to the DC/AC converter (930)
- Remove the DC/AC converter (930) by undoing the 2 screws (940)

### Removing the LCD

- Disconnect the display cable (945) by cutting through the adhesive label(946).
- Remove the display connector (1020) after you have undone the two screws (1040).
- Disconnect the display cable (1030) at the display (910).
- Remove the display (910) after removing the 4 screws (920)

### Installing and putting into operation a new LCD or DC/AC converter

- Reinstall the new LCD or new DC/AC converter by reversing the disassembly procedure, refit all screws and reconnect the cables that have been disconnected (drawing 1145.1390).
- When replacing the display (921) or display cable (945), use a new adhesive label (946) to secure the cabling.
- Place the key-side of the front unit on the top of the instrument so that the cables can be connected to the front module controller.
- Carefully connect all cable connectors to the front module controller, ensuring that the polarity is correct.

#### Front Module Controller Typ FMR6

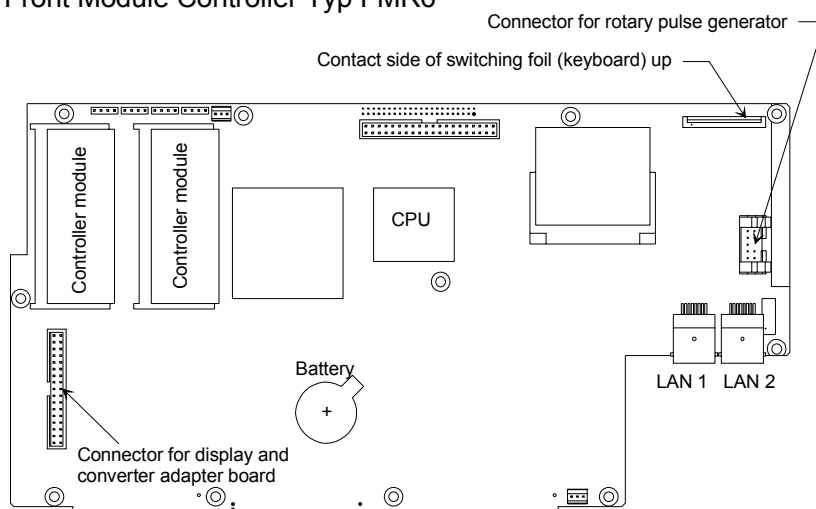


Fig. 3-5 Location of the edge contacts on the front module controller

- Reinsert the front unit in the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (168) (2), (153), (154), (163), (164).



#### **Caution**

*Avoid trapping cables and ensure cabling is tidy.*

- Replace the front cover (300, 303, 306, 310, 313, 316) and secure with countersunk screw (390).
- Refit the 2 front handles (410) using the 4 screws.
- Fit the termination and the 3.5mm connection cables (only with option ZVAx-B16).
- Connect the mains cable, turn on at the mains switch and press the ON key.

## Replacing Flexible switch board (Keyboard) A16 / Key Pad A15

(See Chapter 5, Spare Parts List, Items 860, 870 and drawings 1145.1110, 1145.1390)

The flexible switch board (keyboard) and key pad are located behind the front cover and the keyboard frame

### Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains.
- Remove termination and 3.5mm connection cables (only with option ZVAx-B16)
- Remove the 4 screws from the front handles (410), left and right, and take off the front handles.
- Remove the countersunk screw (390) next to the display and pull off the front cover (300, 303, 306, 310, 313, 316) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- ZVA8: Remove the countersunk screws (168) (2), (153), (154), (163), (164)
- Pull out the front unit together with the keyboard and display (600, 604) forwards and place it with the key-side on top of the instrument.



#### **Caution**

*The cables to the front module controller are still connected.*

- Disconnect the cables to the LCD, the DC/AC illumination converter, the key pad (keyboard), the tachogenerator and, if necessary, the network connection to the front module controller.

**Note:** *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

### Removing the flexible switch board (keyboard) / key pad

- Place the front unit with the key-side upwards on a clean surface.
- Remove knob (990) from the tachogenerator.
- Undo the 10 countersunk screws (890) and remove the keyboard frame (800, 805).
- The flexible switch board (860) and the key pad (870) can now be replaced.

## Installing a new flexible switch board / key pad and reassembling the instrument

- Insert the new flexible switch board (860) into the keyboard frame (800, 805) from behind.
  - N.B.:** The positioning pins must be inserted in the holes in the keyboard frame.
- Place the new key pad (870) on the rear of the flexible switch board (860).
  - Note:** Thread the foil cable's connector through the slot in the mounting tray. Position the key pad so that the pins on the flexible switch board pass through the holes in the key pad.
- Place the rear of the display unit on the key pad (870).
  - N.B.:** Position the display unit so that the pins on the flexible switch board pass through the holes in the mounting tray.
- Press the front unit together, with the key-side upwards turn and screw back together again with 10 countersunk screws (890).
- Place the front unit with the key-side on top of the instrument so that the cables can be connected to the front module controller
- Reconnect the cables to the front module controller, ensuring correct polarity.

### Front Module Controller Typ FMR6

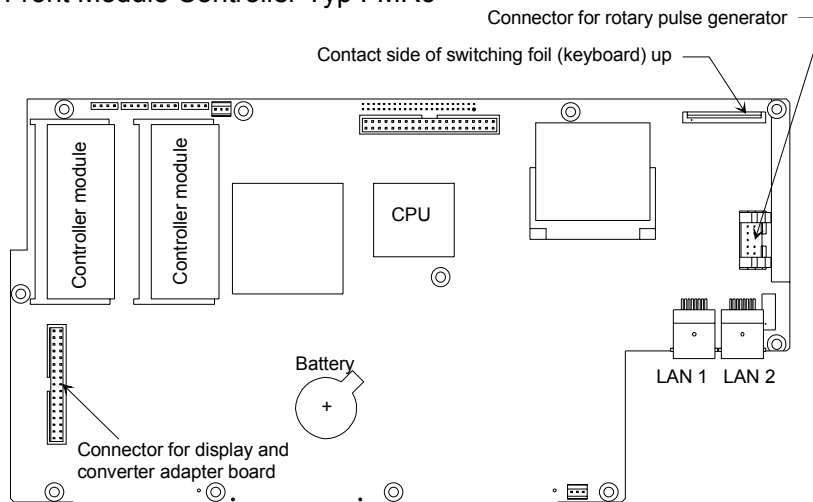


Fig. 3-6 Location of the edge contacts on the front module controller

- Reinsert the front unit into the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (168) (2 ), (153), (154), (163), (164).



### Caution

Avoid trapping cables and ensure cabling is tidy.

- Replace the front cover (300, 303, 306, 310, 313, 316) and secure with the countersunk screw (390).
- Refit the 2 front handles (410) using 4 screws.
- Fit the termination and the 3.5mm connection cables (only with option ZVAX-B16).
- Connect the mains cable, turn on at the mains switch and press the ON key.

## **Replacing the Front Cover**

(See Chapter 5, Spare Parts List, Items 300, 303, 306, 310, 313, 316 and drawing 1145.1110)

The front cover is the outermost front panel with lettering. Each instrument type has its own front cover.

- Turn off the instrument and disconnect from the mains.
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles
- Remove termination and 3.5mm connection cables (only with option ZVAX-B16)
- Remove the countersunk screw (390) next to the display and pull off the front cover (e.g. 300) forwards
- Fit the new front cover and reassemble the instrument by reversing the disassembly procedure.
- Connect the mains cable, turn on at the mains switch and press the ON key.

## Replacing Disk Drive A30

(See Chapter 5, Spare Parts List, Item 670 and drawings 1145.1110 and 1145.1310)

### Opening the instrument and removing the disk drive

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Remove the 2 sems screws (700) and carefully lift out the floppy disk drive (670), together with the floppy drive holder (680).

***N.B.:** The floppy cable to the motherboard is still connected.*

- Disconnect floppy cable (690) on the floppy disk drive.

### Installing a new disk drive and reassembling the instrument

- Release the floppy disk drive by removing the 3 sems screws (700) from the floppy drive holder (680) and insert a new floppy disk drive (670) into the floppy drive holder (680).
- Connect floppy cable (690) on the floppy disk drive.
- Resecure the floppy disk drive (680) from above to the side of the instrument with the fan using 2 sems screws (700).

***N.N.:** Center the floppy disk drive wrt the cut-out in the front cover.*

- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.

### Function test

- The instrument boots up and starts the instrument firmware.
- Insert a 3 ½ "disk with files.
- Press the FILE key, then the File Manager softkey and Edit Path.
- Enter " a " and " : " with the screen functions and terminate with the Enter key.
- The directory structure of the disk displayed on the screen shows that the floppy disk drive is operating properly.

## Replacing USB Board A40

(See Chapter 5, Spare Parts List, Item 1050 and drawings 1145.1110 and 1145.1390)

The USB board is located behind the front cover and the keyboard frame next to the ON key.

### Opening the instrument and removing the USB-board

- Turn off the instrument and disconnect from the mains.
- Remove termination and 3.5mm connection cables (only with option ZVAx-B16)
- Remove the 4 screws from the front handles (410), left and right, and take off the front handles.
- Remove the countersunk screw (390) next to the display and pull off the front cover (300, 303, 306, 310, 313, 316) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- ZVA8: Remove the countersunk screws (168) (2 ), (153), (154), (163), (164).
- Pull out the front unit together with the keyboard and display (600, 604) forwards and place it with the key-side on top of the instrument.
- Remove the 2 screws (1070), disconnect the cable and remove the USB board (1050).

### Fitting the USB board and reassembling the instrument

- Install the new USB board by reversing the removal procedure, replace all screws and connect and install the relevant cables (drawing 1145.1390).
- Insert the front unit back into the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (168) (2 ), (153), (154), (163), (164).
- Replace the front cover (300, 303, 306, 310, 313, 316) and secure with the countersunk screw (390).
- Refit the 2 front handles (410) using 4 screws.
- Fit the termination and the 3.5mm connection cables (only with option ZVAx-B16).
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check the USB board: Connect the mouse or keyboard and perform a function check.

## Replacing Power Supply A20

(See Chapter 5, Spare Parts List, Items 790 and drawings 1145.1110, 1145.1310)

The power supply is installed at the rear of the instrument frame.

### Removing the power supply

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) towards the rear.
- Remove the 4 screws (792) in the rear panel.
- Pull out the power supply unit a little at the rear of the instrument, remove screw (737) and anti-touch guard (736).
- On the left-hand side of the power supply, pull off the protective conductor cable and fuse board (735) to the left.
- On the right-hand side of the power supply, remove the plug-on connections to the motherboard.
- Remove the power supply unit.

### Installing the new power supply

- Fit the new power supply by reversing the removal procedure.
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors  
[ INFO : Error Log ]



## **Replacing Fuse board A21**

(See Chapter 5, Spare Parts List, Item 735, and drawings 1145.1110, 1145.1290)

The fuse board is installed on the left-hand side of the power supply.

### **Removing the power supply and the fuse board**

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Remove the 4 screws (757) in the rear panel.
- Pull out the power supply unit a little at the rear of the instrument, remove screw (737) and anti-touch guard (736).
- On the left-hand side of the power supply, pull off the fuse board (735) to the left.
- Disconnect the two mains cables from the fuse board.

### **Fitting the new fuse board and the power supply**

- Connect the mains cables to the fuse board and refit the fuse board to the power supply.
- Secure the anti-touch guard (736) with screw (737).
- Reinstall the power supply by reversing the removal procedure.
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors  
[ INFO : Error Log ]

## Replacing a Fan

(See Chapter 5, Spare Parts List, Item 15 and drawings 1145.1110, 1145.1310)

The fans, three in all, are located behind the right-hand side panel.

### Opening the instrument and removing the fan

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Lift off the top instrument cover (296) after undoing the countersunk screws (298).
- For replacing the fan located near by the front remove the 2 sems screws (700) and carefully lift out the floppy disk drive (670), together with the floppy disk holder (680).
- Disconnect the fan cable on the motherboard.
- Remove fan (15) by undoing the 4 fan screws (16).

### Fitting a new fan and reassembling the instrument

- Install the fan using the 4 fan screws.

***N.B.:*** *The arrows on the fan show the installation position. The fan blows air into the instrument. Route the fan cable so that it cannot get caught in the fan.*

- Connect the fan cabling on the motherboard X35, X36 and X37 (FAN).
- Refit the top instrument cover (296) with countersunk screws (298).
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check that all three fans are operating correctly (fans are blowing air into the instrument).
- Turn off the instrument and disconnect the mains cabling again.
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.

## Replacing Motherboard A10 (See Chapter 5, Spare Parts List, Item 510 and drawings 1145.1110, 1145.1310)

The motherboard is located on the base of the instrument.

**N.B.:** *The motherboard can only be replaced at R&S service centers.*

### Opening the instrument and removing the motherboard

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Lift off the top instrument cover (296) after undoing the countersunk screws (298).
- Extract the top boards: Use ejector lever for the synthesizer and network controller, hold the frequency reference by the enclosure.
- Remove the power supply (550).
  - Remove the 4 screws (757) in the rear panel.
  - Pull out the power supply unit a little at the rear of the instrument, remove screw (737) and anti-touch guard (736).
  - On the left-hand side of the power supply, pull off the protective conductor cable and the fuse board (735) to the left.
  - On the right-hand side of the power supply, pull off the plug-in connections to the motherboard.
  - Remove the power supply unit.
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles.
- Remove the countersunk screw (390) next to the display and pull off the front cover (300, 303, 306, 310, 313, 316) forwards.
- Remove termination and 3.5mm connection cables (only with option ZVAX-B16)
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- Remove the countersunk screws (168) (2 ), (153), (154), (163), (164).
- Pull out the front unit together with the keyboard and display (600, 604) forwards.

**Caution!**

*The cables to the front module controller are still connected.*

- Disconnect the cables to the LCD, the DC/AC illumination converter, the key pad (keyboard), the tachogenerator and, if necessary, the network connection to the front module controller.

**Note:** *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

- Remove the front module controller (for instructions see "Replacing Front Module Controller A90")

- Place the instrument on its top and remove the instrument's base cover (297) by undoing the screws (299).
- Undo the RF cabling from the reflectometers (165, 170, 175) to the LO divider (125) and to the motherboard.
- Release the 50-pin flat cable and disconnect from the reflectometers
- Remove screws (151, 156, 161) and take out the reflectometers.
- Undo RF cabling at the LO divider (125).
- Disconnect the 12-pin flat cable from the LO divider
- Remove screws (127) (2 in the strut, 4 in the rear panel) and take out the LO divider together with plate (126)

Undo the screws holding the connectors on the rear panel:

- The 6 hexagonal nuts and washers for the BNC connectors.
  - 2 hexagonal bolts (530, 540) each for the monitor interface and the user-control interface.
  - 2 hexagonal screws (550) each for the USB interface and in the dummy panel (555).
- Remove the 3 screws (144) each for the left and right side panels and the 2 screws (143) in the center and take out both motherboard rails (140, 141).
  - Disconnect any cabling still on the motherboard (fan, floppy, IEC-bus, etc.).
  - Remove the 14 screws holding the motherboard (520) and take out the motherboard.
  - Remove the RF and IF cables using the tool 11W 101-000.

**Installing the motherboard and reassembling the instrument**

**N.B.:** *The motherboard is the passport of the instrument and unique for every unit.  
The Eprom on the motherboard contains the serial No. of the instrument.  
Pre-configured motherboards are not available.*

- Install the new motherboard by reversing the removal procedure.  
**N.B.:** *Install the motherboard carefully to prevent any damage to components.  
Lettering indicates where cables are to be connected.*
- Reinstall the front module controller, front unit, power supply, boards and cables, instrument covers, enclosure and rear-panel feet by reversing the disassembly procedure.
- Connect the mains cable, turn on at the mains switch and press the ON key.
- For writing motherboard data to the EPROM please contact the service center in Munich.
- Select Service Level 2 (see Service Functions).
- Check the protocol file for errors: [ INFO : Error Log ]
- Align the DC inputs (see **Aligning the DC Inputs**)
- Write synthesizer mapping and shift data to the motherboard EPROM (see **Correction Value Recording**)

## Replacing a Reflectometer RM8 A510 to 540

(See Chapter 5, Spare Parts List, Items 150, 160 and drawing 1145.1110)

The boards are located under the motherboard.

### Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Remove the bottom instrument cover (297) after undoing the screws (299).
- Remove termination and 3.5mm connection cables (only with option ZVAX-B16)
- Remove the screws (153), (154), (163), (164) in the front of the instrument next to the port connector and (168) in case of port 4.
- Disconnect the source cable, the LO cable, the two IF cables and the 50-pin control cable from the reflectometer.
- Remove the 2 screws (151, 161) at the end of the reflectometer and take out the reflectometer

### Installing the board and reassembling the instrument

- Insert the new board into the instrument and reconnect any cables that have been disconnected  
*N.B.: Use the lettering on the motherboard as an aid.*
- Screw in the screws (153, 154, 163, 164, 168) in the front of the instrument.
- Screw in the 2 screws (151, 161) in the end of the reflectometer.
- Fit the instrument base cover (297) and secure with screws (299).
- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

## **Replacing Generator Board (ZVA8 only)**

(See Chapter 5, Spare Parts List, Item 110 and drawing 1302.4960.08)

### **Opening the instrument and removing the board**

- Remove the reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Remove the cover (130)
- Remove the fan cable
- Pull off the generator board (110)

### **Installing the board and reassembling the instrument**

- Fit the new generator board (110)
- Reconnect the fan cable
- Fit the cover (130)
- Reinstall the reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

## Replacing Receiver Board (ZVA8 only)

(See Chapter 5, Spare Parts List, Item 120, 125 and drawing 1302.4960.08)

### Opening the instrument and removing the board

- Remove the reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Remove the cover (150)
- Pull off the receiver board (120, 125)

### Installing the board and reassembling the instrument

- Fit the new receiver board (120, 125)
- Fit the cover (150)
- Reinstall the reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the generator and receiver correction data (see **Recording Correction Values**).

Perform the factory system error calibration (see **Factory System Error Calibration**).



## **Replacing Generator and Receiver Cover (ZVA8 only)**

(See Service Circular 10028 and Chapter 5, Spare Parts List, Items 130, 150 and drawing 1302.4960.08)

### **Opening the instrument and removing the cover**

- Remove the reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Remove the RM mount (200), 4 screws (210)
- Remove the covers (130, 150)

### **Installing the cover and reassembling the instrument**

- Fit the new covers (130, 150)
- Refit the RM mount (200)
- Reinstall the reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the receiver correction data (see **Recording Correction Values**).

Perform the factory system error calibration (see **Factory System Error Calibration**).

## Replacing the Inner Conductor of a Port Connector (ZVA8 only)

(See Chapter 5, Spare Parts List, Item 110, and drawings 1145.1110, 1145.4177, 1145.3593)

### Opening the instrument and removing the reflectometer

- Remove the Reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)

### Replacing the inner conductor

- Unscrew the N outer conductor with a spanner (narrow, SW 14mm) and take out inner conductor unit.

***N.B.:** Ensure that the centring disk (135) is also removed.*

- Carefully insert the new inner conductor in the bridge unit enclosure and screw back the N outer-conductor (lock with Loctite 262, mount with torque 3.5 Nm).

### Reassembling the instrument

- Reinstall the Reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Perform factory system error calibration (see **Factory System Error Calibration**).

## Replacing the Bridge Unit (ZVA8 only)

(See Chapter 5, Spare Parts List, drawings 1145.1110, 1145.4177, Item 100)

### Opening the instrument and removing the reflectometer

- Remove the Reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)

### Removing the bridge unit

- Loosen the MEAS, REF and GEN cables (310, 320, 300) at both ends and disconnect at the bridge unit.

*N.B.: When loosening support the cable with a 7mm spanner!*

- Remove the 3 screws (160) and carefully pull the bridge unit off the reflectometer.
- Remove the 2 screws (240) and remove the plate (230).

### Fitting the new bridge unit

- Secure plate (230) to the new bridge unit using the 2 screws (240).
- Carefully place the bridge unit on the reflectometer and secure with 3 screws (160).
- Screw the MEAS- REF and GEN cables (310, 320, 300) to the bridge unit, and then tighten at both ends.

*N.B.: When tightening with a 7 mm spanner support the cable.*

### Reassembling the instrument

- Reinstall the Reflectometer (see chapter **Replacing Reflectometer Board A510 to A540**)
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

## Replacing a Reflectometer RM24 A510 to 540

(See Chapter 5, Spare Parts List, Items 180, 185, 190 and drawings 1145.1110, 1302.4425)

The boards are located under the motherboard.

### Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Remove the bottom instrument cover (297) after undoing the 12 countersunk screws (299).
- Remove 3.5mm connection cables (only with option ZVAX-B16)
- Disconnect the three cables to the coupler, the LO cable, the two IF cables and the 50-pin control cable from the reflectometer.
- Loosen the screws (xxx) and take out the reflectometer.

### Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the screws (xxx).
- Reconnect any cables that have been disconnected.
- Fit the 3.5mm connection cables (only with option ZVAX-B16).
- Fit the instrument base cover (297) and secure with screws (299).
- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the generator and receiver correction data (see **Recording Correction Values**).

Perform the factory system error calibration (see **Factory System Error Calibration**).

## Replacing the Coupler Unit (ZVA24 only)

(See Chapter 5, Spare Parts List, drawing 1145.1110, item 230)

### Opening the instrument and removing the coupler

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Remove the instrument base cover (297) after undoing the screws (299).
- Disconnect the 3 RF cables and the bias cable from the coupler
- Remove the 3.5mm connection cables (only with option ZVAX-B16).
- Remove the screws (182, 186, 202, 206) in the front of the instrument next to the port connector and take out the coupler.

### Fitting the new coupler unit and reassembling the instrument

- Insert the coupler into the instrument and screw in the 4 screws (181, 186, 220).
- Reconnect the 3 RF cables and the bias cable.
- Fit the 3.5mm connection cables (only with option ZVAX-B16).
- Fit the instrument base cover (297) and secure with 12 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

## Replacing the Reflectometer Fan

(See Chapter 5, Spare Parts List, Item 100, 190 and drawings 1145.1110, 1145.4177, 1145.4283)

- Remove the Reflectometer (see chapter Replacing a Reflectometer RMxx A510 to A540)

### Replacing the fan

- Disconnect the fan cable at the reflectometer.
- Undo the 4 holding screws (110,194) and remove the fan.
- Insert the new fan (cable outlet to the outside).
- Screw back the 4 screws (110, 194) and washers (120, 130, 192, 193).

### Reassembling the instrument

- Reinstall the Reflectometer (see chapter **Replacing a Reflectometer RMxx A510 to A540**)
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check that the fan is operating.
- Turn off the instrument again and disconnect from the mains.
- Fit the instrument base cover (297) and secure with 12 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Reconnect the mains cable and turn on at the mains switch. The instrument is now in the standby mode.

## **Replacing Network Controller Board A130, A140**

(See Chapter 5, Spare Parts List, Items 100, 105 and drawing1145.1110)

The board is in the upper section of the instrument.

### **Opening the instrument and removing the board**

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the screws (298).
- Extract the network controller using the ejector lever

### **Fitting the board and reassembling the instrument**

- Fit the new board in the instrument.
- Refit the top instrument cover (296) with screws (298).
- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the receiver correction data (see **Recording Correction Values**).
- Perform factory system error calibration (see **Factory System Error Calibration**).
- Align the DC inputs (see **Aligning the DC Inputs**).

## Replacing Synthesizer Board A150, A160

(See Chapter 5, Spare Parts List, Items 110, 112, 113, 115 and drawing 1145.1110)

The board is located in the upper section of the instrument.

### Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the screws (298).
- Extract the synthesizer with the ejector lever.

### Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Refit the instrument top cover (296) securing with the screws (298).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode.
- Install firmware update, if necessary (version  $\geq 1.78$ ).
- Install synthesizer mapping (see **Correction Value Recording**)
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]
- Record the generator and receiver correction data (see **Correction Value Recording**).
- Perform factory system error calibration (see **Factory System Error Calibration**).



## **Replacing Frequency Reference Board A100**

(See Chapter 5, Spare Parts List, Item 120 and drawings 1145.1110, 1164.1770)

### **Opening the instrument and replacing the board**

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the screws (298).
- Extract the frequency reference board (120).

### **Installing the board and reassembling the instrument**

- Insert the new board into the instrument
- Refit the instrument top cover (296) with the screws (298).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:  
[ INFO : Error Log ]

## Troubleshooting

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

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



### Warning

*Do not insert or remove boards that are still live  
Avoid causing shorts when measuring voltages*

### The ZVA has the following facilities to simplify diagnosis:

- Selftest
- Service functions

**N.B.** *The first thing to do if you encounter any problems is to check if any connection (cables, edge connectors etc.) are damaged or even incorrectly inserted.*

## Test Equipment and Accessories

Item.	Instrument type	Recommended features	Recommended model	R&S Order No.	Qty.
1	DC meter		URE	0350.5315.02	1
2	Power supply	0 to 10 V			
3	Spectrum analyzer	Frequency range 0 to 26 GHz	FSU 26	1129.9003.26	1
4	Adapter cable	1 m long SMP male to SMA male	-	1129.8259.00	1
5	Adapter cable	0.5 m long SMP male to SMP male	-	1129.8265.00	1
6	SMA cable	0.5 m long SMA male to SMA male	-	1142.5895.00	2
7	SMA cable	1 m long SMA male to SMA male	-	1142.5889.00	2
8	BNC cable	1 m to 2 m long BNC male to BNC male	-	e.g. 1100.8850.00	1
9	Adapter	SMA female to N male	-	4012.5837.00	2
10	Adapter	N male to BNC female	-	0118.2812.00	1
11	Termination	SMA termination. 50 $\Omega$ male	-	0249.7823.00	3
12	SMP adapter	SMP female to SMP female	-	1093.6869.00	1
13	Adapter board	Extension 150 mm high, 48 pins, 2 mm pitch	-	1100.3542.02	1
14	Conn. Cables for DC Inputs	4-pin mini-DIN plug	ZV-Z71	1164.1005.02	1
15	Cable tool		Rosenberger 11W 101-000		1

## Troubleshooting - Power-up Problems

- **Fault: It is not possible to turn on the ZVA.**

Action	Cause of fault / remedy
Check mains switch on the rear panel ↓ Check LED is yellow (standby) ↓ ↓	Mains switch OFF: Turn on at mains switch.  LED does not come on: ➤ Measure voltage at X92.C23 (Front module controller): Nom. value: +13.5 V ± 1V  Nom. value reached: Fault in key pad or controller.  No voltage: Power supply defective or short to 12 V standby.
Turn on instrument. Check LED is green ↓ ↓	LED does not come on: ➤ Measure the PWR-ON signal at power supply X92.B24: < 1V for ON Voltage > 1V: Key pad or controller defective.

- **Fault: Fan not working.**

Action	Cause of fault / remedy
Check voltage at connector: X35, X36, X37 pin 3:      nom. value 12V  ↓  Select Service Function Set Service Level 1 Set Service Function 2.5.0.11.1.5 (max. fan speed) Check voltage at connector: X35, X36, X37 pin 3:      nom. value 0.9V	If no voltage can be measured the fan fuse may be defective (F12, F62, F63)

## Troubleshooting Boot Problems

- **Fault: ZVA does not start the measurement application.**

The first action the ZVA performs after power-up is booting BIOS for the processor. When the processor has been successfully initialised, the Windows XP start-up procedure begins. Then, the measurement application is loaded as an autostart program.

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

The message “No System Disk or Disk error...” indicates that the hard disk data is corrupt. If this is the case, replace the hard disk.

If the operating system on the hard disk has been corrupted and so cannot be loaded correctly, Windows XP outputs a “blue screen”.

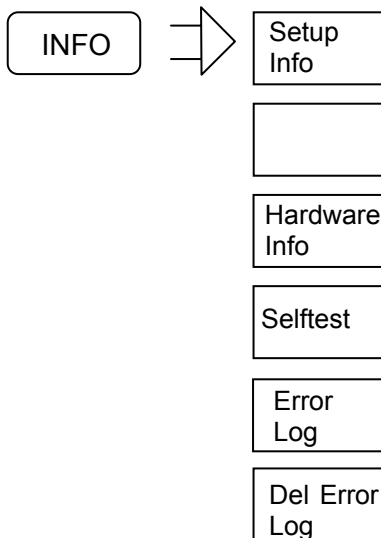
This screen summarizes all the key information about the internal status of the processor.

## Troubleshooting - Boot Error

If the message below appears on the screen when the boot procedure has been completed,

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

the cause of the error can be found in the Error-Log file.



Press the *Error Log* softkey.

The results are displayed on the screen.

### Cause of error: Data cannot be read from one or more boards.

When the instrument is booted, all the calibration data that is required must be written to the processor's RAM.

When the NWA application is started, the entry on the hard disk is compared with the Eprom data on the board. If the data matches, the data is loaded from the hard disk into RAM. If there is not a match, the Eprom data is written to the hard disk and then loaded into RAM.

If the data at the specified address cannot be read, a check is made in Config.ini to check if the board in question should be present. If so, the board is simulated (i.e. if this board is present and is functioning physically, the instrument will function) and an entry is made in the ErrorLog file.

If a board must always be physically present, (frequency reference, synthesizer1, NetworkControler1, reflectometer1, reflectometer2), an error message is output.

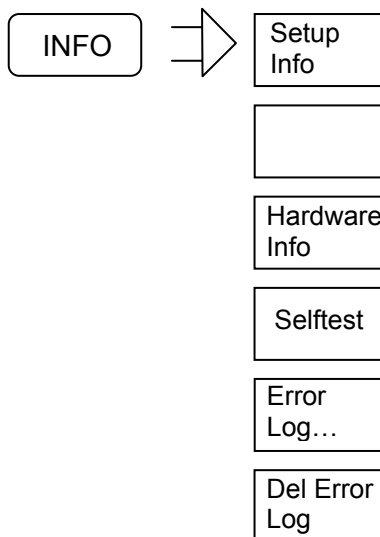
See: Troubleshooting with the Selftest

## Troubleshooting with the Selftest

The selftest is used to check supply voltages to the boards, including voltages generated on the boards themselves. On the frequency reference board, two clock signals (128 MHz and ADC-CLK) are also measured.

### Starting the selftest:

- Select Service Level 2 (see Service Functions) – this means that the temperature sensor readings are displayed and tighter voltage tolerances used.
- Call the selftest in the INFO menu:



Start the selftest with the *Selftest* softkey.

The selftest results are displayed on the screen.

In the selftest result-table, an abbreviation is used for every board designation:

Fr	Frequency reference
Nd1	Network controller1, digital section
Nd2	Network controller2, digital section (only 4-port instruments)
Sy1/DDSCON	Synthesizer1
Sy1/DDSCON	Synthesizer2(only 3-port and 4-port instruments)
Rm1	Reflectometer port1
Rm2	Reflectometer port2
Rm3	Reflectometer port3 (applies only to 3-port and 4-port-instruments)
Rm4	Reflectometer port4 (applies only to 4-port instruments)

Total selftest status: user mode ---PASSED---



Instrument Type: ZVA8 with 4 Ports

Part Number: 1145.1110k10

Product ID: 01.00

Serial Number: 100124

IP Addresses

IP Address: 0.0.0.0&nbs; Subnet Mask: 0.0.0.0

IP Address: 0.0.0.0 Subnet Mask: 0.0.0.0

IP Address: 127.0.0.1 (Localhost) Subnet Mask: 255.0.0.0

SyMapping: ZVA8\_P4

LO Divider: is not active

Date: 05/28/04

Time: 14:52:57

**Voltages Fr**

Test description	Min	Max	Result	State
+10V_A SUPPLY	1.550V	1.950V	1.756V	PASSED
+5V_A SUPPLY	1.400V	1.800V	1.560V	PASSED
+5V_REF	1.400V	1.800V	1.560V	PASSED
+12V_STB	1.900V	2.300V	2.112V	PASSED
128_VCXO	0.800V	4.000V	2.696V	PASSED
ADC_CLK	0.800V	4.000V	2.060V	PASSED
-10V_A SUPPLY	1.900V	2.300V	2.128V	PASSED
-5V_A SUPPLY	2.100V	2.500V	2.264V	PASSED

**Voltages Nd1**

Test description	Min	Max	Result	State
+5VA_ADC	2.250V	2.750V	2.488V	PASSED
+2.5VD_MDD1	1.125V	1.375V	1.264V	PASSED
+2.5VD_MDD2	1.125V	1.375V	1.264V	PASSED
+1.5VD_FCON	0.675V	0.825V	0.752V	PASSED
-5VA_ADC	2.250V	2.750V	2.464V	PASSED
DGND1	0.000V	0.200V	0.000V	PASSED
DGND2	0.000V	0.200V	0.000V	PASSED
AGND	0.000V	0.200V	0.000V	PASSED

**Voltages Nd2**

Test description	Min	Max	Result	State
+5VA_ADC	2.250V	2.750V	2.484V	PASSED
+2.5VD_MDD1	1.125V	1.375V	1.260V	PASSED
+2.5VD_MDD2	1.125V	1.375V	1.260V	PASSED
+1.5VD_FCON	0.675V	0.825V	0.752V	PASSED
-5VA_ADC	2.250V	2.750V	2.460V	PASSED
DGND1	0.000V	0.200V	0.000V	PASSED
DGND2	0.000V	0.200V	0.000V	PASSED
AGND	0.000V	0.200V	0.000V	PASSED

#### Voltages Sy1\DDSCON

Test description	Min	Max	Result	State
+10V_A SUPPLY	1.500V	2.000V	1.752V	PASSED
+5V_A SUPPLY	1.300V	1.800V	1.560V	PASSED
+5V_REF	1.300V	1.800V	1.568V	PASSED
+7V_A SUPPLY	1.400V	1.900V	1.628V	PASSED

#### Voltages Sy2\DDSCON

Test description	Min	Max	Result	State
+10V_A SUPPLY	1.500V	2.000V	1.752V	PASSED
+5V_A SUPPLY	1.300V	1.800V	1.560V	PASSED
+5V_REF	1.300V	1.800V	1.564V	PASSED
+7V_A SUPPLY	1.400V	1.900V	1.616V	PASSED

#### Voltages Rm1

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.496V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.564V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.564V	PASSED
+12V FAN	2.000V	2.600V	2.216V	PASSED
+12V SUPPLY	2.000V	2.600V	2.204V	PASSED
-12V SUPPLY	1.600V	2.000V	1.796V	PASSED

#### Voltages Rm2

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.500V	PASSED



+10.5VA SUPPLY	2.300V	2.800V	2.576V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.592V	PASSED
+12V FAN	2.000V	2.600V	2.204V	PASSED
+12V SUPPLY	2.000V	2.600V	2.204V	PASSED
-12V SUPPLY	1.600V	2.000V	1.796V	PASSED

[Voltages Rm3](#)

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.500V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.584V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.600V	PASSED
+12V FAN	2.000V	2.600V	2.196V	PASSED
+12V SUPPLY	2.000V	2.600V	2.220V	PASSED
-12V SUPPLY	1.600V	2.000V	1.800V	PASSED

[Voltages Rm4](#)

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.492V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.604V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.568V	PASSED
+12V FAN	2.000V	2.600V	2.216V	PASSED
+12V SUPPLY	2.000V	2.600V	2.136V	PASSED
-12V SUPPLY	1.600V	2.000V	1.804V	PASSED

- [Voltages Fr](#)
- [Voltages Nd1](#)
- [Voltages Nd2](#)
- [Voltages Sy1\DDSCON](#)
- [Voltages Sy2\DDSCON](#)
- [Voltages Rm1](#)
- [Voltages Rm2](#)
- [Voltages Rm3](#)
- [Voltages Rm4](#)
- [Home](#)

### Interpreting the Results of the Selftest

Negative voltages are transformed into positive voltages by means of a positive voltage and a resistor network because the A/D converters that are used can handle only positive voltages. This is why an acceptable negative voltage may elicit a FAIL because the associated positive voltage is out of tolerance.

The voltages supplied by the power supply are not checked directly. The failure of a power supply voltage can, however, be deduced from FAILs of certain voltages on several boards. The following Table shows how the board-oriented voltages checked during the selftest are derived from the power supply voltages.

Power supply	+3.4 V	+5.2 V	+6.5 V	+8.25 V	+12.25 V	-6.5 V	-12.25 V
Fr			+5V_A +5V_REF		+10V_A +12V_STB	-5V_A	-10V_A
Nd	+2.5VD_MDD1 +2.5VD_MDD2 +1.5VD_FCON		+5VA_ADC			-5VA_ADC	
Sy			+5V_A +5V_REF		+7V_A +10V_A		
Rm			+5V		+10.5VA +10.5VB +12V +12V FAN		-12V

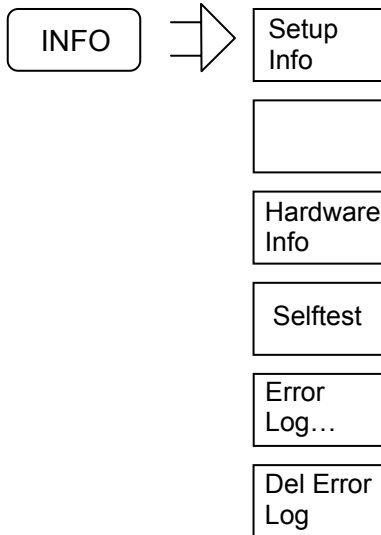
If the voltages listed in a column are all FAIL, the corresponding power supply voltage has failed or is out-of-tolerance. The power supply must then be replaced.

On the motherboard, there is a separate fuse for each board and for each of the power supply voltages used on the board. If a FAIL message is output, the first action to take is to check the fuse. The LO divider board must be removed before the fuses on the motherboard can be checked (See Chapter Board Replacement).

If an internal board voltage is out-of-tolerance, even though the power supply voltages used on the board are OK, the board must be replaced.

## Checking the Temperature Sensors

Select Service Level 2 (see Service Functions).



When the *Hardware Info* softkey is pressed information about the installed hardware, the results of temperature measurements and ... are displayed.

### Temperature Info

Current Temperature Readings

Component	Sensor	Temperature	Sensor	Temperature	Sensor	Temperature
Motherboard	Near NC:	33.75°C	Near SY:	34.75°C	Near PS:	38.50°C
Netcon 1	Analog:	40.25°C	Digital:	49.75°C		
Netcon 2	Analog:	----	Digital:	----		
Reflectometer 1	Generator:	38.50°C				
Reflectometer 2	Generator:	36.00°C				
Reflectometer 3	Generator:	38.25°C				
Reflectometer 4	Generator:	39.25°C				
Synthesizer 1	Synth. 1:					
Synthesizer 2	Synth. 2:					

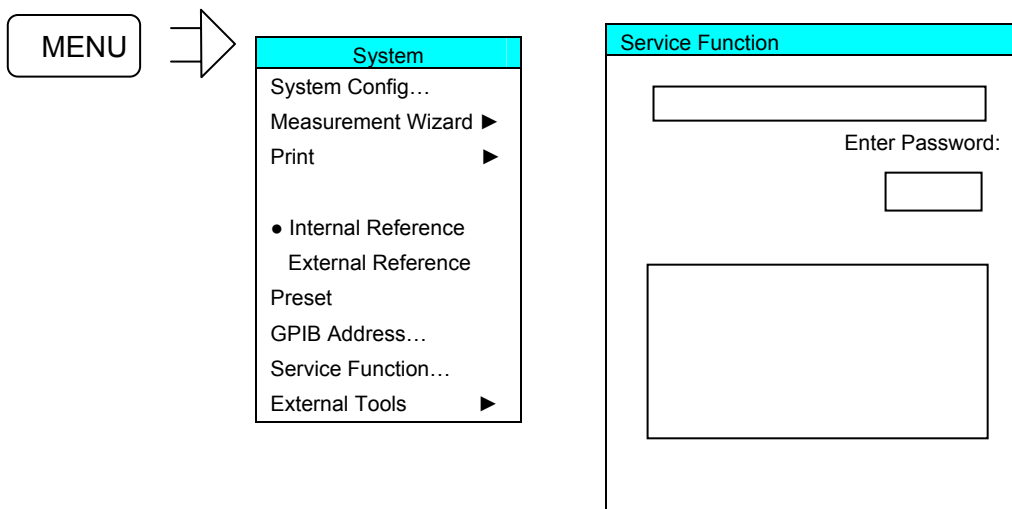
Highly elevated temperature values indicate a fan failure.

## Service Functions

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

There are three different service levels:

Service level	Password
0	No password necessary
1	894129
2	30473035



Service Function Structure



Group	Applies to
1	API
2	HW (boards)

Boards Main ID	Boards Sub ID
0: All boards	0
1: Network controller1	0: All board 1: PCI 2: ND 3: NA
2: Network controller2	
5: Motherboard	0:
9: Frequency reference	0:
11: Synthesizer1	0: All board 1: SY1 2: SY2 3: SY3 4: SY4
12: Synthesizer2	
21: Reflectometer1	0: all board 1: GEN 2: REC
22: Reflectometer 2	
23: Reflectometer 3	
24: Reflectometer 4	

**Group 1:  
General Functions**

Functions	Service function	Data	Serv. Lev.
Enables/disables the peak detector and RMS detector independently of the model	1.0.0.1.X	0 → Use disabled 1 → Use enabled	2
Enable/disables the arbitrary mode settings in the port configuration (e.g. LowNoise/ LowDistortion) independently of the model	1.0.0.5.X	0 → Use disabled 1 → Use enabled	2
Activates or deactivates the setting of measured values to default values when status messages are issued due to HW faults	1.1.0.2.X	0 → Deactivate default values 1 → Activate default values	0
Activates or deactivates factory calibration for the active setup	1.1.0.3.X	0 → Deactivate factory calibration 1 → Activate factory calibration	0

**Group 2:  
General Functions**

Functions	Service function	Data	Serv. Lev.
Suppress error-message box	2.0.0.0.X	X=0 → MSG box is output (default state) X=1 → MSG box is suppressed (error is nevertheless entered in the log file)	1
Selftest all boards	2.0.0.5.0.0		0, 1 or 2

**Network controller**

Functions	Service function	Data	Serv. lev.
ND1:Read Temp (addr.:68)	2.1.2.3		1
ND2:Read Temp (addr.:68)	2.2.2.3		1
ND[1..2] Selftest	2.[1-2].2.5.0.0		0, 1 or 2
NA1:Read Temp (addr.:69)	2.1.3.3		1
NA2:Read Temp (addr.:69)	2.2.3.3		1

**Motherboard**

Functions	Service function	Data	Serv. lev.
MB: Fan manual	2.5.0.11.1.X	X= 0 to 5	1
MB: Fan automatic	2.5.0.11.0		1
MB:Read Temp Front (NC) (addr.:205)	2.5.0.3.1		1
MB: Read Temp Rear (SY) (addr.: 204)	2.5.0.3.2		1
MB: Read Temp Back (PS) (addr.: 202)	2.5.0.3.3		1

**Frequency reference**

Functions	Service function	Data	Serv.lev.
FR Selftest	2.9.0.5.0.0		0, 1 or 2

**Reflectometers**

Functions	Service function	Data	Serv.lev.
RM[1-4]: Fan manual	2.[21-24].0.11.X	X = 1 to 5	1
RM[1-4]:Fan automatic	2.[21-24].0.11.0		1
RM[1-4]: Read Temp Gen	2.[21-24].1.3		1
RM[1-4]: Read Temp Rec	2.[21-24].2.3		1
RM[1-4]: Selftest	2.[21-24].0.5.X	X = 0 to 4	1
RM[1-4]: Read OVL	2.[21-24].0.12		1
RM[1-4]: OVL Reset	2.[21-24].0.13		1
RM[1-4] Generator Selftest	2.[21-24].1.5.0.0		0, 1 or 2
RM[1-4]: IF shift	2.[21-24].2.18.ZF	IF in Hz 0 = IF via shift table	0

## Determining which Boards are defective

The table below lists boards that are probably defective based on the faults that occurred during the performance test.

Problem with:	Defective board	
	Probable	Also possible
Frequency accuracy	Frequency reference	
SSB phase-noise Only one port All ports	Synthesizer1 Frequency reference	
Level accuracy Only one port All ports	Reflectometer associated with defective port Synthesizer1	
Max. output level Only one port All ports	Reflectometer associated with defective port Synthesizer1	
Absolute accuracy wave quantity a	Reflectometer associated with defective port	
Level linearity	Reflectometer associated with defective port	
Harmonic ratio	Reflectometer associated with defective port	Synthesizer1
Spurious suppression	Synthesizer1	
Matching portx	Bridge unit of reflectometer associated with the defective port	
Directivity portx	Bridge unit of reflectometer associated with the defective port	
Receiver absolute accuracy Port 1, 2 Port 3, 4 All ports	Reflectometer associated with defective port Reflectometer associated with defective port Synthesizer1	Network controller1 Network controller2 Frequency reference
Receiver linearity for high levels Portx All ports	Reflectometer associated with defective port LO divider	LO divider Synthesizer2
Receiver linearity for low levels Port1, 2 Port3, 4	Network controller1 Network controller2	
Receiver noise level portx	Reflectometer associated with defective port	Synthesizer2 or synth.1 for 2-port models
Dynamic range portx	Reflectometer associated with defective port (see Circular 10028)	Synthesizer2 or synth.1 for 2-port models
DC measurement input1V	Motherboard	Network controller1
DC measurement input 10V	Motherboard	Network controller1
Frequency reference input/output	Frequency reference	
Accuracy on S-parameter measurements depending on meas. bandwidth	See Circular 10029	

A board test should be performed before the board that has been deduced to be defective is replaced.



## **Board Test**

When boards are being tested, internal sources are used whenever possible. This means that it is always assumed that the downstream board in the signal path is OK. If a clear fault is not present, the order of the board tests given below should always be followed.

The inputs and outputs of the boards to be tested can be accessed via cables in the lower section of the instrument (except the frequency reference board).

### **Opening the instrument**

(See Chapter 5, drawing1145.1110)

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and pull off the enclosure (400) backwards.
- Remove the instrument base cover (297) after undoing the screws (299).

Only when testing the frequency reference board:

- Lift off the instrument top cover (296) after undoing the screws (298).

## Testing the frequency reference board

(see **Test Equipment**)

- Remove the board from the instrument.
- Reinsert board and extension card.
- Connect the output to be tested to the spectrum analyzer using an adapter cable and adapter SMA-N.
- Set the frequencies listed in the table.
- Check signals according to following table.

Signal	Connector	Frequency	Nom. level	Setting
NA1_AD_CLK	X103	80 MHz	10 dBm $\pm$ 1dB	
NA2_AD_CLK	X104	80 MHz	10 dBm $\pm$ 1dB	
SY1_REF	X105	128 MHz	10 dBm $\pm$ 1dB	
SY2_REF	X106	128 MHz	10 dBm $\pm$ 1dB	
REF_10_OUTIN	X107	10 MHz	6 dBm $\pm$ 1dB	Menu/System/Internal Reference

The board must be replaced if the signal is more than 2 dB below the stated nominal level.

- Connect the frequency reference output of the spectrum analyzer to X107 (REF\_10\_OUTIN) using an adapter cable and adapter SMA-N.
- Connect X105 or X106 (SY1\_REF or SY2\_REF) to the spectrum analyzer using an adapter cable and adapter SMA-N.
- The 128 MHz signal's frequency must precisely equal its nominal frequency.

If the frequency differs in any way (e.g. 128.001 MHz), replace the board.

### Testing the Synthesizer Board

**N.B.:** Synthesizers with part numbers 1145.xxxx or 1300.xxxx are no longer available. In case of defect please contact the Central Service in Munich.

- Disconnect source (or local) cable at the reflectometer (1 to 4, depending on which synthesizer section is to be tested).
- Connect the end of the cable to the spectrum analyzer input via an adapter cable and adapter SMA-N.

**N.B.:** Bend the source cable as little as possible, if necessary secure adapter cable with adhesive tape.

- Enter service function 2.21.2.18.17512345 (IF = 17.512345 MHz).
- Set the frequencies listed in the table on the ZVA and check the values.  
 [ Sweep : Sweep Type : CW Mode : CW Frequency : ...Hz]  
 [ Sweep : Single : Restart]

#### Synthesizer-LS 1302.4290.xx

Source Mod. 02, 24

Frequency (ZVA setting)	Source Level (Mod. 02)	2nd harmonic	3rd harmonic
300 kHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
100 MHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
1 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
2 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
3 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
4 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
6 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc
8 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc

Local Mod. 02

Frequency (ZVA setting)	LO-Frequency (Spec analyzer setting)	Local Level (Mod. 02)	2nd harmonic	3rd harmonic
300 kHz	17.812345 MHz	+3 dBm to -3 dBm	< -28 dBc	< -5 dBc
100 MHz	117.512345 MHz	+3 dBm to -3 dBm	< -28 dBc	< -5 dBc
1 GHz	1017.512345 MHz	+3 dBm to -3 dBm	< -25 dBc	< -5 dBc
2 GHz	2017.512345 MHz	+3 dBm to -3 dBm	< -25 dBc	< -5 dBc
3 GHz	3017.512345 MHz	+3 dBm to -3 dBm	< -25 dBc	< -5 dBc
3.8 GHz	3817.512345	-3 dBm to -3	< -25 dBc	< -14 dBc

	MHz	dBm		
4 GHz	4017.512345 MHz	+3 dBm to -3 dBm	< -25 dBc	< -30 dBc
5.2 GHz	5217.512345 MHz	+2 dBm to -4 dBm	< -25 dBc	< -30 dBc
5.3 GHz	5317.512345 MHz	+7 dBm to +2 dBm	< -25 dBc	< -30 dBc
7.2 GHz	7217.512345 MHz	+7 dBm to +2 dBm	< -25 dBc	< -30 dBc
8 GHz	8017.512345 MHz	+7 dBm to 0 dBm	< -25 dBc	< -30 dBc

## Local Mod. 24

Frequency (ZVA setting)	LO-Frequency (Spec analyzer setting)	Local Level (Mod. 24)	2nd harmonic	3rd harmonic
10 MHz	27.512345 MHz	-3 dBm to -10 dBm	< -28 dBc	< -5 dBc
100 MHz	117.512345 MHz	-3 dBm to -10 dBm	< -28 dBc	< -5 dBc
1 GHz	1017.512345 MHz	-3 dBm to -10 dBm	< -20 dBc	< -5 dBc
2 GHz	2017.512345 MHz	-3 dBm to -10 dBm	< -20 dBc	< -5 dBc
3 GHz	3017.512345 MHz	-3 dBm to -10 dBm	< -20 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	-3 dBm to -10 dBm	< -20 dBc	< -14 dBc
4 GHz	4017.512345 MHz	-3 dBm to -10 dBm	< -20 dBc	< -30 dBc
5.2 GHz	5217.512345 MHz	+1 dBm to -4 dBm	< -20 dBc	< -30 dBc
5.3 GHz	5317.512345 MHz	+1 dBm to -4 dBm	< -20 dBc	< -30 dBc
7.2 GHz	7217.512345 MHz	+1 dBm to -4 dBm	< -20 dBc	< -30 dBc
8 GHz	8017.512345 MHz	+1 dBm to -6 dBm	< -20 dBc	< -30 dBc

**Synthesizer-DS 1302.5180.xx**

Source 1 to 4 (set port1 to 4 active)

Frequency (ZVA setting)	Source Level	2nd harmonic	3rd harmonic
300 kHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
100 MHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
1 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
2 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
3 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
4 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
6 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc
8 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc

Isolation of source switch1 to 4  
ZVA frequency 8 GHz

Port no.	Port setting	Source output	Isolation
1	Port1 inactive	X165	-90 dBc ±5 dB
	Port2 active	X166	
2	Port1 active	X165	-90 dBc ±5 dB
	Port2 inactive	X166	
3	Port3 inactive	X168	-90 dBc ±5 dB
	Port4 active	X169	
4	Port3 active	X168	-90 dBc ±5 dB
	Port4 inactive	X169	

The cable loss must also be taken into account at the stated levels. For the specified cable it is 0.25 dB/GHz (0.5 m) 0.5 dB/GHz (1 m).

The board must be replaced if the level is more than 2 dB below the specified value or the other values are more than 2 dB above their specified value.

**Synthesizer-LO 1302.4248.02**

Local 1 to 4 (set port1 to 4 active)

Frequency (ZVA setting)	LO-Frequency (Spec analyzer setting)	Local Level	2nd harmonic	3rd harmonic
300 kHz	17.812345 MHz	-3 dBm to -6 dBm	< -28 dBc	< -5 dBc
100 MHz	117.512345 MHz	-3 dBm to -6 dBm	< -28 dBc	< -5 dBc
1 GHz	1017.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -5 dBc
2 GHz	2017.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -5 dBc
3 GHz	3017.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -14 dBc
4 GHz	4017.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -30 dBc
5.2 GHz	5217.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -30 dBc
5.5 GHz	5517.512345 MHz	-3 dBm to -6 dBm	< -25 dBc	< -30 dBc
7.2 GHz	7217.512345 MHz	-3 dBm to -9 dBm	< -25 dBc	< -30 dBc
8 GHz	8017.512345 MHz	-3 dBm to -9 dBm	< -25 dBc	< -30 dBc

## Testing the Reflectometer RM8

### Generator levels

It is assumed that the synthesizer section (synthesizer1) associated with the reflectometer to be tested is OK.

- Loosen cable W514 (GEN -> Bridge unit) at both ends and screw off at the generator output GEN.

**Note:** When loosening, support the cable with a 7mm spanner

- Connect the generator output to the spectrum analyzer using the SMA cables ( ) and adapter SMA-N.
- Set the power to 8 dBm
- Set the ZVA to the CW sweep mode.
- Set the frequencies listed in the table.

Frequency	Level	2nd harmonic	3rd harmonic
300 kHz	16 dBm	---	---
50 MHz	16 dBm	< - 21 dBc	< - 21 dBc
1 GHz	16 dBm	< - 21 dBc	< - 21 dBc
3 GHz	16 dBm	< - 21 dBc	< - 21 dBc
6 GHz	16 dBm	< - 21 dBc	---
8 GHz	16 dBm	< - 21 dBc	---

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

### Receiver levels

The following is assumed:

- The LO synthesizer section (synthesizer1 mod. 04, synthesizer2) associated with the reflectometer to be tested is OK.
  - The network controller associated with the reflectometer to be tested is OK.
  - One reflectometer in the instrument is functioning.
- Loosen cable W515 (Bridge unit -> MEAS) and cable W518 (Bridge unit -> REF) at both ends and screw off at the MEAS and REF receiver inputs.

**N.B.:** When loosening, support the cable with a 7mm spanner

Connect the receiver input (MEAS or REF) to a functioning instrument port using an adapter cable and adapter SMA-N.

- Set the ZVA to the CW sweep mode.
- Set the frequencies and output levels for the port used for the measurement as indicated in the table and read off the level for the receiver to be tested (wave quantity ax or bx).

Frequency	Output level	Displayed level ax or bx
300 kHz	-20 dBm	0 dBm
50 MHz	-20 dBm	0 dBm
1 GHz	-20 dBm	0 dBm
3 GHz	-20 dBm	0 dBm
6 GHz	-20 dBm	0 dBm
8 GHz	-20 dBm	0 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are more than 3 dB below the levels and ratios list in the table, the board must be replaced.

### Bridge unit levels

The following is assumed:

- One reflectometer in the instrument is OK.

#### Method 1:

The generator section of the associated reflectometer is OK (output level at the port meets specifications).

- Loosen cable W515 (Bridge unit -> MEAS) and cable W518 (Bridge unit -> REF) at both ends and disconnect at the bridge unit.

**N.B.:** When loosening, support the cable with a 7mm spanner

- Connect the bridge unit output (MEAS = connector W515 or REF = connector W518) to a functioning port using the SMA cable and adapter SMA-N to a functioning port. Terminate the bridge unit output that is not used with an SMA termination.
- Screw a SHORT from the N calibration kit to the port connector.
- Set the frequencies and levels listed in the table for the reflectometer associated with the bridge unit (port) and measure the level (wave quantity bx) at the port used for the measurement.



Frequency	Level	Output level MEAS	Output level REF
300 kHz	0 dBm	-18 dBm	-32 dBm
50 MHz	0 dBm	-18 dBm	-32 dBm
1 GHz	0 dBm	-18 dBm	-32 dBm
3 GHz	0 dBm	-18 dBm	-32 dBm
6 GHz	0 dBm	-18 dBm	-32 dBm
8 GHz	0 dBm	-18 dBm	-32 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

If the measured values are more than 3 dB below the levels in the table, the board must be replaced.

**Method 2:**

The receive section of the associated reflectometer is OK.

- Loosen cable W514 (GEN -> Bridge unit) at both ends and screw off at the bridge unit.  
*N.B.: When loosening, support the cable with a 7mm spanner*
- Connect the bridge input (connector. W514) to a functioning port using the SMA cable and SMA-N adapter.
- Screw a SHORT from the N calibration kit to the port connector.
- Set the frequencies and levels listed in the table at the port used for the measurement and measure the level (wave quantity ax or bx) at the reflectometer associated with the bridge unit (port).

Frequency	Level	Output level MEAS	Output level REF
300 kHz	8 dBm	-18 dBm	-32 dBm
50 MHz	8 dBm	-18 dBm	-32 dBm
1 GHz	8 dBm	-18 dBm	-32 dBm
3 GHz	8 dBm	-18 dBm	-32 dBm
6 GHz	8 dBm	-18 dBm	-32 dBm
8 GHz	8 dBm	-18 dBm	-32 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

If the measured values are more than 3 dB below the levels given in the table, the board must be replaced.

## Bridge Directivity

The following is assumed:

- The generator and receiver sections of the reflectometer associated with the bridge unit are OK.
- Screw the SHORT from an N calibration kit to the port connector.
- Perform a sweep from 300 kHz to 8 GHz, measure S11, save measured values (Data -> Mem : Math = Data/Mem).
- Screw the MATCH from the N calibration kit to the port connector.
- The trace gives the directivity.

Frequency range	Directivity
300 kHz to 50 MHz	< -10 dB
50 MHz to 8 GHz	< -16 dB

If the measured values are greater than the values stated in the table, the bridge unit must be replaced.

## Bridge unit: Port Matching

It is assumed that there is a functioning reflectometer in the instrument.

- Loosen cables W514 (GEN -> Bridge unit), W515 (Bridge unit -> MEAS) and W518 (Bridge unit -> REF) at both ends and unscrew at the bridge unit.

**N.B.:** When loosening, support the cable with a 7mm spanner

- Terminate the bridge unit input and bridge unit outputs with 3 SMA terminations.
- Connect N test cable to a functioning instrument port and perform a 1-port calibration at the end of the cable.
- Connect the end of the test cable to the port of the bridge unit under test and display the Sxx magnitude on the screen.

Frequency range	Sxx dB
300 kHz to 2 GHz	-12 dB
2 GHz to 8 GHz	-18 dB

If the values in the table are exceeded, the board must be replaced.

**Testing the Reflectometer RM24**

**Generator levels**

It is assumed that the synthesizer section (synthesizer1) associated with the reflectometer to be tested is OK.

- Loosen cable W514 (GEN -> coupler unit) at both ends and screw off at the generator output GEN.
- Connect the generator output to the spectrum analyzer using the SMA cable ().
- Set the ZVA to the CW sweep mode.
- Set the frequencies listed in the table.
- Set the power listed in the table.

Frequency	Set power to	Level on GEN output	2nd harmonic	3rd harmonic
10 MHz	10 dBm	13.0 dBm	---	---
100 MHz	10 dBm	13.0 dBm	< - 21 dBc	< - 21 dBc
1 GHz	10 dBm	13.2 dBm	< - 21 dBc	< - 21 dBc
4 GHz	10 dBm	13.7 dBm	< - 21 dBc	< - 21 dBc
8 GHz	10 dBm	14.3 dBm	< - 21 dBc	< - 21 dBc
9 GHz	10 dBm	14.5 dBm	< - 21 dBc	---
12 GHz	10 dBm	15.0 dBm	---	---
15 GHz	5 dBm	7.5 dBm	---	---
18 GHz	5 dBm	8.0 dBm	---	---
20 GHz	5 dBm	8.3 dBm	---	---

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

**Receiver levels**

The following is assumed:

- The LO synthesizer section (synthesizer1 mod. 20, synthesizer2) associated with the reflectometer to be tested is OK.
  - The network controller associated with the reflectometer to be tested is OK.
  - One reflectometer in the instrument is functioning.
- Loosen cable W515 (coupler unit -> MEAS) and cable W518 (coupler unit -> REF) at both ends and screw off at the MEAS and REF receiver inputs.
  - Connect the receiver input (MEAS or REF) to a functioning instrument port using an adapter cable.
  - Set the ZVA to the CW sweep mode.
  - Set the frequencies and output levels for the port used for the measurement as indicated in the table and read off the level for the receiver to be tested (wave quantity ax or bx).

Frequency	Output level	Displayed level ax or bx
10 MHz	-30 dBm	+20 dBm $\pm$ 3 dB
100 MHz	-30 dBm	+5 dBm $\pm$ 3 dB
1 GHz	-20 dBm	-5 dBm $\pm$ 3 dB
2.5 GHz	-20 dBm	-10 dBm $\pm$ 3 dB
3 GHz	-20 dBm	-10 dBm $\pm$ 3 dB
8 GHz	-20 dBm	-10 dBm $\pm$ 3 dB
9 GHz	-20 dBm	-10 dBm $\pm$ 3 dB
12 GHz	-20 dBm	-10 dBm $\pm$ 3 dB
15 GHz	-20 dBm	-8 dBm $\pm$ 4 dB
18 GHz	-20 dBm	-8 dBm $\pm$ 4 dB
20 GHz	-20 dBm	-8 dBm $\pm$ 4 dB

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are more than 2 dB below the levels list in the table, the board must be replaced.

### Coupler unit levels

The following is assumed:

- One reflectometer in the instrument is OK.

#### Method 1:

The generator section of the associated reflectometer is OK (output level at the port meets specifications).

- Loosen cable W515 (coupler unit -> MEAS) and cable W518 (coupler unit -> REF) at both ends and disconnect at the bridge unit.
- Connect the coupler unit output (MEAS = connector W515 or REF = connector W518) to a functioning port using the SMA cable and adapter SMA-N to a functioning port. Terminate the coupler unit output that is not used with an SMA termination.
- Screw a SHORT from the calibration kit to the port connector.
- Set the frequencies and levels listed in the table for the reflectometer associated with the coupler unit (port) and measure the level (wave quantity bx) at the port used for the measurement.

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-50 dBm ± 3 dB	-47 dBm ± 3 dB
100 MHz	0 dBm	-35 dBm ± 3 dB	-32 dBm ± 3 dB
1 GHz	0 dBm	-15 dBm ± 3 dB	-11 dBm ± 3 dB
2 GHz	0 dBm	-10 dBm ± 3 dB	-4.7 dBm ± 3 dB
8 GHz	0 dBm	-10 dBm ± 3 dB	-3.7 dBm ± 3 dB
12 GHz	0 dBm	-10 dBm ± 3 dB	-3 dBm ± 3 dB
16 GHz	0 dBm	-12 dBm ± 4 dB	-2.3 dBm ± 4 dB
20 GHz	0 dBm	-12 dBm ± 4 dB	-1.7 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

If the measured values are more than 2 dB below the levels in the table, the coupler unit must be replaced.

**Method 2:**

The receiver section of the associated reflectometer is OK.

- Loosen cable W514 (GEN -> coupler unit) at both ends and screw off at the coupler unit.
- Connect the coupler input (connector. W514) to a functioning port using the SMA cable.
- Screw a SHORT from the calibration kit to the port connector.
- Set the frequencies and levels listed in the table at the port used for the measurement and measure the level (wave quantity ax or bx) at the reflectometer associated with the coupler unit (port).

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-53 dBm ± 3 dB	-50 dBm ± 3 dB
100 MHz	0 dBm	-38 dBm ± 3 dB	-35 dBm ± 3 dB
1 GHz	0 dBm	-18.2 dBm ± 3 dB	-15 dBm ± 3 dB
2 GHz	0 dBm	-13.3 dBm ± 3 dB	-8 dBm ± 3 dB
8 GHz	0 dBm	-14.3 dBm ± 3 dB	-8 dBm ± 3 dB
12 GHz	0 dBm	-15 dBm ± 3 dB	-3 dBm ± 3 dB
16 GHz	0 dBm	-17.7 dBm ± 4 dB	-8 dBm ± 4 dB
20 GHz	0 dBm	-18.3 dBm ± 4 dB	-8 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

If the measured values are more than 2 dB below the levels given in the table, the coupler unit must be replaced.

## Coupler Directivity

The following is assumed:

- The generator and receiver sections of the reflectometer associated with the coupler unit are OK.
- Screw the SHORT from the calibration kit to the port connector.
- Perform a sweep from 10 MHz to 20 GHz, measure S11, save measured values (Data -> Mem : Math = Data/Mem).
- Screw the MATCH from the calibration kit to the port connector.
- The trace gives the directivity.

Frequency range	Directivity
10 MHz to 12 GHz	< -15 dB
12 GHz to 24 GHz	< -10 dB

If the measured values are greater than the values stated in the table, the coupler unit must be replaced.

## Coupler unit: Port Matching

It is assumed that there is a functioning reflectometer in the instrument.

- Loosen cables W514 (GEN -> coupler unit), W515 (coupler unit -> MEAS) and W518 (coupler unit -> REF) at both ends and unscrew at the coupler unit.
- Terminate the coupler unit input and coupler unit outputs with 3 SMA terminations.
- Connect test cable to a functioning instrument port and perform a 1-port calibration at the end of the cable.
- Connect the end of the test cable to the port of the coupler unit under test and display the Sxx magnitude on the screen.

Frequency range	Sxx dB
10 MHz to 12 GHz	< -14 dB
12 GHz to 20 GHz	< -10 dB

If the values in the table are exceeded, the coupler must be replaced.

## Testing the Network Controller Board

### Testing the IF inputs

It is assumed that there is one functioning reflectometer in the instrument.

- Disconnect the IF-MEAS and IF-REF cable from each of the reflectometers.
- Connect the input to be tested at the end of the appropriate IF cable (W136, W137, W138, W139, and W146, W147, W148, W149) to a functioning port using the adapter cable and SMA-N adapter .
- Set the ZVA to CW sweep mode, CENTER 17.512345 MHz.
- Setting at the port used for the measurement: POWER -10 dBm
- Setting at the port associated with the network controller under test: WAVE QUANTITY ax or bx.
- Enter service function 2.21.2.18.17512345 (IF = 17.512345 MHz).
- Disable level corrections with SF 2.21[.24].2.15.1

If the level displayed on the ZVA's screen is not within the range  $-4 \text{ dBm} \pm 2 \text{ dB}$ , the board must be replaced.

## Testing the Motherboard

### 28 V supply

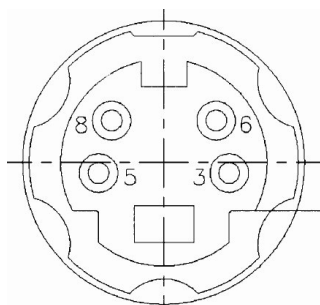
Using a multimeter, measure the voltage at X 100.B5 (wrt ground).  
Permissible deviation:  $\pm 0.5$  V

### Preamplifier for DC measurement inputs

Apply the DC voltages listed in the table using the 4-pin Mini-DIN connector at the DC measurement input.

Measure the DC voltage with a multimeter.

Input	Voltage at	Gnd	APPLIED VOLTAGE	Measurement at	Rated value
DC MEAS -1 V to +1 V	8	3, 5, 6	- 1 V	X 141.B10	2.33 V
DC MEAS -1 V to +1 V	6	3, 5, 8	+ 1 V	X 141.B11	2.33 V
DC MEAS -10 V to +10 V	8	3, 5, 6	- 10 V	X 141.D10	2.33 V
DC MEAS -10 V to +10 V	6	3, 5, 8	+ 10 V	X 141.D11	2.33 V



Pin assignment DC MEAS connector

If the measured value is more than 10% above or more than 10% below the stated nominal value, the motherboard must be replaced.



**Table of Contents- Chapter 4 "Software Update / Installation of Options"**

**4 Software Update / Installation of Options ..... 4.1**

**Installing new ZVA Software .....4.1**

**Installing Options .....4.2**

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## **4 Software Update / Installation of Options**

Chapter 4 provides information on updating software, restoring the operating system installation and installing options. Descriptions accompanying the software update or the options can be included in this folder as part of Chapter 4.

### **Installing new ZVA Software**

The instrument firmware can be downloaded from the R&S website ([www.rohde-schwarz.com](http://www.rohde-schwarz.com)). This is a Microsoft Installation file (.MSI). The file name is ZVAB\_XX\_YY.MSI for a released version and ZVAB\_XX\_YY\_BETAZZ.MSI for a test version. This file must be made available to the instrument via a suitable medium (Memory Stick, USB CD-ROM drive network or Remote Desktop). The instrument firmware is installed when you double click on the file. The instrument is ready for operation after you switch off and then switch back on again.

## Installing Options

The following options can be fitted to the ZVA:

Direct Generator/Receiver Access		
for ZVA8	R&S ZVA8-B16	1164.0209.08
for ZVA24 with two ports	R&S ZVA24-B16	1164.0209.24
for ZVA24 with four ports	R&S ZVA24-B16	1164.0209.26
Generator Step Attenuator Port 1		
for ZVA8	R&S ZVA8-B21	1164.0009.02
for ZVA24	R&S ZVA24-B21	1164.0109.02
Generator Step Attenuator Port 2		
for ZVA8	R&S ZVA8-B22	1164.0015.02
for ZVA24	R&S ZVA24-B22	1164.0115.02
Generator Step Attenuator Port 3		
for ZVA24 with four ports	R&S ZVA8-B23	1164.0121.02
Generator Step Attenuator Port 4		
for ZVA24 with four ports	R&S ZVA8-B24	1164.0138.02
Receiver Step Attenuator Port 1		
for ZVA8	R&S ZVA8-B31	1164.0044.02
for ZVA24	R&S ZVA24-B31	1164.0144.02
Receiver Step Attenuator Port 2		
for ZVA8	R&S ZVA8-B32	1164.0050.02
for ZVA24	R&S ZVA24-B32	1164.0150.02
Receiver Step Attenuator Port 3		
for ZVA24 with four ports	R&S ZVA8-B33	1164.0167.02
Receiver Step Attenuator Port 4		
for ZVA24 with four ports	R&S ZVA8-B34	1164.0173.02
Oven Controlled Crystal Oscillator (OCXO)	R&S ZVAB-B4	1164.1757.02
Time Domain	R&S ZVAB-K2	1164.1657.02
Frequency Conversion	R&S ZVA-K4	1164.1863.02

Install according to the instructions that are supplied with the option.

These installation instructions can be appended to this chapter.

The OCXO option is permanently integrated on the frequency reference board (mod. 03, mod. 05) and, as a rule, it is specified when the instrument is ordered. When it is retrofitted, the frequency reference board must be replaced (replace mod. 02 or mod. 04 with mod. 05).

#### Installing hardware options:

##### Caution



*Before installing the options, disconnect the mains cable.*

*Observe the safety instructions at the beginning of this manual.*

*The boards in the instrument are electrostatically sensitive devices (ESD). The appropriate handling instructions for these devices must be observed (ESD workstation).*

- Turn off the instrument and disconnect the mains cable.
- Unscrew the 4 back-panel feet (460) and pull off the enclosure (400) towards the rear.
- Follow the **replacement instructions in Chapter 3**
- When installation has been completed, push the enclosure back into position and refit the the back-panel feet.



##### Caution

*When replacing the enclosure, ensure that no cables are damaged or pulled out:*

- Connect the mains cable and turn on the instrument.



## Contents - Chapter 5 "Documents"

<b>5 Documents</b> .....	<b>1</b>
<b>Shipping of Instrument and Ordering of Spare Parts</b> .....	<b>1</b>
Shipping of Instrument .....	1
Shipping of a Module .....	1
Ordering Spare Parts .....	2
Refurbished Modules .....	2
Return of Defective Replaced Modules .....	2
<b>Spare Parts</b> .....	<b>3</b>
Available Power Cables .....	3
<b>Spare Parts List</b> .....	<b>4</b>
<b>Mechanical Drawings</b> .....	<b>4</b>
<b>Circuit Diagram</b> .....	<b>20</b>

### Figures

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### Tables

Fehler! Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.

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## 5 Documents

This chapter provides information on the ordering of spare parts and contains the spare parts list and the documents for the complete ZVA unit.

### Shipping of Instrument and Ordering of Spare Parts

Please contact your Rohde & Schwarz support center or our spare parts express service if you need service or repair of your equipment or to order spare parts and modules.

The list of the Rohde & Schwarz representatives and the address of our spare parts express service are provided at the beginning of this service manual.

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

- Instrument model
- Stock No.
- Serial number
- Firmware version
- Detailed error description in case of repair
- Contact partner for checkbacks

### Shipping of Instrument

When shipping the instrument, be sure to provide sufficient mechanical and antistatic protection:

- When transporting or shipping the instrument, repack it as originally packed. The two protective caps for the front and rear panels prevent the control elements and connectors from being damaged. The antistatic packing foil prevents any undesired electrostatic charging from occurring.
- If you do not use the original packaging, provide enough padding around the instrument to keep it from slipping inside the package. Wrap antistatic packing foil around the instrument to protect it from electrostatic charging.

### Shipping of a Module

When shipping a module, also be sure to provide it with sufficient mechanical and antistatic protection:

- Ship the module in a sturdy, padded box.
- Wrap the board in antistatic foil.  
If the packaging is antistatic but not conductive, additional conductive packaging is required. The additional packaging is not required if the enclosed packaging is conductive.  
Exception: If the module contains a battery, the tight-fitting packaging must always consist of antistatic, non-chargeable material to protect the battery from being discharged.

## **Ordering Spare Parts**

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

- Stock No. (see component lists in this chapter)
- Designation
- Component number according to component list
- Number of pieces
- Instrument type for the replacement part
- Contact person for any questions

The stock numbers necessary for ordering replacement parts and modules as well as power cables can be found later in this chapter.

## **Refurbished Modules**

Refurbished modules are an economical alternative to original modules. It should be kept in mind that refurbished modules are not new, but are repaired and fully tested parts. They may bear signs of use, but they are electrically and mechanically equivalent to new modules.

To find out which refurbished modules are available, please refer to your Rohde & Schwarz representative (or to Central Service at Rohde & Schwarz Munich).

## **Return of Defective Replaced Modules**

Defective modules that are covered by the replacement program and can be repaired can be returned within **3 months** after delivery of the replaced module. A repurchasing value is credited.

Excluded are parts that cannot be repaired, e.g. PCBs that are burnt, broken or damaged by repair attempts, incomplete modules, or parts that are heavily damaged mechanically.

The defective parts must be sent back with a **returned accompanying document** containing the following information:

- Stock No., serial number and designation of the removed part
- **Precise** description of the malfunction
- Stock No., serial number and designation of the instrument the part was removed from
- Date part was removed
- Name of the technician who exchanged the part

A returned accompanying document is provided with each replacement module.

## Spare Parts

The Stock Nos. necessary for ordering replacement parts and modules can be found in the component lists provided later in this chapter.



### Important!

*When replacing a module, please observe the safety instructions and repair instructions provided in chapter 3 and at the beginning of this service manual*

*When shipping a module, be sure to provide sufficient mechanical and antistatic protection.*

## Available Power Cables

Table 5-1 List of power cables available

Stock No.	Safety plug in accordance with	Mainly used in
DS 0006.7013	BS1363: 1967' complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020	Type 12 complying with SEV regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036	Type 498/13 complying with US regulation UL 498, or with IEC 83	USA/Canada
DS 0006.7107	Type SAA3 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0099.1456	DIN 49 441, 10 A, 250 V, straight	Europe (except Switzerland)



**Spare Parts List**

**Mechanical Drawings**

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### List of ZVA parts including spare parts

The ZVA is constructed in accordance with R&S Design 2000.

Rackmount: 6E 1/1 T350 MOD. 22

Overall dimensions: B x H x T: 465.1 x 286.2 x 417.0

Accessories: 19" Adapter ZZA-611, Stock No. 1096.3302.00

**Note:** The recommended spare parts are marked with an x in the last column.

Table 0-2 List of all ZVA part and spare parts

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
DRAWING 1145.1110.01 (ZVA NETWORK ANALYZER)					
10	ZM FUNDAMENTAL UNIT ZVA	1145.1310.08	1		
12	ZM FUNDAMENTAL UNIT ZVA	1145.1310.24	1		
15	ZM FAN ZVB	1145.2200.00	3	E1 E2 E3	x
16	VS 7985/ISR-M4X8-A4-PA	1148.2652.00	12		
18	VS DIN433-4.3-A4	0082.4586.00	12		
100	ZE NETWORK CONTROLLER	1145.3635.02	1	A140	x
105	ZE NETWORK CONTROLLER	1145.3635.02	1	A130	x
110	EE SYNTH-LS	1302.4290.02	1	A160	X
112	EE SYNTH-LS	1302.4290.20	1	A160	x
113	EE SYNTH-DS	1302.5180.02	1	A160	X
115	EE SYNTH-LO	1302.4248.02	1	A150	X
120	EE FREQ. REFERENCE	1145.3835.04	1	A100	X
121	EE PCI BALANCE	1300.1687.02	1	A199	X
130	ED PORT BIAS	1145.3935.02	1	A18	
135	ED PORT BIAS	1145.3935.02	1	A19	
140	MZ MOTHERB. RAIL 1 ZVA	1145.2168.00	1		
141	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
142	VS 6900/ISR-M2.5X8-A2	0041.1653.00	1		
143	MZ RAIL CONTACT ZVB 8/20	1300.0874.00	1		
145	ZN MOTHERB. RAIL 2 ZVA	1145.2051.00	1		

**ZVA****List of ZVA parts including spare parts**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
146	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
147	VS 6900/ISR-M2.5X8-A2	0041.1653.00	1		
150	ZM RM UNIT ZVA 8	1145.4177.02	2	A510 A520	
151	VS 6900/ISR-M2.5X6-A2	1148.3059.00	4		
152	ZM CABLE SET ZVA8 2PORT	1302.5050.08	1		
153	VS 965/ISR-M2.5X8-A4-PA	1148.3294.00	4		
154	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	8		
155	ZM RM UNIT ZVA 8GHz	1145.4177.02	3	A510 A520 A530	
156	VS 6900/ISR-M2.5X6-A2	1148.3059.00	6		
157	ZM CABLE SET ZVA	1145.2551.09	1		
158	VS 965/ISR-M2.5X8-A4-PA	1148.3294.00	6		
159	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	12		
160	ZM RM UNIT ZVA 8GHz	1145.4177.02	4	A510 A520 A530 A540	
161	VS 6900/ISR-M2.5X6-A2	1148.3059.00	8		
162	ZM CABLE SET ZVA	1145.2551.10	1		
163	VS 965/ISR-M2.5X8-A4-PA	1148.3294.00	8		
164	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	16		
166	DW RF CABLE W509/A520	1145.3041.00	1	W509	
167	MZ EXT. ANALYZER MOUNT	1145.3058.00	1		
168	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
170	ZN MOTHERB. RAIL 2 ZVA	1145.2051.00	1		
171	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
172	VS 6900/ISR-M2.5X8-A2	0041.1653.00	1		
180	ZE RM UNIT ZVA 24 GHz	1145.4302.02	2	A510 A520	
182	VS 965/ISR-M3X8-A4-PA	1148.2798.00	8		
185	ZM CABLE SET ZVA24 2PORT	1302.5050.24	1		
186	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	8		
190	ZE RM UNIT ZVA 24 GHz	1145.4302.02	3	A510 A520 A530	

**List of ZVB parts including spare parts**

**ZVA**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
192	VS 965/ISR-M3X8-A4-PA	1148.2798.00	12		
195	ZM CABLE SET ZVA	1145.2551.25	1		
196	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	12		
200	ZE RM UNIT ZVA 24 GHz	1145.4302.02	4	A510 A520 A530 A540	
202	VS 965/ISR-M3X8-A4-PA	1148.2798.00	16		
205	ZM CABLE SET ZVA	1145.2551.26	1		
206	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	16		
260	KB COVER PLATE ZVA	1145.3029.00	1		
261	VS 6900/ISR-M2.5X6-A2	1148.3059.00	12		
262	ZN COVER HOLDING	1300.0974.00	2		
263	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
264	KB REAR PLATE	1145.1861.00	1		
265	VS 6900/ISR-M2.5X6-A2	1148.3059.00	5		
270	FT ADAPTER 8PINS	1093.9122.00	2	X241 X242	x
275	DG CABLE 2XRJ45 ST/ST 8P	1138.9677.00	2	W241 W242	
280	DY IEC-BUS CABLE W21	1129.7252.00	1	W21	
282	VS DIN125-A3.2-A4	0082.4670.00	2		
284	VS DIN137-A3-A2	0005.0296.00	2		
286	VS DIN934-M3-A4	0016.4398.00	2		
290	MP COVER 25PIN SUB-D	1093.9000.00	1		
291	MP COVER FOR IEC-BUS	0852.0450.00	1		
292	MP CAP	0570.5187.00	2		
293	MP CAP	0344.4591.00	2		
294	MP CAP	0009.9217.00	1		
295	MP ADHESIVE FOIL 33X68	1300.0597.00	4		
296	MZ TOP COVER ZVA	1145.1855.00	1		
297	MZ BOTTOM COVER ZVA	1145.1955.00	1		
299	VS 6900/ISR-M2.5X6-A2	1148.3059.00	26		
300	KB FRONT COVER ZVA 8 2PORT	1145.1555.00	1		



**ZVA****List of ZVA parts including spare parts**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
303	KB FRONT COVER ZVA 8 3PORT	1145.1549.00	1		
306	KB FRONT COVER ZVA 8 4PORT	1145.1503.00	1		
310	KB FRONT COVER ZVA24 2PORT	1145.2380.00	1		
313	KB FRONT COVER ZVA24 3PORT	1145.2397.00	1		
316	KB FRONT COVER ZVA 24 4PORT	1145.1510.00	1		
390	KB COUNTERSUNK SCREW M1.6X3 LIGHT-GREY	0396.1070.00	1		
400	KR CASING 6E1/1T450N-ZV	1145.1832.00	1		x
405	KR HOLDING HOOK	1096.4796.00	6		x
410	KR BW2 FRONT HANDLE 6E	1096.1500.00	2		x
420	VS SCREW M4X14-ISR	1096.4896.00	6		
430	KR BW2 INSTRUMENT FOOT	1096.2506.00	4		x
440	KR BW2 MOUNTING FOOT	1096.2529.00	2		x
450	KR BW2 SIDE CARRYING HANDLE T450	1096.2670.00	1		x
460	KR BW2 REAR PANEL FOOT 50MM	1096.2493.00	4		x
470	OS BW2 REAR PANEL FOOT LABEL	1096.2435.00	1		
471	FJ CAP	0092.6375.00	2		
472	FJ CAP	0092.6375.00	3		
473	FJ CAP	0092.6375.00	4		
DRAWING 1145.1310.01 (FUNDAMENTAL UNIT ZVA)					
500	ZM METAL FRAME ZVA	1145.1355.00	1		
510	ED MOTHERBOARD	1145.3535.02	1	A10	x
520	VS 6900/ISR-M2.5X6-A2	1148.3059.00	15		
530	FM LOCKING SCREW H=4.5	1093.9180.00	2		
540	FM LOCKING SCREW M3	0009.6501.00	2		
550	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
555	MZ CASCADE PLATE	1145.4690.00	1		
560	MF COVER	1302.4377.00	1		
565	VS 965/ISR-M2.5X16-A4-PA	1148.3313.00	2		
570	VS SCREW M2.5X6	0071.7572.00	2		

**List of ZVB parts including spare parts**

**ZVA**

<b>Position.</b>	<b>Designation</b>	<b>Stock No.</b>	<b>Number</b>	<b>Electrical Designation</b>	<b>Recommended spare parts</b>
580	GR FRONT MOD. CONTROLLER 6/5+	1091.2908.00	1	A90	x
582	LITHIUM BATTERY CR2032	0858.2049.00	1		x
590	VS 6900/ISR-M2.5X6-A2	1148.3059.00	10		
595	DF CABLE 4X2 AND SHIELDING 630	1145.5115.00	1	W12	
596	DZ FEED THROUGH	0062.1146.00	1		
597	DZ HOLDER	0794.5214.00	1		
598	DZ CABLE TIE	0015.9038.00	4		
600	ZM DISPLAY UNIT ZVA	1145.1390.08	1	A1	
604	ZM DISPLAY UNIT ZVA	1145.1390.24	1	A1	
610	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	6		
670	GP 3.5 FLOPPY DRIVE SLIM	0048.6638.00	1	A30	x
680	MZ FLOPPY DRIVE HOLDER	1093.4620.00	1		
690	DF FLEX-STRIP CONNECTOR	1091.2066.00	1	W300	
700	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
702	VS 7985/ISR-M2.5X4-A4-PA	1148.2717.00	3		
704	VS DIN127-B2.5-A4	0082.4786.00	3		
710	ZE HD WITH FIRMWARE ZVAB	1145.1178.02	1	A60	x
715	DY CABLE W11	1091.0734.00	1	W11	x
720	MZ DISK HOLDER	1093.4837.00	1		
725	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
730	VS 965/ISR-M3X5-A4-PA	1148.2775.00	4		
735	ED AC FUSE BOARD	1145.3906.02	1	A21	x
736	MZ PROTECTION COVER	1300.0845.00	1		
737	VS 7985/ISR-M3X10-A4-PA	1148.2623.00	1		
738	OS LABEL 25MM HIGH-VOLTAGE FLASH	0042.5169.00	1		
740	DY CABLE FOR ZVBA POWER SUPPLY	1145.5544.00	1	W22	x
745	DX POWER SUPPLY CABLE 6P	1145.5515.00	1	W23	
750	DX POWER SUPPLY CABLE 8P	1145.5521.00	1	W24	
755	DX POWER SUPPLY CABLE 10P	1145.5538.00	1	W25	

**ZVA****List of ZVA parts including spare parts**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
756	VS DIN137-A3-A2	0005.0296.00	8		
757	VS DIN137-A4-A2	0005.0315.00	4		
760	FN POWER FILTER WITH SWITCH	1145.5067.00	1	X200	x
765	VS 965/ISR-M3X8-A4-PA	1148.2798.00	2		
770	ZE POWER UNIT ZVAB	1145.3893.00	1	W200	x
771	DZ GROMMET 7X12X16	0099.3520.00	1		
772	VS 965/ISR-M3X8-A4-PA	1148.2798.00	2		
773	VS DIN125-A3.2-A4	0082.4670.00	2		
774	VS DIN934-M3-A4	0016.4398.00	2		
775	DX PE CABLE	1090.3881.00	1	W201	
778	OS LABEL RD11 EARTH SYMBOL	0042.5330.00	2		
788	OS LABEL 25MM HIGH-VOLTAGE FLASH	0042.5169.00	2		
789	PROTECTION COVER ZVA	1145.3193.00	1		
790	GJ SWITCHING POWER SUPPLY AC90-264V	1145.5238.00	1	A20	x
791	VS DIN433-4.3-A4	0082.4586.00	4		
792	VS 7985/ISR-M4X6-A4-PA	1148.2646.00	4		
797	HS IMAGE SOFTWARE	0048.7540.00	1		
DRAWING 1145.1390.01 (DISPLAY UNIT ZVA)					
800	ZM MOUNTING THROUGH ZVA 8	1145.1703.00	1		
805	ZM MOUNTING THROUGH ZVA24	1145.2480.00	1		
810	OP SCREENED FILTER GLASS 10 OHM/SQ	1069.2021.00	1		x
820	EK RF SPRING (169)	1069.3063.00	2		
830	EK RF SPRING (225)	1069.3057.00	2		
840	MB SCREEN HOLDER	0852.0850.00	4		
850	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	4		
855	MM PROTECTIVE COLLAR 9.6X13.9	0852.1234.00	1		
860	SF FLEXIBLE SWITCH BOARD	1145.1990.00	1	A16	x
870	SF KEY PAD 68T ZVA	1145.2016.00	1	A15	x
880	ZM SUPPORT PLATE ZVA	1145.1984.00	1		

**List of ZVB parts including spare parts**

**ZVA**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
890	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	16		
895	MZ SUPPORT PLATE 2 ZVA	1145.2474.00	1		
897	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	3		
905	MZ DUST PROOFING ZVA	1145.1649.00	1		
910	BP TFT 800X600X3 10.4INCH	1145.5367.00	1	A70	x
912	MZ DISPLAY COVER	1302.5215.00	1		
920	VS 6900/ISR-M2.5X6-A2	1148.3059.00	4		
930	BP 8MA22368	1145.5267.00	1	T10	x
935	VS DIN125-A2.2-HP	0049.7396.00	2		
940	VS 7985/ISR-M2X6-A4-PA	1148.2700.00	2		
950	DF CONVERTER CABLE L=330	1145.5215.00	1	W100	x
960	EM ROTARY PULSE GENERATOR 1 (WITH KEY)	0852.2701.00	1	B10	x
970	VS SCREW FOR PLASTIC 1.8X4.4	1066.2066.00	3		
980	EM COLLAR	0852.1105.00	1		
990	OK KNOB	0852.1086.00	1		
1000	MZ HOLDING BRACKET FOR PCB	1145.1890.00	2		
1010	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	2		
1020	GR DISPLAY CONNECTOR FMR6 TOSHIBA	1091.2637.00	1	A19	
1030	DF DISPLAY CABLE NEC-ADAPTER	1145.5509.00	1	W70	x
1040	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
1050	ED USB BOARD	1145.3206.02	1	A40	x
1070	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	2		
DRAWING 1145.4177.01 (RM UNIT ZVA 8)					
100	ZE RM8 BR UNIT	1145.3593.02	1	A505	x
160	VS 965/ISR-M2.5X8-A4-PA	1148.3294.00	3		
170	MB INTAKE FUNNEL RM8	1145.4583.00	1		
180	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
190	ZE FAN 40x40x10	1145.4590.00	1	E500	x
192	VS DIN433-3.2-A4	0082.4570.00	4		

**ZVA****List of ZVA parts including spare parts**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
193	VS DIN128-A3-A2	0005.2499.00	4		
194	VS 7985/ISR-M3X16-A4	1145.5021.00	4		
200	MZ RM MOUNT ZVA	1145.2068.00	1		
210	VS 6900/ISR-M2.5X6-A2	1148.3059.00	4		
230	MZ SMA HOLDING ZVA	1145.2022.00	1		
240	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
250	OS LABEL RM8	1145.4548.00	1		
300	DW CABLE W514 GEN	1145.2616.00	1	W514	
310	DW CABLE W515 MEAS	1145.2622.00	1	W515	
320	DW CABLE W518 REF	1145.3012.00	1	W518	
330	FJ TERMINATION 50OHMS SMA	0249.7823.00	1		
510	ZM RM SUBUNIT ZVAB 4/8GHZ	1302.4990.08	1		
DRAWING 1145.3593.01 (RM8 BR UNIT)					
100	MB OUTER CONDUCTOR	1045.8888.00	1		
110	ZM INNER CONDUCTOR UNIT	1300.1387.00	1		x
DRAWING 1302.4990.01 (RM SUBUNIT ZVAB 8)					
110	ED RM8 GENERATOR	1145.4754.02	1	A504	x
125	ED RM8 RECEIVER 2	1302.5009.08	1	A503	x
130	MN COVER B-SIDE GEN 8GHZ	1145.3670.00	1		
140	MN COVER A-SIDE GEN 8GHZ	1302.5096.00	1		
150	MN COVER B-SIDE REC 8GHZ	1302.5109.00	1		
400	OS BARCODE LABEL FOR PCB	0071.7714.00	1		
DRAWING 1145.4302.01 (RM UNIT ZVA 24)					
200	ZE REFLECTOMETER 24	1145.4283.02	1	A500	x
220	FJ ADAPTER PC3.5 MALE/MALE	1127.9493.00	1	X2	x
230	ZE COUPLER 24	1162.0701.02	1	A501	x
240	MZ COUPLER HOLDING ZVA	1145.4677.00	1		
250	VS 7985/ISR-M2.5X16-A4-PA	1148.2869.00	1		
270	MZ SMA HOLDING ZVA24	1145.4660.00	1		

**List of ZVB parts including spare parts**

**ZVA**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
275	MZ PLATE RM24	1145.4490.00	1		
280	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
300	DW RF CABLE W518 REF	1300.0351.00	1	W518	
310	DW RF CABLE W515 MEAS	1300.0368.00	1	W515	
320	DW RF CABLE W514 GEN	1300.0374.00	1	W514	
330	DV RF CABLE W541	1145.4931.00	1	W541	
DRAWING 1145.4283.01 (REFLECTOMETER 24)					
20	ED RM24 GENERATOR	1145.4348.02	1	A504	x
30	ZE GENERATOR 24	1151.6503.02	1	A506	x
40	MN COVER A-SIDE GEN 24GHZ	1145.4648.00	1		
50	ED RM24 RECEIVER	1145.4360.02	1	A503	x
60	ZE RECEIVER 24	1151.7022.02	1	A507	x
70	MN COVER B-SIDE REC 24GHZ	1145.4654.00	1		
80	MZ RM HOLDING ZVA	1145.2422.00	1		
90	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	16	E500	
100	ZE FAN 40x40x20	1145.4619.00	1		x
110	VS 7985/ISR-M3X25-A4	1148.3007.00	4		
120	VS DIN433-3.2-A4	0082.4570.00	4		
130	VS DIN128-A3-A2	0005.2499.00	4		
140	DY CABLE 26P 1,27 70MM1:1	1145.4831.00	1	W519	
DRAWING 1164.1770.00 (OPTION ZVAB-B4 1164.1757.02)					
20	EE FREQUENCY REFERENCE	1145.3835.05	1	A100	
30	PD INSTALLATION INSTRUCTION ZVAB-B4	1164.1770.00	1		
DRAWING 1164.0250.00 (OPTION ZVA8-B16 DIRECT GENERATOR/RECEIVER ACCESS 1164.0209.08/09/10)					
20	DW RF CABLE W503 REF OUT	1145.2968.00	2	W503	X
22	DW RF CABLE W503 REF OUT	1145.2968.00	1	W503	X
24	DW RF CABLE W503 REF OUT	1145.2968.00	1	W503	X
30	DW RF CABLE W501 REF IN	1145.2951.00	2	W501	X
32	DW RF CABLE W501 REF IN	1145.2951.00	1	W501	x

**ZVA**

**List of ZVA parts including spare parts**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
34	DW RF CABLE W501 REF IN	1145.2951.00	1	W501	x
40	DW RF CABLE W513 SRC OUT	1164.0321.00	2	W513	x
42	DW RF CABLE W513 SRC OUT	1164.0321.00	1	W513	x
44	DW RF CABLE W513 SRC OUT	1164.0321.00	1	W513	x
50	DW RF CABLE W534 SRC IN	1145.2997.00	2	W534	x
52	DW RF CABLE W534 SRC IN	1145.2997.00	1	W534	X
54	DW RF CABLE W534 SRC IN	1145.2997.00	1	W534	X
60	DW RF CABLE W505 MEAS OUT	1145.2980.00	2	W505	X
62	DW RF CABLE W505 MEAS OUT	1145.2980.00	1	W505	X
64	DW RF CABLE W505 MEAS OUT	1145.2980.00	1	W505	x
70	DW RF CABLE W506 MEAS IN	1164.0280.00	2	W506	x
72	DW RF CABLE W506 MEAS IN	1164.0280.00	1	W506	x
74	DW RF CABLE W506 MEAS IN	1164.0280.00	1	W506	x
80	DW RF CABLE W535 SRC OUT	1145.3006.00	2	W535	x
82	DW RF CABLE W535 SRC OUT	1145.3006.00	1	W535	x
84	DW RF CABLE W535 SRC OUT	1145.3006.00	1	W535	X
90	DW RF CABLE W504 MEAS IN	1145.2974.00	2	W504	X
92	DW RF CABLE W504 MEAS IN	1145.2974.00	1	W504	X
94	DW RF CABLE W504 MEAS IN	1145.2974.00	1	W504	X
100	DW RF CABLE W513 SRC OUT	1300.0480.00	2	W513	x
102	DW RF CABLE W513 SRC OUT	1300.0480.00	1	W513	x
104	DW RF CABLE W513 SRC OUT	1300.0480.00	1	W513	x
110	DW CABLE EXT. 3.6	1300.1729.00	6	W611 W612 W613 W621 W622 W623	x
112	DW CABLE EXT. 3.6	1300.1729.00	3	W631 W632 W633	x
114	DW CABLE EXT. 3.6	1300.1729.00	3	W641 W642 W643	x
115	PD INSTALLATION INSTRUCTION	1164.0250.00	1		
DRAWING 1164.0267.00 (OPTION ZVA24-B16 DIRECT GENERATOR/RECEIVER ACCESS 1164.0209.24/25/26)					

**List of ZVB parts including spare parts**

**ZVA**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
120	DW RF CABLE W503 REF OUT	1300.0380.00	2	W503	x
122	DW RF CABLE W503 REF OUT	1300.0380.00	1	W503	x
124	DW RF CABLE W503 REF OUT	1300.0380.00	1	W503	x
130	DW RF CABLE W501 REF IN	1300.0397.00	2	W501	x
132	DW RF CABLE W501 REF IN	1300.0397.00	1	W501	x
134	DW RF CABLE W501 REF IN	1300.0397.00	1	W501	x
140	DW RF CABLE W513 SRC OUT	1300.0474.00	2	W513	X
142	DW RF CABLE W513 SRC OUT	1300.0474.00	1	W513	X
144	DW RF CABLE W513 SRC OUT	1300.0474.00	1	W513	X
150	DW RF CABLE W534 SRC IN	1300.0422.00	2	W534	X
152	DW RF CABLE W534 SRC IN	1300.0422.00	1	W534	x
154	DW RF CABLE W534 SRC IN	1300.0422.00	1	W534	x
160	DW RF CABLE W505 MEAS OUT	1300.0416.00	2	W505	x
162	DW RF CABLE W505 MEAS OUT	1300.0416.00	1	W505	x
164	DW RF CABLE W505 MEAS OUT	1300.0416.00	1	W505	x
170	DW RF CABLE W506 MEAS IN	1300.0468.00	2	W506	x
172	DW RF CABLE W506 MEAS IN	1300.0468.00	1	W506	x
174	DW RF CABLE W506 MEAS IN	1300.0468.00	1	W506	x
180	DW RF CABLE W535 SRC OUT	1300.0439.00	2	W535	x
182	DW RF CABLE W535 SRC OUT	1300.0439.00	1	W535	x
184	DW RF CABLE W535 SRC OUT	1300.0439.00	1	W535	x
190	DW RF CABLE W504 MEAS IN	1300.0400.00	2	W504	x
192	DW RF CABLE W504 MEAS IN	1300.0400.00	1	W504	X
194	DW RF CABLE W504 MEAS IN	1300.0400.00	1	W504	X
200	DW CABLE EXT. (AL3.6 PC3.	1145.2580.00	6	W611 W612 W613 W621 W622 W623	X
202	DW CABLE EXT. (AL3.6 PC3.	1145.2580.00	3	W631 W632 W633	x
204	DW CABLE EXT. (AL3.6 PC3.	1145.2580.00	3	W641 W642 W643	x



Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
210	PD INSTALLATION INSTRUCTION	1164.0267.00	1		
Zeichnung 1164.0215.00 (OPTION ZVA8-B21 GEN.ATTENUATOR PORT 1 1164.0009.02) (OPTION ZVA8-B22 GEN.ATTENUATOR PORT 2 1164.0015.02) (OPTION ZVA8-B23 GEN.ATTENUATOR PORT 3 1164.0021.02) (OPTION ZVA8-B24 GEN.ATTENUATOR PORT 4 1164.0038.02)					
20	ZE ATTENUATOR COMB 8	1137.1595.02	1	A550	
40	VS DIN6900-M2.5X6 -A2	0071.5040.00	2		
50	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
60	DW RF CABLE W512 ATT-GEN	1164.0315.00	1	W512	
70	DW RF CABLE W536 SRC	1164.0367.00	1	W536	
80	DW RF CABLE W517 EXT SRC1	1300.0516.00	1	W517	
130	PD INSTALLATION INSTRUCTION	1164.0215.00	1		
Zeichnung 1164.0215.00 (OPTION ZVA8-B31 REC.ATTENUATOR PORT 1 1164.0044.02) (OPTION ZVA8-B32 REC.ATTENUATOR PORT 2 1164.0050.02) (OPTION ZVA8-B33 REC.ATTENUATOR PORT 3 1164.0067.02) (OPTION ZVA8-B34 REC.ATTENUATOR PORT 4 1164.0073.02)					
20	ZE ATTENUATOR REC8	1137.1543.02	1	A550	
40	VS DIN6900-M2.5X6 -A2	0071.5040.00	2		
50	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
70	DW RF CABLE W507 ATT-REC	1164.0296.00	1	W507	
80	DW RF CABLE W508 MEAS	1164.0273.00	1	W508	
100	PD INSTALLATION INSTRUCTION	1164.0215.00	1		
Zeichnung 1164.0221.00 (OPTION ZVA24-B21 GEN.ATTENUATOR PORT 1 1164.0109.02) (OPTION ZVA24-B22 GEN.ATTENUATOR PORT 2 1164.0115.02) (OPTION ZVA24-B23 GEN.ATTENUATOR PORT 3 1164.0121.02) (OPTION ZVA24-B24 GEN.ATTENUATOR PORT 4 1164.0138.02)					
20	ZE ATTENUATOR GEN24	1046.5082.04	1	A550	
30	MZ ATTENUATOR MOUNT ZVA24	1164.0438.00	1		
40	VS DIN6900-M2.5X6 -A2	0071.5040.00	3		
50	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
60	DW RF CABLE W512 ATT-GEN	1300.0451.00	1	W512	
70	DW RF CABLE W536 SRC	1164.0380.00	1	W536	
120	PD INSTALLATION INSTRUCTION	1164.0221.00	1		

**List of ZVB parts including spare parts**

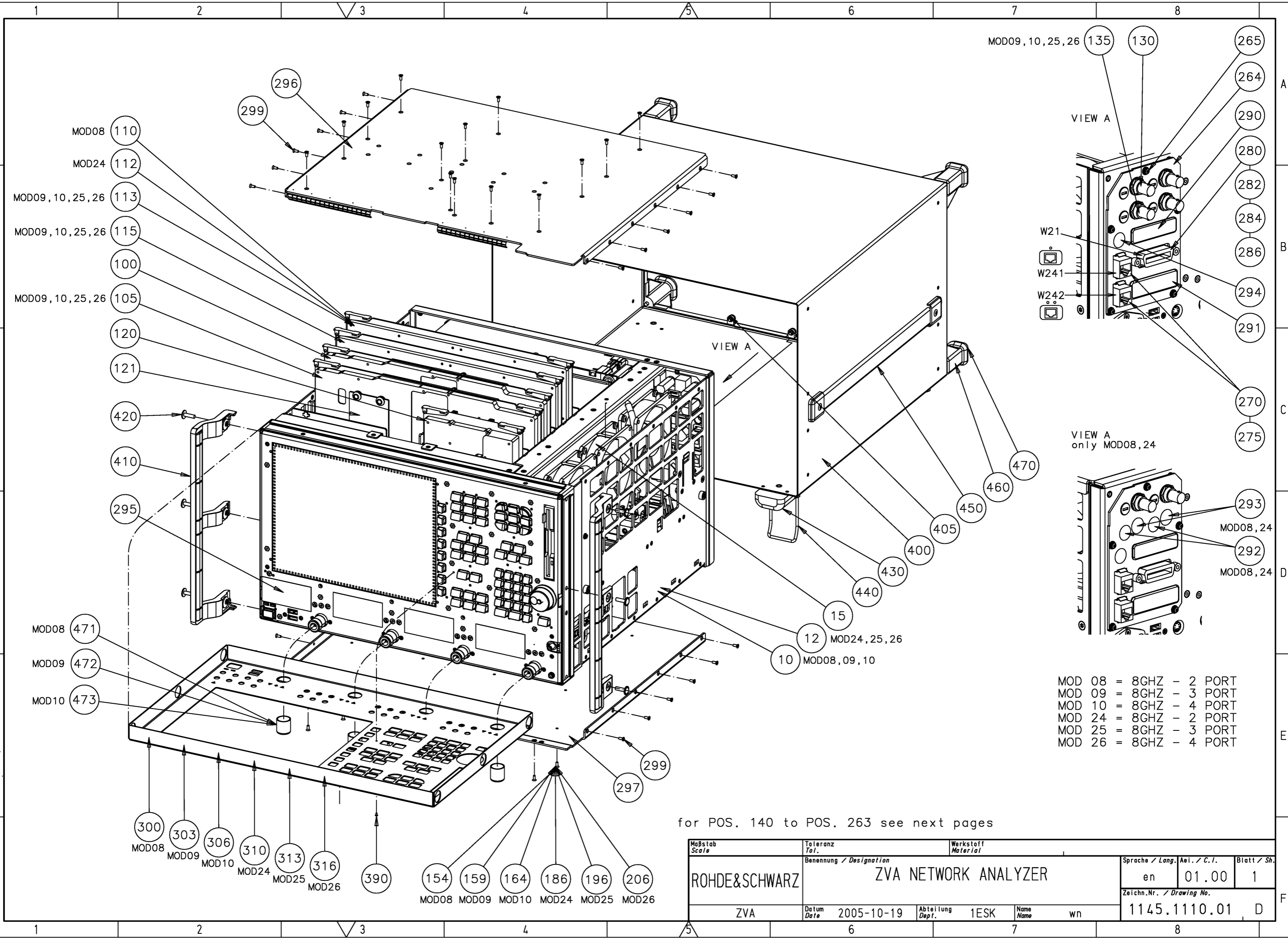
**ZVA**

Position.	Designation	Stock No.	Number	Electrical Designation	Recommended spare parts
Zeichnung	1164.0221.00 (OPTION ZVA24-B31 REC.ATTENUATOR PORT 1 1164.0144.02) (OPTION ZVA24-B32 REC.ATTENUATOR PORT 2 1164.0150.02) (OPTION ZVA24-B33 REC.ATTENUATOR PORT 3 1164.0167.02) (OPTION ZVA24-B34 REC.ATTENUATOR PORT 4 1164.0173.02)				
20	ZE ATTENUATOR REC24	1046.5082.05	1	A550	
30	MZ ATTENUATOR MOUNT ZVA24	1164.0438.00	1		
40	VS DIN6900-M2.5X6 -A2	0071.5040.00	3		
50	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
70	DW RF CABLE W507 ATT-REC	1300.0445.00	1	W507	
80	DW RF CABLE W508 MEAS	1164.0373.00	1	W508	
120	PD INSTALLATION INSTRUCTION	1164.0221.00	1		

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Projection  
Method



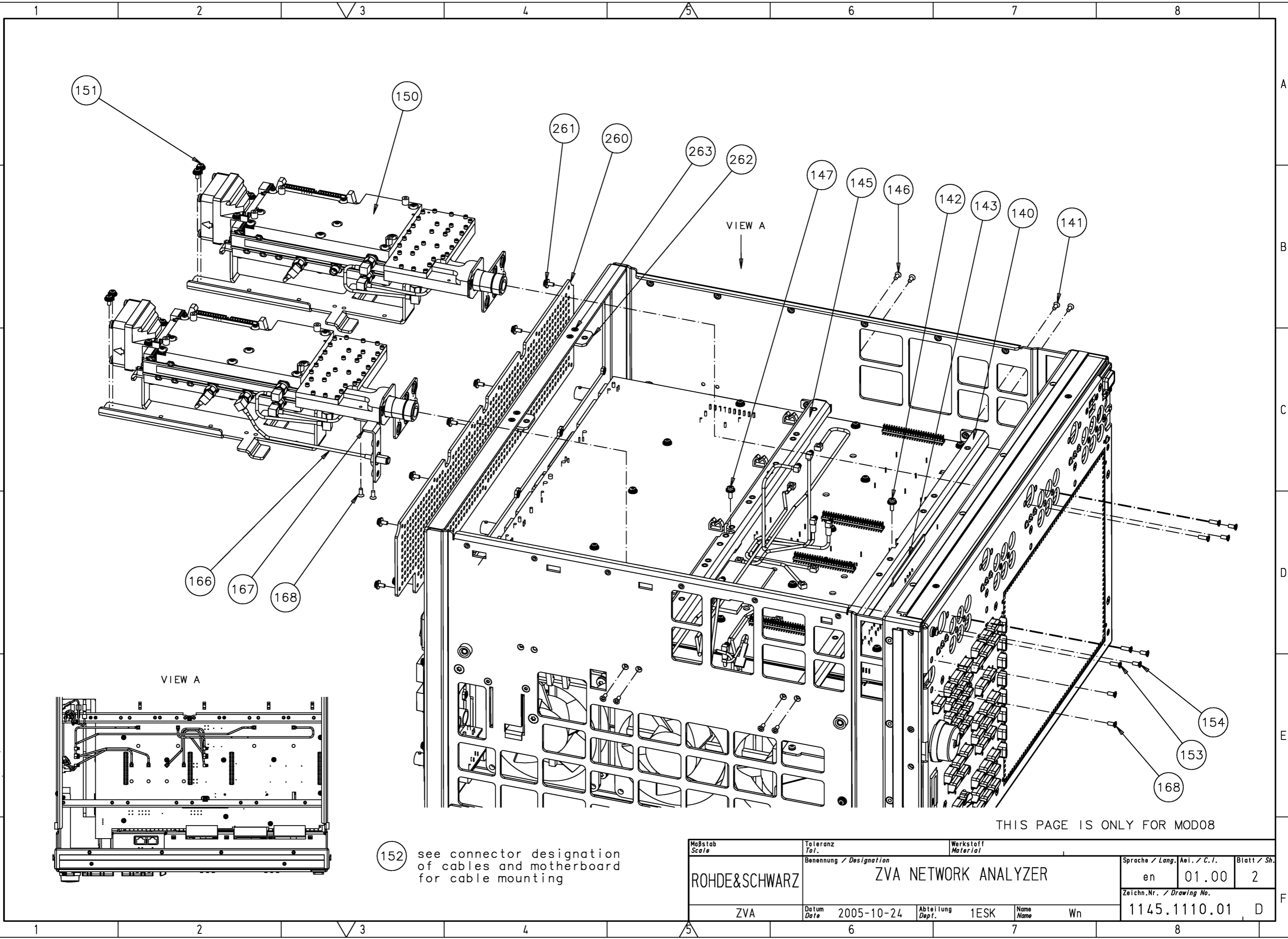
- MOD 08 = 8GHZ - 2 PORT
- MOD 09 = 8GHZ - 3 PORT
- MOD 10 = 8GHZ - 4 PORT
- MOD 24 = 8GHZ - 2 PORT
- MOD 25 = 8GHZ - 3 PORT
- MOD 26 = 8GHZ - 4 PORT

for POS. 140 to POS. 263 see next pages

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	ZVA NETWORK ANALYZER		en	01.00	1
Datum Date			Zeichn.Nr. / Drawing No.		
ZVA	2005-10-19	Abteilung Dept.	1ESK	Name Name	wn
			1145.1110.01		D

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Projektions-  
 methode  
 Projection  
 Method



I

A

B

C

D

E

F

A

B

C

D

E

F

VIEW A

VIEW A

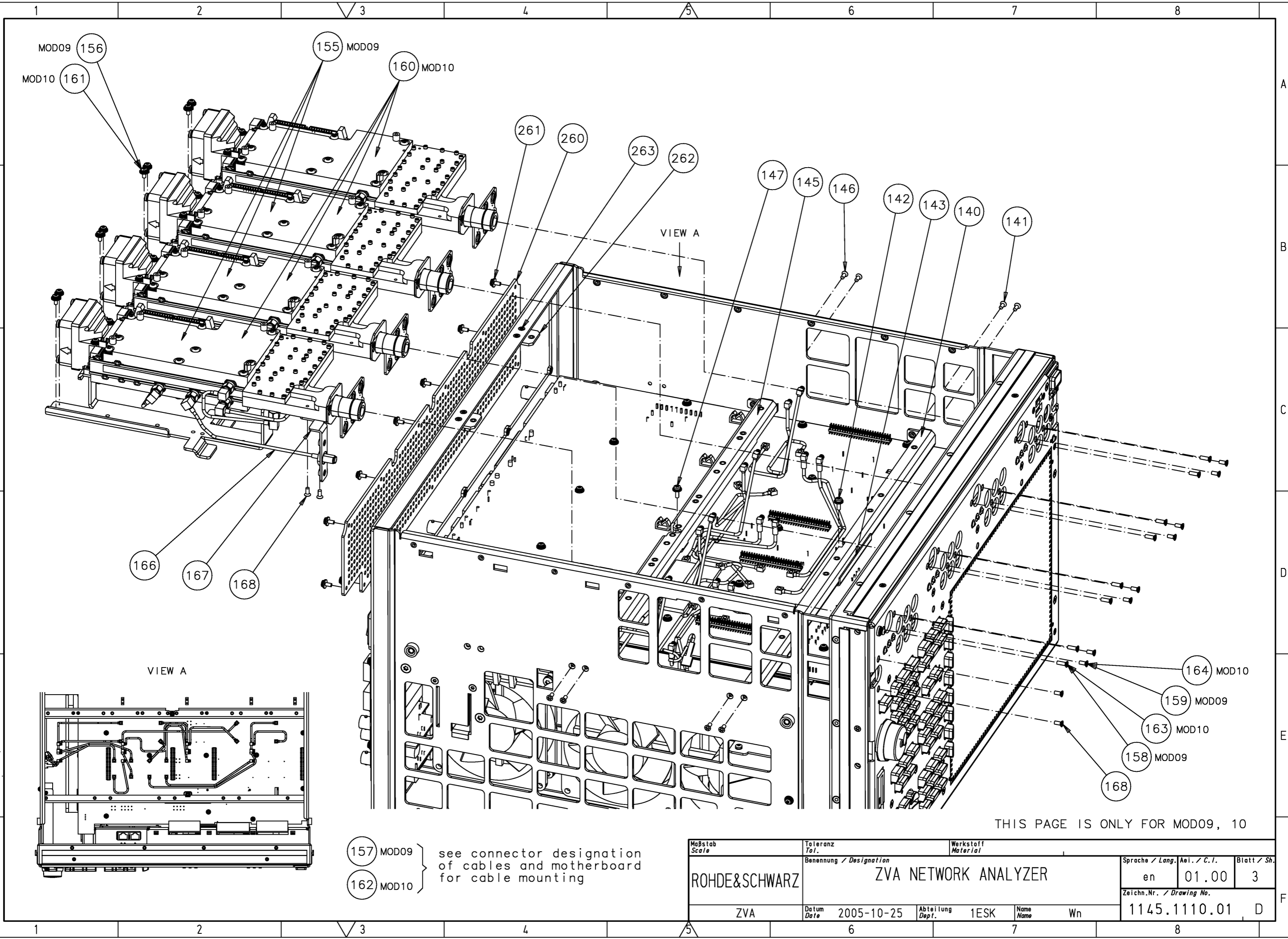
THIS PAGE IS ONLY FOR MOD08

152 see connector designation  
 of cables and motherboard  
 for cable mounting

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	ZVA NETWORK ANALYZER	en	01.00	2
ZVA	Datum Date	2005-10-24	Zeichn.Nr. / Drawing No.		
	Abteilung Dept.	1ESK	Name Name	Wn	D
			1145.1110.01		

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Projektions-  
 methode  
 Projection  
 Method



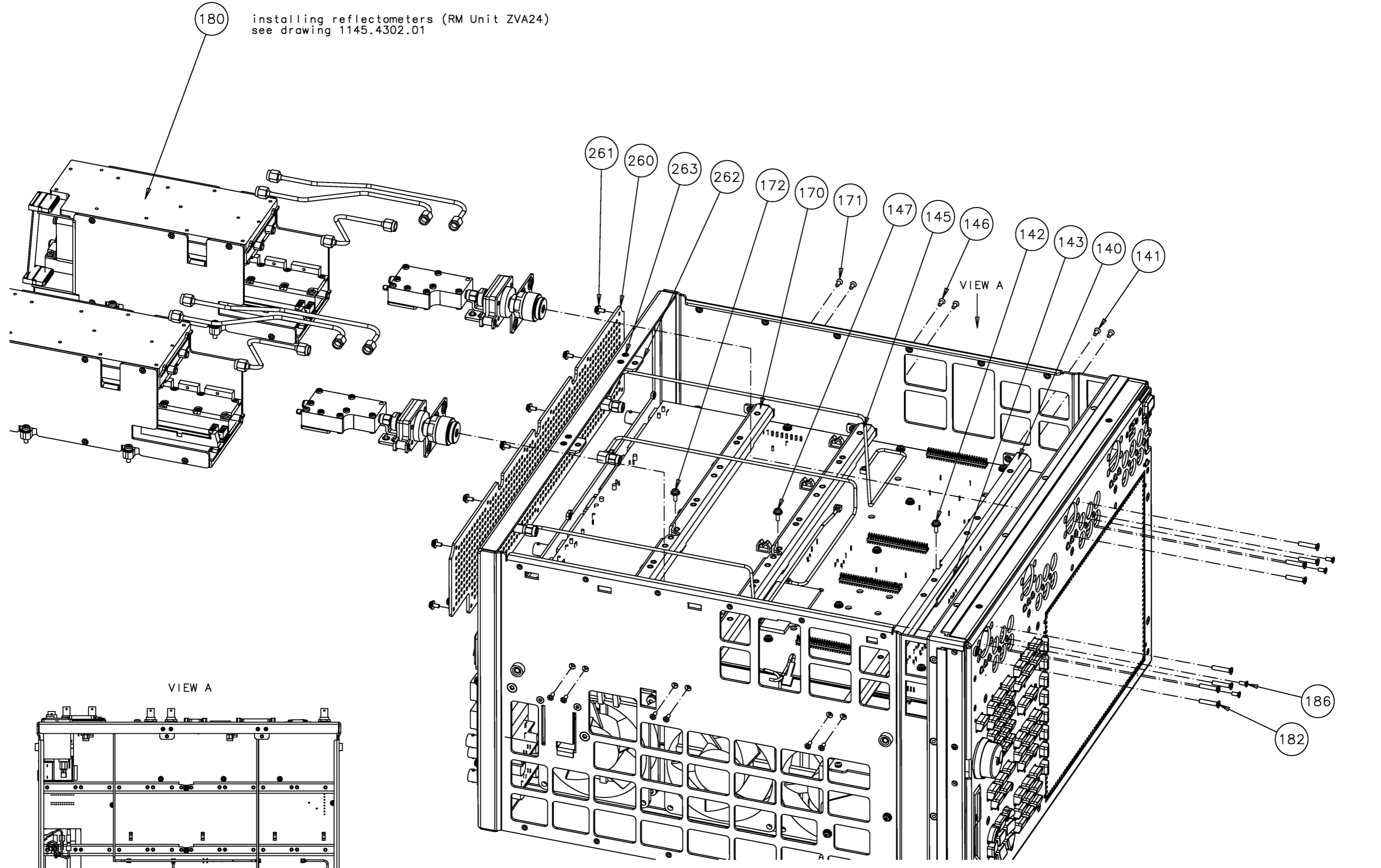
THIS PAGE IS ONLY FOR MOD09, 10

157 MOD09 } see connector designation  
 162 MOD10 } of cables and motherboard  
 for cable mounting

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / Ael. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	ZVA NETWORK ANALYZER	en	01.00	3
ZVA	Datum Date	2005-10-25	Zeichn.Nr. / Drawing No.		
	Abteilung Dept.	1ESK	Name Name	Wn	D
			1145.1110.01		

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Projektions-  
 methode  
 Projection  
 Method



180 installing reflectometers (RM Unit ZVA24)  
 see drawing 1145.4302.01

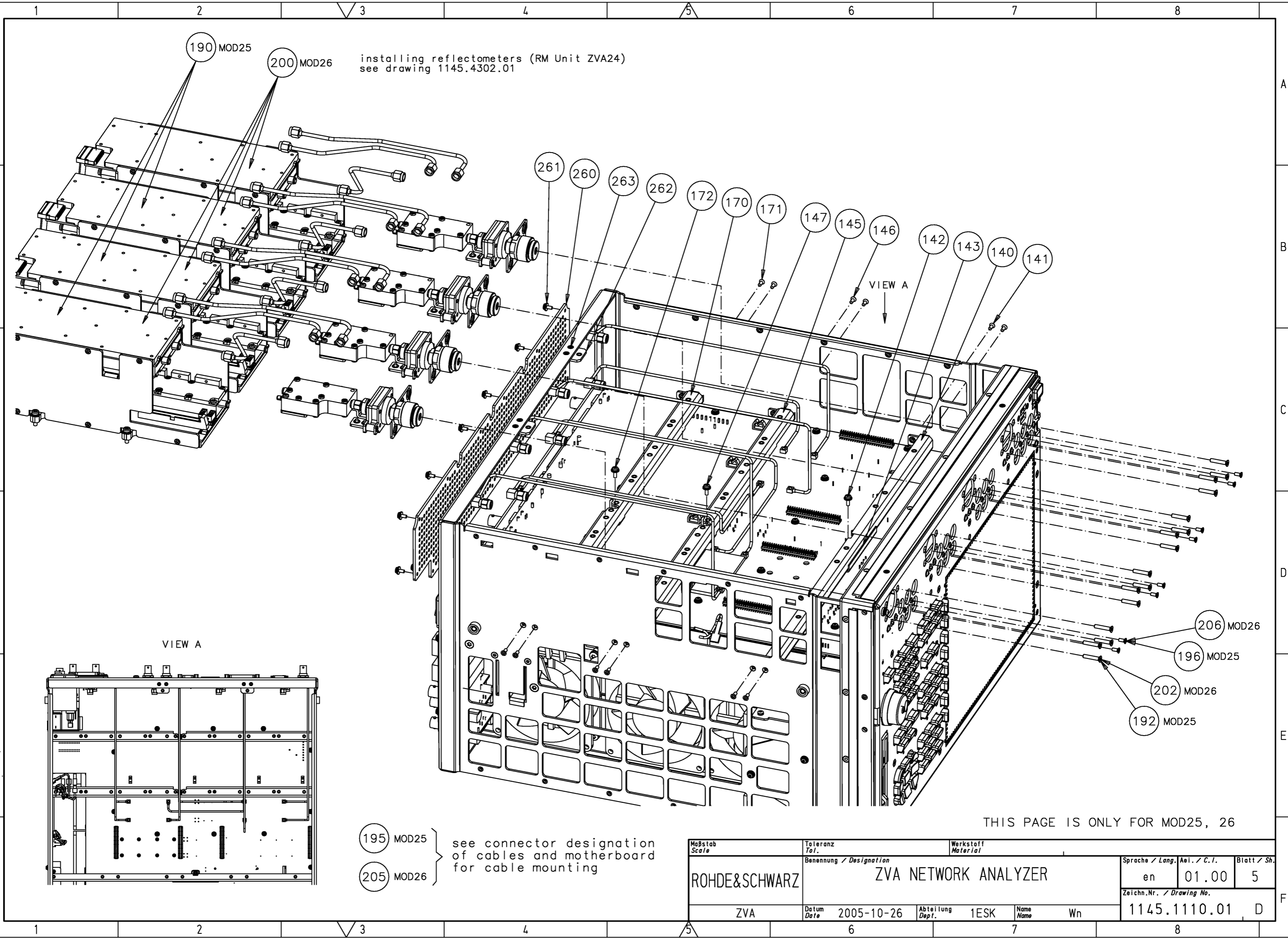
185 see connector designation  
 of cables and motherboard  
 for cable mounting

THIS PAGE IS ONLY FOR MOD24

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	ZVA NETWORK ANALYZER	en	01.00	4
ZVA	Datum Date	2005-10-26	Zeichn.Nr. / Drawing No.		1145.1110.01
	Abteilung Dept.	1ESK	Name Name	Wn	D

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Projektions-  
methode  
 Projection  
Method



installing reflectometers (RM Unit ZVA24)  
 see drawing 1145.4302.01

THIS PAGE IS ONLY FOR MOD25, 26

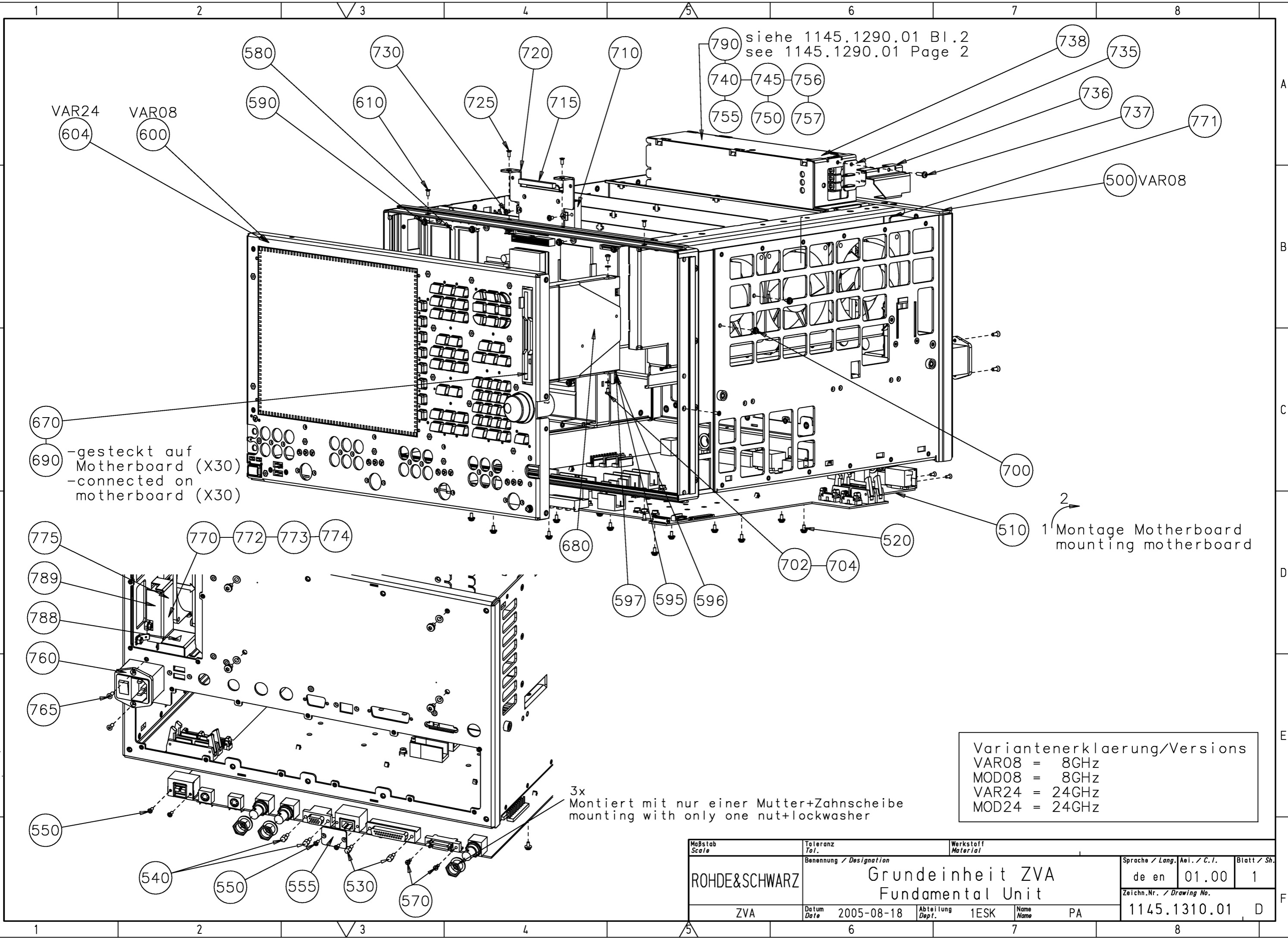
195 MOD25 } see connector designation  
 of cables and motherboard  
 for cable mounting  
 205 MOD26 }

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	ZVA NETWORK ANALYZER		en	01.00	5
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-10-26	1ESK	Wn	1145.1110.01 D	



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Projektions-  
methode  
Projection  
Method



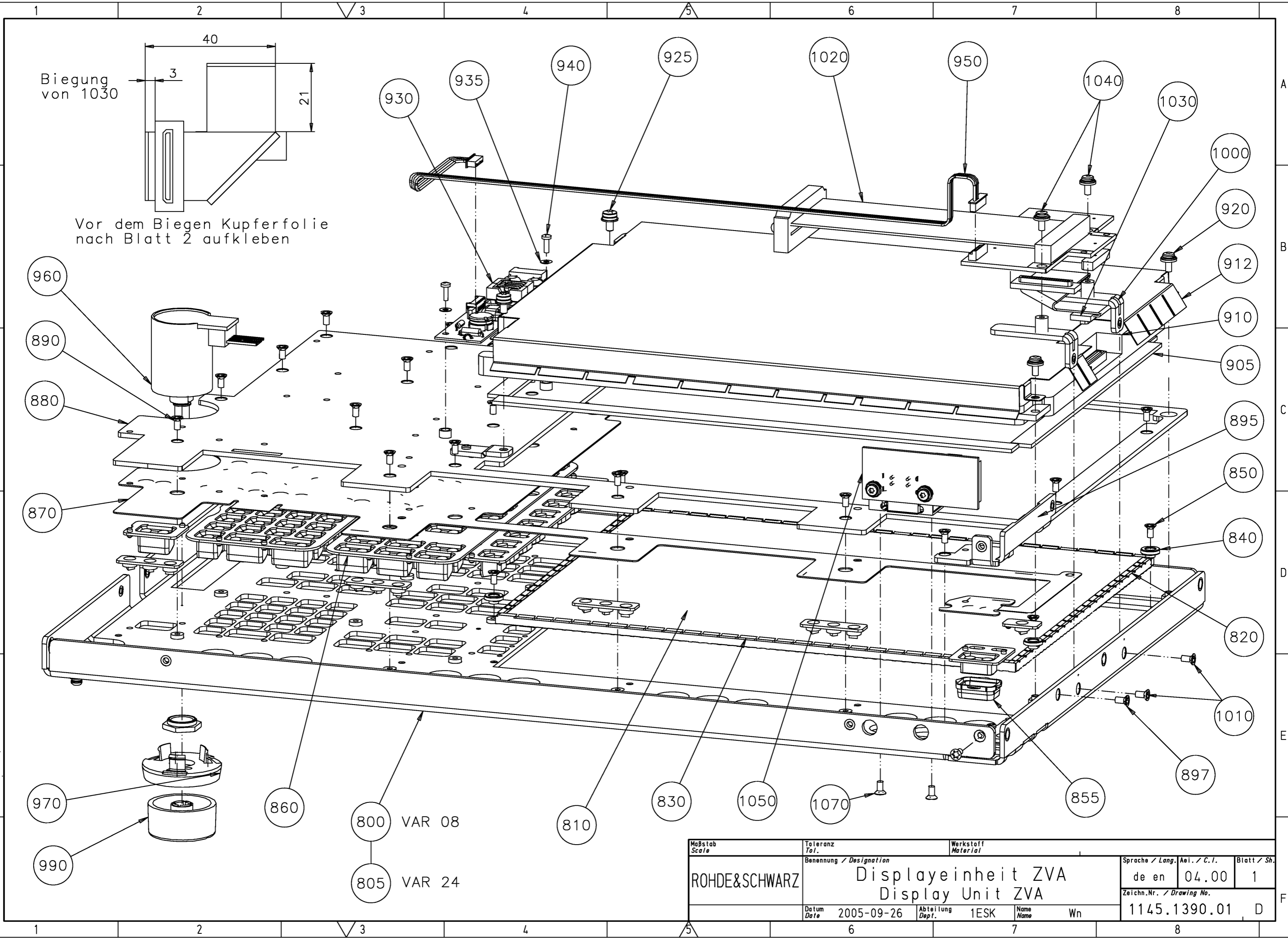
Variantenerklärung/Versions			
VAR08	=	8GHz	
MOD08	=	8GHz	
VAR24	=	24GHz	
MOD24	=	24GHz	

3x Montiert mit nur einer Mutter+Zahnscheibe  
mounting with only one nut+lockwasher

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	Grundeinheit ZVA Fundamental Unit		de en	01.00
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-08-18	1ESK	PA	1145.1310.01	
				D	

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Projektions-  
methode  
Projection  
Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	Displayeinheit ZVA Display Unit ZVA		de en 04.00	1
Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.		
2005-09-26	1ESK	Wn	1145.1390.01 D		

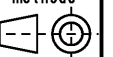
970  
990  
860  
800 VAR 08  
805 VAR 24  
810  
830  
1050  
1070  
855  
897

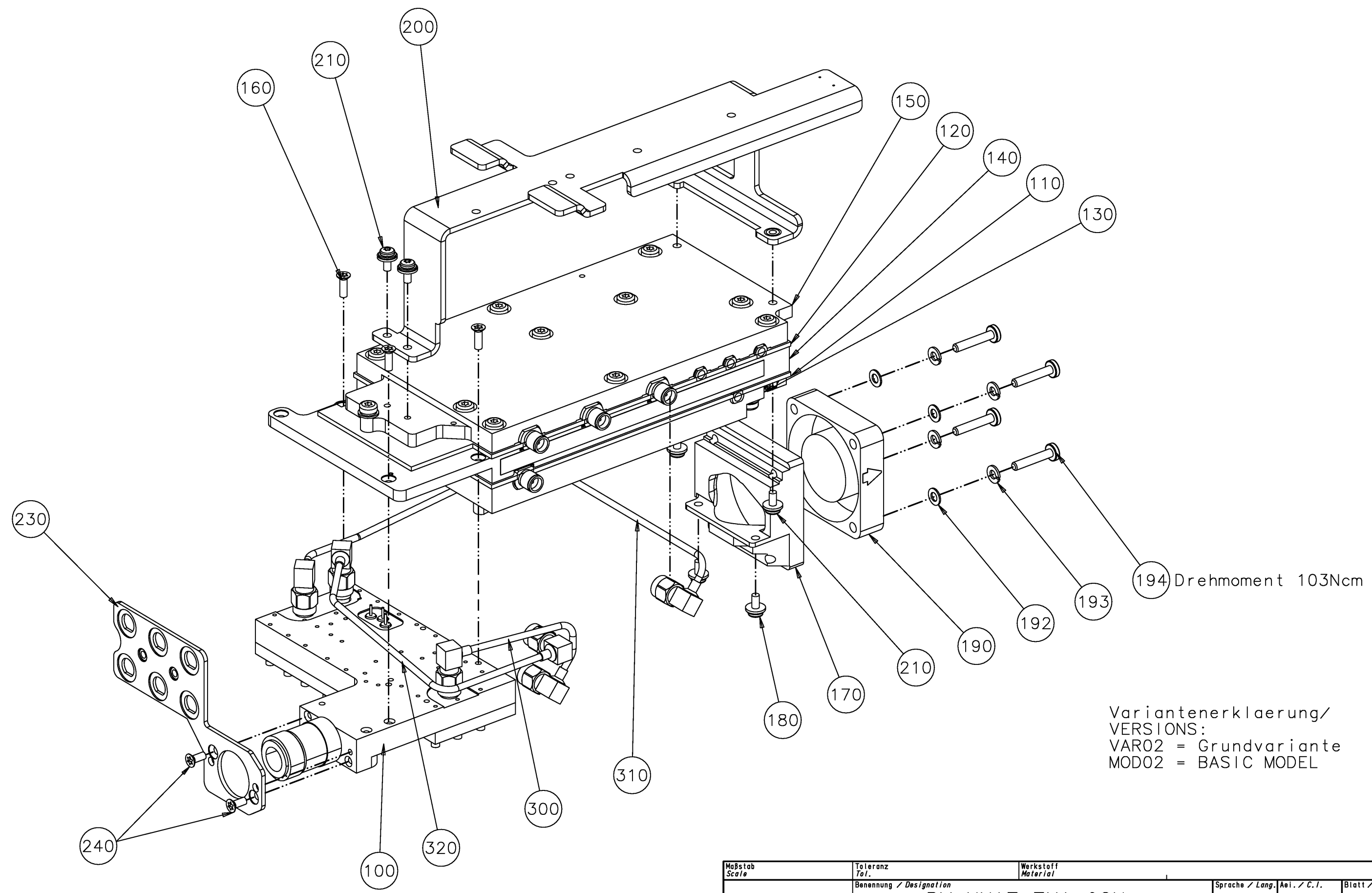
960  
890  
880  
870

1000  
920  
912  
910  
905  
895  
850  
840  
820  
1010  
897

40  
3  
21  
Biegung von 1030  
Vor dem Biegen Kupferfolie nach Blatt 2 aufkleben  
930  
935  
940  
925  
1020  
950  
1040  
1030

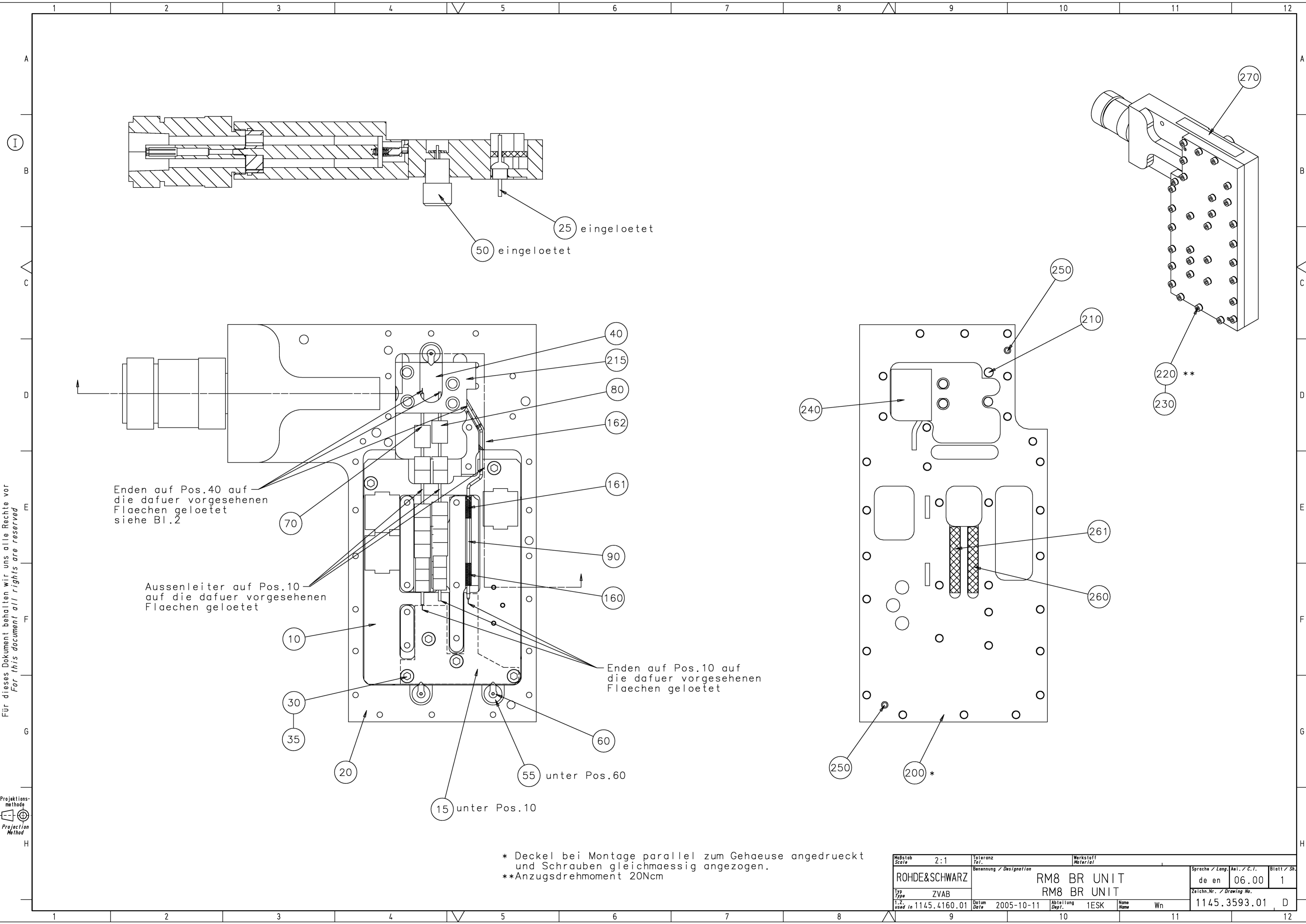
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Projektions-  
 methode  
  
 Projection  
 Method



Variantenerklärung/  
 VERSIONS:  
 VAR02 = Grundvariante  
 MOD02 = BASIC MODEL

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / Aei. / C. I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	RM UNIT ZVA 8GHz RM UNIT ZVA 8GHz	de en	02.00	1
Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.		
16.10.2003	1ESK	Wn	1145.4177.01 D		



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Projektions-  
methode  
Projection  
Method

\* Deckel bei Montage parallel zum Gehäuse angedrückt und Schrauben gleichmässig angezogen.  
\*\*Anzugsdrehmoment 20Ncm

Maßstab Scale	2:1	Toleranz Tol.	Material	Sprache / Lang. / Aei. / C.F.	Blatt / Sh.
ROHDE&SCHWARZ		Benennung / Designation	RM8 BR UNIT RM8 BR UNIT	de en 06.00	1
Typ Type	ZVAB	Datum Date	2005-10-11	Abteilung Dept.	1ESK
1.Z. used in	1145.4160.01	Name	Wn	Zeichn.Nr. / Drawing No.	1145.3593.01

1

2

3

4

A

A

B

B

C

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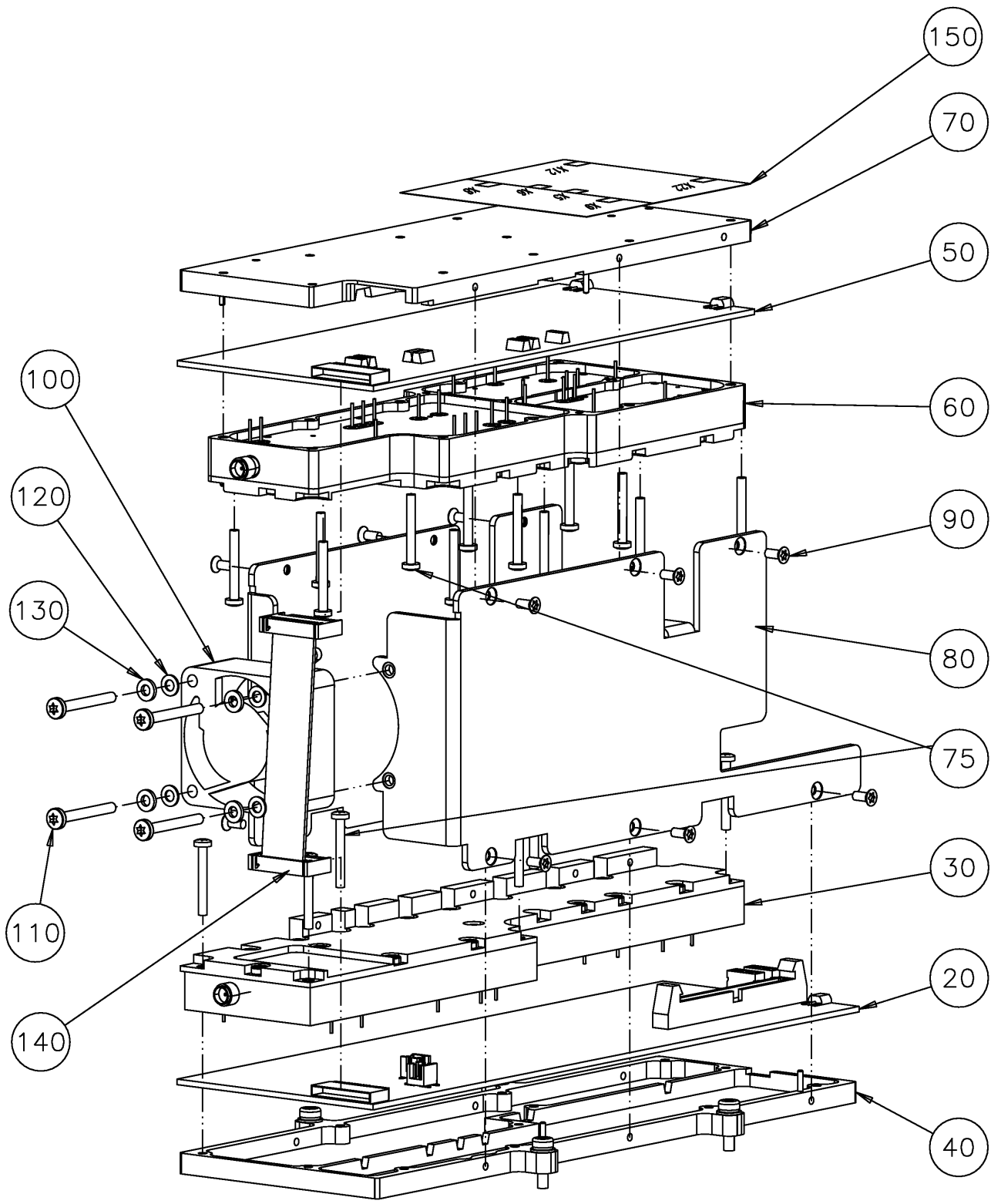
D

E

E

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I



Projektions-  
methode  
Projection  
Method

gesichert nach HVL170

Maßstab Scale	Toleranz Tol.	Werkstoff Material		Sprache / Lang. Aei. / C. I.	Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation REFLECTOMETER 24			de en 03.00	1
	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-07-13	1ESK	HG	1145.4283.01 D	

1

2

3

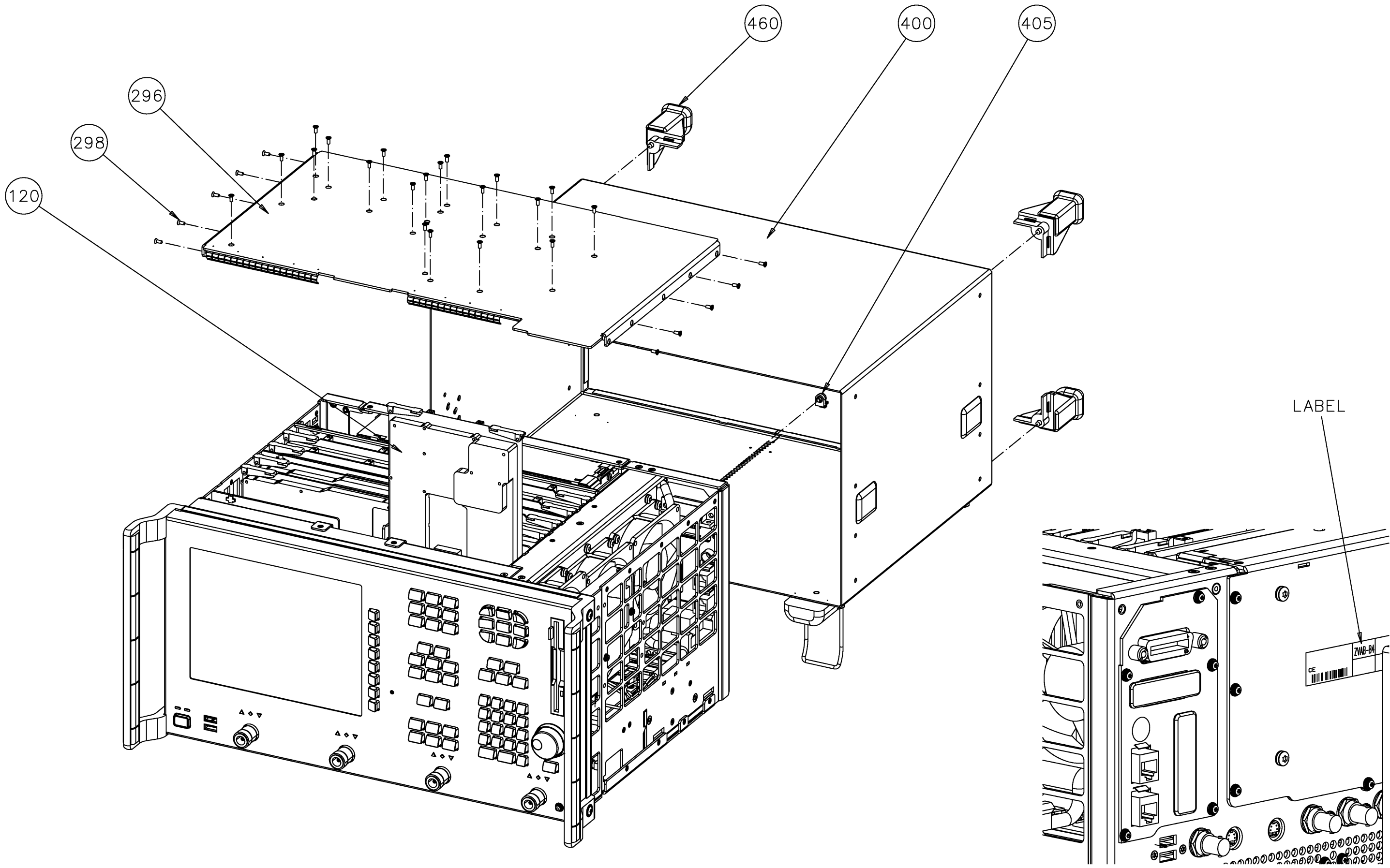
4

F

F

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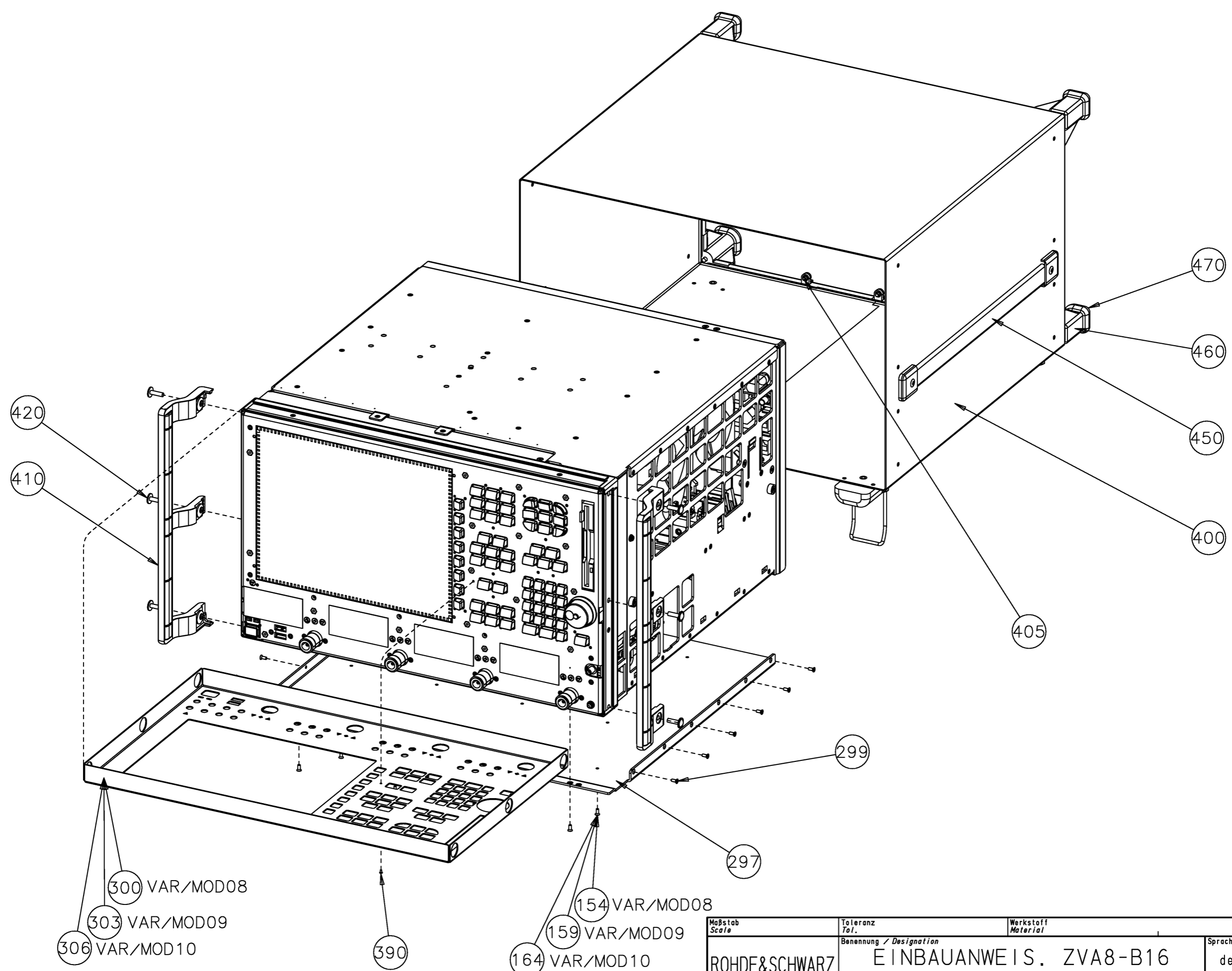
Projektions-  
 methode  
 Projection  
 Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung ZVAB-B4 INSTALL. INSTR. ZVAB-B4		en	01.00	1
Datum Date	04.05.2004	Abteilung Dept.	1ESK	Name Name	FR
			Zeichn.Nr. / Drawing No.		1164.1770.00 D

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Projektions-  
 methode  
 Projection  
 Method

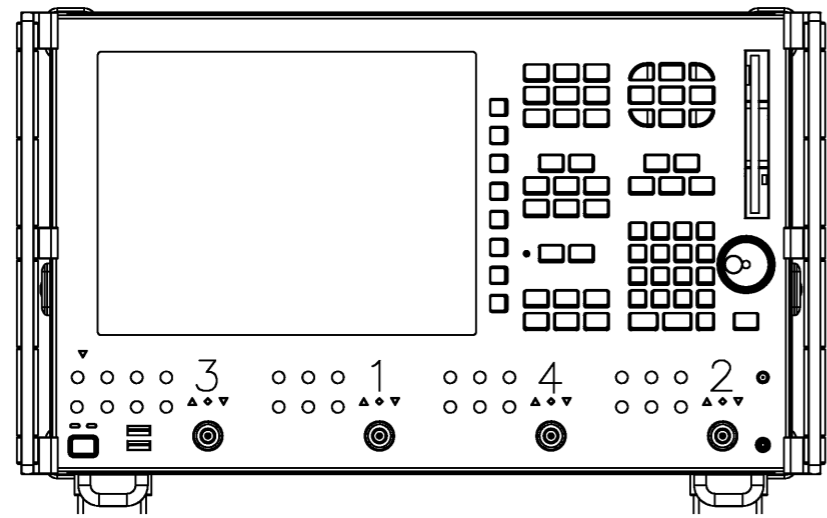


300 VAR/MOD08  
 303 VAR/MOD09  
 306 VAR/MOD10

390

154 VAR/MOD08  
 159 VAR/MOD09  
 164 VAR/MOD10

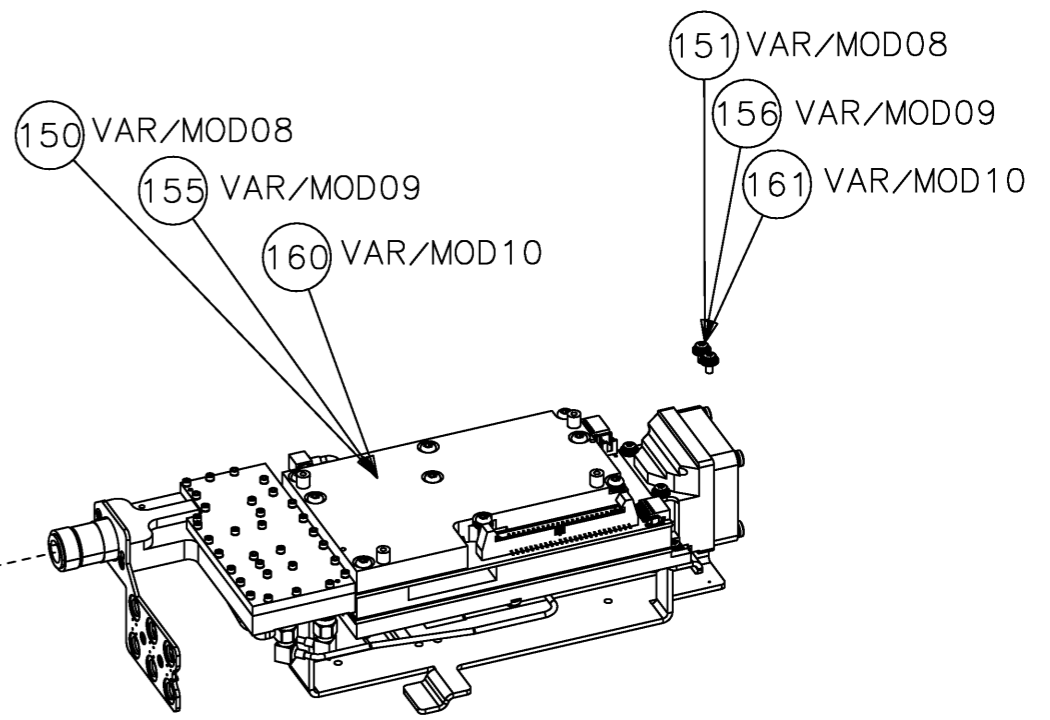
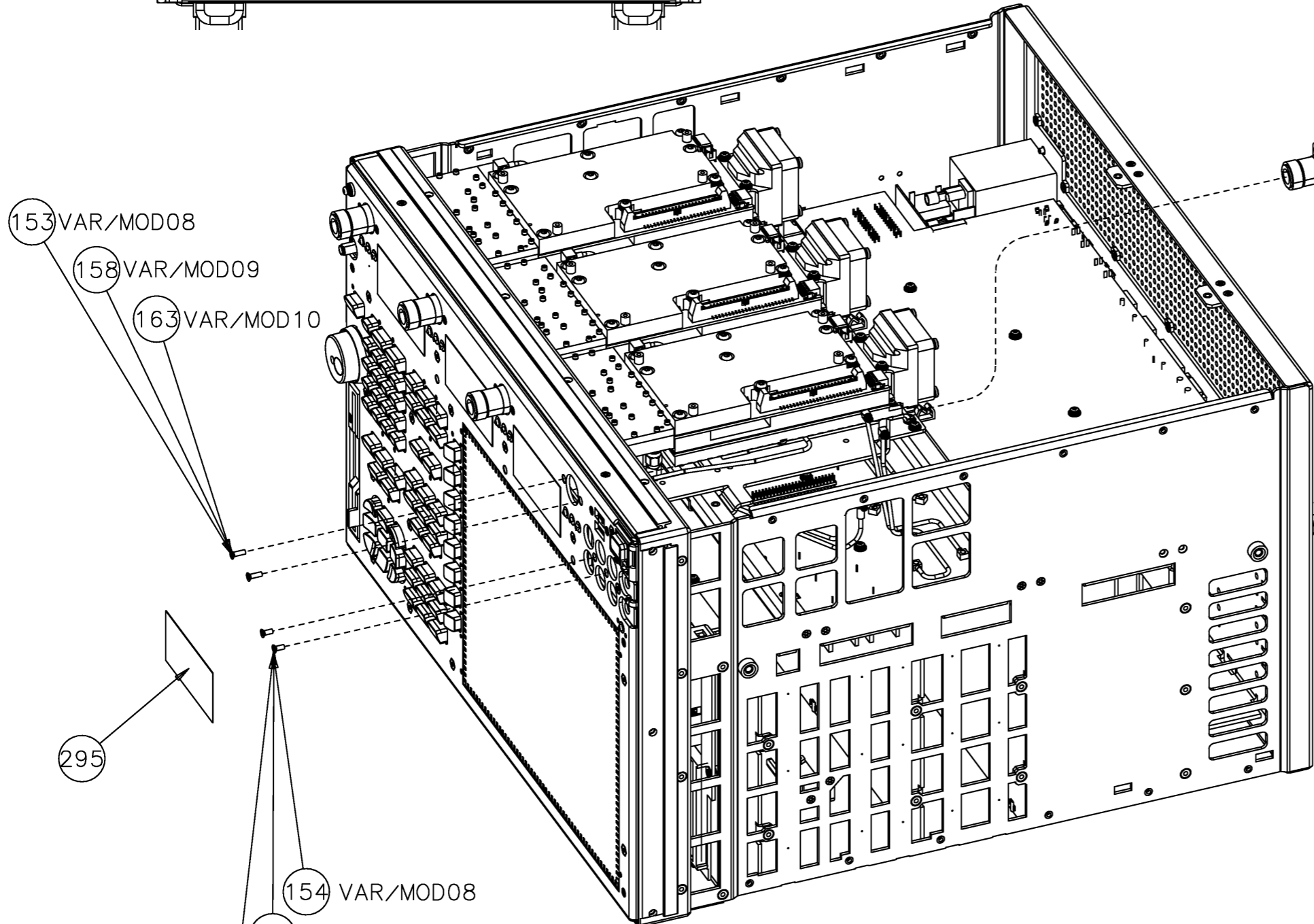
Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL		de en	01.00	1
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-08	1ESK	Wn	1164.0250.00 D	



Montage/Demontage der Reflektometer  
(RM Unit ZVA8)/  
Installing/uninstalling reflectometers  
(RM Unit ZVA8)

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Projektions-  
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Projection  
Method

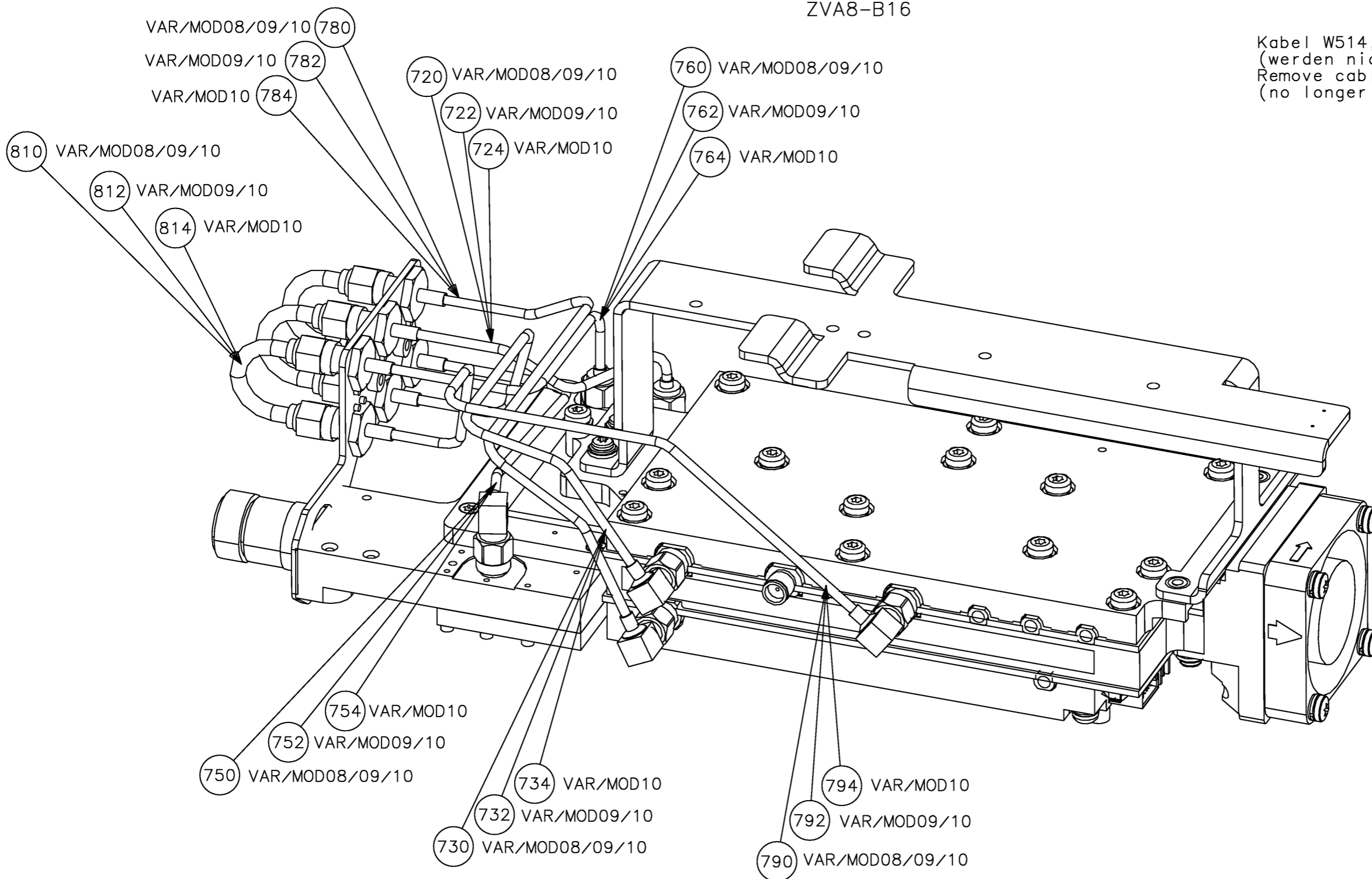


Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL		de en	01.00	2
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-08	1ESK	Wn	1164.0250.00	D



ZVA8-B16

Kabel W514, W515 und W518 demontieren  
(werden nicht mehr benoetigt)  
Remove cable W514, W515 and W518  
(no longer required)



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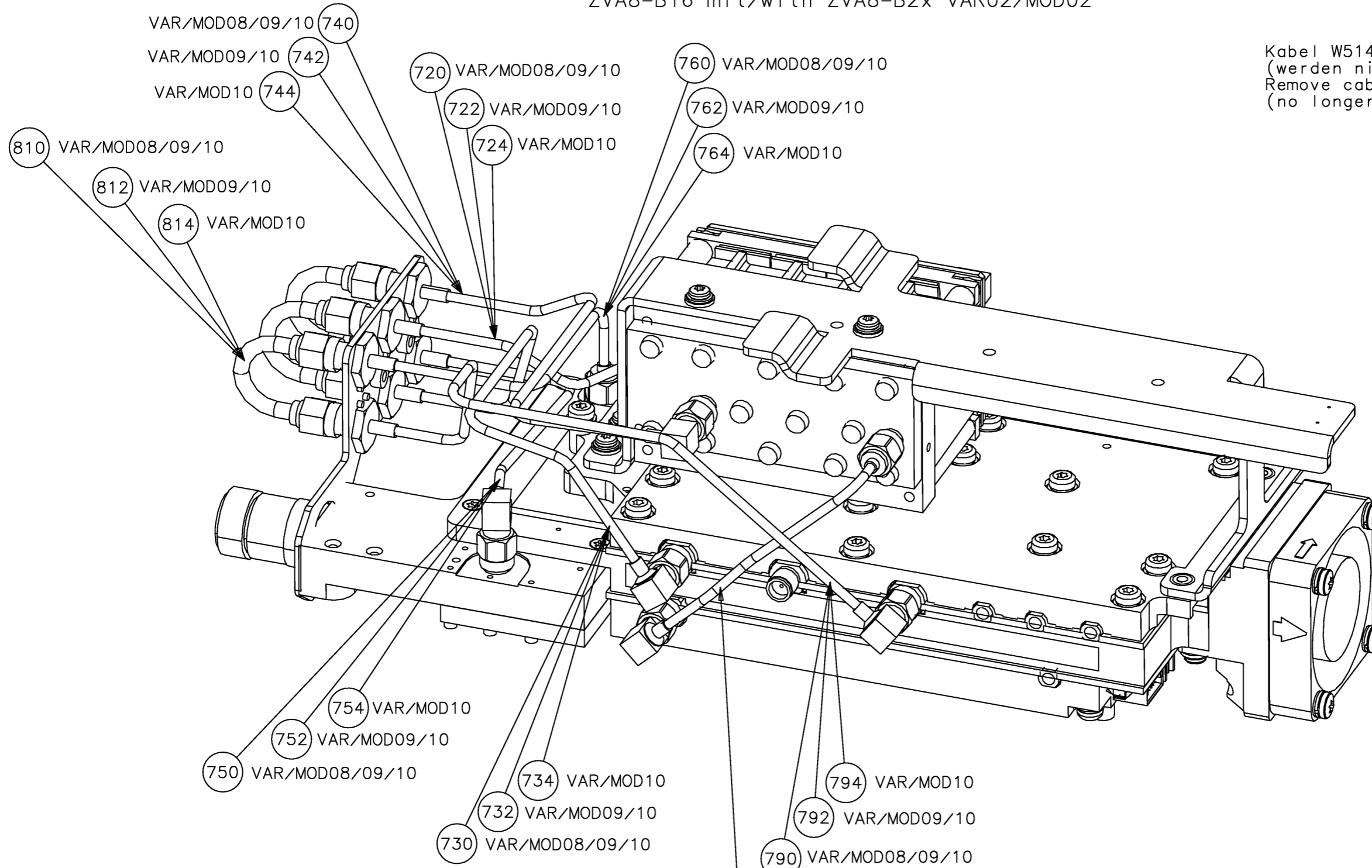
Projektions-  
methode  
Projection  
Method

Pos. 740, 742, 744, 770, 772, 774, 800, 802 und 804 werden nicht benoetigt  
Pos. 740, 742, 744, 770, 772, 774, 800, 802 and 804 not required

Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL			de en	01.00	3
ZVA	Datum Date	2005-10-06	Abteilung Dept.	1ESK	Name Name	Wn
				Zeichn.Nr. / Drawing No.		1164.0250.00 D

ZVA8-B16 mit/with ZVA8-B2x VAR02/MOD02

Kabel W514, W515 und W518 demontieren  
(werden nicht mehr benoetigt)  
Remove cable W514, W515 and W518  
(no longer required)



W512 1164.0315.00  
Bestandteil von/part of  
ZVA8-B2x

W536 1164.0309.00 Bestandteil von/part of ZVA8-B2x  
wird nicht benoetigt/will not be used

Pos. 770, 772, 774, 780, 782, 784, 800, 802 und 804 werden nicht benoetigt  
Pos. 770, 772, 774, 780, 782, 784, 800, 802 and 804 not required

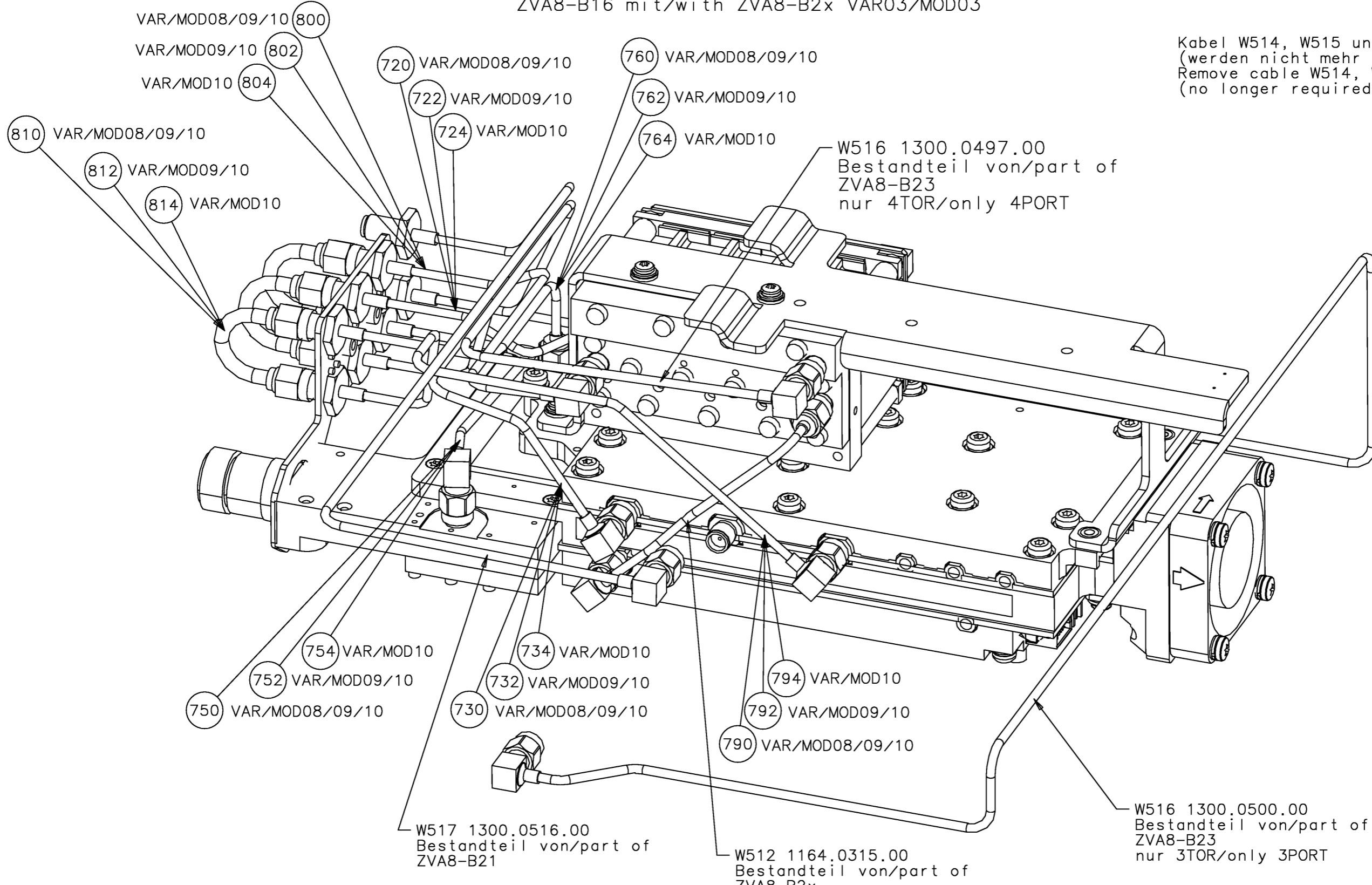
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Projektions-  
methode  
Projection  
Method

Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ		Benennung / Designation		de en	01.00	4
		EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL		Zeichn.Nr. / Drawing No.		
ZVA	Datum Date	2005-10-06	Abteilung Dept.	1ESK	Name Name	Wn
				1164.0250.00		D

ZVA8-B16 mit/with ZVA8-B2x VAR03/MOD03

Kabel W514, W515 und W518 demontieren  
(werden nicht mehr benoetigt)  
Remove cable W514, W515 and W518  
(no longer required)



W536 1164.0367.00 Bestandteil von/part of ZVA8-B21  
und/and ZVA8-B23 wird nicht benoetigt/will not be used  
Pos. 740, 742, 744, 770, 772, 774, 780, 782 und 784 werden nicht benoetigt  
Pos. 740, 742, 744, 770, 772, 774, 780, 782 und 784 not required

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Projektions-  
methode  
Projection  
Method

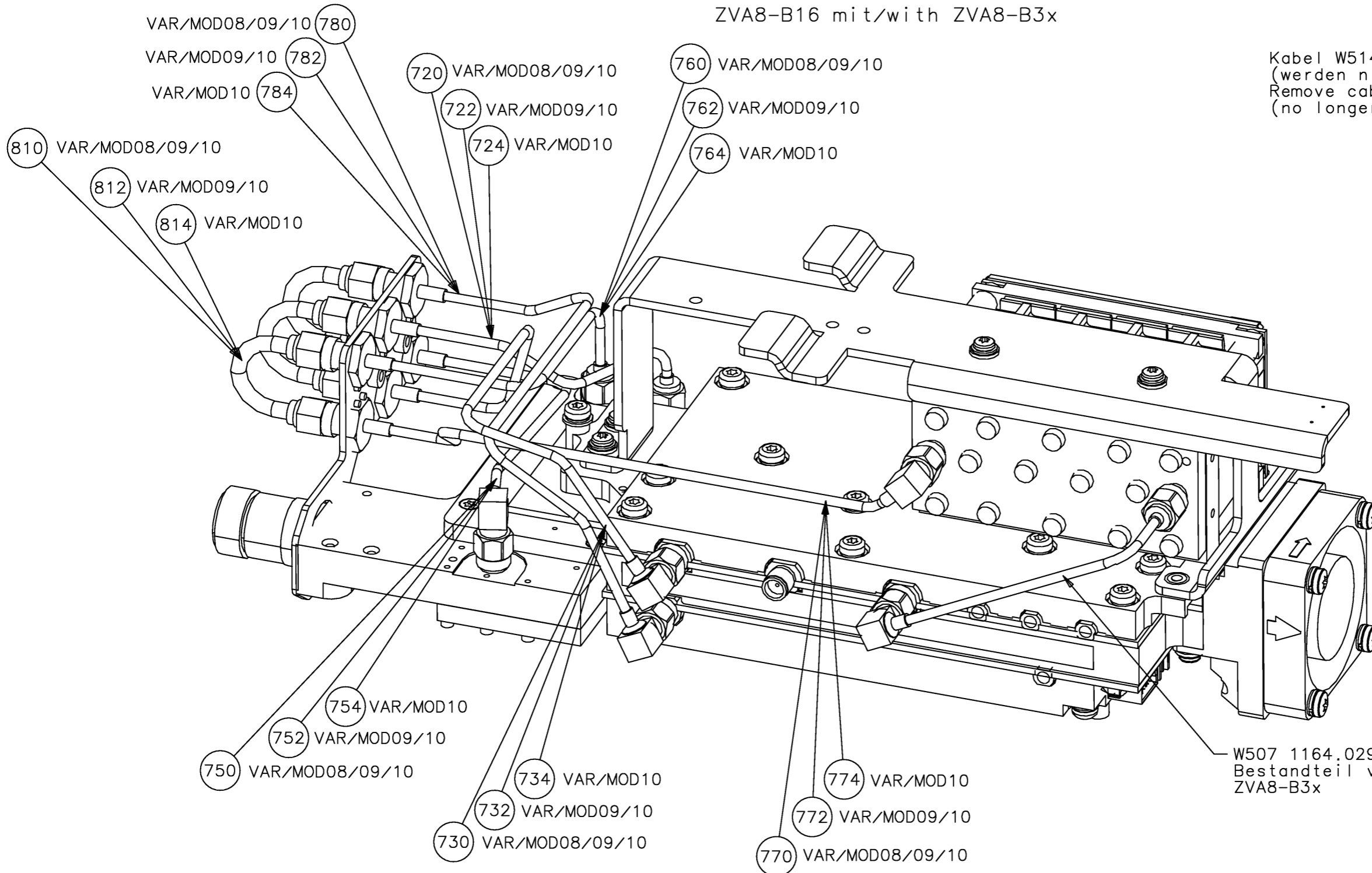
Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ		Benennung / Designation		de en	01.00	5
		EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL		Zeichn.Nr. / Drawing No.		
ZVA	Datum Date	2005-10-06	Abteilung Dept.	1ESK	Name Name	Wn
				1164.0250.00		D

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Projektions-  
methode  
Projection  
Method

ZVA8-B16 mit/with ZVA8-B3x

Kabel W514, W515 und W518 demontieren  
(werden nicht mehr benötigt)  
Remove cable W514, W515 and W518  
(no longer required)



W507 1164.0296.00  
Bestandteil von/part of  
ZVA8-B3x

W508 1164.0273.00 Bestandteil von/part of ZVA8-B3x  
wird nicht benötigt/ will not be used

Pos. 740, 742, 744, 790, 792, 794, 800, 802 und 804 werden nicht benötigt  
Pos. 740, 742, 744, 790, 792, 794, 800, 802 and 804 not required

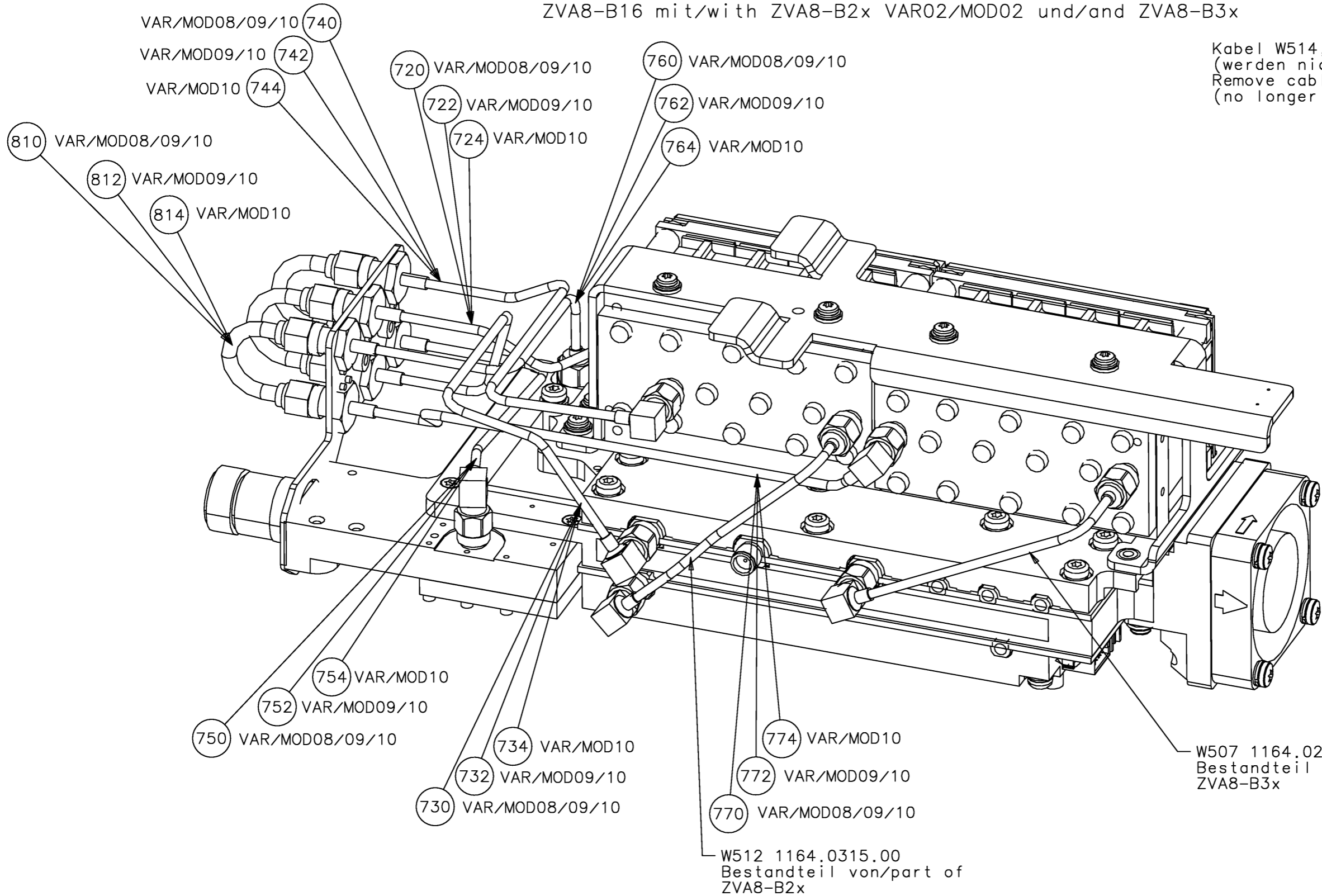
Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material		Sprache / Lang. / Aei. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL			de en	01.00	6
ZVA	Datum Date	2005-10-06	Abteilung Dept.	1ESK	Name Name	Wn
				Zeichn.Nr. / Drawing No.		1164.0250.00

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Projektions-  
methode  
Projection  
Method

ZVA8-B16 mit/with ZVA8-B2x VAR02/MOD02 und/and ZVA8-B3x

Kabel W514, W515 und W518 demontieren  
(werden nicht mehr benoetigt)  
Remove cable W514, W515 and W518  
(no longer required)

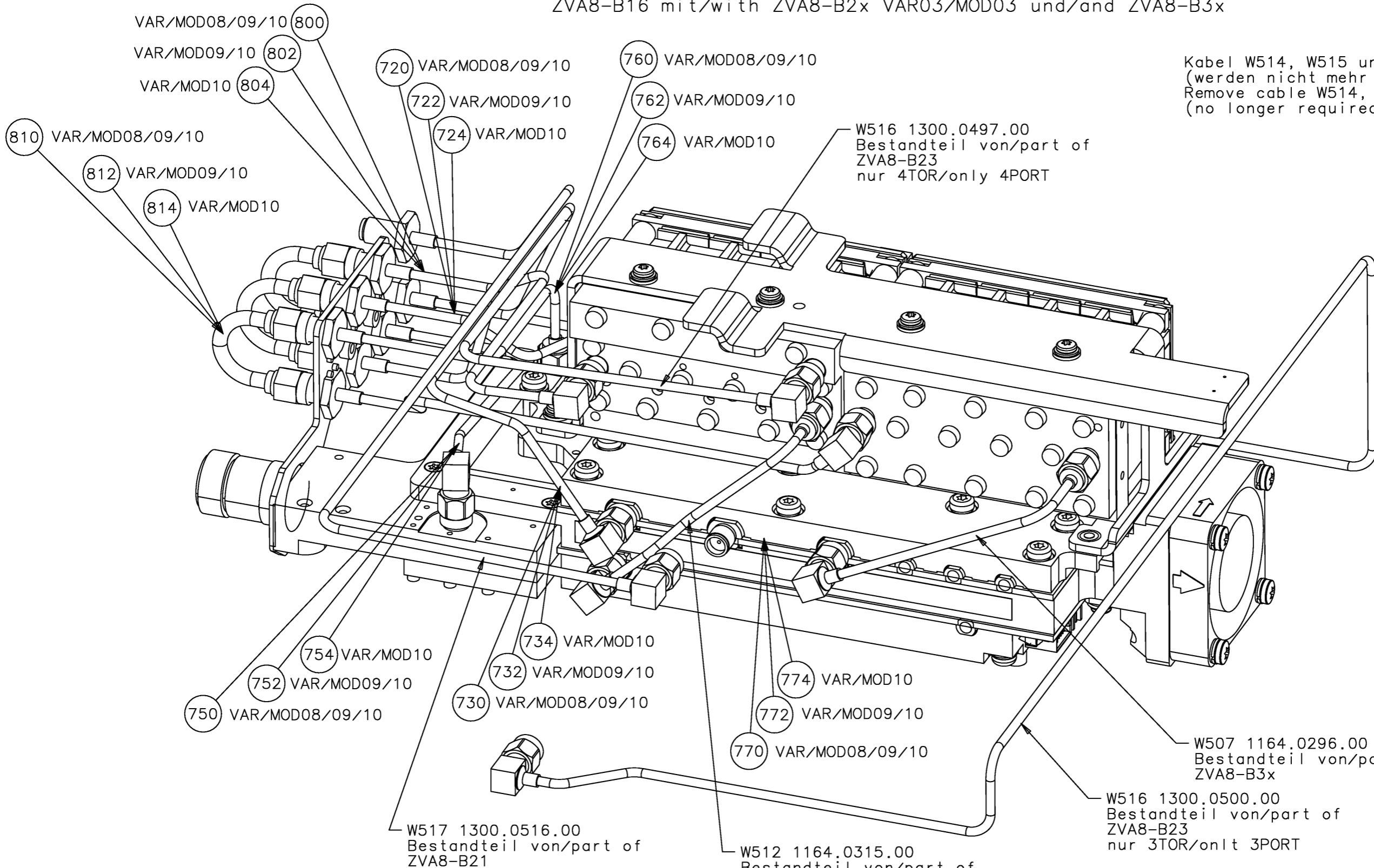


Pos. 780, 782, 784, 790, 792, 794, 800, 802 und 804 werden nicht benoetigt  
Pos. 780, 782, 784, 790, 792, 794, 800, 802 and 804 not required

Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL			de en	01.00	7
ZVA	Datum Date	2005-10-06	Abteilung Dept.	1ESK	Name Name	Wn
				Zeichn.Nr. / Drawing No.		1164.0250.00

ZVA8-B16 mit/with ZVA8-B2x VAR03/MOD03 und/and ZVA8-B3x

Kabel W514, W515 und W518 demontieren  
(werden nicht mehr benoetigt)  
Remove cable W514, W515 and W518  
(no longer required)



W536 1164.0367.00 Bestandteil von/part of ZVA8-B21 und/and ZVA8-B23 wird nicht benoetigt/will not be shown  
W508 1164.0273.00 Bestandteil von/part of ZVA8-B3x wird nicht benoetigt/will not be shown

Pos. 740, 742, 744, 780, 782, 784, 790, 792 und 794 werden nicht benoetigt  
Pos. 740, 742, 744, 780, 782, 784, 790, 792 and 794 not required

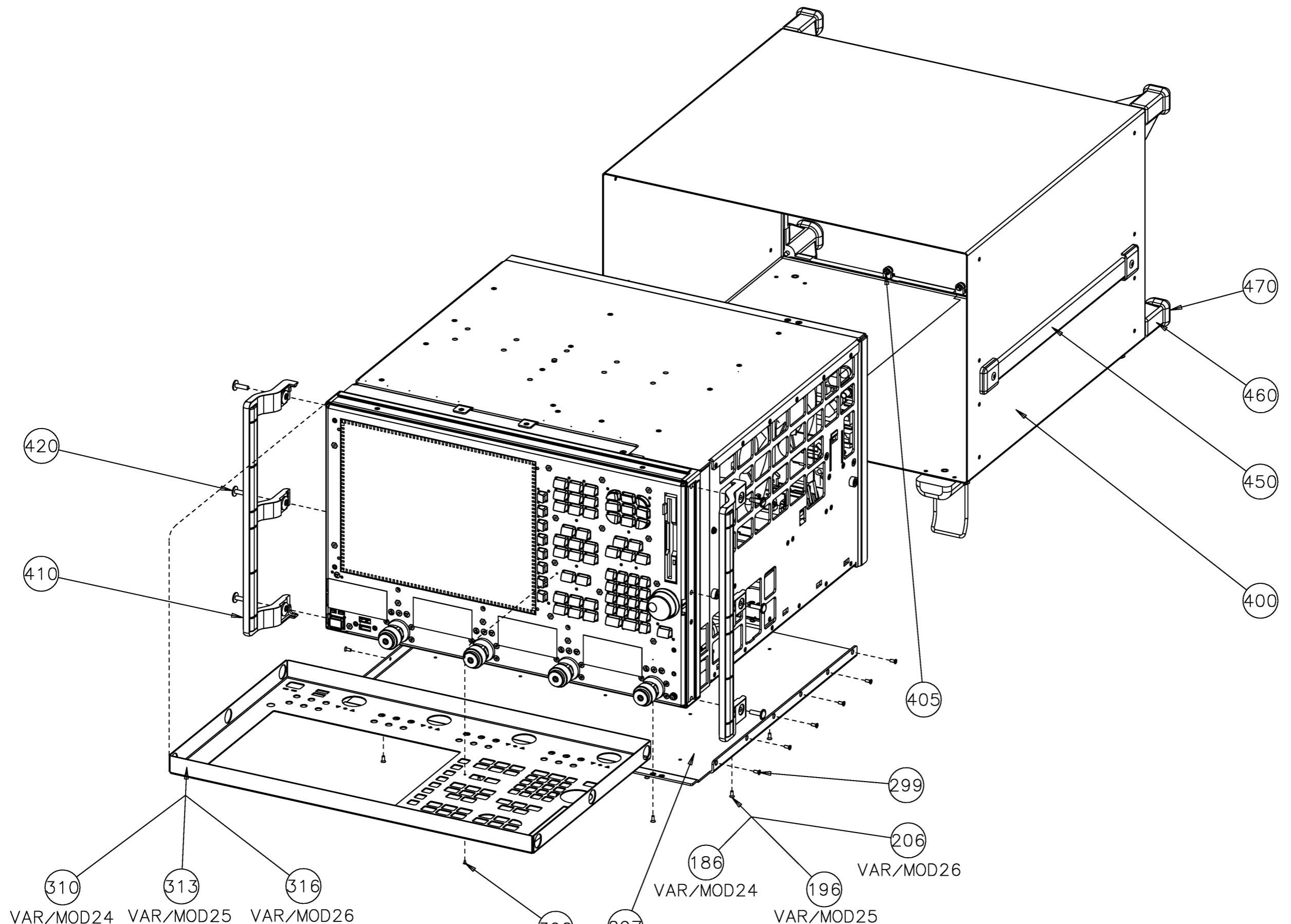
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Projektions-  
methode  
Projection  
Method

Maßstab Scale	Toleranz Tol.	1:1	Werkstoff Material	
Benennung / Designation		EINBAUANWEIS. ZVA8-B16 INSTALLATION MANUAL		
ROHDE&SCHWARZ		Datum Date	2005-10-06	Abteilung Dept.
		ZVA	1ESK	Name Name
			Wn	
Sprache / Lang.		de en	Ver. / C.I.	01.00
Blatt / Sh.				8
Zeichn.Nr. / Drawing No.		1164.0250.00		

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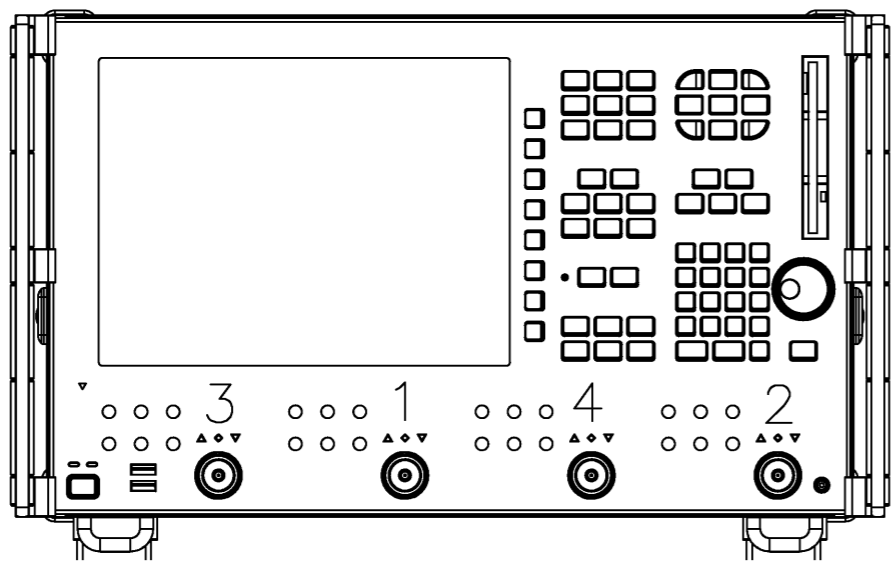
Projektions-  
 methode  
 Projection  
 Method



310 VAR/MOD24 313 VAR/MOD25 316 VAR/MOD26

186 VAR/MOD24 196 VAR/MOD25 206 VAR/MOD26 299

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS ZVA24-B16 INSTALLATION MANUAL		de en	01.00	1
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-01	1ESK	WN/PA	1164.0267.00 D	

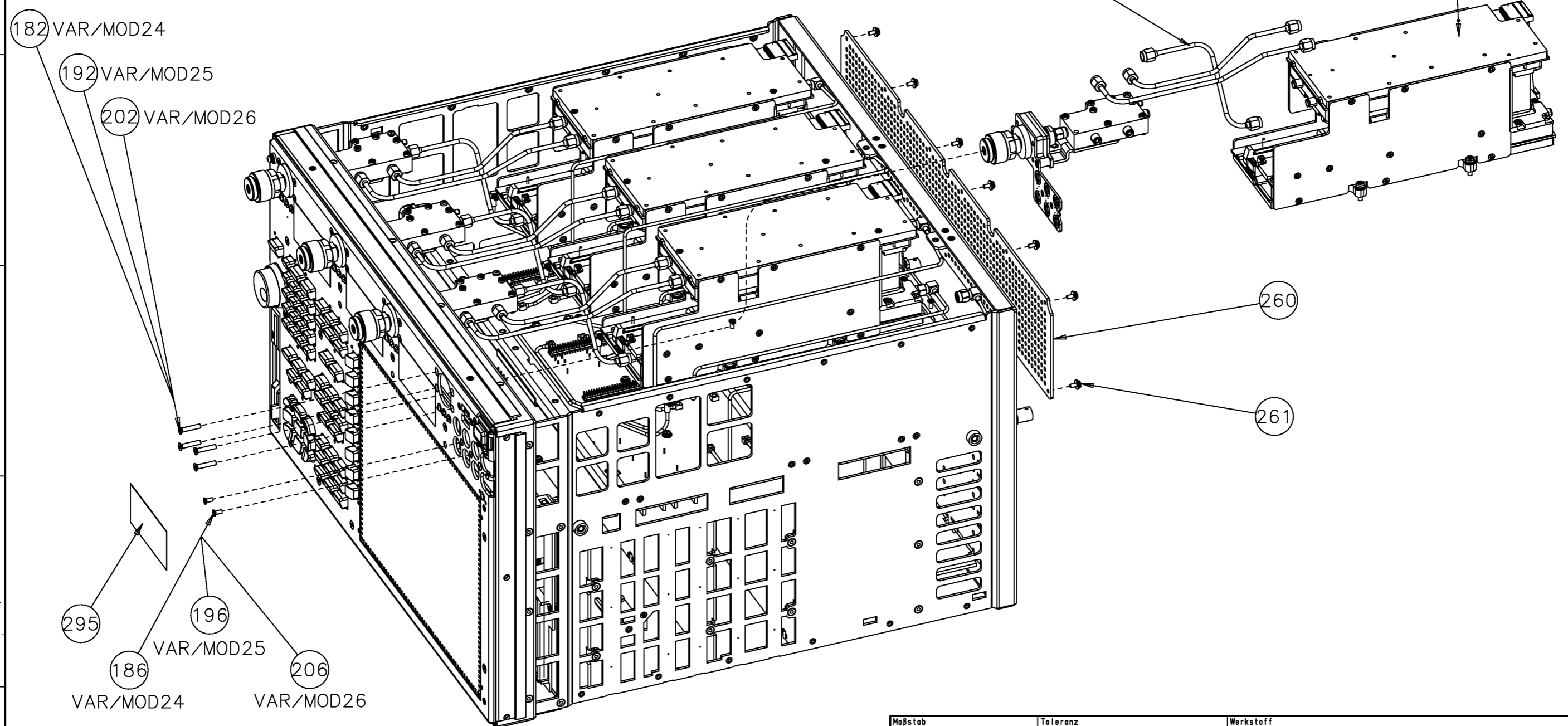


Montage/Demontage der Reflektometer (RM Unit ZVA24)/  
Installing/uninstalling reflectometers (RM Unit ZVA24)

Kabel zwischen Koppler/Eichleitung und RM Unit  
vor Demontage der RM Unit ZVA24  
entfernen und nach Montage  
RM Unit ZVA24 mit Optionen  
Kabel entsprechend Einbauanweisung  
montieren./  
Remove cable between coupler/Attenuator and RM unit  
prior to uninstalling the RM Unit ZVA24  
After installing of the RM Unit ZVA24 with options  
connect cable as described in installation instructions.

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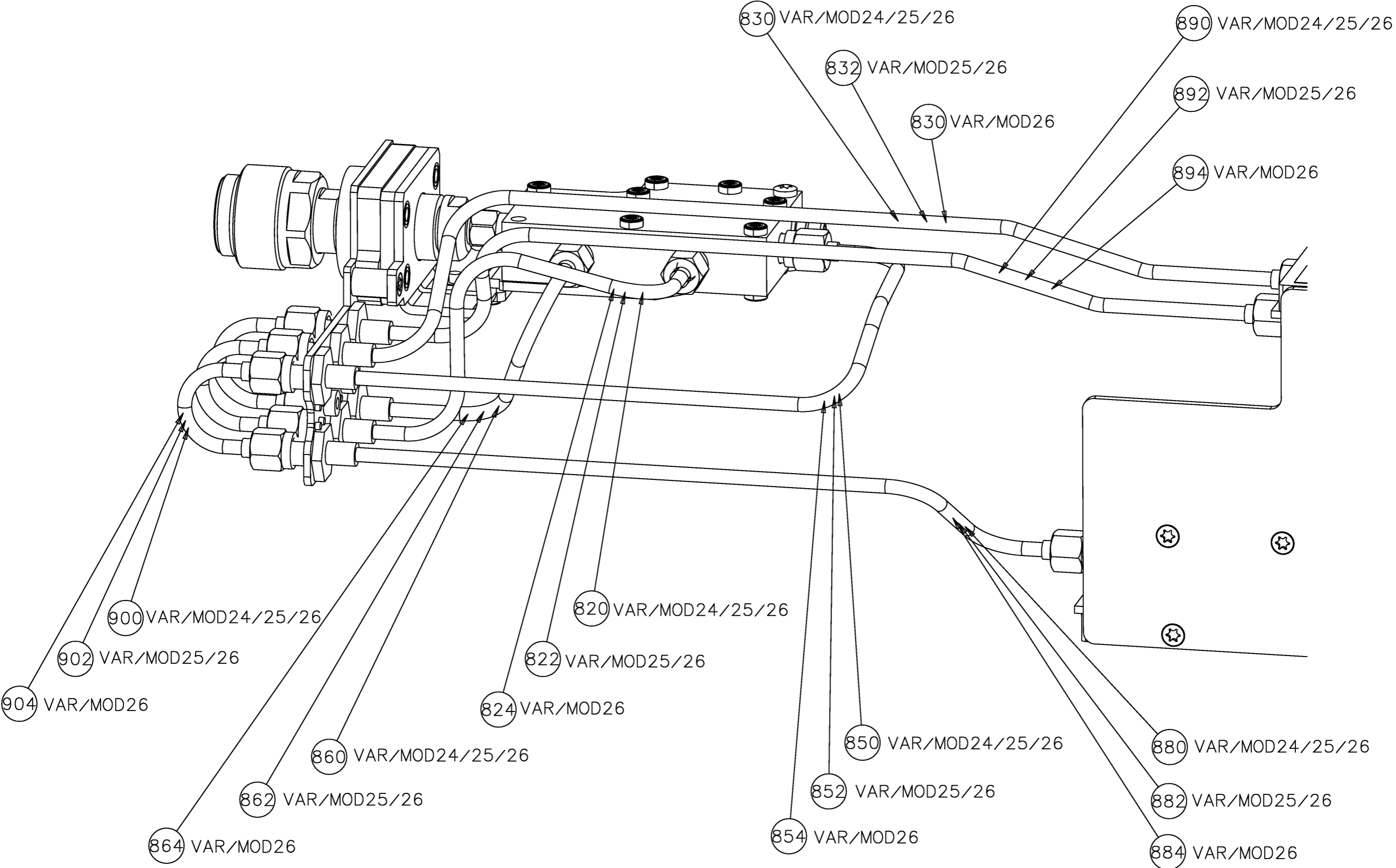
Projektions-  
methode  
Projection  
Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS ZVA24-B16 INSTALLATION MANUAL		de en	01.00	2
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-05	1ESK	WN/PA	1164.0267.00 D	



ZVA24-B16



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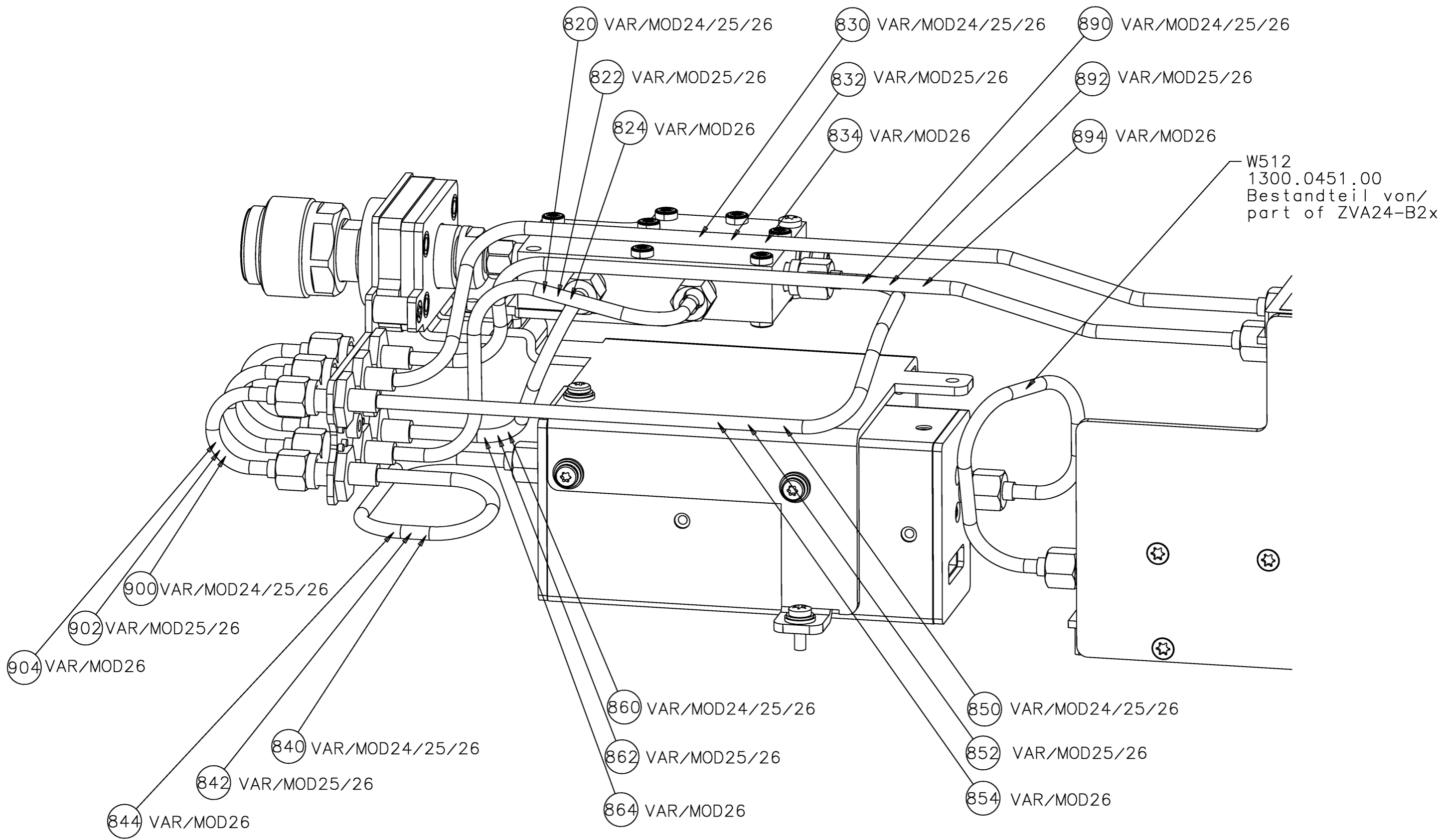
Projektions-  
methode  
Projection  
Method

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS ZVA24-B16 INSTALLATION MANUAL		de en	01.00	3
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-05	1ESK	WN/PA	1164.0267.00	D

# ZVA24-B16 mit/with ZVA24-B2x

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Projektions-  
methode  
Projection  
Method

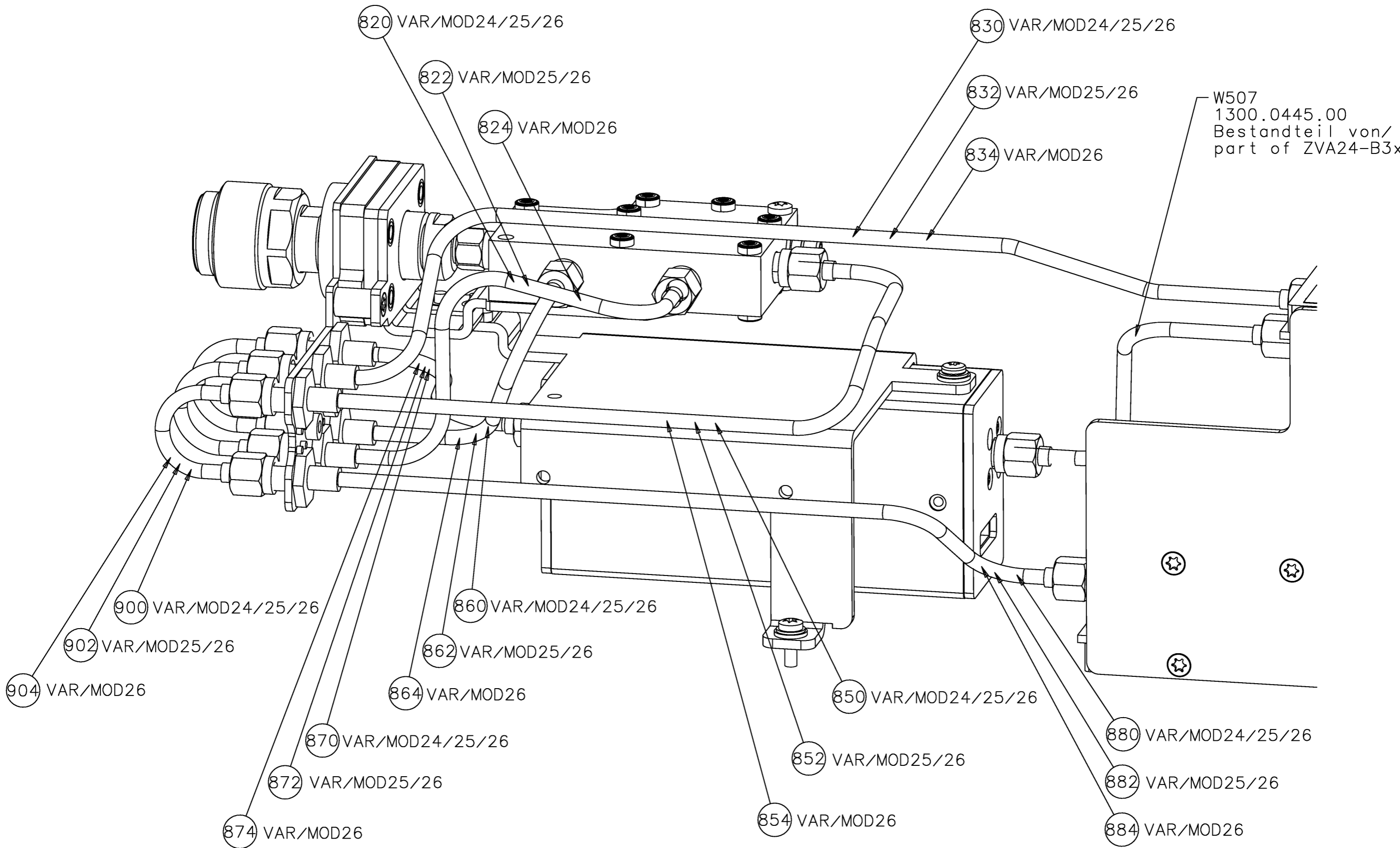


Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS ZVA24-B16 INSTALLATION MANUAL		de en	01.00	4
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-06	1ESK	WN/PA	1164.0267.00	D

# ZVA24-B16 mit/with ZVA24-B3x

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Projektions-  
methode  
Projection  
Method

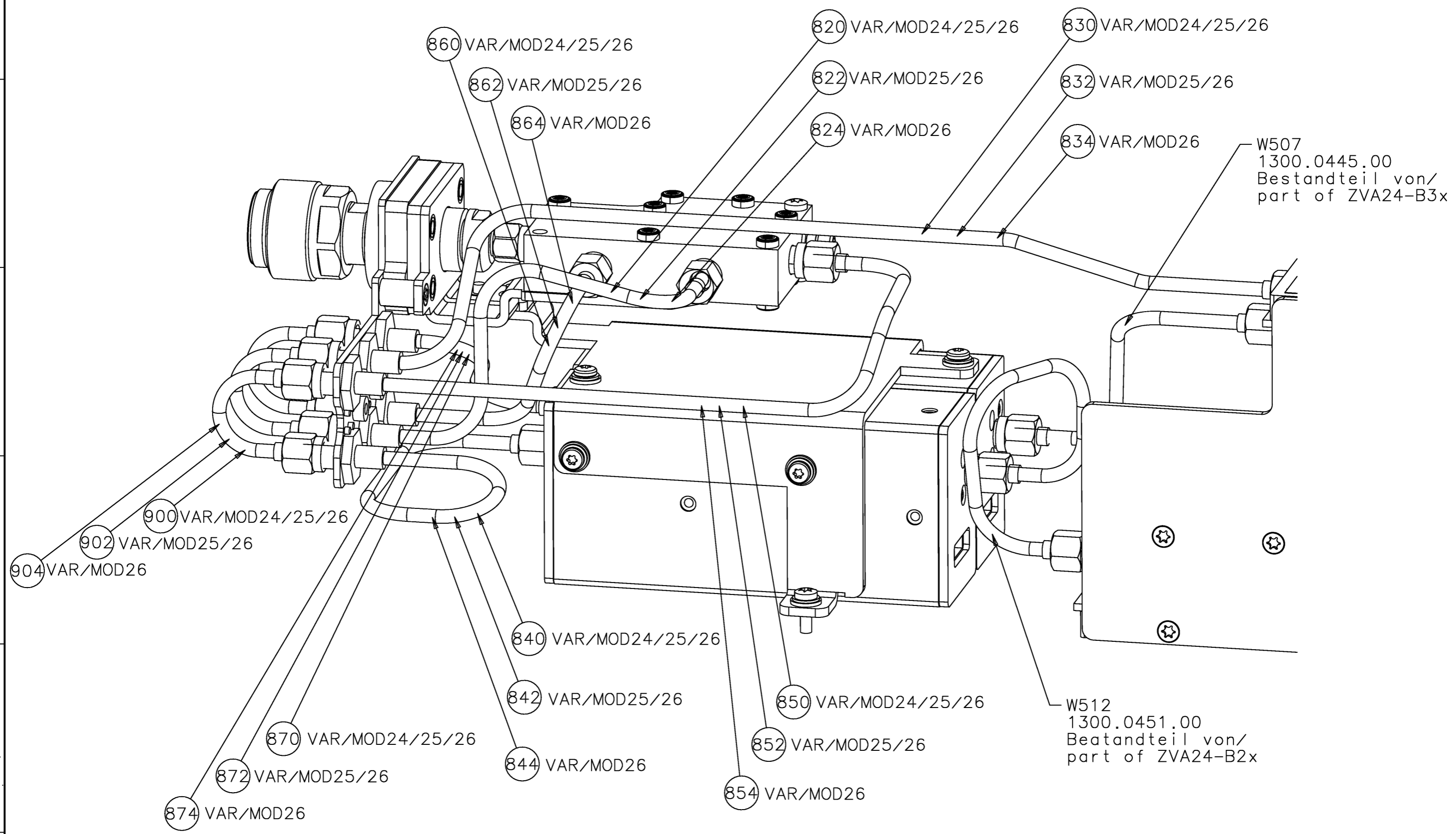


Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS ZVA24-B16 INSTALLATION MANUAL		de en	01.00	5
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-06	1ESK	WN/PA	1164.0267.00 D	

ZVA24-B16 mit/with ZVA24-B2x und/and ZVA24-B3x

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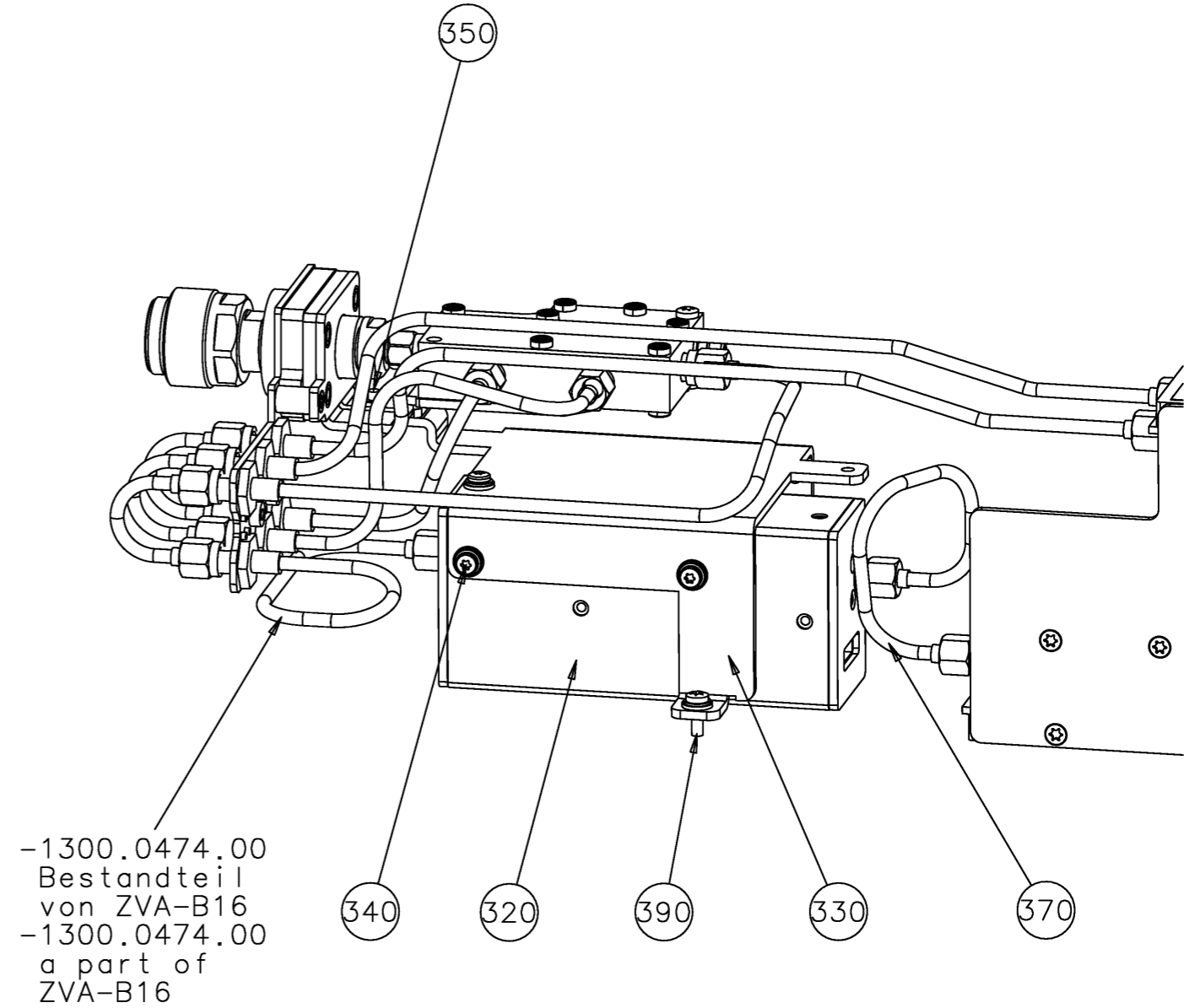
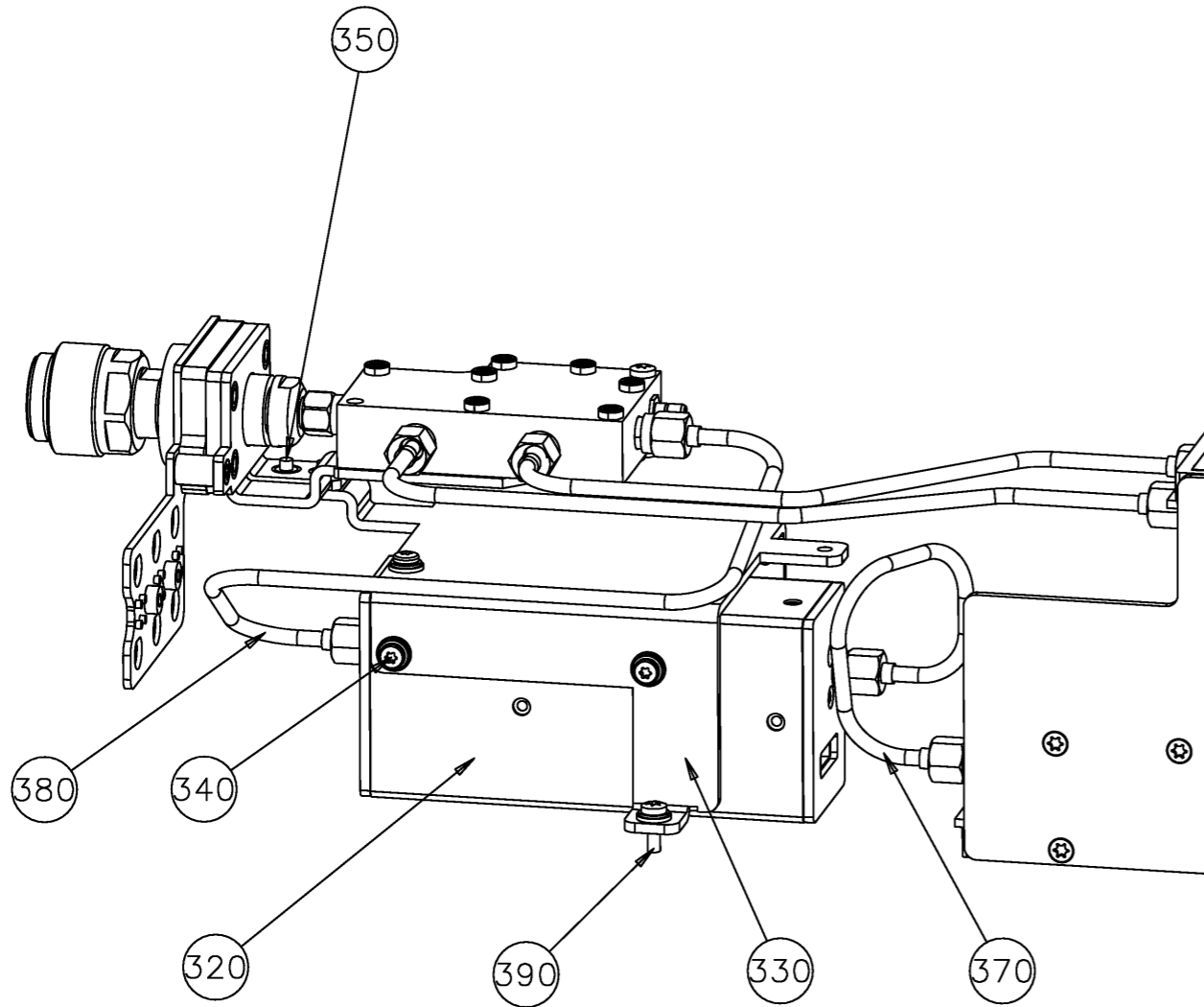
Projektions-  
methode  
Projection  
Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS ZVA24-B16 INSTALLATION MANUAL		de en	01.00	6
ZVA	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-06	1ESK	WN/PA	1164.0267.00	D

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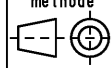
Projektions-  
methode  
Projection  
Method

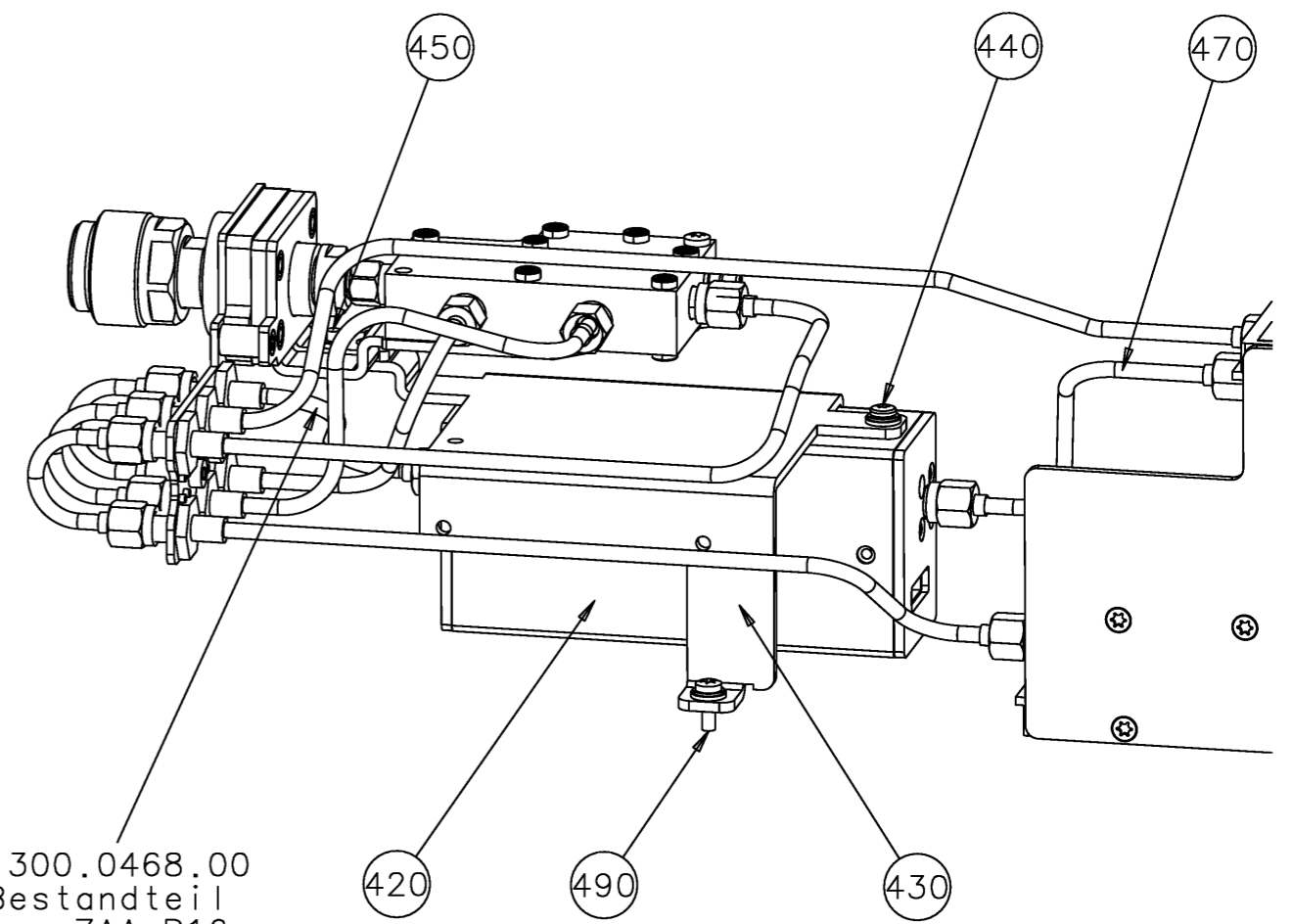
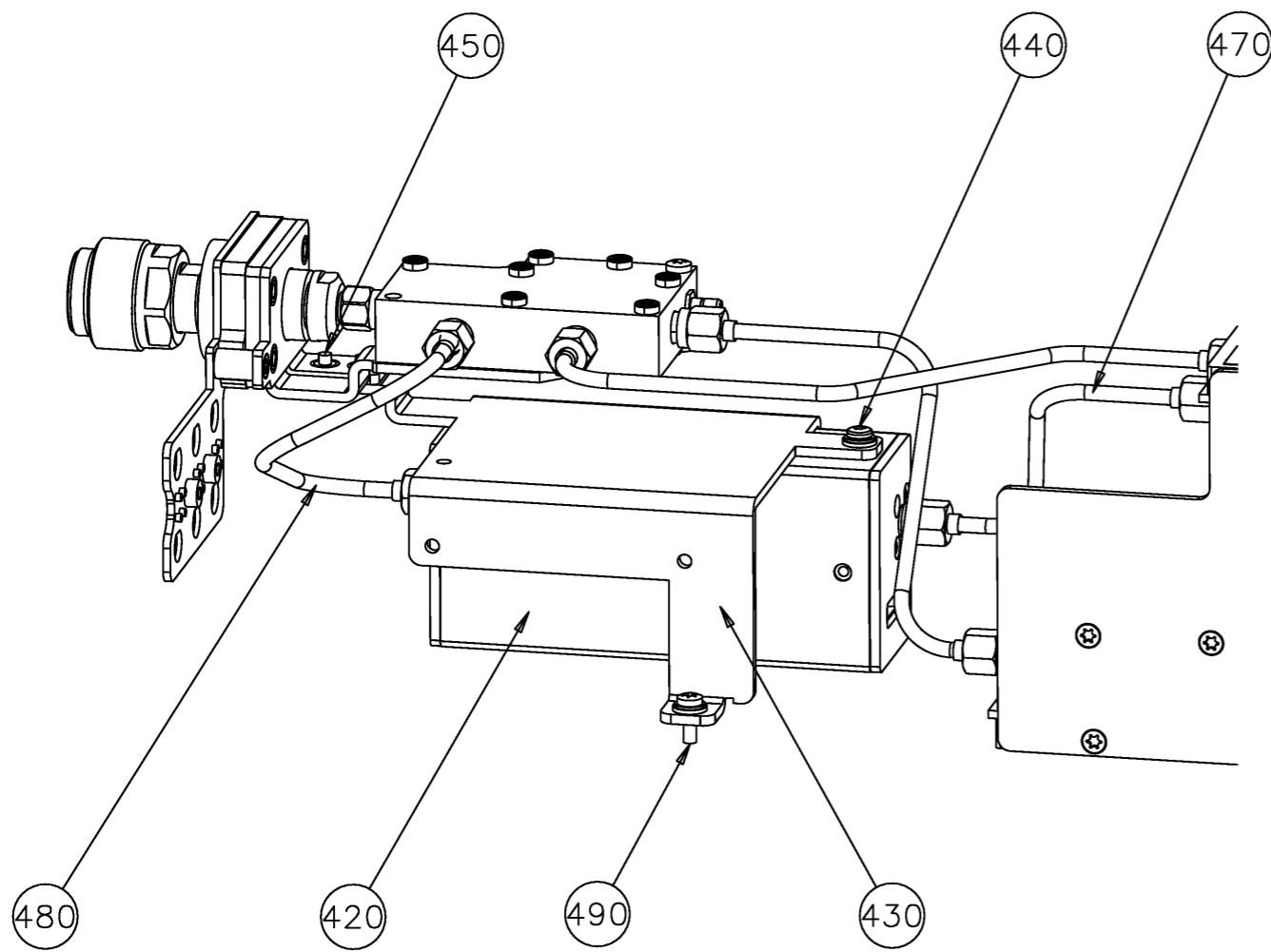


Pos.360 nicht dargestellt  
Pos.360 not shown

Maßstab Scale	Toleranz Tol.	Werkstoff Material		
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction			Sprache / Lang. Aei. / C.I. de en 01.00
ZVA-BXX	Datum Date	Abteilung Dept.	Name Name	Blatt / Sh. 3
	2005-08-31	1ESK	WN/PA	Zeichn.Nr. / Drawing No. 1164.0215.00

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Projektions-  
 methode  
  
 Projection  
 Method




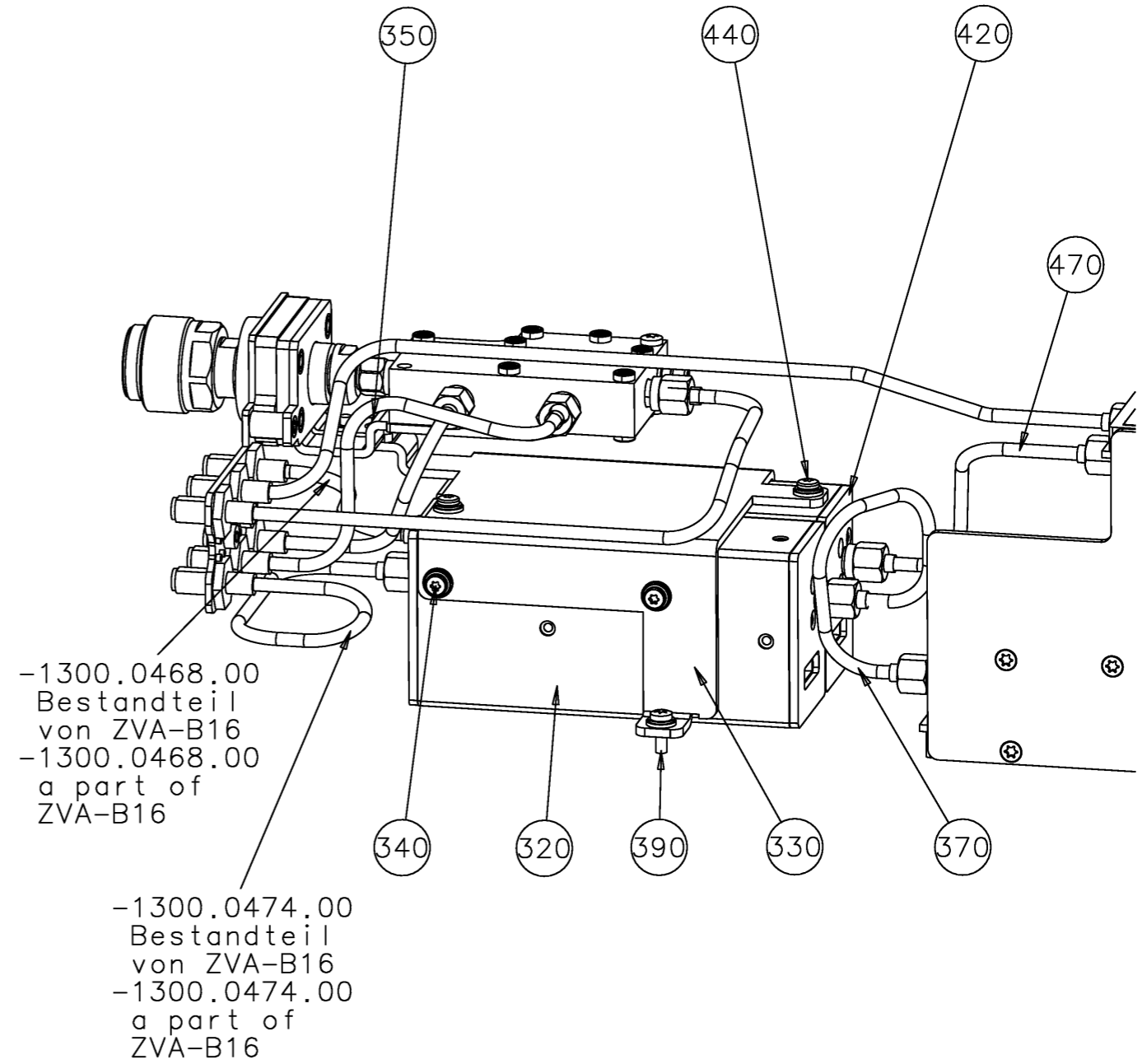
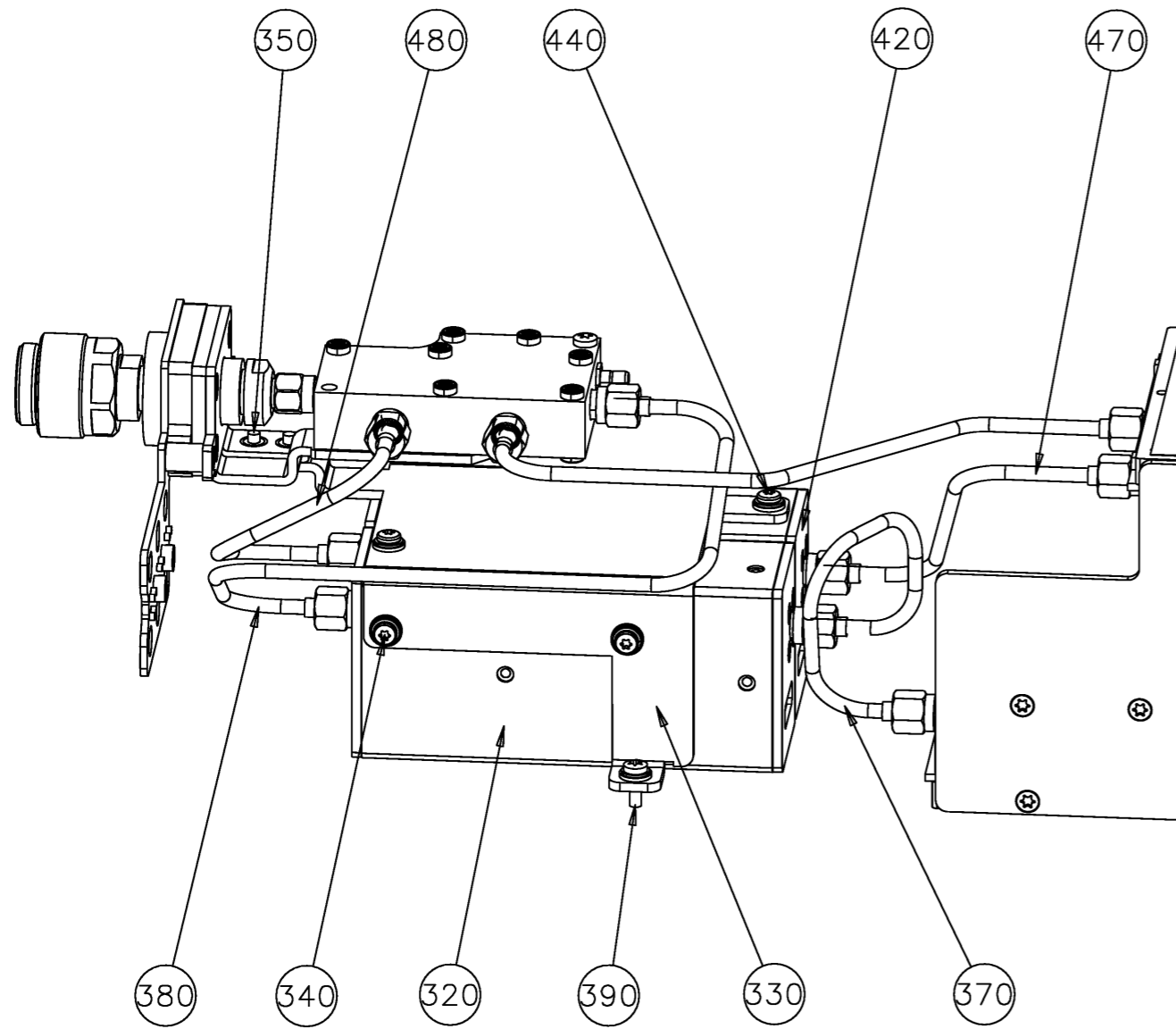
-1300.0468.00  
 Bestandteil  
 von ZAA-B16  
 -1300.0468.00  
 a part of  
 ZAA-B16

Pos. 460 nicht dargestellt  
 Pos. 460 not shown

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. / Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	4
ZVA-BXX	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-08-30	1ESK	WN	1164.0215.00	D

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Projektions-  
 methode  
  
 Projection  
 Method

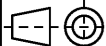


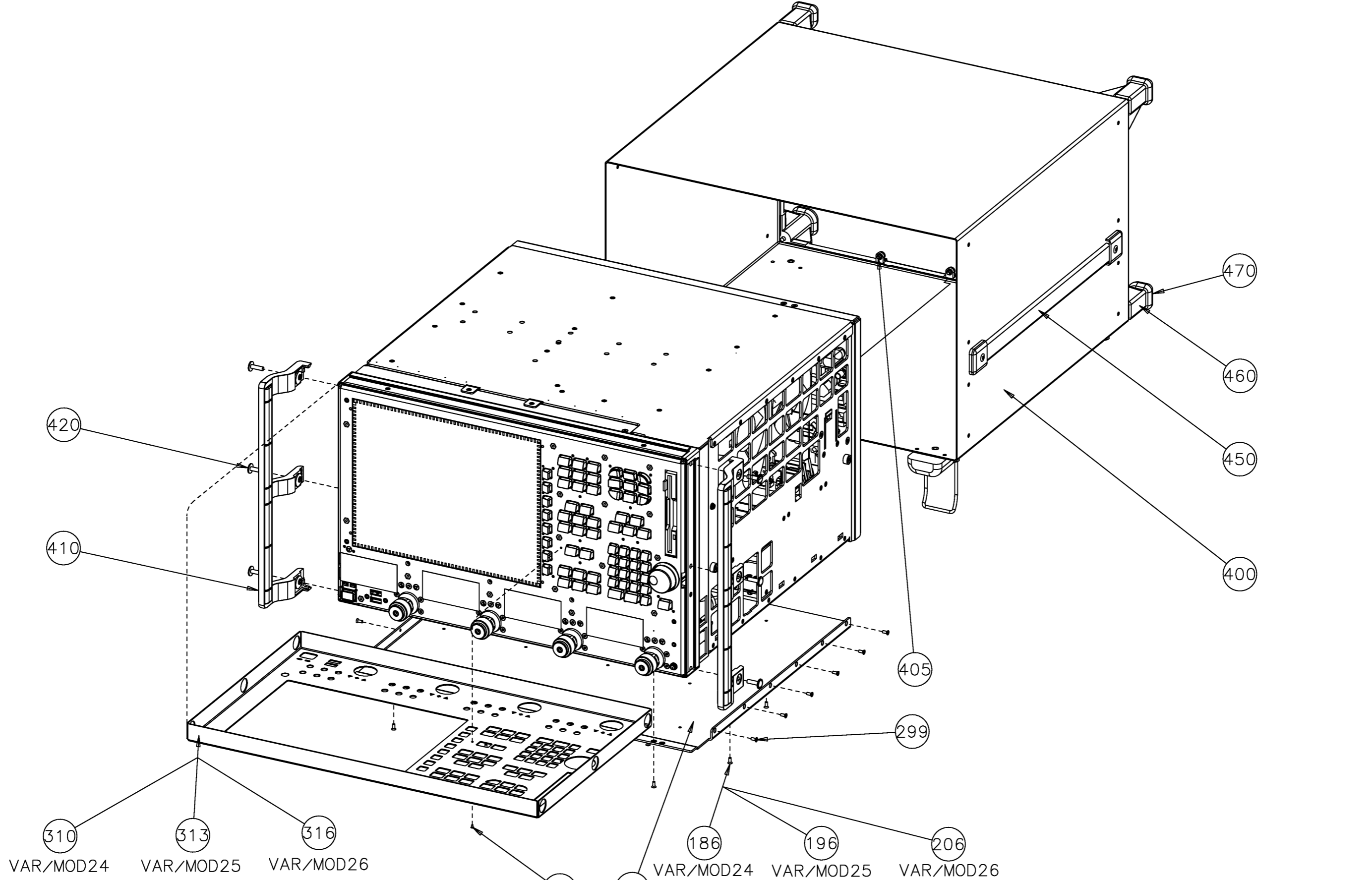
Pos.360 und 460 nicht dargestellt  
 Pos.360 and 460 not shown

Pos. 430,450 und 490 werden nicht benoetigt  
 Pos. 430,450 und 490 will be not required

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	5
ZVA-BXX	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-08-30	1ESK	WN/PA	1164.0215.00 D	

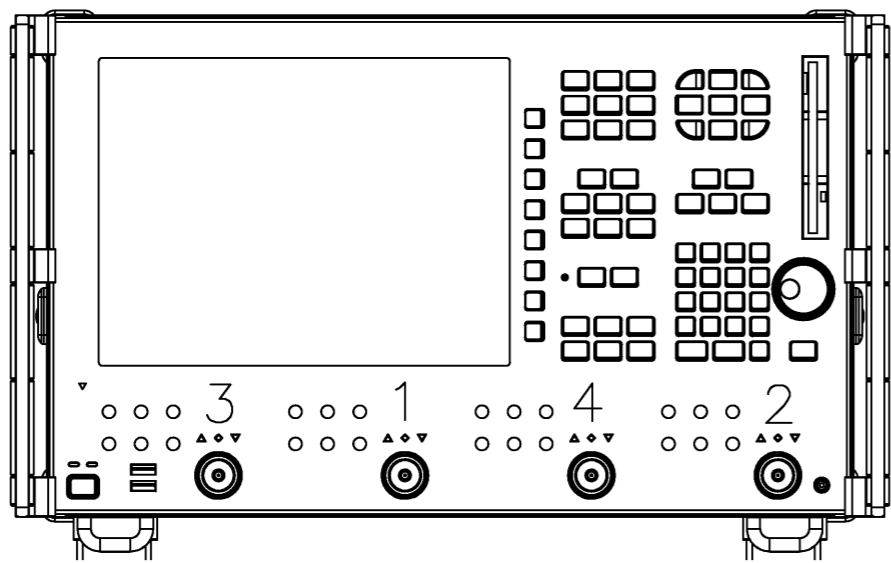
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Projektions-  
 methode  
  
 Projection  
 Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	1
ZVA24-BXX	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-01	1ESK	WN/PA	1164.0221.00	D



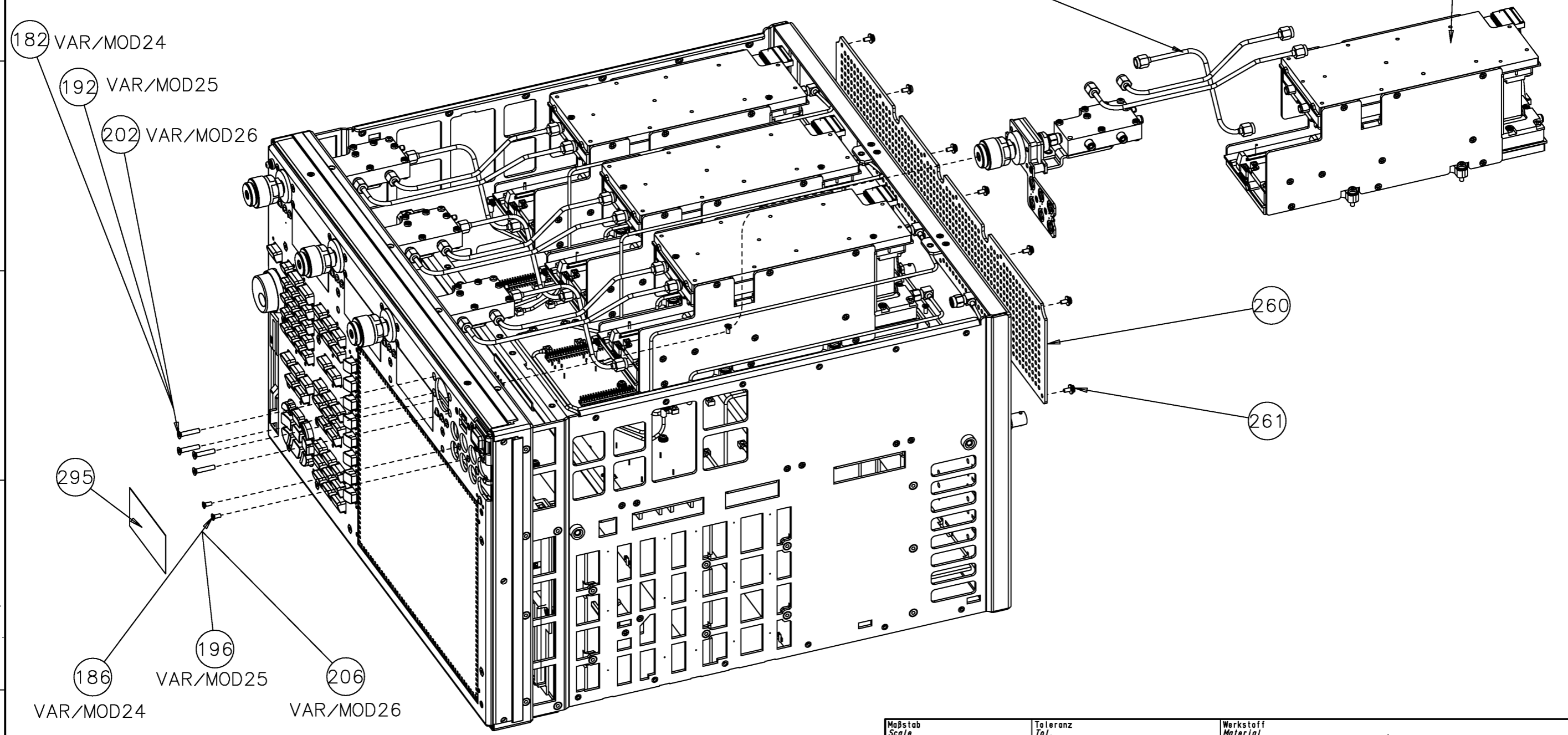


Montage/Demontage der Reflektometer (RM Unit ZVA24)/  
Installing/uninstalling reflectometers (RM Unit ZVA24)

Kabel zwischen Koppler/Front und RM Unit  
vor Demontage der RM Unit ZVA24  
entfernen und nach Montage der  
RM Unit ZVA24 mit Optionen  
Kabel entsprechend Einbauanweisung  
montieren./  
Remove cable between coupler/front and RM unit  
prior to uninstalling the RM Unit ZVA24  
After installation of the RM Unit ZVA24 with options  
connect cables as described in installation instructions.

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Projektions-  
methode  
Projection  
Method



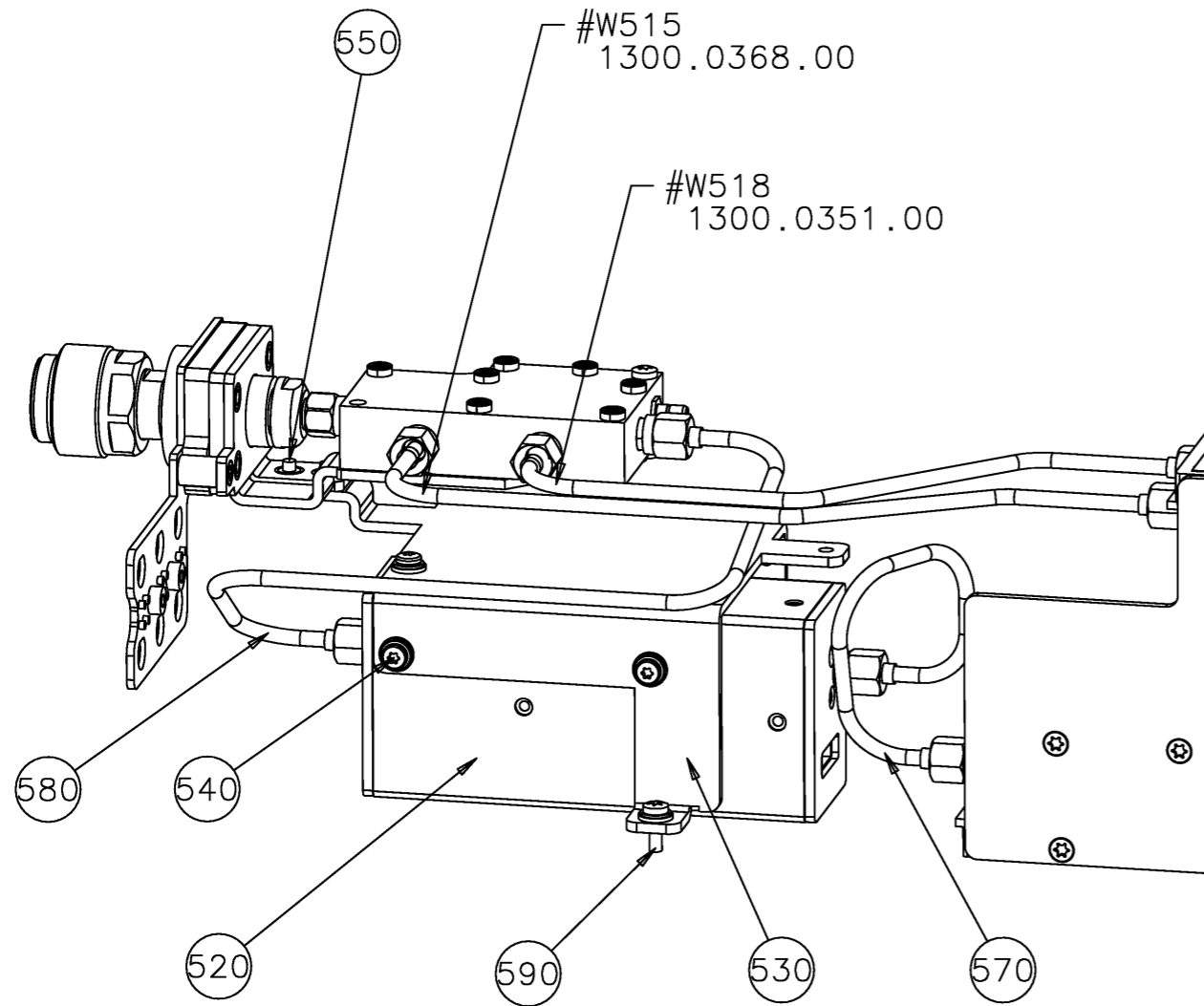
- 180 VAR/MOD24
- 190 VAR/MOD25
- 200 VAR/MOD26

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	2
ZVA24-BXX	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-09-05	1ESK	WN/PA	1164.0221.00	D

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Projektions-  
methode  
Projection  
Method

### ZVA24-B2X

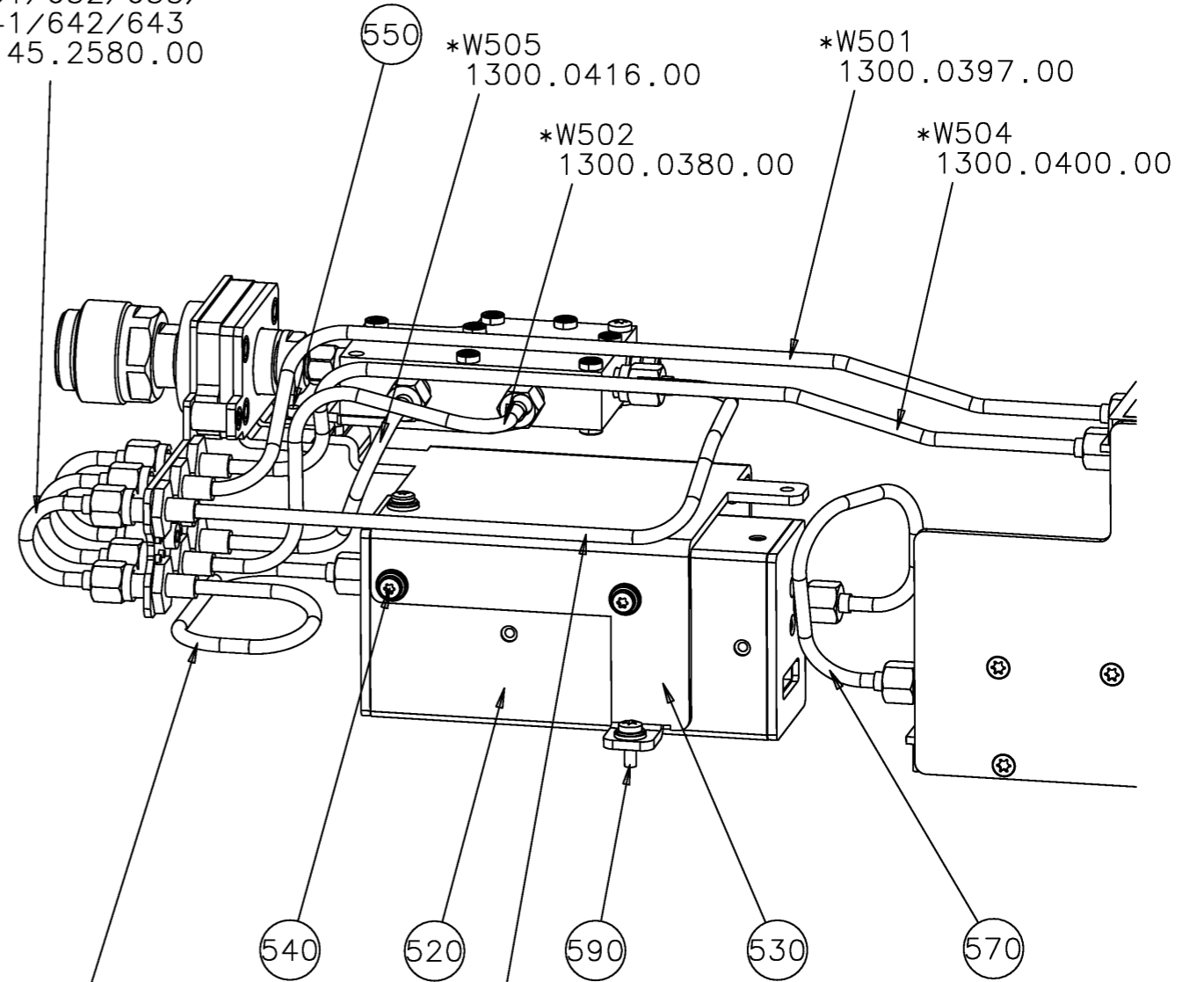


#Bestandteil von/  
part of RM Unit ZVA24

#Pos.560 nicht dargestellt  
Pos.560 not shown

### ZVA24-B2x mit/with ZVA24-B16

\*W611/612/613  
621/622/623/  
631/632/633/  
641/642/643  
1145.2580.00



\*W513  
1300.0474.00

\*W534  
1300.0422.00

\*Bestandteil von/  
part of ZVA24-B16

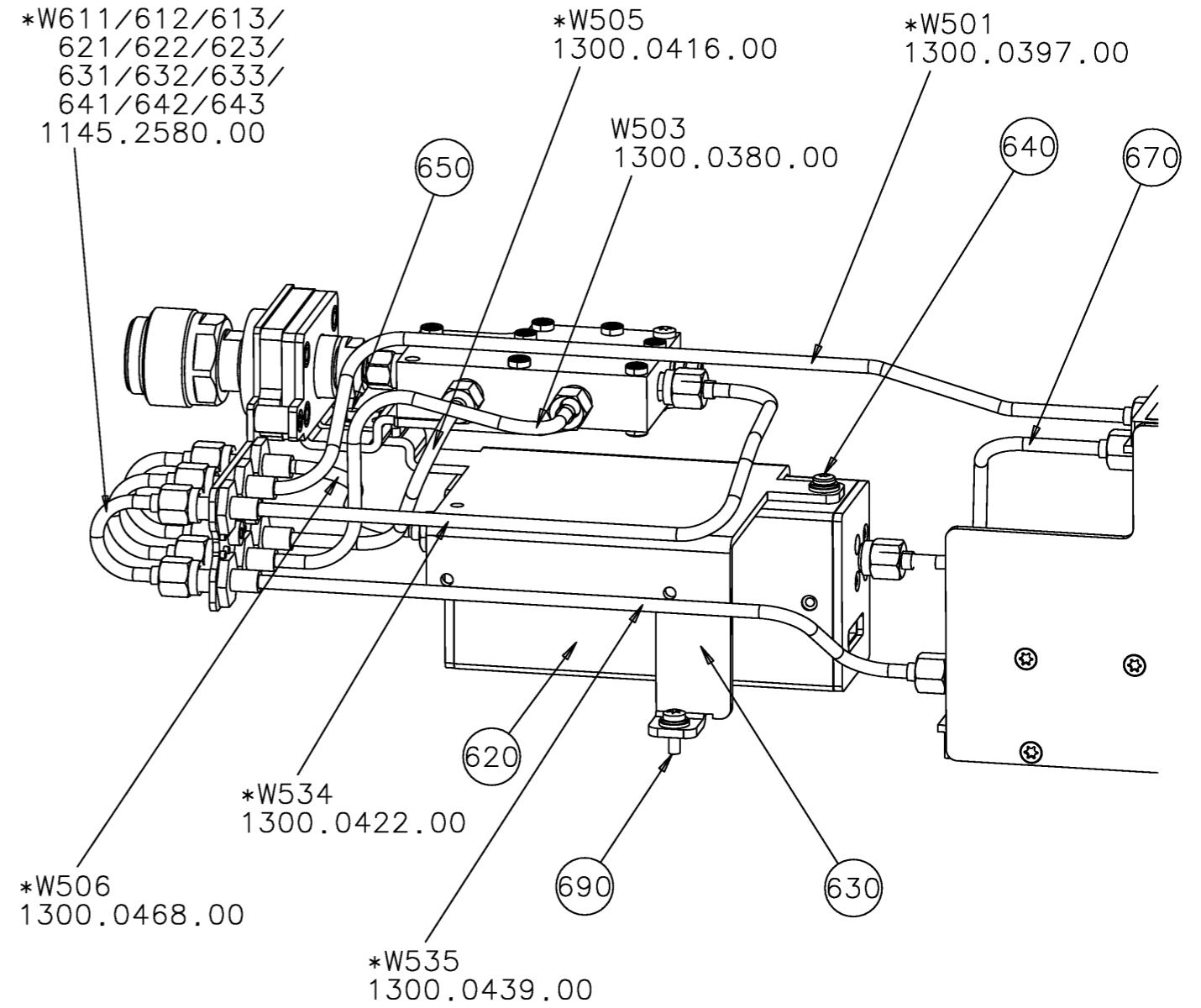
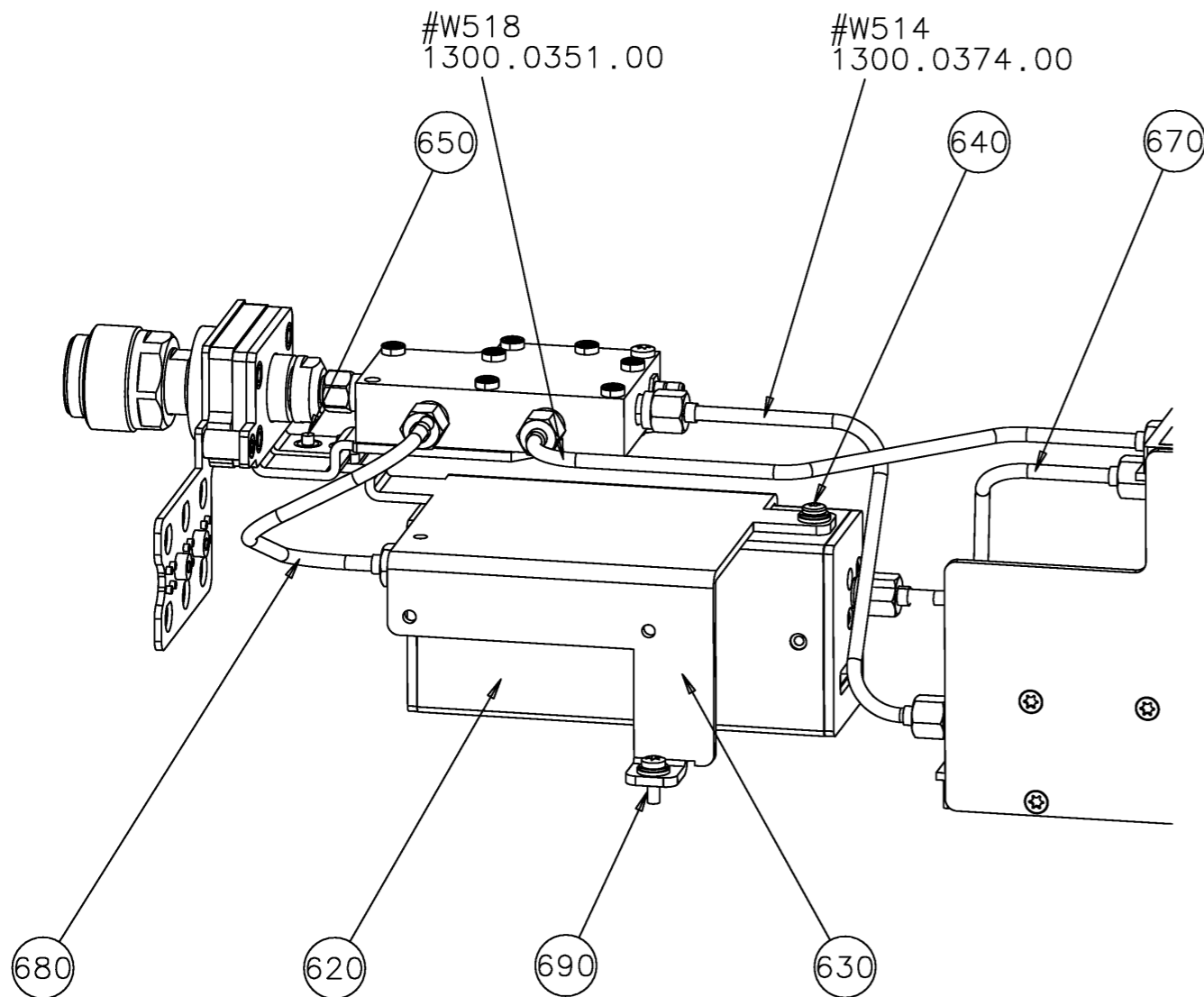
Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	3
ZVA24-BXX	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-08-31	1ESK	WN/PA	1164.0221.00	D

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Projektions-  
methode  
Projection  
Method

ZVA24-B3x

ZVA 24-B3x mit/with ZVA24-B16



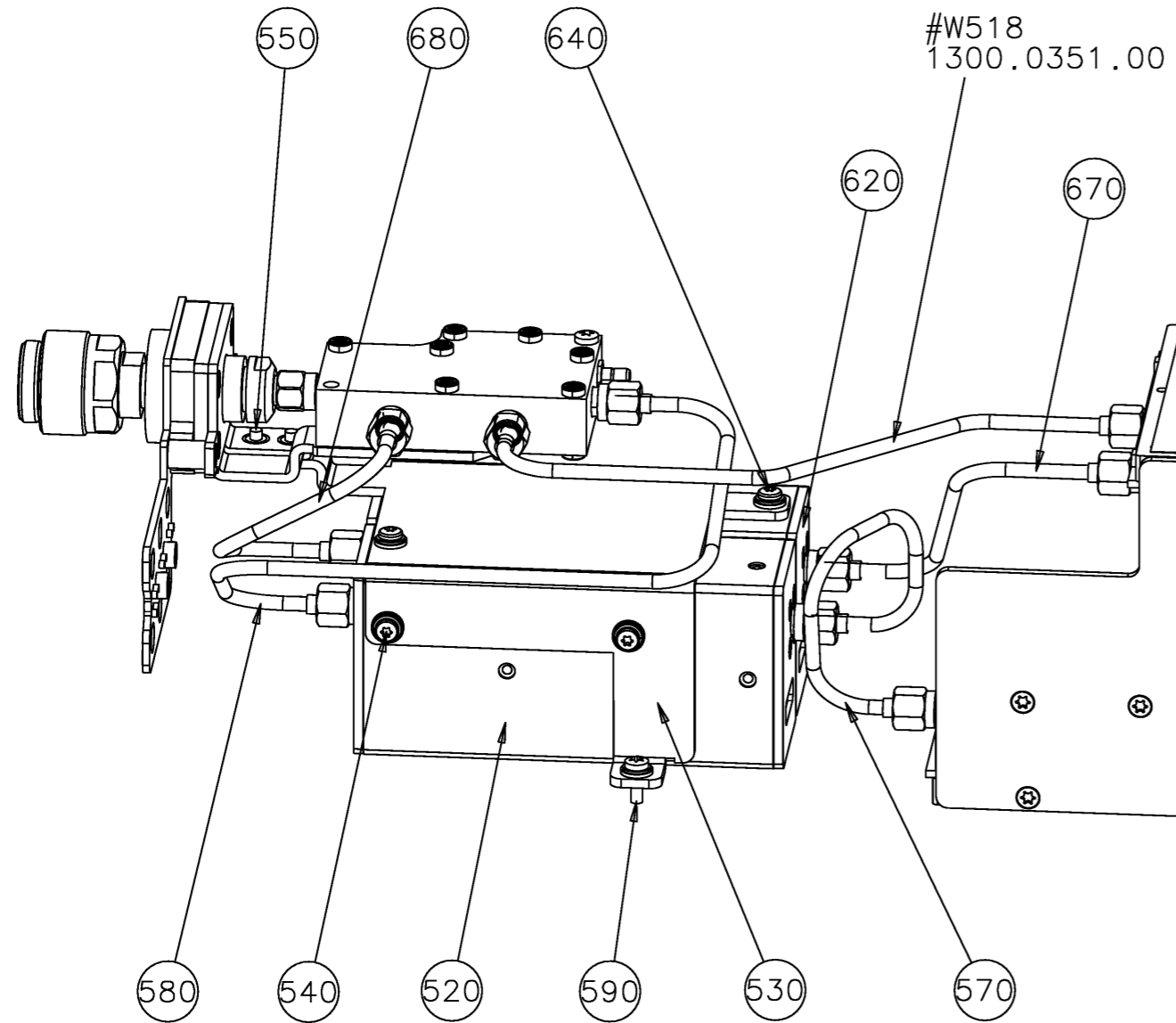
#Bestandteil von/  
part of RM unit ZVA24

\*Bestandteil von/  
part of ZVA24-B16

#Pos. 660 nicht dargestellt  
Pos. 660 not shown

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	4
ZVA24-BXX	Datum Date	Abteilung Dept.	Zeichn.Nr. / Drawing No.		
	2005-08-30	1ESK	1164.0221.00		D
		Name Name	WN/PA		

ZVA24-B2x und/and ZVA24-B3x

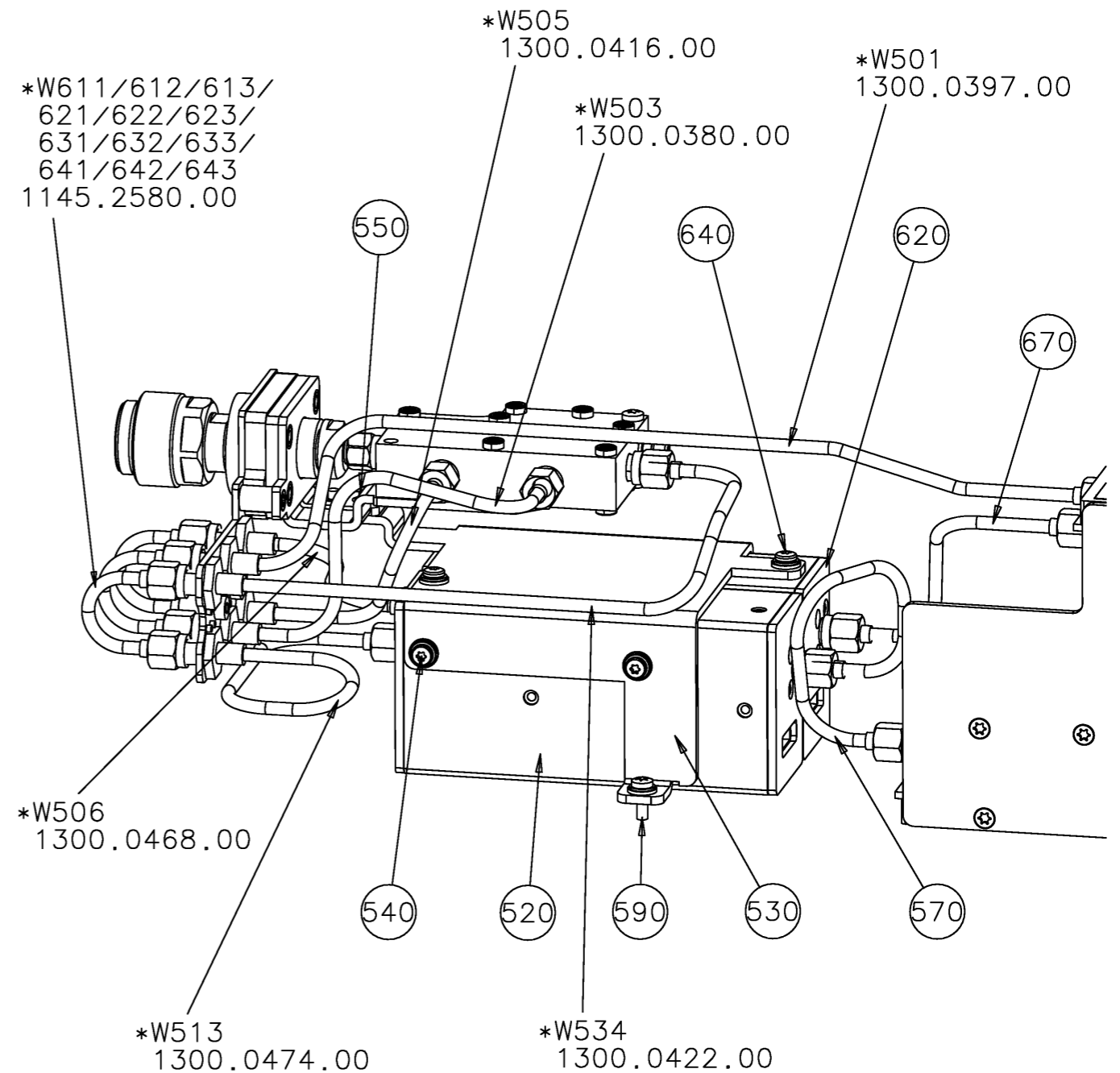


#Bestandteil von/  
part of RM unit ZVA24

#Pos. 560 und 660 nicht dargestellt  
Pos. 360 and 660 not shown

#Pos. 630, 650 und 690 werden nicht benoetigt  
Pos. 630, 650 und 690 will be not required

ZVA24-B2x und/and ZVA24 - B3x mit/with ZVA24-B16



\*Bestandteil von/  
part of ZVA24-B16

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Projektions-  
methode  
Projection  
Method

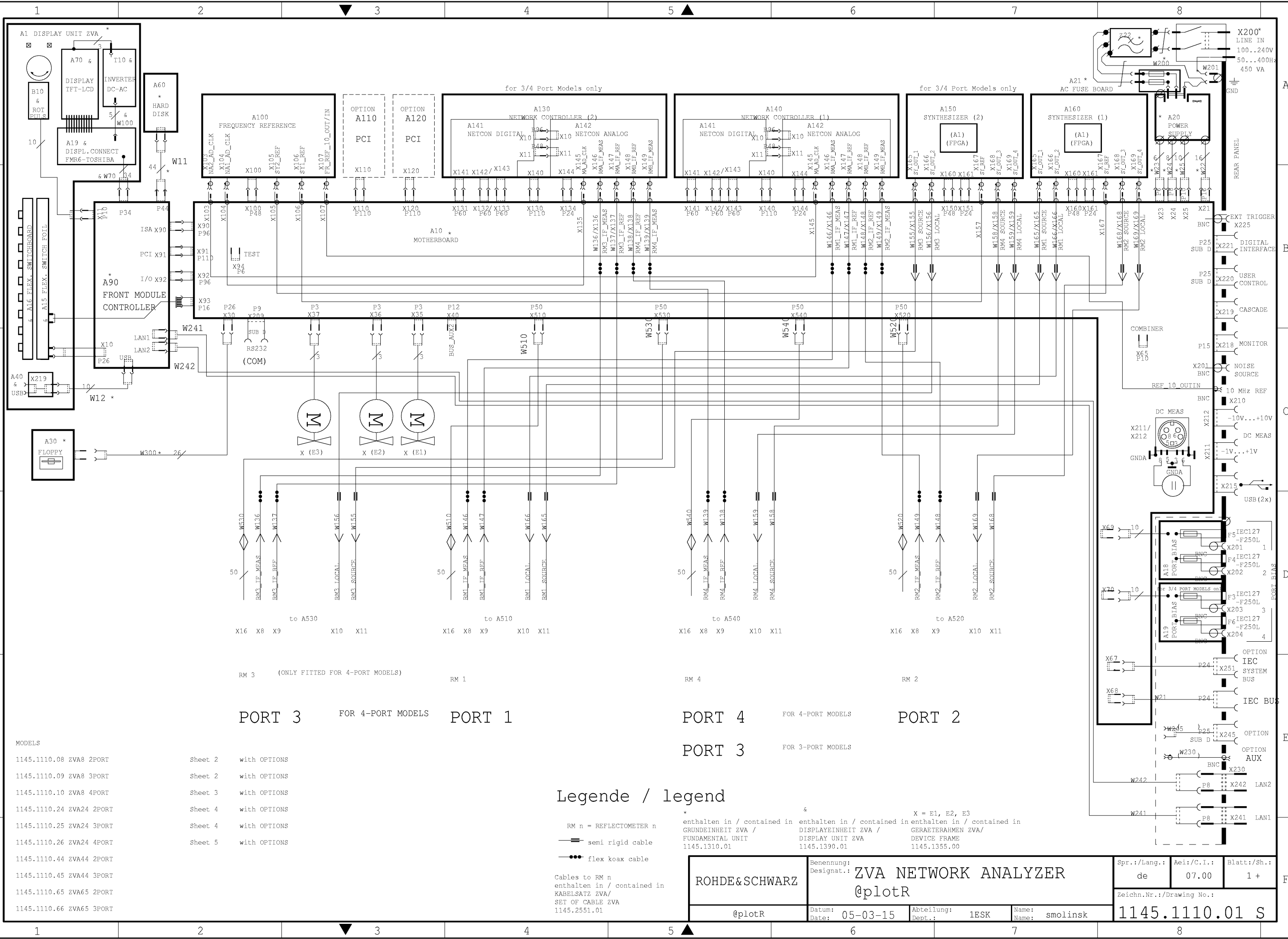
Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. Aei. / C.I.		Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation Einbauanweisung Assembly Instruction		de en	01.00	5
ZVA24-BXX	Datum Date	Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
	2005-08-30	1ESK	WN/PA	1164.0221.00	D



**ROHDE & SCHWARZ**

## **Circuit Diagram**

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MODELS	Sheet	with OPTIONS
1145.1110.08 ZVA8 2PORT	Sheet 2	with OPTIONS
1145.1110.09 ZVA8 3PORT	Sheet 2	with OPTIONS
1145.1110.10 ZVA8 4PORT	Sheet 3	with OPTIONS
1145.1110.24 ZVA24 2PORT	Sheet 4	with OPTIONS
1145.1110.25 ZVA24 3PORT	Sheet 4	with OPTIONS
1145.1110.26 ZVA24 4PORT	Sheet 5	with OPTIONS
1145.1110.44 ZVA44 2PORT		
1145.1110.45 ZVA44 3PORT		
1145.1110.65 ZVA65 2PORT		
1145.1110.66 ZVA65 3PORT		

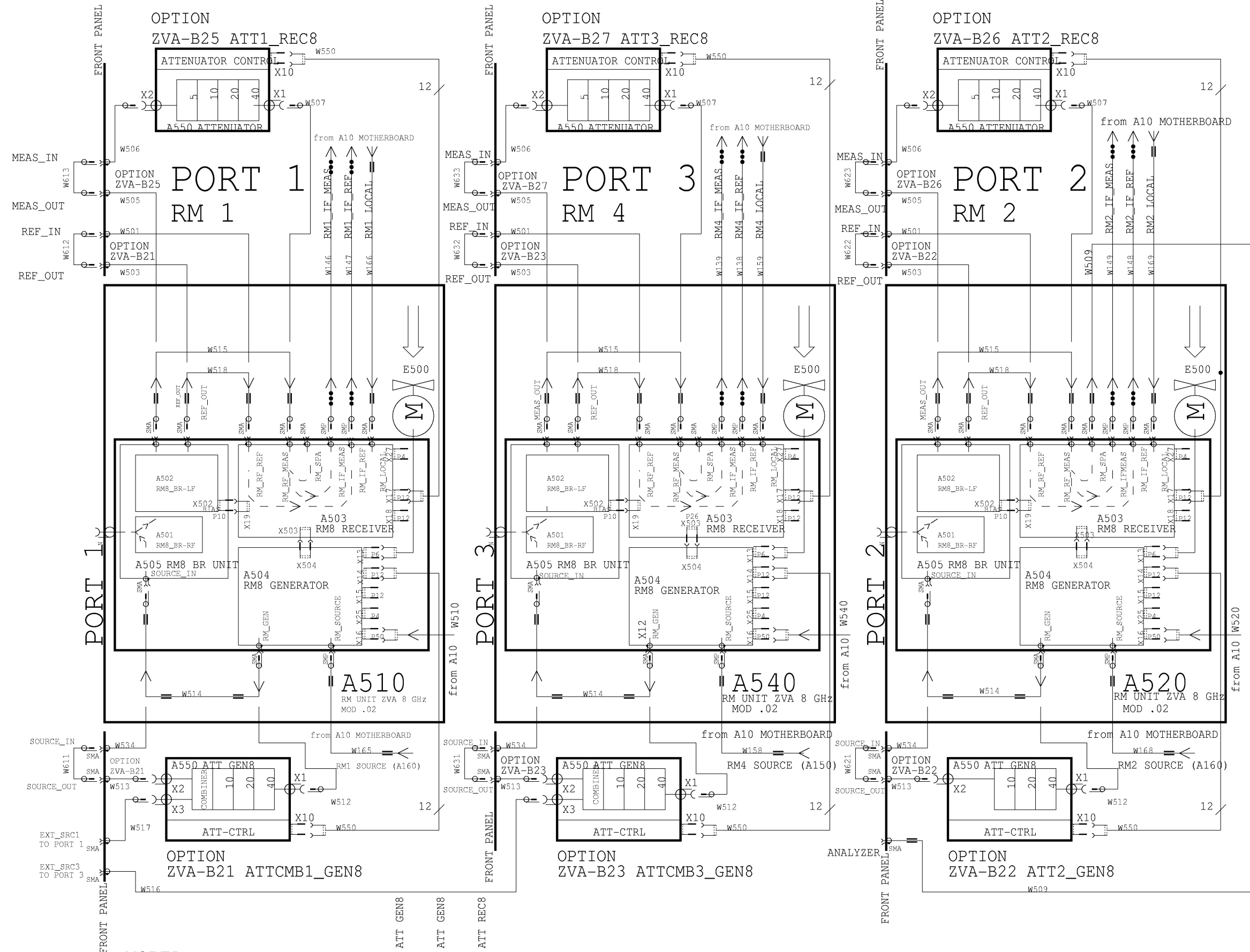
Legende / legend

- RM n = REFLECTOMETER n
- semi rigid cable
- flex koax cable
- \* enthalten in / contained in GRUNDEINHEIT ZVA / FUNDAMENTAL UNIT 1145.1310.01
- \* enthalten in / contained in DISPLAYEINHEIT ZVA / DISPLAY UNIT ZVA 1145.1390.01
- \* enthalten in / contained in GERAEETERAHMEN ZVA / DEVICE FRAME 1145.1355.00
- X = E1, E2, E3

Cables to RM n  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.01

ROHDE&SCHWARZ	Benennung: Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 07.00	Blatt:/Sh.: 1 +
	@plotR	Zeichn.Nr./Drawing No.: 1145.1110.01 S		
Datum: Date: 05-03-15	Abteilung: Dept.: IESK	Name: Name: smolinsk		

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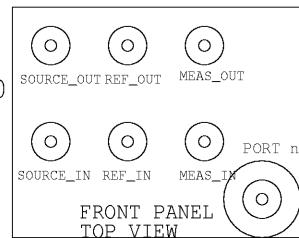


MODEL  
1145.1110.08  
ZVA8 2PORT

MODEL  
1145.1110.09  
ZVA8 3PORT

Ext Cables to A510, A520  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.08

Ext Cables to A510, A520, A540  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.09

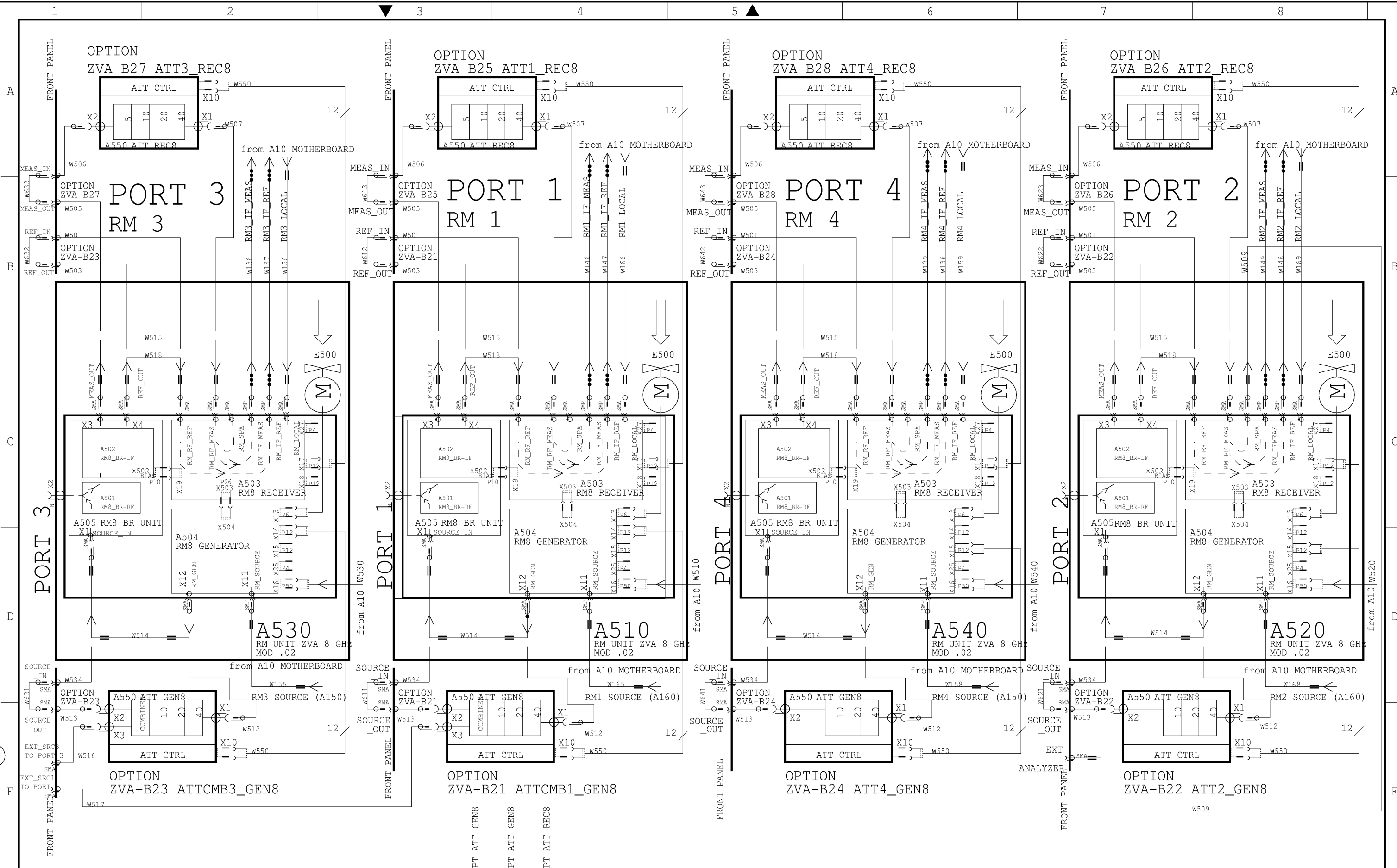


Legende / legend

- RM n = REFLECTOMETER n
- semi rigid cable
- flex coax cable

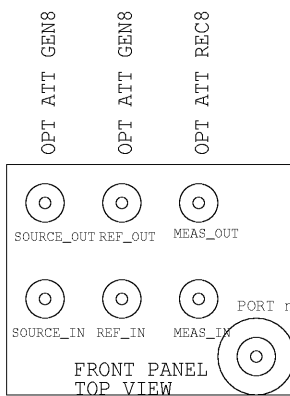
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	@plotR			Zeichn.Nr./Drawing No.: 1145.1110.01 S		
@plotR	Datum: Date: 05-03-15	Abteilung: Dept.: 1ESK	Name: Name: smolinsk			

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MODEL  
1145.1110.10  
ZVA8 4PORT

Ext Cables to A510, A520, A530, 540  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.10



Legende / legend

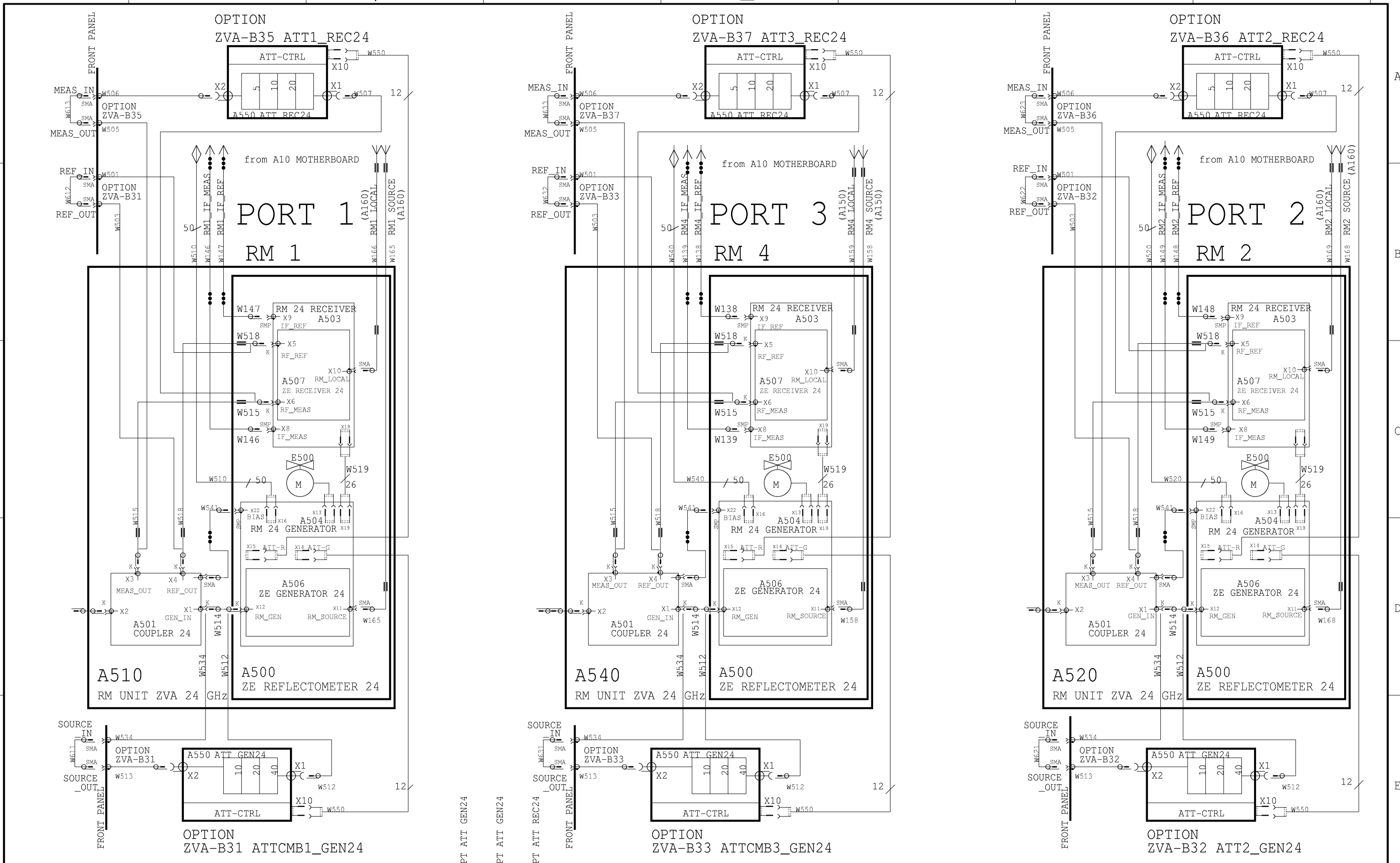
- RM n = REFLECTOMETER n
- semi rigid cable
- flex koax cable

MODEL  
1145.1110.10 ZVA8 4PORT

ROHDE&SCHWARZ @plotR	Benennung: Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 07.00	Blatt:/Sh.: 3 +
	Datum: Date: 05-03-15	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr./Drawing No.: 1145.1110.01 S

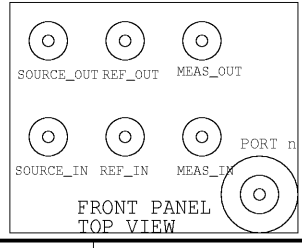


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MODEL 1145.1110.24 ZVA24 2PORT  
Ext Cables to A510, A520  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.24

MODEL 1145.1110.25 ZVA24 3PORT  
Ext Cables to A510, A520, A540  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.25



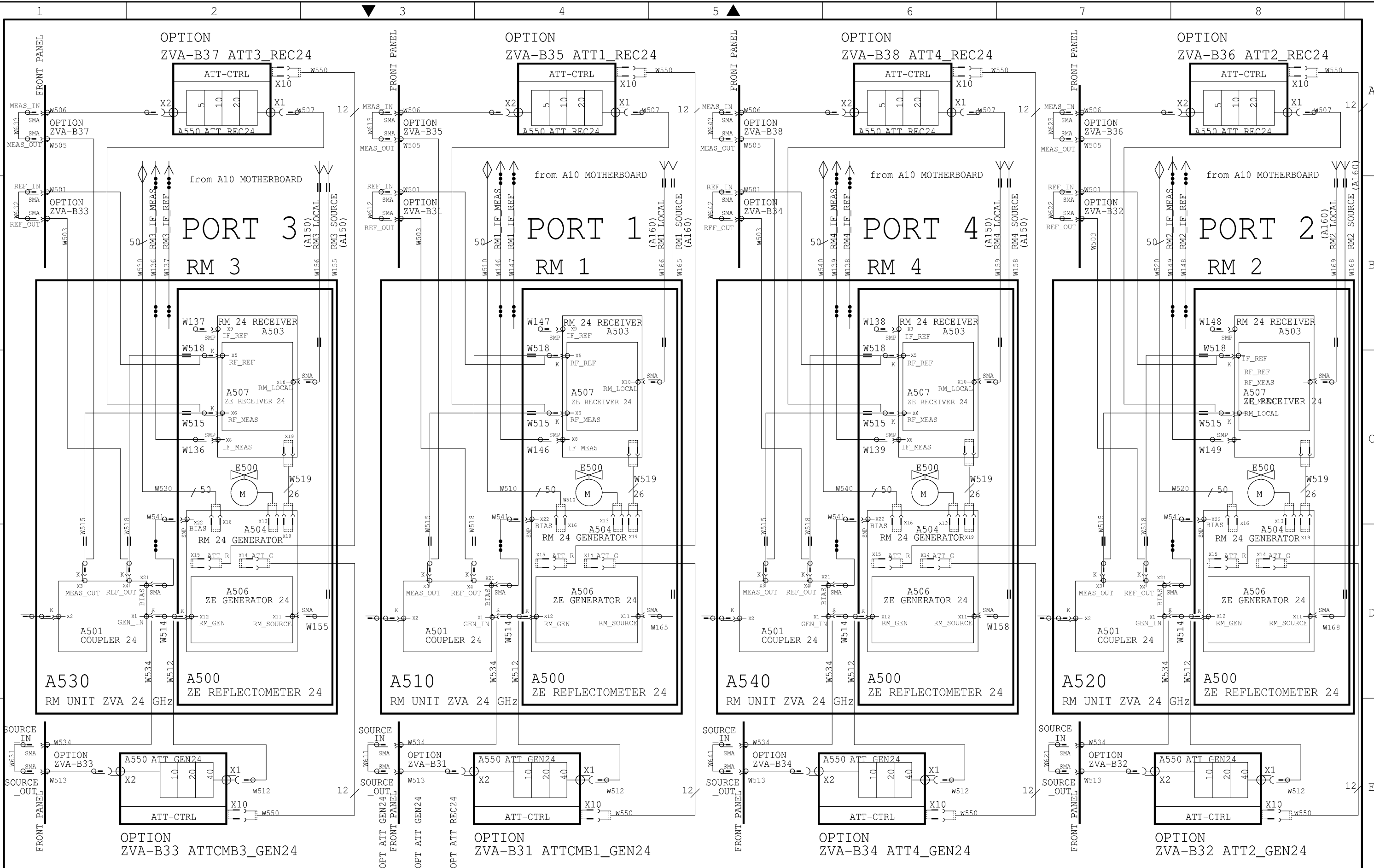
Legende / legend

RM n = REFLECTOMETER n  
— semi rigid cable  
••• flex koax cable

ROHDE&SCHWARZ @plotR	Benennung: Designat.: ZVA NETWORK ANALYZER @plotR		Spr./Lang.: de	Aei./C.I.: 07.00	Blatt./Sh.: 4 +
	Datum: Date: 05-03-15	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr./Drawing No.: 1145.1110.01 S	

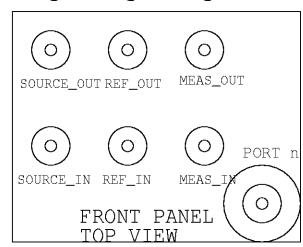
MODELS 1145.1110.24 ZVA24 2PORT  
1145.1110.25 ZVA24 3PORT

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MODEL 1145.1110.26  
ZVA24 4PORT

Ext Cables to A510, A520, A530, A540  
enthalten in / contained in  
KABELSATZ ZVA/  
SET OF CABLE ZVA  
1145.2551.26



Legende / legend

ROHDE&SCHWARZ	Benennung: Designat.: ZVA NETWORK ANALYZER @plotR			Spr.:/Lang.: de	Aei:/C.I.: 07.00	Blatt:/Sh.: 5 -
	Datum: Date: 05-03-15			Abteilung: Dept.: 1ESK		Name: Name: smolinsk
Zeichn.Nr./Drawing No.: 1145.1110.01 S						

MODEL 1145.1110.26 ZVA24 4PORT