Service Manual Instrument

Vector Network Analyzers

R&S® ZVA 8 / ZVA 24 / ZVA 40 / ZVA50 / ZVA67

1145.1110.08/10 / 24/26 / 40/42 / 50/52

1305.7002.02

ROHDE&SCHWARZ
Test and Measurement

1145.1155.82-05

Index

A

B

D

F

F

I

K

L

M

O

P

P

R

S

T

Contents of the Manuals for the ZVA Network Analyzer

Service manual - instrument

This service manual for the instrument contains information on checking specs, instrument alignment, repairs and troubleshooting. The service manual – instrument contains all the information you will need to repair the instrument by means of board replacement.

The service manual has four chapters and an annex (Chapter 5) which contains the instrument documentation:

Chapter 1 Contains all the information you will need to check specs and lists the test equipment required.

Chapter 2 Describes the manual alignment of the frequency and DC measurement accuracy, automatic alignment after board replacement and also system error calibration.

Chapter 3 Describes the instrument design and simple repair and troubleshooting strategies. Board replacement plays a key role.

Chapter 4 Contains information on expansions and modifications achieved by updating instrument software and by retrofitting options.

Chapter 5 Describes how to return the instrument and order spare parts. It also contains spare parts lists and exploded diagrams of the instrument.

Operating manual

The operating manual contains all the information you will need about the technical characteristics of the instrument, putting the instrument into operation, the basic operating procedures, controls and displays, menu operation and remote control.

By way of an introduction, typical measurement tasks are explained using menu screen-shots and program examples.

The operating manual also contains notes on maintenance and explains how to troubleshoot faults using the warnings and error messages output by the instrument.

Service and Repairs

Contact your Rohde & Schwarz Service Center or the Rohde & Schwarz Express Spare-Part Delivery Service to solve your service problems or to order spare parts and boards.

A list of Rohde & Schwarz representatives and the address of our Express Spare-Part Delivery Service can be found at the beginning of this service manual.

To help us process your queries rapidly and effectively, and to determine whether your instrument is still covered by warranty, we need the following information:

- Instrument model
- Serial number
- Firmware version
- If repairs are to be made, the description of the fault should be as accurate as possible
- Contact person to answer any questions that may arise

Rohde & Schwarz offers the following calibration services:

- Calibration on R&S's own test systems. The calibration documentation meets the requirements of the ISO 9000 quality management system.
- Calibration in an R&S-based, accredited calibration laboratory. The calibration documentation comprises the calibration certificate.
  The calibration documentation meets the requirements of the ISO 17025 quality management system.

Chapter 5 describes in detail the procedure for returning your instrument and the procedure for ordering spare parts.

Table of Contents - Chapter 1 "Performance Test"

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**]
#	Represents the number of the PORT under test, e.g. **1** for PORT 1.

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 (2σ): 0.06 dB c) Frequency response: 50 MHz to 4 GHz: < 1 dB 4 GHz to 8 GHz: < 1.5 dB 8 GHz to 22 GHz: < 2 dB 22 GHz to 40 GHz: < 2.5 dB 40 GHz to 50 GHz: < 3 dB	R&S FSU 26 R&S FSU 40 R&S FSU 50 R&S FSU 67		Frequency accuray Harmonics Output linearity Input linearity
2	Power meter		R&S NRP + Sensor		Max output power Accuracy of output power Power measurement accuray
3	Power sensor	300 kHz to 8 GHz	R&S NRP-Z51		Max output power Accuracy of output power Power measurement accuray on R&S ZVA8
3	Power sensor	10 MHz to 24 GHz	R&S NRP-Z52		Max output power Accuracy of output power Power measurement accuray on R&S R&S ZVA24
3	Power sensor	10 MHz to 40 GHz	R&S NRP-Z55		Max output power Accuracy of output power Power measurement accuray on R&S ZVA40
3	Power sensor	10 MHz to 50 GHz	R&S NRP-Z56		Max output power Accuracy of output power Power measurement accuray on R&S ZVA50
3	Power sensor	10 MHz to 67 GHz	R&S NRP-Z57		Max output power Accuracy of output power Power measurement accuray on R&S ZVA67
4	Calibration kit	N, 50 Ω, DC to 18 GHz	R&S ZV-Z270	5011.6536.02	Input linearity Matching port 1 to port 4 Input noise level on R&S ZVA8
4	Calibration kit	3.5mm, 50 Ω, DC to 26.5 GHz	R&S ZV-Z235	5011.6542.02	Input linearity Matching port 1 to port 4 Input noise level on R&S ZVA24
4	Calibration kit	2.92 mm, 50 Ω, DC to 40 GHz	R&S ZV-Z229	5011.6559.02	Input linearity Matching port 1 to port 4 Input noise level on R&S ZVA40
4	Calibration kit	2.4 mm, 50 Ω, DC to 50 GHz	R&S ZV-Z224	5011.6565.02	Input linearity Matching port 1 to port 4 Input noise level on R&S ZVA40 and R&S ZVA50

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
4	Calibration kit	1.85 mm, 50 Ω, 10 MHz to 67 GHz	R&S ZV-Z218	5011.6571.02	Input linearity Matching port 1 to port 4 Input noise level on R&S ZVA67
5	Signal generator	300 kHz to 40 GHz, Power = -40 dBm to 10 dBm	R&S SML01 R&S SMR40 with Option R&S SMR-B17	1090.3000.11 1104.0002.40 1104.5233.02	Power measurement accuray
5	Signal generator	40 GHz to 50 GHz, Power = -40 dBm to 00 dBm	R&S SMR50 with Option R&S SMR-B18	1134.9008.50 1135.2907.02	Power measurement accuray on R&S ZVA50 (40 to 50GHz)
6	Power splitter	N, 50 Ohm, Γ_{eq} < 0.05 (50 MHz to 8 GHz) Output tracking < 0.15 dB	Weinschel 1870A	-	Power measurement accuray
5	Power splitter	3.5mm, 50 Ohm, Output tracking < 0.25 dB	Weinschel 1593	-	Recording correction values on R&S ZVA24
6	Power splitter	2.92mm, 50 Ohm, Output tracking < 0.5 dB	Weinschel 1534	-	Power measurement accuray on R&S R&S ZVA40
6	Power splitter	1.85mm, 50 Ohm, Output tracking < 0.5 dB	Anritsu SC6778	-	Power measurement accuray on R&S R&S ZVA50
7	Test cable	Test cable N (m) to N (m).	R&S ZV-Z11	1085.6505.03	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement accuray on R&S ZVA8
7	Test cable	Test cable 3.5 mm (m) to 3.5 mm (f)	R&S ZV-Z14	1134.4093.02	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement accuray on R&S ZVA24
7	Test cable	Test cable 2.92 mm (f) to 2.92 mm (f) Order No. 23005066 Huber & Suhner		-	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement accuracy on R&S ZVA40
7	Test cable	Test cable 2.92 mm (m) to 2.92mm (f) Order No. 23005070 Huber & Suhner		-	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement accuracy on R&S ZVA40
7	Test cable	Test cable 2.4 mm (f) to 2.4mm (f) Order No. Huber & Suhner		-	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement accuracy on R&S ZVA40 and R&S ZVA50
7	Test cable	Test cable 2.4mm (m) to 2.4mm (f) Order No. Huber & Suhner		-	Power measurement accuracy on R&S ZVA40 and R&S ZVA50

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
7	Test cable	Test cable 1.85 mm (f) to 1.85mm (f)	R&S ZV-Z97	1301.7637.25	Frequency uncertainty Harmonics Matching port 1 to port 4 Power measurement accuracy on R&S ZVA67
7	Test cable	Test cable 1.85mm (f) to 1.85mm (m)	GORE EN0CB0CB0240	-	Power measurement accuracy on R&S ZVA67
8	BNC cable	Male – male, approx. 1.5 m			General: Device synchronisation
9	DC power supply	-12 V to +12 V	R&S NGSM 32/10	0192.0810.31	DC meas inputs
10	Multimeter	MU < 0.2%, DC range 1 V, 10 V	R&S URE3	0350.5315.03	DC meas inputs
11	Conn. Cables for DC inputs		R&S ZV-Z71	1164.1005.02	DC meas inputs

Performance Test

Compare with data sheet

Checking the Frequency Accuracyy

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:

- [**PRESET**]
- [**FREQ** : **1 GHz**]
- [**SPAN** : **100 kHz**]
- [**BW** : MANUAL RES BW : **2 kHz**]
- [**MARKER** : MARKER MODE : FREQ COUNT]
- [**AMPT** : REF LEVEL : **10 dBm**]

R&S® ZVA settings

- Select [**System** : Internal Reference]

- [**Preset**]
- [**Meas** :Wave Quantities: a1 Src Port 1]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **1 GHz**; Power : **0 dBm**]
- [**Sweep** : Single : **Restart**]

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 port#

Spectrum analyzer settings:

Note:
Synchronize the reference oscillators in the spectrum analyzer and in the R&S®ZVA.

- [**PRESET**]
- [**FREQ** : f_{GEN}, 2* f_{GEN}, 3* f_{GEN} *]
- [**SPAN** : ZERO SPAN]
- [**BW** : MANUAL RES BW : **1 kHz**]
- [**MARKER** : DETECTOR : RMS]
- [**AMPT** : REF LEVEL : **13 dBm**]

* For measurement frequencies, see Performance Test Report {fGEN}.

R&S® ZVA settings:

- [**Preset**]
- [**Meas** : Wave Quantities: a# Src Port #]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **{f_{GEN}*}** ; Power : **10 dBm**]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies, see Performance Test Report {fGEN}.

Measurement: Read off the levels L_{n*fgen} (n = 1, 2, 3) indicated by the spectrum analyzer’s markers.

Calculation:

$$\text{Harmonics} = L_{n*f\,gen} - L_{fgen} - \text{cable loss (in dB)}$$

The cable loss corresponds to the S_{21} of the test cable used between the fundamental and the measured harmonic (S_{21} is negative).

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 #
Power sensor settings:	For measurement frequencies, see Performance Test Report {f_{GEN}*}.
R&S®ZVA settings:	- [**Preset**] - [**Meas** :Wave Quantities: a# Src Port #] - [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}** ; Power : **-10 dBm**] - [**Mode** : ALC : **On**] - [**Sweep** : Single : **Restart**] * For measurement frequencies, see Performance Test Report {f_{GEN}}.
Measurement:	Read off the levels indicated by the power sensor Level deviation = L_{SENSOR} – (-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 #

Spectrum analyzer settings:

Note:
Synchronize the reference oscillators in the spectrum analyzer and in the R&S®ZVA :

- [**PRESET**]
- [**FREQ** : f_{GEN}*]
- [**SPAN** : ZERO SPAN]
- [**BW** : MANUAL RES BW : **1 kHz**]
- [**MARKER** : DETECTOR : RMS]
- [**AMPT** : REF LEVEL :**15 dBm**]

In case of optional generator step attenuators:
If ZVAB source level value < -25 dBm
- [**AMPT** : RF ATTEN : **5 dB**]
- [**AMPT** : REF LEVEL : **-20 dBm**]

* For measurement frequencies, see Performance Test Report {fGEN}.

R&S®ZVA settings:

- [**Preset**]
- [**Meas** : Wave Quantities: a# Src Port #]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **{f_{GEN}*}** ; Power : **{l_{GEN}*}**]
- [**Mode** : ALC : **On**]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies {fGEN} and levels {l_{GEN}}, see Performance Test Report

Measurement: Read the spectrum analyzer’s marker values (level L) .

Calculation: The measured values are referred to the level at the ZVA setting of -10 dBm.
Calculating the generator level linearity:

Level linearity = $L - L_{@-10dBm}$ – step width (in dB)

Step width = l_{gen} – (-10 dBm) (reference)

Checking the Power Measurement Accuracyy

Instrument:

Power sensor or
Power meter with power sensor
(see Chapter “Test Equipment“, Item2)

Signal generator (see Chapter “Test Equipment“, Item5)

Power splitter (see Chapter “Test Equipment“, Item6)

Calibration kit (see Chapter “Test Equipment“, Item4)

Test cable (see Chapter “Test Equipment“, Item7)

Preparation/
test setup:

Connect the signal generator to the power-splitter input using the test cable.

Connect the power sensor to a power-splitter output

Connect the other power-splitter output to port# using an adapter from the calibration kit

The reference oscillators in the signal generator and in the ZVA must be synchronized.

R&S®ZVA settings:

- [**Preset**]
- [**Meas** : Wave Quantities: b# Src Port #]
- [**Power** : RF Off]
- [**Meas Bandwidth** : 100 Hz]
- [**Marker**]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **{f_{GEN}*}**]
- [**Sweep** : Single : **Restart**]

* For the measurement frequencies, see Performance Test Report {fGEN}.

Measurement:

Signal generator : CW Mode, Frequency: f_{gen}
Signal-generator level: -5 dBm

Adjust the signal-generator level so that the power meter reads 0 dB +/- 0.2 dB

Read off the power meter display and the ZVA marker values.

Level error = $L_{ZVA} – L_{PS}$

In case of optional receiver step attenuators further R&S® ZVAB settings:

- [**PRESET**]
- [**MEAS** : WAVE QUANTITIES : b# SRC PORT #
- [**TRACE FUNCT**: DATA → MEM : MATH = DATA / MEM]
- [**POWER**: STEP ATTENUATORS: b#: 5 dB]
- [**POWER**: STEP ATTENUATORS: b#: 15 dB]
- [**POWER**: STEP ATTENUATORS: b#: 35 dB]

In case of optional receiver step attenuators further measurement:

Read out math trace.

Checking the Input Linearity

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

R&S®ZVA settings:

- [**Preset**]
- [**Meas** : Ratios: b#/a# Src Port #]
- [**Meas Bandwidth** : 10 Hz]
- [**Marker**]
- [**Sweep** : Sweep Type : Power : Start -40dBm : Stop 10dBm : CW Frequency : **{f_{GEN}*}**]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies, see Performance Test Report {fGEN}

1. Test setup: Connect an open male to port #

1. Measurement:

- [**Trace Funct**]
- [**Data -> Mem**]
- [**Show Mem** : off]

2. Test setup: Connect a short male to port #

2. Measurement:

- [**Math = Data/Mem** : on]

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 #

R&S®ZVA settings:

- [**Preset**]
- [**Meas** : Wave Quantities: b# Src Port #]
- [**Power** : RF Off]
- [**Meas Bandwidth** : 10 Hz]
- [**Marker**]
- [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}**]
- Service Function 1.0.0.1.1 (see chapter 3 ‘Service Functions’, Service Level 2)
- [**Measure** : Wave Quantities : More Wave Quantities… : Properties : Detector : **RMS** : Meas. Time: 500ms]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies, see Performance Test Report {fGEN}.

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)
R&S®ZVA settings:	- [**Preset**] - [**Power** : 0 dBm]
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 end of the test cable to port 2 (port 3, port4) on the R&S®ZVA.
R&S®ZVA settings:	- [**Meas** : S11] - [**Marker**] - [**Add Channnel + Trace**] - [**Meas** : S22 (S33, S44)] - [**Power** : -40 dBm] - [**Trace Funct**] - [**Show Data** : off] - [**Trace Select** : Trc 1]
1. Measurement	Read off the network analyzer’s marker values (for marker frequencies see Performance Test Report)
R&S®ZVA settings:	- [**Power** : -40 dBm] - [**Trace Funct**] - [**Show Data** : off] - [**Trace Select** : Trc 2] - [**Trace Funct**] - [**Show Data** : on] - [**Meas** : S22] - [**Marker**]
2. Preparation/ test setup:	Set port 2 power to 0 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 end of the test cable to port 1 on the R&S®ZVA.
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:

- [**Preset**]
- [**Meas** : Ratios : b1/a2 Src Port 2]
  [**Meas** : Ratios : b2/a1 Src Port 1]
  [**Meas** : Ratios : b3/a4 Src Port 4]
  [**Meas** : Ratios : b4/a3 Src Port 3]
- [**Power** : Max. spec. Power]
- [**Meas Bandwidth** : 10 Hz]
- [**Marker**]
- [**SWEEP** : NUMBER OF POINTS : 201 (ZVB4)]
  201 (ZVB8)]
  301 (ZVB20)]
  351 (ZVA24)]
  701 (ZVA40)]
  851 (ZVA50)]
  1001 (ZVA67)]
- [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}**]
- [**Measure** : Wave Quantities : More Wave Quantities… : Properties :
  Detector : **RMS** Meas Time: 1 s (R&S ZVA8), 0.5 s (R&S ZVA24, R&S ZVA40, R&S ZVA50, R&S ZVA67)]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies, see Performance Test Report {fGEN}.

Measurement: Read off marker value

Calculation: Dynamic range = Marker value + Power value

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 port#

R&S®ZVA settings:
- [**Preset**]
- [**Meas** : Wave Quantities : b#/ Src Port #]
- [**Power** : 0 dBm]
- [**Meas Bandwidth** : 100 Hz]
- [**Trace Funct** : Data -> Mem : Math = Data/Mem : Show Mem off]
- [**Pwr BW AVG** : Receiver Step Atten : Port # {a Rec Att}*]
- [**Trace Funct** : Shift Response Value : Magnitude { -a Rec Att}]
- [**Marker**]

* For attenuator settings {a Rec Att}, see Performance Test Report.

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: - [**Preset**]

For DC Meas 1 V:
- [**Meas** : More : DC Inputs : DC Meas ±1 V]
- [**Format** : Real]
- [**Scale** : Scale/Div : .25 x1]
- [**Marker**]

For DC Meas 10 V:
- [**Meas** : More : DC Inputs : DC Meas ±10 V]
- [**Format** : Real]
- [**Scale** : Scale/Div : 2.5 x1]
- [**Marker**]

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 R&S® ZVA8

ROHDE&SCHWARZ	**Vector Network Analyzer 8 GHz, _ ports** **R&S® ZVA8**	**1145.1110K__**
Serial number: Date: Person responsible: Signature:		

Parameter	**Reference**	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement uncertainty**
Frequency deviation @ 1 GHz	Page 1.5	- 8000	_________	+ 8000	Hz	1 Hz
With Option ZVAB-B4		- 100		+ 100		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __	Page 1.5				dBc	1 dB
Harmonics						
Source power +10dBm						
Freq. Harmonics						
50 MHz 100 MHz			________	-20		
150 MHz			________	-20		
100 MHz 200 MHz			________	-20		
300 MHz			________	-20		
200 MHz 400 MHz			________	-20		
600 MHz			________	-20		
500 MHz 1000 MHz			________	-20		
1500 MHz			________	-20		
750 MHz 1500 MHz			________	-20		
2250 MHz			________	-20		
1 GHz 2 GHz			________	-20		
3 GHz			________	-20		
1.5 GHz 3 GHz			________	-20		
4.5 GHz			________	-20		
2 GHz 4 GHz			________	-20		
6 GHz			________	-20		
2.1 GHz 4.2 GHz			________	-20		
6.3 GHz			________	-20		
2.5 GHz 5.0 GHz			________	-20		
7.5 GHz			________	-20		
3.0 GHz 6.0 GHz			________	-20		
9.0 GHz			________	-20		
3.5 GHz 7 GHz			________	-20		
10.5 GHz			________	-20		
4.0 GHz 8.0 GHz			________	-20		
12.0 GHz			________	-20		
Source power +8dBm						
4.1 GHz 8.2 GHz			________	-20		
12.3 GHz			________	-20		
5.0 GHz 10.0 GHz			________	-20		
15.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics**	Page 1.5				dBc	2 dB
Freq. Harmonics						
5.04 GHz 10.08 GHz			________	-20		
15.12 GHz			________	-20		
5.05 GHz 10.10 GHz			________	-20		
15.15 GHz			________	-20		
5.5 GHz 11.0 GHz			________	-20		
16.5 GHz			________	-20		
6.0 GHz 12.0 GHz			________	-20		
18.0 GHz			________	-20		
6.35 GHz 12.70 GHz			________	-20		
19.05 GHz			________	-20		
7.0 GHz 14.0 GHz			________	-20		
21.0 GHz			________	-20		
8.0 GHz 16.0 GHz			________	-20		
24.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm**	Page 1.7				dB	0.2 dB
Test frequency:						
300 kHz		- 2	________	2		
1 MHz		- 2	________	2		
2 MHz		- 2	________	2		
5 MHz		- 2	________	2		
10 MHz		- 2	________	2		
20 MHz		- 2	________	2		
50 MHz		- 0.8	________	0.8		
100 MHz		- 0.8	________	0.8		
200 MHz		- 0.8	________	0.8		
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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
51 MHz	23 dB		- 0.8	________	0.8		
	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		
500MHz	23 dB		- 0.8	________	0.8		
	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		
1 GHz	23 dB		- 0.8	________	0.8		
	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		
2 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
2.1 GHz	23 dB		- 0.8	________	0.8		
	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		
3 GHz	23 dB		- 0.8	________	0.8		
	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		
4 GHz	23 dB		- 0.8	________	0.8		
	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		
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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		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		
8 GHz	18 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
51 MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
500MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
2 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
2.1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
3 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
4 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
4.1 GHz	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
6 GHz	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
8 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __	Page 1.9				dB	0.3 dB
Power measurement uncertainty						
Test frequency:						
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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm** **Frequ. Level**	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		
500 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		
4 GHz 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		
4.1 GHz 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.10				dB	0.01 dB
Input linearity							
Reference –10 dBm							
Frequ.	**Level**						
8 GHz	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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __	Page 1.11				dBm	
Input noise level						
(without opt. rec atten.						
and dir. gen/rec access						
Test frequency:						
423 kHz			________	–100		–
1.12 MHz			________	–100		–
2.12 MHz			________	–100		–
5.12 MHz			________	–100		–
10.12 MHz			________	–100		–
20.12 MHz			________	–100		–
50.12 MHz			________	–100		–
100.12 MHz			________	–115		–
200.12 MHz			________	–115		–
500.12 MHz			________	–115		–
700.12 MHz			________	–115		–
750.12 MHz			________	–115		–
1.00012 GHz			________	–115		–
1.50012 GHz			________	–115		–
2.00012 GHz			________	–115		–
2.10012 GHz			________	–115		–
2.50012 GHz			________	–115		–
3.00012 GHz			________	–115		–
3.50012 GHz			________	–115		–
4.00012 GMz			________	–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		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec attenuator)	Page 1.11				dBm	
Test frequency:						
423 kHz			________	–99		–
1.12 MHz			________	–99		–
2.12 MHz			________	–99		–
5.12 MHz			________	–99		–
10.12 MHz			________	–99		–
20.12 MHz			________	–99		–
50.12 MHz			________	–99		–
100.12 MHz			________	–114		–
200.12 MHz			________	–114		–
500.12 MHz			________	–114		–
700.12 MHz			________	–114		–
750.12 MHz			________	–114		–
1.00012 GHz			________	–114		–
1.50012 GHz			________	–114		–
2.00012 GHz			________	–114		–
2.10012 GHz			________	–114		–
2.50012 GHz			________	–114		–
3.00012 GHz			________	–114		–
3.50012 GHz			________	–114		–
4.00012 GMz			________	–114		–
4.10012 GHz			________	–114		–
4.50012 GHz			________	–114		–
5.00012 GHz			________	–114		–
5.05012 GHz			________	–114		–
5.70012 GHz			________	–114		–
6.00012 GHz			________	–114		–
6.35012 GHz			________	–114		–
6.36012 GHz			________	–114		–
7.00012 GHz			________	–114		–
7.50012 GHz			________	–114		–
7.99988 GHz			________	–114		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. dir. gen/rec access)	Page 111				dBm	
Test frequency:						
423 kHz			________	–98		–
1.12 MHz			________	–98		–
2.12 MHz			________	–98		–
5.12 MHz			________	–98		–
10.12 MHz			________	–98		–
20.12 MHz			________	–98		–
50.12 MHz			________	–98		–
100.12 MHz			________	–113		–
200.12 MHz			________	–113		–
500.12 MHz			________	–113		–
700.12 MHz			________	–113		–
750.12 MHz			________	–113		–
1.00012 GHz			________	–113		–
1.50012 GHz			________	–113		–
2.00012 GHz			________	–113		–
2.10012 GHz			________	–113		–
2.50012 GHz			________	–113		–
3.00012 GHz			________	–113		–
3.50012 GHz			________	–113		–
4.00012 GMz			________	–113		–
4.10012 GHz			________	–113		–
4.50012 GHz			________	–113		–
5.00012 GHz			________	–113		–
5.05012 GHz			________	–113		–
5.70012 GHz			________	–113		–
6.00012 GHz			________	–113		–
6.35012 GHz			________	–113		–
6.36012 GHz			________	–113		–
7.00012 GHz			________	–113		–
7.50012 GHz			________	–113		–
7.99988 GHz			________	–113		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec. atten. and opt. dir. gen/rec access)	Page 111				dBm	
Test frequency:						
423 kHz			________	–97		–
1.12 MHz			________	–97		–
2.12 MHz			________	–97		–
5.12 MHz			________	–97		–
10.12 MHz			________	–97		–
20.12 MHz			________	–97		–
50.12 MHz			________	–97		–
100.12 MHz			________	–112		–
200.12 MHz			________	–112		–
500.12 MHz			________	–112		–
700.12 MHz			________	–112		–
750.12 MHz			________	–112		–
1.00012 GHz			________	–112		–
1.50012 GHz			________	–112		–
2.00012 GHz			________	–112		–
2.10012 GHz			________	–112		–
2.50012 GHz			________	–112		–
3.00012 GHz			________	–112		–
3.50012 GHz			________	–112		–
4.00012 GMz			________	–112		–
4.10012 GHz			________	–112		–
4.50012 GHz			________	–112		–
5.00012 GHz			________	–112		–
5.05012 GHz			________	–112		–
5.70012 GHz			________	–112		–
6.00012 GHz			________	–112		–
6.35012 GHz			________	–112		–
6.36012 GHz			________	–112		–
7.00012 GHz			________	–112		–
7.50012 GHz			________	–112		–
7.99988 GHz			________	–112		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Matching (raw)**	Page 1.12				dB	1 dB
Test frequency:						
300 kHz		16	________			
1 MHz		16	________			
2 MHz		16	________			
5 MHz		16	________			
10 MHz		16	________			
20 MHz		16	________			
50 MHz		16	________			
100 MHz		16	________			
200 MHz		16	________			
500 MHz		16	________			
750 MHz		16	________			
1.0 GHz		16	________			
1.5 GHz		16	________			
2.0 GHz		16	________			
2.5 GHz		16	________			
3.0 GHz		16	________			
3.5 GHz		16	________			
4.0 GHz		16	________			
4.5 GHz		16	________			
5.0 GHz		16	________			
5.5 GHz		16	________			
6.0 GHz		16	________			
6.5 GHz		16	________			
7.0 GHz		16	________			
7.5 GHz		14	________			
8.0 GHz		14	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port __ **Dynamic range** (without options step attenuator and direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
303 kHz		100	________			–
1.12 MHz		100	________			–
2.12 MHz		100	________			–
5.12 MHz		100	________			–
10.12 MHz		100	________			–
20.12 MHz		100	________			–
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port __ **Dynamic range** (with option generator or receiver attenuator)	Page 1.13				dB	
Test frequency:						
303 kHz		99	________			_
1.12 MHz		99	________			_
2.12 MHz		99	________			_
5.12 MHz		99	________			_
10.12 MHz		99	________			_
20.12 MHz		99	________			_
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port __ **Dynamic range** (with option generator and receiver attenuator or with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
303 kHz		98	________			–
1.12 MHz		98	________			–
2.12 MHz		98	________			–
5.12 MHz		98	________			–
10.12 MHz		98	________			–
20.12 MHz		98	________			–
50.12 MHz		118	________			–
100.12 MHz		128	________			–
200.12 MHz		128	________			–
500.12 MHz		128	________			–
700.12 MHz		128	________			–
750.12 MHz		128	________			–
1.00012 GHz		128	________			–
1.50012 GHz		128	________			–
2.00012 GHz		128	________			–
2.10012 GHz		128	________			–
2.50012 GHz		128	________			–
3.00012 GHz		128	________			–
3.50012 GHz		128	________			–
3.99988 GHz		128	________			–
4.10012 GHz		123	________			–
4.50012 GHz		123	________			–
5.00012 GHz		123	________			–
5.05012 GHz		123	________			–
5.70012 GHz		123	________			–
6.00012 GHz		123	________			–
6.35012 GHz		123	________			–
6.36012 GHz		123	________			–
6.99988 GHz		123	________			–
7.50012 GHz		118	________			–
7.99988 GHz		118	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port __ **Dynamic range** (with options generator attenuator or receiver attenuator and option direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
303 kHz		97	________			_
1.12 MHz		97	________			_
2.12 MHz		97	________			_
5.12 MHz		97	________			_
10.12 MHz		97	________			_
20.12 MHz		97	________			_
50.12 MHz		117	________			_
100.12 MHz		127	________			_
200.12 MHz		127	________			_
500.12 MHz		127	________			_
700.12 MHz		127	________			_
750.12 MHz		127	________			_
1.00012 GHz		127	________			_
1.50012 GHz		127	________			_
2.00012 GHz		127	________			_
2.10012 GHz		127	________			_
2.50012 GHz		127	________			_
3.00012 GHz		127	________			_
3.50012 GHz		127	________			_
3.99988 GHz		127	________			_
4.10012 GHz		122	________			_
4.50012 GHz		122	________			_
5.00012 GHz		122	________			_
5.05012 GHz		122	________			_
5.70012 GHz		122	________			_
6.00012 GHz		122	________			_
6.35012 GHz		122	________			_
6.36012 GHz		122	________			_
6.99988 GHz		122	________			_
7.50012 GHz		117	________			_
7.99988 GHz		117	________			_

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port __ **Dynamic range** (with options generator attenuator and receiver attenuator and direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
303 kHz		96	________			_
1.12 MHz		96	________			_
2.12 MHz		96	________			_
5.12 MHz		96	________			_
10.12 MHz		96	________			_
20.12 MHz		96	________			_
50.12 MHz		116	________			_
100.12 MHz		126	________			_
200.12 MHz		126	________			_
500.12 MHz		126	________			_
700.12 MHz		126	________			_
750.12 MHz		126	________			_
1.00012 GHz		126	________			_
1.50012 GHz		126	________			_
2.00012 GHz		126	________			_
2.10012 GHz		126	________			_
2.50012 GHz		126	________			_
3.00012 GHz		126	________			_
3.50012 GHz		126	________			_
3.99988 GHz		126	________			_
4.10012 GHz		121	________			_
4.50012 GHz		121	________			_
5.00012 GHz		121	________			_
5.05012 GHz		121	________			_
5.70012 GHz		121	________			_
6.00012 GHz		121	________			_
6.35012 GHz		121	________			_
6.36012 GHz		121	________			_
6.99988 GHz		121	________			_
7.50012 GHz		116	________			_
7.99988 GHz		116	________			_

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
5 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		
10 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		
20 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		
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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Accuracy **DC meas 1 V**	Page 1.15				mV	1 mV
Pos. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Neg. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Accuracy **DC meas 10 V**	Page 1.15				V	0.01 V
Pos. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		
Neg. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		

Performance Test Report R&S® ZVA24

ROHDE&SCHWARZ	**Vector Network Analyzer, 24 GHz, _ ports** **R&S® ZVA24**	**1145.1110K__**
Serial number: Date: Person responsible: Signature:		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Frequency deviation @ 1 GHz	Page 1.5	- 8000	_________	+ 8000	Hz	1 Hz
With Option ZVAB-B4		- 100		+ 100		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics** **Source power +10dBm** **Freq. Harmonics**	Page 1.5				dBc	1 dB
50 MHz 100 MHz			________	-20		
150 MHz			________	-20		
100 MHz 200 MHz			________	-20		
300 MHz			________	-20		
200 MHz 400 MHz			________	-20		
600 MHz			________	-20		
500 MHz 1000 MHz			________	-20		
1500 MHz			________	-20		
750 MHz 1500 MHz			________	-20		
2250 MHz			________	-20		
1 GHz 2 GHz			________	-20		
3 GHz			________	-20		
1.5 GHz 3 GHz			________	-20		
4.5 GHz			________	-20		
2 GHz 4 GHz			________	-20		
6 GHz			________	-20		
2.1 GHz 4.2 GHz			________	-20		
6.3 GHz			________	-20		
2.5 GHz 5.0 GHz			________	-20		
7.5 GHz			________	-20		
3.0 GHz 6.0 GHz			________	-20		
9.0 GHz			________	-20		
3.5 GHz 7 GHz			________	-20		
10.5 GHz			________	-20		
4.0 GHz 8.0 GHz			________	-20		
12.0 GHz			________	-20		
4.1 GHz 8.2 GHz			________	-20		
12.3 GHz			________	-20		
5.0 GHz 10.0 GHz			________	-20		
15.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics** **Freq. Harmonics**	Page 1.5				dBc	2 dB
5.04 GHz 10.08 GHz			________	-20		
15.12 GHz			________	-20		
5.05 GHz 10.10 GHz			________	-20		
15.15 GHz			________	-20		
5.5 GHz 11.0 GHz			________	-20		
16.5 GHz			________	-20		
6.0 GHz 12.0 GHz			________	-20		
18.0 GHz			________	-20		
6.35 GHz 12.70 GHz			________	-20		
19.05 GHz			________	-20		
7.0 GHz 14.0 GHz			________	-20		
21.0 GHz			________	-20		
8.0 GHz 16.0 GHz			________	-20		
24.0 GHz			________	-20		
8.1 GHz 16.2 GHz			________	-20		
24.3 GHz			________	-20		
9.0 GHz 18.0 GHz			________	-20		
27.0 GHz			________	-20		
10.0 GHz 20.0 GHz			________	-20		
30.0 GHz			________	-20		
10.2 GHz 20.4 GHz			________	-20		
30.6 GHz			________	-20		
11.0 GHz 22.0 GHz			________	-20		
33.0 GHz			________	-20		
12.7 GHz 25.4 GHz			________	-20		
38.1 GHz			________	-20		
13.0 GHz 26.0 GHz			________	-20		
39.0 GHz			________	-20		
14.0 GHz 28.0 GHz			________	-20		
42.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Harmonics Source power +10 dBm	Page 1.5				dBc	2 dB
Freq. Harmonics						
14.6 GHz 29.2 GHz			________	-20		
43.8 GHz			________	-20		
15.0 GHz 30.0 GHz			________	-20		
45.0 GHz			________	-20		
16.0 GHz 32.0 GHz			________	-20		
17.0 GHz 34.0 GHz			________	-20		
18.0 GHz 36.0 GHz			________	-20		
19.0 GHz 38.0 GHz			________	-20		
20.0 GHz 40.0 GHz			________	-20		
20.1 GHz 40.2 GHz			________	-20		
21.0 GHz 42.0 GHz			________	-20		
21.75 GHz 43.5 GHz			________	-20		
22.0 GHz 44.0 GHz			________	-20		
23.0 GHz 46.0 GHz			________	-20		
24.0 GHz 48.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm**	Page 1.7				dB	0.2 dB
Test frequency						
10 MHz		- 2	________	2		
20 MHz		- 2	________	2		
50 MHz		- 0.8	________	0.8		
100 MHz		- 0.8	________	0.8		
200 MHz		- 0.8	________	0.8		
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		
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		
15.0 GHz		- 0.8	________	0.8		
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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
24.0 GHz		- 0.8	________	0.8		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm** Freq. Level	Page 1.8				dB	0.1 dB
51 MHz 23 dB		-2	________	2		
20 dB		-2	________	2		
15 dB		-2	________	2		
10 dB		-2	________	2		
5 dB		-2	________	2		
-5 dB		-2	________	2		
-10 dB		-2	________	2		
-15 dB		-2	________	2		
-20 dB		-2	________	2		
500MHz 23 dB		- 0.8	________	0.8		
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		
1 GHz 23 dB		- 0.8	________	0.8		
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		
2 GHz 23 dB		- 0.8	________	0.8		
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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	Level						
2.1 GHz	23 dB		- 0.8	________	0.8		
	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		
3 GHz	23 dB		- 0.8	________	0.8		
	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		
4 GHz	23 dB		- 0.8	________	0.8		
	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		
4.1 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	Level						
6 GHz	23 dB		- 0.8	________	0.8		
	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		
8 GHz	23 dB		- 0.8	________	0.8		
	18 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		
10 GHz	23 dB		- 0.8	________	0.8		
	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		
13 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		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		
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		
24 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
51 MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
500MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**		- 2	________	2		
1 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 2	________	2		
-45 dB		- 2	________	2		
-50 dB		- 2	________	2		
-55 dB		- 3	________	3		
-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						
		- 2	________	2		
2 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 2	________	2		
-45 dB		- 2	________	2		
-50 dB		- 2	________	2		
-55 dB		- 3	________	3		
-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						

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
2.1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
3 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __	Page 1.8				dB	0.1 dB
Power linearity						
(with Opt. Gen Atten)						
Reference –10 dBm						
Freq. Level						
4 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		
4.1 GHz 22 dB		- 2	________	2		
19 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
-90 dB		- 3	________	3		
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**		- 2	________	2		
6 GHz 22 dB		- 2	________	2		
19 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 2	________	2		
-45 dB		- 2	________	2		
-50 dB		- 2	________	2		
-55 dB		- 3	________	3		
-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						
		- 2	________	2		
8 GHz 22 dB		- 2	________	2		
17 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 2	________	2		
-45 dB		- 2	________	2		
-50 dB		- 2	________	2		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		
-75 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	-80 dB		- 3	________	3		
	-85 dB		- 3	________	3		
	-90 dB						
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
10 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
13 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	-75 dB		- 3	________	3		
	-80 dB		- 3	________	3		
	-85 dB		- 3	________	3		
	-90 dB		- 3	________	3		
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
16 GHz	18 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
20 GHz	18 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
-80 dB		- 3	________	3		
-85 dB		- 3	________	3		
-90 dB		- 3	________	3		
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
24 GHz 18 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9				dB	0.3 dB
Test frequency:						
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		
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		
17.0 GHz		- 2	________	2		
18.0 GHz		- 2	________	2		
19.0 GHz		- 2	________	2		
20.0 GHz		- 2	________	2		
21.0 GHz		- 2	________	2		
22.0 GHz		- 2	________	2		
23.0 GHz		- 2	________	2		
24.0 GHz		- 2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**	Page 1.10				dB	0.01 dB
Freq. Level						
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		
2 GHz 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		
8 GHz 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		

Parameter		Reference	**Min. value**	**Actual value**	**Max. value**	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**		Page 1.10				dB	0.01 dB
Freq.	**Level**						
20 GHz	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		
24 GHz	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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (without opt. gen/rec atten. and dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–80		–
200.12 MHz			________	–80		–
500.12 MHz			________	–80		–
700.12 MHz			________	–110		–
750.12 MHz			________	–110		–
1.00012 GHz			________	–110		–
1.50012 GHz			________	–110		–
2.00012 GHz			________	–115		–
2.10012 GHz			________	–115		–
2.50012 GHz			________	–115		–
3.00012 GHz			________	–115		–
3.50012 GHz			________	–115		–
4.00012 GMz			________	–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		–
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			________	–110		–
12.99988 GHz			________	–110		–
14.00012 GHz			________	–110		–
15.00012 GHz			________	–110		–
16.00012 GHz			________	–110		–
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec attenuator**)**	Page 1.11				dBm	
Test frequency:						
100.12 MHz			________	–79		–
200.12 MHz			________	–79		–
500.12 MHz			________	–79		–
700.12 MHz			________	–109		–
750.12 MHz			________	–109		–
1.00012 GHz			________	–109		–
1.50012 GHz			________	–109		–
2.00012 GHz			________	–114		–
2.10012 GHz			________	–114		–
2.50012 GHz			________	–114		–
3.00012 GHz			________	–114		–
3.50012 GHz			________	–114		–
4.00012 GMz			________	–114		–
4.10012 GHz			________	–114		–
4.50012 GHz			________	–114		–
5.00012 GHz			________	–114		–
5.05012 GHz			________	–114		–
5.70012 GHz			________	–114		–
6.00012 GHz			________	–114		–
6.35012 GHz			________	–114		–
6.36012 GHz			________	–114		–
7.00012 GHz			________	–114		–
7.50012 GHz			________	–114		–
7.99988 GHz			________	–114		–
8.10012 GHz			________	–114		–
9.00012 GHz			________	–114		–
10.00012 GHz			________	–114		–
10.20012 GHz			________	–114		–
11.00012 GHz			________	–114		–
12.00012 GHz			________	–114		–
12.70012 GHz			________	–114		–
12.80012 GHz			________	–114		–
12.99988 GHz			________	–114		–
14.00012 GHz			________	–108		–
15.00012 GHz			________	–108		–
16.00012 GHz			________	–108		–
16.10012 GHz			________	–108		–
18.00012 GHz			________	–108		–
19.00012 GHz			________	–108		–
20.00012 GHz			________	–108		–
21.00012 GHz			________	–108		–
22.00012 GHz			________	–108		–
23.00012 GHz			________	–108		–
23.99988 GHz			________	–108		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. direct gen/rec access)	Page 111				dBm	
Test frequency:						
100.12 MHz			________	–78		–
200.12 MHz			________	–78		–
500.12 MHz			________	–78		–
700.12 MHz			________	–108		–
750.12 MHz			________	–108		–
1.00012 GHz			________	–108		–
1.50012 GHz			________	–108		–
2.00012 GHz			________	–113		–
2.10012 GHz			________	–113		–
2.50012 GHz			________	–113		–
3.00012 GHz			________	–113		–
3.50012 GHz			________	–113		–
4.00012 GMz			________	–113		–
4.10012 GHz			________	–113		–
4.50012 GHz			________	–113		–
5.00012 GHz			________	–113		–
5.05012 GHz			________	–113		–
5.70012 GHz			________	–113		–
6.00012 GHz			________	–113		–
6.35012 GHz			________	–113		–
6.36012 GHz			________	–113		–
7.00012 GHz			________	–113		–
7.50012 GHz			________	–113		–
7.99988 GHz			________	–113		–
8.10012 GHz			________	–113		–
9.00012 GHz			________	–113		–
10.00012 GHz			________	–113		–
10.20012 GHz			________	–113		–
11.00012 GHz			________	–115		–
12.00012 GHz			________	–115		–
12.70012 GHz			________	–115		–
12.80012 GHz			________	–113		–
12.99988 GHz			________	–113		–
14.00012 GHz			________	–106		–
15.00012 GHz			________	–106		–
16.00012 GHz			________	–106		–
16.10012 GHz			________	–106		–
18.00012 GHz			________	–106		–
19.00012 GHz			________	–106		–
20.00012 GHz			________	–106		–
21.00012 GHz			________	–106		–
22.00012 GHz			________	–106		–
23.00012 GHz			________	–106		–
23.99988 GHz			________	–106		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec. attenuator and opt. direct gen/rec access)	Page 111				dBm	
Test frequency:						
100.12 MHz			________	–77		–
200.12 MHz			________	–77		–
500.12 MHz			________	–77		–
700.12 MHz			________	–107		–
750.12 MHz			________	–107		–
1.00012 GHz			________	–107		–
1.50012 GHz			________	–107		–
2.00012 GHz			________	–112		–
2.10012 GHz			________	–112		–
2.50012 GHz			________	–112		–
3.00012 GHz			________	–112		–
3.50012 GHz			________	–112		–
4.00012 GMz			________	–112		–
4.10012 GHz			________	–112		–
4.50012 GHz			________	–112		–
5.00012 GHz			________	–112		–
5.05012 GHz			________	–112		–
5.70012 GHz			________	–112		–
6.00012 GHz			________	–112		–
6.35012 GHz			________	–112		–
6.36012 GHz			________	–112		–
7.00012 GHz			________	–112		–
7.50012 GHz			________	–112		–
7.99988 GHz			________	–112		–
8.10012 GHz			________	–112		–
9.00012 GHz			________	–112		–
10.00012 GHz			________	–112		–
10.20012 GHz			________	–112		–
11.00012 GHz			________	–112		–
12.00012 GHz			________	–112		–
12.70012 GHz			________	–112		–
12.80012 GHz			________	–112		–
12.99988 GHz			________	–112		–
14.00012 GHz			________	–104		–
15.00012 GHz			________	–104		–
16.00012 GHz			________	–104		–
16.10012 GHz			________	–104		–
18.00012 GHz			________	–104		–
19.00012 GHz			________	–104		–
20.00012 GHz			________	–104		–
21.00012 GHz			________	–104		–
22.00012 GHz			________	–104		–
23.00012 GHz			________	–104		–
23.99988 GHz			________	–104		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Matching (raw)**	Page 1.12				dB	1 dB
Test frequency:						
10 MHz		10	________			
20 MHz		10	________			
50 MHz		12	________			
100 MHz		12	________			
200 MHz		12	________			
500 MHz		12	________			
750 MHz		12	________			
1.0 GHz		12	________			
1.5 GHz		12	________			
2.0 GHz		12	________			
2.5 GHz		8	________			
3.0 GHz		8	________			
3.5 GHz		8	________			
4.0 GHz		8	________			
4.5 GHz		8	________			
5.0 GHz		8	________			
5.5 GHz		8	________			
6.0 GHz		8	________			
6.5 GHz		8	________			
7.0 GHz		8	________			
7.5 GHz		8	________			
8.0 GHz		8	________			
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (without options step atten. and direct gen./rec. access) **Test frequency:**	Page 1.13				dB	
10.12 MHz		90	________			_
20.12 MHz		90	________			_
50.12 MHz		90	________			_
100.12 MHz		105	________			_
200.12 MHz		105	________			_
500.12 MHz		105	________			_
700.12 MHz		125	________			_
750.12 MHz		125	________			_
1.00012 GHz		125	________			_
1.50012 GHz		125	________			_
2.00012 GHz		130	________			_
2.10012 GHz		130	________			_
2.50012 GHz		130	________			_
3.00012 GHz		130	________			_
3.50012 GHz		130	________			_
4.00012 GHz		130	________			_
4.10012 GHz		130	________			_
4.50012 GHz		130	________			_
5.00012 GHz		130	________			_
5.05012 GHz		130	________			_
5.70012 GHz		130	________			_
6.00012 GHz		130	________			_
6.35012 GHz		130	________			_
6.36012 GHz		130	________			_
7.00012 GHz		130	________			_
7.50012 GHz		130	________			_
7.99988 GHz		130	________			_
8.10012 GHz		130	________			_
9.00012 GHz		130	________			_
10.00012 GHz		130	________			_
10.20012 GHz		130	________			_
11.00012 GHz		130	________			_
12.00012 GHz		130	________			_
12.70012 GHz		130	________			_
12.80012 GHz		130	________			_
12.99988 GHz		130	________			_
14.00012 GHz		125	________			_
15.00012 GHz		125	________			_
16.00012 GHz		125	________			_
16.10012 GHz		125	________			_
18.00012 GHz		125	________			_
19.00012 GHz		125	________			_
20.00012 GHz		125	________			_
21.00012 GHz		125	________			_
22.00012 GHz		125	________			_
23.00012 GHz		125	________			_
23.99988 GHz		125	________			_

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. gen. or rec. atten.)	Page 1.13				dB	
Test frequency:						
10.12 MHz		89	________			–
20.12 MHz		89	________			–
50.12 MHz		89	________			–
100.12 MHz		104	________			–
200.12 MHz		104	________			–
500.12 MHz		104	________			–
700.12 MHz		104	________			–
750.12 MHz		124	________			–
1.00012 GHz		124	________			–
1.50012 GHz		124	________			–
2.00012 GHz		129	________			–
2.10012 GHz		129	________			–
2.50012 GHz		129	________			–
3.00012 GHz		129	________			–
3.50012 GHz		129	________			–
4.00012 GHz		129	________			–
4.10012 GHz		129	________			–
4.50012 GHz		129	________			–
5.00012 GHz		129	________			–
5.05012 GHz		129	________			–
5.70012 GHz		129	________			–
6.00012 GHz		129	________			–
6.35012 GHz		129	________			–
6.36012 GHz		129	________			–
7.00012 GHz		129	________			–
7.50012 GHz		129	________			–
7.99988 GHz		129	________			–
8.10012 GHz		129	________			–
9.00012 GHz		129	________			–
10.00012 GHz		129	________			–
10.20012 GHz		129	________			–
11.00012 GHz		129	________			–
12.00012 GHz		129	________			–
12.70012 GHz		129	________			–
12.80012 GHz		129	________			–
12.99988 GHz		129	________			–
14.00012 GHz		123	________			–
15.00012 GHz		123	________			–
16.00012 GHz		123	________			–
16.10012 GHz		123	________			–
18.00012 GHz		123	________			–
19.00012 GHz		123	________			–
20.00012 GHz		123	________			–
21.00012 GHz		123	________			–
22.00012 GHz		123	________			–
23.00012 GHz		123	________			–
23.99988 GHz		123	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. gen. and rec. atten. or with opt. direct gen./rec. access)	Page 1.13				dB	
Test frequency:						
10.12 MHz		88	________			_
20.12 MHz		88	________			_
50.12 MHz		88	________			_
100.12 MHz		103	________			_
200.12 MHz		103	________			_
500.12 MHz		103	________			_
700.12 MHz		103	________			_
750.12 MHz		123	________			_
1.00012 GHz		123	________			_
1.50012 GHz		123	________			_
2.00012 GHz		128	________			_
2.10012 GHz		128	________			_
2.50012 GHz		128	________			_
3.00012 GHz		128	________			_
3.50012 GHz		128	________			_
4.00012 GHz		128	________			_
4.10012 GHz		128	________			_
4.50012 GHz		128	________			_
5.00012 GHz		128	________			_
5.05012 GHz		128	________			_
5.70012 GHz		128	________			_
6.00012 GHz		128	________			_
6.35012 GHz		128	________			_
6.36012 GHz		128	________			_
7.00012 GHz		128	________			_
7.50012 GHz		128	________			_
7.99988 GHz		128	________			_
8.10012 GHz		128	________			_
9.00012 GHz		128	________			_
10.00012 GHz		128	________			_
10.20012 GHz		128	________			_
11.00012 GHz		128	________			_
12.00012 GHz		128	________			_
12.70012 GHz		128	________			_
12.80012 GHz		128	________			_
12.99988 GHz		128	________			_
14.00012 GHz		121	________			_
15.00012 GHz		121	________			_
16.00012 GHz		121	________			_
16.10012 GHz		121	________			_
18.00012 GHz		121	________			_
19.00012 GHz		121	________			_
20.00012 GHz		121	________			_
21.00012 GHz		121	________			_
22.00012 GHz		121	________			_
23.00012 GHz		121	________			_
23.99988 GHz		121	________			_

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. gen. or rec. atten. and with opt. direct gen./rec. access) **Test frequency**:	Page 1.13				dB	
10.12 MHz		87	________			_
20.12 MHz		87	________			_
50.12 MHz		87	________			_
100.12 MHz		102	________			_
200.12 MHz		102	________			_
500.12 MHz		102	________			_
700.12 MHz		102	________			_
750.12 MHz		122	________			_
1.00012 GHz		122	________			_
1.50012 GHz		122	________			_
2.00012 GHz		127	________			_
2.10012 GHz		127	________			_
2.50012 GHz		127	________			_
3.00012 GHz		127	________			_
3.50012 GHz		127	________			_
4.00012 GHz		127	________			_
4.10012 GHz		127	________			_
4.50012 GHz		127	________			_
5.00012 GHz		127	________			_
5.05012 GHz		127	________			_
5.70012 GHz		127	________			_
6.00012 GHz		127	________			_
6.35012 GHz		127	________			_
6.36012 GHz		127	________			_
7.00012 GHz		127	________			_
7.50012 GHz		127	________			_
7.99988 GHz		127	________			_
8.10012 GHz		127	________			_
9.00012 GHz		127	________			_
10.00012 GHz		127	________			_
10.20012 GHz		127	________			_
11.00012 GHz		127	________			_
12.00012 GHz		127	________			_
12.70012 GHz		127	________			_
12.80012 GHz		127	________			_
12.99988 GHz		127	________			_
14.00012 GHz		119	________			_
15.00012 GHz		119	________			_
16.00012 GHz		119	________			_
16.10012 GHz		119	________			_
18.00012 GHz		119	________			_
19.00012 GHz		119	________			_
20.00012 GHz		119	________			_
21.00012 GHz		119	________			_
22.00012 GHz		119	________			_
23.00012 GHz		119	________			_
23.99988 GHz		119	________			_

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. gen. and rec. atten. and with opt. direct gen./rec. access) **Test frequency**:	Page 1.13				dB	
10.12 MHz		86	________			
20.12 MHz		86	________			–
50.12 MHz		86	________			–
100.12 MHz		101	________			–
200.12 MHz		101	________			–
500.12 MHz		101	________			–
700.12 MHz		101	________			–
750.12 MHz		121	________			–
1.00012 GHz		121	________			–
1.50012 GHz		121	________			–
2.00012 GHz		126	________			–
2.10012 GHz		126	________			–
2.50012 GHz		126	________			–
3.00012 GHz		126	________			–
3.50012 GHz		126	________			–
4.00012 GHz		126	________			–
4.10012 GHz		126	________			–
4.50012 GHz		126	________			–
5.00012 GHz		126	________			–
5.05012 GHz		126	________			–
5.70012 GHz		126	________			–
6.00012 GHz		126	________			–
6.35012 GHz		126	________			–
6.36012 GHz		126	________			–
7.00012 GHz		126	________			–
7.50012 GHz		126	________			–
7.99988 GHz		126	________			–
8.10012 GHz		126	________			–
9.00012 GHz		126	________			–
10.00012 GHz		126	________			–
10.20012 GHz		126	________			–
11.00012 GHz		126	________			–
12.00012 GHz		126	________			–
12.70012 GHz		126	________			–
12.80012 GHz		126	________			–
12.99988 GHz		126	________			–
14.00012 GHz		117	________			–
15.00012 GHz		117	________			–
16.00012 GHz		117	________			–
16.10012 GHz		117	________			–
18.00012 GHz		117	________			–
19.00012 GHz		117	________			–
20.00012 GHz		117	________			–
21.00012 GHz		117	________			–
22.00012 GHz		117	________			–
23.00012 GHz		117	________			–
23.99988 GHz		117	________			–

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
5 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		
	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		
	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		
	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		
	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		
	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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**	Page 1.14				dB	0.1 dB
Atten. **Frequ.**						
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		
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Accuracy DC meas 1 V	Page 1.15				mV	1 mV
Pos. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Neg. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Accuracy DC meas 10 V	Page 1.15				V	0.01 V
Pos. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		
Neg. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		

Performance Test Report R&S® ZVA40

ROHDE&SCHWARZ	Vector Network Analyzer, 40 GHz, _ ports R&S® ZVA40	1145.1110K__
Serial number: Date: Person responsible: Signature:		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Frequency deviation @ 1 GHz	Page 1.5	- 8000	_________	+ 8000	Hz	1 Hz
With Option ZVAB-B4		- 100		+ 100		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics** **Source power +10dBm**	Page 1.5				dBc	1 dB
Freq. **Harmonics**						
50 MHz 100 MHz			________	-20		
150 MHz			________	-20		
100 MHz 200 MHz			________	-20		
300 MHz			________	-20		
200 MHz 400 MHz			________	-20		
600 MHz			________	-20		
500 MHz 1000 MHz			________	-20		
1500 MHz			________	-20		
750 MHz 1500 MHz			________	-20		
2250 MHz			________	-20		
1 GHz 2 GHz			________	-20		
3 GHz			________	-20		
1.5 GHz 3 GHz			________	-20		
4.5 GHz			________	-20		
2 GHz 4 GHz			________	-20		
6 GHz			________	-20		
2.1 GHz 4.2 GHz			________	-20		
6.3 GHz			________	-20		
2.5 GHz 5.0 GHz			________	-20		
7.5 GHz			________	-20		
3.0 GHz 6.0 GHz			________	-20		
9.0 GHz			________	-20		
3.5 GHz 7 GHz			________	-20		
10.5 GHz			________	-20		
4.0 GHz 8.0 GHz			________	-20		
12.0 GHz			________	-20		
4.1 GHz 8.2 GHz			________	-20		
12.3 GHz			________	-20		
5.0 GHz 10.0 GHz			________	-20		
15.0 GHz			________	-20		
5.04 GHz 10.08 GHz			________	-20		
15.12 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __	Page 1.5				dBc	2 dB
Harmonics						
Freq. Harmonics						
5.05 GHz 10.10 GHz			________	-20		
15.15 GHz			________	-20		
5.5 GHz 11.0 GHz			________	-20		
16.5 GHz			________	-20		
6.0 GHz 12.0 GHz			________	-20		
18.0 GHz			________	-20		
6.35 GHz 12.70 GHz			________	-20		
19.05 GHz			________	-20		
7.0 GHz 14.0 GHz			________	-20		
21.0 GHz			________	-20		
8.0 GHz 16.0 GHz			________	-20		
24.0 GHz			________	-20		
8.1 GHz 16.2 GHz			________	-20		
24.3 GHz			________	-20		
9.0 GHz 18.0 GHz			________	-20		
27.0 GHz			________	-20		
10.0 GHz 20.0 GHz			________	-20		
30.0 GHz			________	-20		
10.2 GHz 20.4 GHz			________	-20		
30.6 GHz			________	-20		
11.0 GHz 22.0 GHz			________	-20		
33.0 GHz			________	-20		
12.7 GHz 25.4 GHz			________	-20		
38.1 GHz			________	-20		
13.0 GHz 26.0 GHz			________	-20		
39.0 GHz			________	-20		2 dB
14.0 GHz 28.0 GHz			________	-20		
42.0 GHz			________	-20		
14.6 GHz 29.2 GHz			________	-20		
43.8 GHz			________	-20		
15.0 GHz 30.0 GHz			________	-20		
45.0 GHz			________	-20		
16.0 GHz 32.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics** **Source power +10 dBm** **Freq. Harmonics**	Page 1.5				dBc	
17.0 GHz 34.0 GHz			________	-20		
18.0 GHz 36.0 GHz			________	-20		
19.0 GHz 38.0 GHz			________	-20		
20.0 GHz 40.0 GHz			________	-20		
20.1 GHz 40.2 GHz			________	-20		
21.0 GHz 42.0 GHz			________	-20		
21.75 GHz 43.5 GHz			________	-20		
22.0 GHz 44.0 GHz			________	-20		
23.0 GHz 46.0 GHz			________	-20		
24.0 GHz 48.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm** **Test frequency:**	Page 1.7				dB	0.2 dB
10 MHz		- 2	________	2		
20 MHz		- 2	________	2		
50 MHz		- 0.8	________	0.8		
100 MHz		- 0.8	________	0.8		
200 MHz		- 0.8	________	0.8		
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		
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		
15.0 GHz		- 0.8	________	0.8		
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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
51 MHz	23 dB		-2	________	2		
	20 dB		-2	________	2		
	15 dB		-2	________	2		
	10 dB		-2	________	2		
	5 dB		-2	________	2		
	-5 dB		-2	________	2		
	-10 dB		-2	________	2		
	-15 dB		-2	________	2		
	-20 dB		-2	________	2		
500MHz	23 dB		- 0.8	________	0.8		
	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		
1 GHz	23 dB		- 0.8	________	0.8		
	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		
2 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
2.1 GHz	23 dB		- 0.8	________	0.8		
	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		
3 GHz	23 dB		- 0.8	________	0.8		
	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		
4 GHz	23 dB		- 0.8	________	0.8		
	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		
4.1 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
6 GHz	23 dB		- 0.8	________	0.8		
	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		
8 GHz	23 dB		- 0.8	________	0.8		
	18 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		
10 GHz	23 dB		- 0.8	________	0.8		
	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		
13 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		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		
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		
24 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		
28 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		
35 GHz	16 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
						dB	0.1 dB
Port __		Page 1.8					
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
40 GHz	16 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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
51 MHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		
500MHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	-90 dB		- 3	________	3		
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
2 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
2.1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
3 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
4 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
4.1 GHz	22 dB		- 2	________	2		
	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
6 GHz 22 dB		- 2	________	2		
19 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		
8 GHz 22 dB		- 2	________	2		
17 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
10 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		
13 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
16 GHz 18 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		
20 GHz 18 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
24 GHz	18 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
28 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __							
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
32 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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		
40 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9				dB	0.3 dB
Test frequency:						
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		
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		
17.0 GHz		- 2	________	2		
18.0 GHz		- 2	________	2		
19.0 GHz		- 2	________	2		
20.0 GHz		- 2	________	2		
21.0 GHz		- 2	________	2		
22.0 GHz		- 2	________	2		
23.0 GHz		- 2	________	2		
24.0 GHz		- 2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9					
Test frequency:						
25.0 GHz		- 3	________	3		
26.0 GHz		- 3	________	3		
27.0 GHz		- 3	________	3		
28.0 GHz		- 3	________	3		
29.0 GHz		- 3	________	3		
30.0 GHz		- 3	________	3		
31.0 GHz		- 3	________	3		
32.0 GHz		- 3	________	3		
33.0 GHz		- 3	________	3		
34.0 GHz		- 3	________	3		
35.0 GHz		- 3	________	3		
36.0 GHz		- 3	________	3		
37.0 GHz		- 3	________	3		
38.0 GHz		- 3	________	3		
39.0 GHz		- 3	________	3		
40.0 GHz		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
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		
1 GHz	10 dB		-0.3	________	0.3		
	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		
4 GHz	10 dB		-0.3	________	0.3		
	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	10 dB		-0.3	________	0.3		
	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	10 dB		-0.3	________	0.3		
	5 dB		-0.3	________	0.3		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**		Page 1.10				dB	0.01 dB
24 GHz	10 dB		-0.3	________	0.3		
	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		
40 GHz	10 dB		-0.3	________	0.3		
	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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (without opt. gen/rec atten. and dir. gen/rec access	Page 1.11				dBm	
Test frequency:						
100.12 MHz			________	–80		–
200.12 MHz			________	–80		–
500.12 MHz			________	-110		–
700.12 MHz			________	–110		–
750.12 MHz			________	–110		–
1.00012 GHz			________	–110		–
1.50012 GHz			________	–110		–
2.00012 GHz			________	–115		–
2.10012 GHz			________	–115		–
2.50012 GHz			________	–115		–
3.00012 GHz			________	–115		–
3.50012 GHz			________	–115		–
4.00012 GMz			________	–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		–
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			________	–115		–
15.00012 GHz			________	–115		–
16.00012 GHz			________	–115		–
16.10012 GHz			________	–115		–
18.00012 GHz			________	–115		–
19.00012 GHz			________	–115		–
20.00012 GHz			________	–115		–
21.00012 GHz			________	–110		–
22.00012 GHz			________	–110		–
23.00012 GHz			________	–110		–
23.99988 GHz			________	–110		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (without opt. gen/rec atten. and dir. gen/rec access	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–100		–
26.0 GHz			________	–100		–
27.0 GHz			________	–100		–
28.0 GHz			________	–100		–
29.0 GHz			________	–100		–
30.0 GHz			________	–100		–
31.0 GHz			________	–100		–
32.0 GHz			________	–100		–
33.0 GHz			________	–95		–
34.0 GHz			________	–95		–
35.0 GHz			________	–95		–
36.0 GHz			________	–95		–
37.0 GHz			________	–95		–
38.0 GHz			________	–95		–
39.0 GHz			________	–95		–
40.0 GHz			________	–95		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten.)	Page 1.11				dBm	
Test frequency:						
100.12 MHz			________	–79		–
200.12 MHz			________	–79		–
500.12 MHz			________	–109		–
700.12 MHz			________	–109		–
750.12 MHz			________	–109		–
1.00012 GHz			________	–109		–
1.50012 GHz			________	–109		–
2.00012 GHz			________	–114		–
2.10012 GHz			________	–114		–
2.50012 GHz			________	–114		–
3.00012 GHz			________	–114		–
3.50012 GHz			________	–114		–
4.00012 GMz			________	–114		–
4.10012 GHz			________	–114		–
4.50012 GHz			________	–114		–
5.00012 GHz			________	–114		–
5.05012 GHz			________	–114		–
5.70012 GHz			________	–114		–
6.00012 GHz			________	–114		–
6.35012 GHz			________	–114		–
6.36012 GHz			________	–114		–
7.00012 GHz			________	–114		–
7.50012 GHz			________	–114		–
7.99988 GHz			________	–114		–
8.10012 GHz			________	–114		–
9.00012 GHz			________	–114		–
10.00012 GHz			________	–114		–
10.20012 GHz			________	–114		–
11.00012 GHz			________	–114		–
12.00012 GHz			________	–114		–
12.70012 GHz			________	–114		–
12.80012 GHz			________	–114		–
12.99988 GHz			________	–114		–
14.00012 GHz			________	–113		–
15.00012 GHz			________	–113		–
16.00012 GHz			________	–113		–
16.10012 GHz			________	–113		–
18.00012 GHz			________	–113		–
19.00012 GHz			________	–113		–
20.00012 GHz			________	–113		–
21.00012 GHz			________	–108		–
22.00012 GHz			________	–108		–
23.00012 GHz			________	–108		–
23.99988 GHz			________	–108		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** **(**without opt. rec atten.)	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–97		–
26.0 GHz			________	–97		–
27.0 GHz			________	–97		–
28.0 GHz			________	–97		–
29.0 GHz			________	–97		–
30.0 GHz			________	–97		–
31.0 GHz			________	–97		–
32.0 GHz			________	–97		–
33.0 GHz			________	–92		–
34.0 GHz			________	–92		–
35.0 GHz			________	–92		–
36.0 GHz			________	–92		–
37.0 GHz			________	–92		–
38.0 GHz			________	–92		–
39.0 GHz			________	–92		–
40.0 GHz			________	–92		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency:						
100.12 MHz			________	–78		–
200.12 MHz			________	–78		–
500.12 MHz			________	–108		–
700.12 MHz			________	–108		–
750.12 MHz			________	–108		–
1.00012 GHz			________	–108		–
1.50012 GHz			________	–108		–
2.00012 GHz			________	–113		–
2.10012 GHz			________	–113		–
2.50012 GHz			________	–113		–
3.00012 GHz			________	–113		–
3.50012 GHz			________	–113		–
4.00012 GMz			________	–113		–
4.10012 GHz			________	–113		–
4.50012 GHz			________	–113		–
5.00012 GHz			________	–113		–
5.05012 GHz			________	–113		–
5.70012 GHz			________	–113		–
6.00012 GHz			________	–113		–
6.35012 GHz			________	–113		–
6.36012 GHz			________	–113		–
7.00012 GHz			________	–113		–
7.50012 GHz			________	–113		–
7.99988 GHz			________	–113		–
8.10012 GHz			________	–113		–
9.00012 GHz			________	–113		–
10.00012 GHz			________	–113		–
10.20012 GHz			________	–113		–
11.00012 GHz			________	–113		–
12.00012 GHz			________	–113		–
12.70012 GHz			________	–113		–
12.80012 GHz			________	–113		–
12.99988 GHz			________	–113		–
14.00012 GHz			________	–111		–
15.00012 GHz			________	–111		–
16.00012 GHz			________	–111		–
16.10012 GHz			________	–111		–
18.00012 GHz			________	–111		–
19.00012 GHz			________	–111		–
20.00012 GHz			________	–111		–
21.00012 GHz			________	–106		–
22.00012 GHz			________	–106		–
23.00012 GHz			________	–106		–
23.99988 GHz			________	–106		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** **(**with opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency:						
25.0 GHz			________	–94		–
26.0 GHz			________	–94		–
27.0 GHz			________	–94		–
28.0 GHz			________	–94		–
29.0 GHz			________	–94		–
30.0 GHz			________	–94		–
31.0 GHz			________	–94		–
32.0 GHz			________	–94		–
33.0 GHz			________	–89		–
34.0 GHz			________	–89		–
35.0 GHz			________	–89		–
36.0 GHz			________	–89		–
37.0 GHz			________	–89		–
38.0 GHz			________	–89		–
39.0 GHz			________	–89		–
40.0 GHz			________	–89		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec. atten. and opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency:						
100.12 MHz			________	–77		–
200.12 MHz			________	–77		–
500.12 MHz			________	–107		–
700.12 MHz			________	–107		–
750.12 MHz			________	–107		–
1.00012 GHz			________	–107		–
1.50012 GHz			________	–107		–
2.00012 GHz			________	–112		–
2.10012 GHz			________	–112		–
2.50012 GHz			________	–112		–
3.00012 GHz			________	–112		–
3.50012 GHz			________	–112		–
4.00012 GMz			________	–112		–
4.10012 GHz			________	–112		–
4.50012 GHz			________	–112		–
5.00012 GHz			________	–112		–
5.05012 GHz			________	–112		–
5.70012 GHz			________	–112		–
6.00012 GHz			________	–112		–
6.35012 GHz			________	–112		–
6.36012 GHz			________	–112		–
7.00012 GHz			________	–112		–
7.50012 GHz			________	–112		–
7.99988 GHz			________	–112		–
8.10012 GHz			________	–112		–
9.00012 GHz			________	–112		–
10.00012 GHz			________	–112		–
10.20012 GHz			________	–112		–
11.00012 GHz			________	–112		–
12.00012 GHz			________	–112		–
12.70012 GHz			________	–112		–
12.80012 GHz			________	–112		–
12.99988 GHz			________	–112		–
14.00012 GHz			________	–109		–
15.00012 GHz			________	–109		–
16.00012 GHz			________	–109		–
16.10012 GHz			________	–109		–
18.00012 GHz			________	–109		–
19.00012 GHz			________	–109		–
20.00012 GHz			________	–109		–
21.00012 GHz			________	–104		–
22.00012 GHz			________	–104		–
23.00012 GHz			________	–104		–
23.99988 GHz			________	–104		–
Port __	Page 1.11				dBm	

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Input noise level (with opt. rec. atten. and opt. dir. gen/rec access)						
Test frequency:						
25.0 GHz			________	–88		–
26.0 GHz			________	–88		–
27.0 GHz			________	–88		–
28.0 GHz			________	–88		–
29.0 GHz			________	–88		–
30.0 GHz			________	–88		–
31.0 GHz			________	–88		–
32.0 GHz			________	–88		–
33.0 GHz			________	–83		–
34.0 GHz			________	–83		–
35.0 GHz			________	–83		–
36.0 GHz			________	–83		–
37.0 GHz			________	–83		–
38.0 GHz			________	–83		–
39.0 GHz			________	–83		–
40.0 GHz			________	–83		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Matching (raw)	Page 1.12				dB	1 dB
Test frequency:						
10 MHz		12	________			
20 MHz		12	________			
50 MHz		12	________			
100 MHz		12	________			
200 MHz		12	________			
500 MHz		12	________			
750 MHz		12	________			
1.0 GHz		12	________			
1.5 GHz		12	________			
2.0 GHz		12	________			
2.5 GHz		12	________			
3.0 GHz		12	________			
3.5 GHz		12	________			
4.0 GHz		12	________			
4.5 GHz		8	________			
5.0 GHz		8	________			
5.5 GHz		8	________			
6.0 GHz		8	________			
6.5 GHz		8	________			
7.0 GHz		8	________			
7.5 GHz		8	________			
8.0 GHz		8	________			
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		6	________			
22.0 GHz		6	________			
23.0 GHz		6	________			
24.0 GHz		6	________			
25.0 GHz		6	________			
26.0 GHz		6	________			
27.0 GHz		6	________			
28.0 GHz		6	________			
29.0 GHz		6	________			
30.0 GHz		6	________			
31.0 GHz		6	________			
32.0 GHz		6	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Matching (raw)**	Page 1.12				dB	1 dB
Test frequency:						
33.0 GHz		6	________			
34.0 GHz		6	________			
35.0 GHz		6	________			
36.0 GHz		6	________			
37.0 GHz		6	________			
38.0 GHz		6	________			
39.0 GHz		6	________			
40.0 GHz		6	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (without opt. step attenuator and without opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
10.0 MHz		90	________			–
20.0 MHz		90	________			–
50.0 MHz		105	________			–
100.0 MHz		105	________			–
200.0 MHz		105	________			–
500.0 MHz		125	________			–
700.0 MHz		125	________			–
750.0 MHz		125	________			–
1.0 GHz		125	________			–
1.5 GHz		125	________			–
2.0 GHz		130	________			–
2.1 GHz		130	________			–
2.5 GHz		130	________			–
3.0 GHz		130	________			–
3.5 GHz		130	________			–
4.0 GHz		130	________			–
4.1 GHz		130	________			–
4.5 GHz		130	________			–
5.0 GHz		130	________			–
5.05 GHz		130	________			–
5.7 GHz		130	________			–
6.0 GHz		130	________			–
6.35 GHz		130	________			–
6.36 GHz		130	________			–
7.0 GHz		130	________			–
7.5 GHz		130	________			–
8.0 GHz		130	________			–
8.1 GHz		130	________			–
9.0 GHz		130	________			–
10.0 GHz		130	________			–
10.2 GHz		130	________			–
11.0 GHz		130	________			–
12.0 GHz		130	________			–
12.7 GHz		130	________			–
12.8 GHz		130	________			–
13.0 GHz		130	________			–
14.0 GHz		130	________			–
15.0 GHz		130	________			–
16.0 GHz		130	________			–
16.1 GHz		130	________			–
18.0 GHz		130	________			–
19.0 GHz		130	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
					dB	
Port __ to Port ___	Page 1.13					
Dynamic range						
(without opt. step attenuator and without opt. direct generator/receiver access)						
Test frequency:		130	________			–
20.0 GHz		125	________			–
21.0 GHz		125	________			–
22.0 GHz		125	________			–
23.0 GHz		125	________			–
24.0 GHz		115	________			–
25.0 GHz		115	________			–
26.0 GHz		115	________			–
27.0 GHz		115	________			–
28.0 GHz		115	________			–
29.0 GHz		115	________			–
30.0 GHz		115	________			–
31.0 GHz		115	________			–
32.0 GHz		110	________			–
33.0 GHz		110	________			–
34.0 GHz		110	________			–
35.0 GHz		110	________			–
36.0 GHz		110	________			–
37.0 GHz		110	________			–
38.0 GHz		110	________			–
39.0 GHz		110	________			–
40.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. generator or receiver attenuator)	Page 1.13				dB	
Test frequency:						
10.0 MHz		89	________			–
20.0 MHz		89	________			–
50.0 MHz		104	________			–
100.0 MHz		104	________			–
200.0 MHz		104	________			–
500.0 MHz		124	________			–
700.0 MHz		124	________			–
750.0 MHz		124	________			–
1.0 GHz		124	________			–
1.5 GHz		124	________			–
2.0 GHz		129	________			–
2.1 GHz		129	________			–
2.5 GHz		129	________			–
3.0 GHz		129	________			–
3.5 GHz		129	________			–
4.0 GHz		129	________			–
4.1 GHz		129	________			–
4.5 GHz		129	________			–
5.0 GHz		129	________			–
5.05 GHz		129	________			–
5.7 GHz		129	________			–
6.0 GHz		129	________			–
6.35 GHz		129	________			–
6.36 GHz		129	________			–
7.0 GHz		129	________			–
7.5 GHz		129	________			–
8.0 GHz		129	________			–
8.1 GHz		129	________			–
9.0 GHz		129	________			–
10.0 GHz		129	________			–
10.2 GHz		129	________			–
11.0 GHz		129	________			–
12.0 GHz		129	________			–
12.7 GHz		129	________			–
12.8 GHz		129	________			–
13.0 GHz		129	________			–
14.0 GHz		128	________			–
15.0 GHz		128	________			–
16.0 GHz		128	________			–
16.1 GHz		128	________			–
18.0 GHz		128	________			–
19.0 GHz		128	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	Page 1.13				dB	
Port __ to Port ___						
Dynamic range						
(with opt. generator or						
receiver attenuator)						
Test frequency:		128	________			–
20.0 GHz		123	________			–
21.0 GHz		123	________			–
22.0 GHz		123	________			–
23.0 GHz		123	________			–
24.0 GHz		112	________			–
25.0 GHz		112	________			–
26.0 GHz		112	________			–
27.0 GHz		112	________			–
28.0 GHz		112	________			–
29.0 GHz		112	________			–
30.0 GHz		112	________			–
31.0 GHz		112	________			–
32.0 GHz		107	________			–
33.0 GHz		107	________			–
34.0 GHz		107	________			–
35.0 GHz		107	________			–
36.0 GHz		107	________			–
37.0 GHz		107	________			–
38.0 GHz		107	________			–
39.0 GHz		107	________			–
40.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ Dynamic range (with opt. generator and receiver attenuator or with opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
10.0 MHz		88	________			–
20.0 MHz		88	________			–
50.0 MHz		103	________			–
100.0 MHz		103	________			–
200.0 MHz		103	________			–
500.0 MHz		123	________			–
700.0 MHz		123	________			–
750.0 MHz		123	________			–
1.0 GHz		123	________			–
1.5 GHz		123	________			–
2.0 GHz		123	________			–
2.1 GHz		128	________			–
2.5 GHz		128	________			–
3.0 GHz		128	________			–
3.5 GHz		128	________			–
4.0 GHz		128	________			–
4.1 GHz		128	________			–
4.5 GHz		128	________			–
5.0 GHz		128	________			–
5.05 GHz		128	________			–
5.7 GHz		128	________			–
6.0 GHz		128	________			–
6.35 GHz		128	________			–
6.36 GHz		128	________			–
7.0 GHz		128	________			–
7.5 GHz		128	________			–
8.0 GHz		128	________			–
8.1 GHz		128	________			–
9.0 GHz		128	________			–
10.0 GHz		128	________			–
10.2 GHz		128	________			–
11.0 GHz		128	________			–
12.0 GHz		128	________			–
12.7 GHz		128	________			–
12.8 GHz		128	________			–
13.0 GHz		128	________			–
14.0 GHz		126	________			–
15.0 GHz		126	________			–
16.0 GHz		126	________			–
16.1 GHz		126	________			–
18.0 GHz		126	________			–
19.0 GHz		126	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. generator and receiver attenuator or with opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
20.0 GHz		126	________			–
21.0 GHz		121	________			–
22.0 GHz		121	________			–
23.0 GHz		121	________			–
24.0 GHz		121	________			–
25.0 GHz		109	________			–
26.0 GHz		109	________			–
27.0 GHz		109	________			–
28.0 GHz		109	________			–
29.0 GHz		109	________			–
30.0 GHz		109	________			–
31.0 GHz		109	________			–
32.0 GHz		109	________			–
33.0 GHz		104	________			–
34.0 GHz		104	________			–
35.0 GHz		104	________			–
36.0 GHz		104	________			–
37.0 GHz		104	________			–
38.0 GHz		104	________			–
39.0 GHz		104	________			–
40.0 GHz		104	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. generator or receiver attenuator and with opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:		87	________			–
10.0 MHz		87	________			–
20.0 MHz		102	________			–
50.0 MHz		102	________			–
100.0 MHz		102	________			–
200.0 MHz		122	________			–
500.0 MHz		122	________			–
700.0 MHz		122	________			–
750.0 MHz		122	________			–
1.0 GHz		122	________			–
1.5 GHz		122	________			–
2.0 GHz		127	________			–
2.1 GHz		127	________			–
2.5 GHz		127	________			–
3.0 GHz		127	________			–
3.5 GHz		127	________			–
4.0 GHz		127	________			–
4.1 GHz		127	________			–
4.5 GHz		127	________			–
5.0 GHz		127	________			–
5.05 GHz		127	________			–
5.7 GHz		127	________			–
6.0 GHz		127	________			–
6.35 GHz		127	________			–
6.36 GHz		127	________			–
7.0 GHz		127	________			–
7.5 GHz		127	________			–
8.0 GHz		127	________			–
8.1 GHz		127	________			–
9.0 GHz		127	________			–
10.0 GHz		127	________			–
10.2 GHz		127	________			–
11.0 GHz		127	________			–
12.0 GHz		127	________			–
12.7 GHz		127	________			–
12.8 GHz		127	________			–
13.0 GHz		124	________			–
14.0 GHz		124	________			–
15.0 GHz		124	________			–
16.0 GHz		124	________			–
16.1 GHz		124	________			–
18.0 GHz		124	________			–
19.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. generator or receiver attenuator and with opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
20.0 GHz		124	________			–
21.0 GHz		119	________			–
22.0 GHz		119	________			–
23.0 GHz		119	________			–
24.0 GHz		119	________			–
25.0 GHz		106	________			–
26.0 GHz		106	________			–
27.0 GHz		106	________			–
28.0 GHz		106	________			–
29.0 GHz		106	________			–
30.0 GHz		106	________			–
31.0 GHz		106	________			–
32.0 GHz		106	________			–
33.0 GHz		101	________			–
34.0 GHz		101	________			–
35.0 GHz		101	________			–
36.0 GHz		101	________			–
37.0 GHz		101	________			–
38.0 GHz		101	________			–
39.0 GHz		101	________			–
40.0 GHz		101	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. generator and receiver attenuator and with opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
10.0 MHz		86	________			–
20.0 MHz		86	________			–
50.0 MHz		101	________			–
100.0 MHz		101	________			–
200.0 MHz		101	________			–
500.0 MHz		121	________			–
700.0 MHz		121	________			–
750.0 MHz		121	________			–
1.0 GHz		121	________			–
1.5 GHz		121	________			–
2.0 GHz		121	________			–
2.1 GHz		126	________			–
2.5 GHz		126	________			–
3.0 GHz		126	________			–
3.5 GHz		126	________			–
4.0 GHz		126	________			–
4.1 GHz		126	________			–
4.5 GHz		126	________			–
5.0 GHz		126	________			–
5.05 GHz		126	________			–
5.7 GHz		126	________			–
6.0 GHz		126	________			–
6.35 GHz		126	________			–
6.36 GHz		126	________			–
7.0 GHz		126	________			–
7.5 GHz		126	________			–
8.0 GHz		126	________			–
8.1 GHz		126	________			–
9.0 GHz		126	________			–
10.0 GHz		126	________			–
10.2 GHz		126	________			–
11.0 GHz		126	________			–
12.0 GHz		126	________			–
12.7 GHz		126	________			–
12.8 GHz		126	________			–
13.0 GHz		126	________			–
14.0 GHz		122	________			–
15.0 GHz		122	________			–
16.0 GHz		122	________			–
16.1 GHz		122	________			–
18.0 GHz		122	________			–
19.0 GHz		122	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with opt. generator and receiver attenuator and with opt. direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
20.0 GHz		122	________			–
21.0 GHz		117	________			–
22.0 GHz		117	________			–
23.0 GHz		117	________			–
24.0 GHz		117	________			–
25.0 GHz		103	________			–
26.0 GHz		103	________			–
27.0 GHz		103	________			–
28.0 GHz		103	________			–
29.0 GHz		103	________			–
30.0 GHz		103	________			–
31.0 GHz		103	________			–
32.0 GHz		103	________			–
33.0 GHz		98	________			–
34.0 GHz		98	________			–
35.0 GHz		98	________			–
36.0 GHz		98	________			–
37.0 GHz		98	________			–
38.0 GHz		98	________			–
39.0 GHz		98	________			–
40.0 GHz		98	________			–

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
5 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		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
10 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		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
20 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		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 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		
	10.0 GHz		-2	________	2		
	12.0 GHz		-2	________	2		
	14.0 GHz		-2	________	2		
	16.0 GHz		-2	________	2		
	18.0GHz		-2	________	2		
	20.0 GHz		-2	________	2		
	22.0 GHz		-2	________	2		
	24.0 GHz		-2	________	2		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Accuracy DC meas 1 V	Page 1.15				mV	1 mV
Pos. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Neg. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Accuracy DC meas 10 V	Page 1.15				V	0.01 V
Pos. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		
Neg. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		

Performance Test Report R&S® ZVA50

ROHDE&SCHWARZ	**Vector Network Analyzer, 50 GHz, _ ports R&S® ZVA50**	**1145.1110K__**
Serial number: Date: Person responsible: Signature:		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Frequency deviation @ 1 GHz	Page 1.5	- 8000	_________	+ 8000	Hz	1 Hz
With Option ZVAB-B4		- 100		+ 100		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics** **Source power +10dBm**	Page 1.5				dBc	1 dB
Freq. Harmonics						
50 MHz 100 MHz			________	-20		
150 MHz			________	-20		
100 MHz 200 MHz			________	-20		
300 MHz			________	-20		
200 MHz 400 MHz			________	-20		
600 MHz			________	-20		
500 MHz 1000 MHz			________	-20		
1500 MHz			________	-20		
750 MHz 1500 MHz			________	-20		
2250 MHz			________	-20		
1 GHz 2 GHz			________	-20		
3 GHz			________	-20		
1.5 GHz 3 GHz			________	-20		
4.5 GHz			________	-20		
2 GHz 4 GHz			________	-20		
6 GHz			________	-20		
2.1 GHz 4.2 GHz			________	-20		
6.3 GHz			________	-20		
2.5 GHz 5.0 GHz			________	-20		
7.5 GHz			________	-20		
3.0 GHz 6.0 GHz			________	-20		
9.0 GHz			________	-20		
3.5 GHz 7 GHz			________	-20		
10.5 GHz			________	-20		
4.0 GHz 8.0 GHz			________	-20		
12.0 GHz			________	-20		
4.1 GHz 8.2 GHz			________	-20		
12.3 GHz			________	-20		
5.0 GHz 10.0 GHz			________	-20		
15.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics** **Freq. Harmonics**	Page 1.5				dBc	2 dB
5.04 GHz 10.08 GHz			________	-20		
15.12 GHz			________	-20		
5.05 GHz 10.10 GHz			________	-20		
15.15 GHz			________	-20		
5.5 GHz 11.0 GHz			________	-20		
16.5 GHz			________	-20		
6.0 GHz 12.0 GHz			________	-20		
18.0 GHz			________	-20		
6.35 GHz 12.70 GHz			________	-20		
19.05 GHz			________	-20		
7.0 GHz 14.0 GHz			________	-20		
21.0 GHz			________	-20		
8.0 GHz 16.0 GHz			________	-20		
24.0 GHz			________	-20		
8.1 GHz 16.2 GHz			________	-20		
24.3 GHz			________	-20		
9.0 GHz 18.0 GHz			________	-20		
27.0 GHz			________	-20		
10.0 GHz 20.0 GHz			________	-20		
30.0 GHz			________	-20		
10.2 GHz 20.4 GHz			________	-20		
30.6 GHz			________	-20		
11.0 GHz 22.0 GHz			________	-20		
33.0 GHz			________	-20		
12.7 GHz 25.4 GHz			________	-20		
38.1 GHz			________	-20		
13.0 GHz 26.0 GHz			________	-20		
39.0 GHz			________	-20		
14.0 GHz 28.0 GHz			________	-20		
42.0 GHz			________	-20		
14.6 GHz 29.2 GHz			________	-20		
43.8 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Harmonics Source power +10 dBm	Page 1.5				dBc	2 dB
Freq. Harmonics			________	-20		
15.0 GHz 30.0 GHz			________	-20		
45.0 GHz			________	-20		
16.0 GHz 32.0 GHz			________	-20		
17.0 GHz 34.0 GHz			________	-20		
18.0 GHz 36.0 GHz			________	-20		
19.0 GHz 38.0 GHz			________	-20		
20.0 GHz 40.0 GHz						
Source power +5dBm			________	-20		
20.1 GHz 40.2 GHz			________	-20		
21.0 GHz 42.0 GHz			________	-20		
21.75 GHz 43.5 GHz			________	-20		
22.0 GHz 44.0 GHz			________	-20		
23.0 GHz 46.0 GHz			________	-20		
24.0 GHz 48.0 GHz			________	-20		
25.0 GHz 50.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm**	Page 1.7				dB	0.2 dB
Test frequency						
10 MHz		- 3	________	3		
20 MHz		- 3	________	3		
50 MHz		- 3	________	3		
100 MHz		- 3	________	3		
200 MHz		- 3	________	3		
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		
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		
15.0 GHz		- 0.8	________	0.8		
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm**	Page 1.7				dB	0.2 dB
Test frequency						
25 GHz		-2	________	2		
26 GHz		-2	________	2		
27 GHz		-2	________	2		
28 GHz		-2	________	2		
29 GHz		-2	________	2		
30 GHz		-2	________	2		
31 GHz		-2	________	2		
32 GHz		-2	________	2		
33 GHz		-2	________	2		
34 GHz		-2	________	2		
35 GHz		-2	________	2		
36 GHz		-2	________	2		
37 GHz		-2	________	2		
38 GHz		-2	________	2		
39 GHz		-2	________	2		
40 GHz		-2	________	2		
41 GHz		-2	________	2		
42 GHz		-2	________	2		
43 GHz		-2	________	2		
44 GHz		-2	________	2		
45 GHz		-2	________	2		
46 GHz		-2	________	2		
47 GHz		-2	________	2		
48 GHz		-2	________	2		
49 GHz		-2	________	2		
50 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
51 MHz	23 dB		-2	________	2		
	20 dB		-2	________	2		
	15 dB		-2	________	2		
	10 dB		-2	________	2		
	5 dB		-2	________	2		
	-5 dB		-2	________	2		
	-10 dB		-2	________	2		
	-15 dB		-2	________	2		
	-20 dB		-2	________	2		
500MHz	23 dB		- 0.8	________	0.8		
	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		
			- 0.8	________	0.8		
1 GHz	23 dB		- 0.8	________	0.8		
	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		
			- 0.8	________	0.8		
2 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
2.1 GHz 23 dB		- 0.8	________	0.8		
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		
3 GHz 23 dB		- 0.8	________	0.8		
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		
4 GHz 23 dB		- 0.8	________	0.8		
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		
4.1 GHz 23 dB		- 0.8	________	0.8		
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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
6 GHz	23 dB		- 0.8	________	0.8		
	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		
8 GHz	23 dB		- 0.8	________	0.8		
	18 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		
10 GHz	23 dB		- 0.8	________	0.8		
	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		
13 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
16 GHz	23 dB		- 0.8	________	0.8		
	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		
20 GHz	23 dB		- 0.8	________	0.8		
	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		
24 GHz	30 dB		- 0.8	________	0.8		
	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		
28 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		
35 GHz	16 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	-15 dB		- 0.8	________	0.8		
	-20 dB		- 0.8	________	0.8		
		Page 1.8				dB	0.1 dB
Port __							
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
40 GHz	16 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		
45 GHz	16 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		
50 GHz	16 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
51 MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
500MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
2 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. Level						
2.1 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		
3 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
4 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
4.1 GHz	22 dB		- 2	________	2		
	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
6 GHz	22 dB		- 2	________	2		
	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
8 GHz	22 dB		- 2	________	2		
	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
10 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
13 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
16 GHz 21 dB		- 2	________	2		
18 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		
20 GHz 21 dB		- 2	________	2		
18 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
24 GHz	18 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
28 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
32 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
40 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
45 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
50 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9				dB	0.3 dB
Test frequency:						
10 MHz		- 2	________	2		
20 MHz		- 2	________	2		
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		
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		
17.0 GHz		- 2	________	2		
18.0 GHz		- 2	________	2		
19.0 GHz		- 2	________	2		
20.0 GHz		- 2	________	2		
21.0 GHz		- 2	________	2		
22.0 GHz		- 2	________	2		
23.0 GHz		- 2	________	2		
24.0 GHz		- 2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9				dB	0.3 dB
Test frequency:						
25.0 GHz		- 3	________	3		
26.0 GHz		- 3	________	3		
27.0 GHz		- 3	________	3		
28.0 GHz		- 3	________	3		
29.0 GHz		- 3	________	3		
30.0 GHz		- 3	________	3		
31.0 GHz		- 3	________	3		
32.0 GHz		- 3	________	3		
33.0 GHz		- 3	________	3		
34.0 GHz		- 3	________	3		
35.0 GHz		- 3	________	3		
36.0 GHz		- 3	________	3		
37.0 GHz		- 3	________	3		
38.0 GHz		- 3	________	3		
39.0 GHz		- 3	________	3		
40.0 GHz		- 3	________	3		
41.0 GHz		- 3	________	3		
42.0 GHz		- 3	________	3		
43.0 GHz		- 3	________	3		
44.0 GHz		- 3	________	3		
45.0 GHz		- 3	________	3		
46.0 GHz		- 3	________	3		
47.0 GHz		- 3	________	3		
48.0 GHz		- 3	________	3		
49.0 GHz		- 3	________	3		
50.0 GHz		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**		Page 1.10				dB	0.01 dB
Freq.	Level						
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		
1 GHz	10 dB		-0.3	________	0.3		
	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		
4 GHz	10 dB		-0.3	________	0.3		
	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	10 dB		-0.3	________	0.3		
	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	10 dB		-0.3	________	0.3		
	5 dB		-0.3	________	0.3		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**		Page 1.10				dB	0.01 dB
Freq.	Level						
24 GHz	10 dB		-0.3	________	0.3		
	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		
40 GHz	10 dB		-0.3	________	0.3		
	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		
50 GHz	10 dB		-0.3	________	0.3		
	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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (without opt. gen/rec atten. and dir. gen/rec access	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–80		–
200.12 MHz			________	–80		–
500.12 MHz			________	–110		–
700.12 MHz			________	–110		–
750.12 MHz			________	–110		–
1.00012 GHz			________	–110		–
1.50012 GH			________	–110		–
2.00012 GHz			________	–115		–
2.10012 GHz			________	–115		–
2.50012 GHz			________	–115		–
3.00012 GHz			________	–115		–
3.50012 GHz			________	–115		–
4.00012 GMz			________	–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		–
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			________	–115		–
15.00012 GHz			________	–115		–
16.00012 GHz			________	–115		–
16.10012 GHz			________	–115		–
18.00012 GHz			________	–115		–
19.00012 GHz			________	–115		–
20.00012 GHz			________	–115		–
21.00012 GHz			________	–110		–
22.00012 GHz			________	–110		–
23.00012 GHz			________	–110		–
23.99988 GHz			________	–110		–

Parameter	Reference	**Min. value**	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** **(**without opt. gen/rec atten. and dir. gen/rec access	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–105		–
26.0 GHz			________	–105		–
27.0 GHz			________	–105		–
28.0 GHz			________	–105		–
29.0 GHz			________	–105		–
30.0 GHz			________	–105		–
31.0 GHz			________	–105		–
32.0 GHz			________	–105		–
33.0 GHz			________	–100		–
34.0 GHz			________	–100		–
35.0 GHz			________	–100		–
36.0 GHz			________	–100		–
37.0 GHz			________	–100		–
38.0 GHz			________	–100		–
39.0 GHz			________	–100		–
40.0 GHz			________	–100		–
41.0 GHz			________	–95		–
42.0 GHz			________	–95		–
43.0 GHz			________	–95		–
44.0 GHz			________	–95		–
45.0 GHz			________	–95		–
46.0 GHz			________	–95		–
47.0 GHz			________	–95		–
48.0 GHz			________	–95		–
49.0 GHz			________	–95		–
50.0 GHz			________	–95		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. receiver atten.)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–79		–
200.12 MHz			________	–79		–
500.12 MHz			________	–109		–
700.12 MHz			________	–109		–
750.12 MHz			________	–109		–
1.00012 GHz			________	–109		–
1.50012 GH			________	–109		–
2.00012 GHz			________	–114		–
2.10012 GHz			________	–114		–
2.50012 GHz			________	–114		–
3.00012 GHz			________	–114		–
3.50012 GHz			________	–114		–
4.00012 GMz			________	–114		–
4.10012 GHz			________	–114		–
4.50012 GHz			________	–114		–
5.00012 GHz			________	–114		–
5.05012 GHz			________	–114		–
5.70012 GHz			________	–114		–
6.00012 GHz			________	–114		–
6.35012 GHz			________	–114		–
6.36012 GHz			________	–114		–
7.00012 GHz			________	–114		–
7.50012 GHz			________	–114		–
7.99988 GHz			________	–114		–
8.10012 GHz			________	–114		–
9.00012 GHz			________	–114		–
10.00012 GHz			________	–114		–
10.20012 GHz			________	–114		–
11.00012 GHz			________	–114		–
12.00012 GHz			________	–114		–
12.70012 GHz			________	–114		–
12.80012 GHz			________	–114		–
12.99988 GHz			________	–114		–
14.00012 GHz			________	–113		–
15.00012 GHz			________	–113		–
16.00012 GHz			________	–113		–
16.10012 GHz			________	–113		–
18.00012 GHz			________	–113		–
19.00012 GHz			________	–113		–
20.00012 GHz			________	–113		–
21.00012 GHz			________	–108		–
22.00012 GHz			________	–108		–
23.00012 GHz			________	–108		–
23.99988 GHz			________	–108		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** **(**with opt. receiver atten.)	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–102		–
26.0 GHz			________	–102		–
27.0 GHz			________	–102		–
28.0 GHz			________	–102		–
29.0 GHz			________	–102		–
30.0 GHz			________	–102		–
31.0 GHz			________	–102		–
32.0 GHz			________	–102		–
33.0 GHz			________	–97		–
34.0 GHz			________	–97		–
35.0 GHz			________	–97		–
36.0 GHz			________	–97		–
37.0 GHz			________	–97		–
38.0 GHz			________	–97		–
39.0 GHz			________	–97		–
40.0 GHz			________	–97		–
41.0 GHz			________	–92		–
42.0 GHz			________	–92		–
43.0 GHz			________	–92		–
44.0 GHz			________	–92		–
45.0 GHz			________	–92		–
46.0 GHz			________	–92		–
47.0 GHz			________	–92		–
48.0 GHz			________	–92		–
49.0 GHz			________	–92		–
50.0 GHz			________	–92		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–78		–
200.12 MHz			________	–78		–
500.12 MHz			________	–108		–
700.12 MHz			________	–108		–
750.12 MHz			________	–108		–
1.00012 GHz			________	–108		–
1.50012 GH			________	–108		–
2.00012 GHz			________	–113		–
2.10012 GHz			________	–113		–
2.50012 GHz			________	–113		–
3.00012 GHz			________	–113		–
3.50012 GHz			________	–113		–
4.00012 GMz			________	–113		–
4.10012 GHz			________	–113		–
4.50012 GHz			________	–113		–
5.00012 GHz			________	–113		–
5.05012 GHz			________	–113		–
5.70012 GHz			________	–113		–
6.00012 GHz			________	–113		–
6.35012 GHz			________	–113		–
6.36012 GHz			________	–113		–
7.00012 GHz			________	–113		–
7.50012 GHz			________	–113		–
7.99988 GHz			________	–113		–
8.10012 GHz			________	–113		–
9.00012 GHz			________	–113		–
10.00012 GHz			________	–113		–
10.20012 GHz			________	–113		–
11.00012 GHz			________	–113		–
12.00012 GHz			________	–113		–
12.70012 GHz			________	–113		–
12.80012 GHz			________	–113		–
12.99988 GHz			________	–113		–
14.00012 GHz			________	–111		–
15.00012 GHz			________	–111		–
16.00012 GHz			________	–111		–
16.10012 GHz			________	–111		–
18.00012 GHz			________	–111		–
19.00012 GHz			________	–111		–
20.00012 GHz			________	–111		–
21.00012 GHz			________	–106		–
22.00012 GHz			________	–106		–
23.00012 GHz			________	–106		–
23.99988 GHz			________	–106		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–103		–
26.0 GHz			________	–103		–
27.0 GHz			________	–103		–
28.0 GHz			________	–103		–
29.0 GHz			________	–103		–
30.0 GHz			________	–103		–
31.0 GHz			________	–103		–
32.0 GHz			________	–103		–
33.0 GHz			________	–98		–
34.0 GHz			________	–98		–
35.0 GHz			________	–98		–
36.0 GHz			________	–98		–
37.0 GHz			________	–98		–
38.0 GHz			________	–98		–
39.0 GHz			________	–98		–
40.0 GHz			________	–98		–
41.0 GHz			________	–93		–
42.0 GHz			________	–93		–
43.0 GHz			________	–93		–
44.0 GHz			________	–93		–
45.0 GHz			________	–93		–
46.0 GHz			________	–93		–
47.0 GHz			________	–93		–
48.0 GHz			________	–93		–
49.0 GHz			________	–93		–
50.0 GHz			________	–93		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten. and dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–77		–
200.12 MHz			________	–77		–
500.12 MHz			________	–107		–
700.12 MHz			________	–107		–
750.12 MHz			________	–107		–
1.00012 GHz			________	–107		–
1.50012 GH			________	–107		–
2.00012 GHz			________	–112		–
2.10012 GHz			________	–112		–
2.50012 GHz			________	–112		–
3.00012 GHz			________	–112		–
3.50012 GHz			________	–112		–
4.00012 GMz			________	–112		–
4.10012 GHz			________	–112		–
4.50012 GHz			________	–112		–
5.00012 GHz			________	–112		–
5.05012 GHz			________	–112		–
5.70012 GHz			________	–112		–
6.00012 GHz			________	–112		–
6.35012 GHz			________	–112		–
6.36012 GHz			________	–112		–
7.00012 GHz			________	–112		–
7.50012 GHz			________	–112		–
7.99988 GHz			________	–112		–
8.10012 GHz			________	–112		–
9.00012 GHz			________	–112		–
10.00012 GHz			________	–112		–
10.20012 GHz			________	–112		–
11.00012 GHz			________	–112		–
12.00012 GHz			________	–112		–
12.70012 GHz			________	–112		–
12.80012 GHz			________	–112		–
12.99988 GHz			________	–112		–
14.00012 GHz			________	–110		–
15.00012 GHz			________	–110		–
16.00012 GHz			________	–110		–
16.10012 GHz			________	–110		–
18.00012 GHz			________	–110		–
19.00012 GHz			________	–110		–
20.00012 GHz			________	–110		–
21.00012 GHz			________	–105		–
22.00012 GHz			________	–105		–
23.00012 GHz			________	–105		–
23.99988 GHz			________	–105		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten. and dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–96		–
26.0 GHz			________	–96		–
27.0 GHz			________	–96		–
28.0 GHz			________	–96		–
29.0 GHz			________	–96		–
30.0 GHz			________	–96		–
31.0 GHz			________	–96		–
32.0 GHz			________	–96		–
33.0 GHz			________	–91		–
34.0 GHz			________	–91		–
35.0 GHz			________	–91		–
36.0 GHz			________	–91		–
37.0 GHz			________	–91		–
38.0 GHz			________	–91		–
39.0 GHz			________	–91		–
40.0 GHz			________	–91		–
41.0 GHz			________	–86		–
42.0 GHz			________	–86		–
43.0 GHz			________	–86		–
44.0 GHz			________	–86		–
45.0 GHz			________	–86		–
46.0 GHz			________	–86		–
47.0 GHz			________	–86		–
48.0 GHz			________	–86		–
49.0 GHz			________	–86		–
50.0 GHz			________	–86		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Matching (raw)	Page 1.12				dB	1 dB
Test frequency						
10 MHz		8	________			
20 MHz		8	________			
50 MHz		10	________			
100 MHz		10	________			
200 MHz		10	________			
500 MHz		10	________			
750 MHz		10	________			
1.0 GHz		10	________			
1.5 GHz		10	________			
2.0 GHz		10	________			
2.5 GHz		10	________			
3.0 GHz		10	________			
3.5 GHz		10	________			
4.0 GHz		10	________			
4.5 GHz		10	________			
5.0 GHz		10	________			
5.5 GHz		10	________			
6.0 GHz		10	________			
6.5 GHz		10	________			
7.0 GHz		10	________			
7.5 GHz		10	________			
8.0 GHz		10	________			
9.0 GHz		10	________			
10.0 GHz		10	________			
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		6	________			
22.0 GHz		6	________			
23.0 GHz		6	________			
24.0 GHz		6	________			
25.0 GHz		6	________			
26.0 GHz		6	________			
27.0 GHz		6	________			
28.0 GHz		6	________			
29.0 GHz		6	________			
30.0 GHz		6	________			
31.0 GHz		6	________			
32.0 GHz		6	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Matching (raw)	Page 1.12				dB	1 dB
Test frequency						
33.0 GHz		6	________			
34.0 GHz		6	________			
35.0 GHz		6	________			
36.0 GHz		6	________			
37.0 GHz		6	________			
38.0 GHz		6	________			
39.0 GHz		6	________			
40.0 GHz		6	________			
41.0 GHz		5	________			
42.0 GHz		5	________			
43.0 GHz		5	________			
44.0 GHz		5	________			
45.0 GHz		5	________			
46.0 GHz		5	________			
47.0 GHz		5	________			
48.0 GHz		5	________			
49.0 GHz		5	________			
50.0 GHz		5	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (without option step attenuator and without option direct generator/receiver access)	Page 1.13				dB	
Test frequency:		90	________			–
10.0 MHz		90	________			–
20.0 MHz		105	________			–
50.0 MHz		105	________			–
100.0 MHz		105	________			–
200.0 MHz		125	________			–
500.0 MHz		125	________			–
700.0 MHz		125	________			–
750.0 MHz		125	________			–
1.0 GHz		125	________			–
1.5 GHz		130	________			–
2.0 GHz		130	________			–
2.1 GHz		130	________			–
2.5 GHz		130	________			–
3.0 GHz		130	________			–
3.5 GHz		130	________			–
4.0 GHz		130	________			–
4.1 GHz		130	________			–
4.5 GHz		130	________			–
5.0 GHz		130	________			–
5.05 GHz		130	________			–
5.7 GHz		130	________			–
6.0 GHz		130	________			–
6.35 GHz		130	________			–
6.36 GHz		130	________			–
7.0 GHz		130	________			–
7.5 GHz		130	________			–
8.0 GHz		130	________			–
8.1 GHz		130	________			–
9.0 GHz		130	________			–
10.0 GHz		130	________			–
10.2 GHz		130	________			–
11.0 GHz		130	________			–
12.0 GHz		130	________			–
12.7 GHz		130	________			–
12.8 GHz		130	________			–
13.0 GHz		130	________			–
14.0 GHz		130	________			–
15.0 GHz		130	________			–
16.0 GHz		130	________			–
16.1 GHz		130	________			–
18.0 GHz		130	________			–
19.0 GHz		130	________			–
20.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
					dB	
	Page 1.13					
Port __ to Port ___						
Dynamic range						
(without option step attenuator and without option direct generator/receiver access)						
		125	________			–
Test frequency:		125	________			–
21.0 GHz		125	________			–
22.0 GHz		125	________			–
23.0 GHz		120	________			–
24.0 GHz		120	________			–
25.0 GHz		120	________			–
26.0 GHz		120	________			–
27.0 GHz		120	________			–
28.0 GHz		120	________			–
29.0 GHz		120	________			–
30.0 GHz		120	________			–
31.0 GHz		115	________			–
32.0 GHz		115	________			–
33.0 GHz		115	________			–
34.0 GHz		115	________			–
35.0 GHz		115	________			–
36.0 GHz		115	________			–
37.0 GHz		115	________			–
38.0 GHz		115	________			–
39.0 GHz		110	________			–
40.0 GHz		110	________			–
41.0 GHz		110	________			–
42.0 GHz		110	________			–
43.0 GHz		110	________			–
44.0 GHz		110	________			–
45.0 GHz		110	________			–
46.0 GHz		110	________			–
47.0 GHz		110	________			–
48.0 GHz		110	________			–
49.0 GHz						
50.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with option generator or receiver attenuator)	Page 1.13				dB	
Test frequency:						
10.0 MHz		89	________			–
20.0 MHz		89	________			–
50.0 MHz		104	________			–
100.0 MHz		104	________			–
200.0 MHz		104	________			–
500.0 MHz		124	________			–
700.0 MHz		124	________			–
750.0 MHz		124	________			–
1.0 GHz		124	________			–
1.5 GHz		124	________			–
2.0 GHz		129	________			–
2.1 GHz		129	________			–
2.5 GHz		129	________			–
3.0 GHz		129	________			–
3.5 GHz		129	________			–
4.0 GHz		129	________			–
4.1 GHz		129	________			–
4.5 GHz		129	________			–
5.0 GHz		129	________			–
5.05 GHz		129	________			–
5.7 GHz		129	________			–
6.0 GHz		129	________			–
6.35 GHz		129	________			–
6.36 GHz		129	________			–
7.0 GHz		129	________			–
7.5 GHz		129	________			–
8.0 GHz		129	________			–
8.1 GHz		129	________			–
9.0 GHz		129	________			–
10.0 GHz		129	________			–
10.2 GHz		129	________			–
11.0 GHz		129	________			–
12.0 GHz		129	________			–
12.7 GHz		129	________			–
12.8 GHz		129	________			–
13.0 GHz		129	________			–
14.0 GHz		128	________			–
15.0 GHz		128	________			–
16.0 GHz		128	________			–
16.1 GHz		128	________			–
18.0 GHz		128	________			–
19.0 GHz		128	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with option generator or receiver attenuator)	Page 1.13				dB	
Test frequency:						
20.0 GHz		128	________			–
21.0 GHz		123	________			–
22.0 GHz		123	________			–
23.0 GHz		123	________			–
24.0 GHz		123	________			–
25.0 GHz		117	________			–
26.0 GHz		117	________			–
27.0 GHz		117	________			–
28.0 GHz		117	________			–
29.0 GHz		117	________			–
30.0 GHz		117	________			–
31.0 GHz		117	________			–
32.0 GHz		117	________			–
33.0 GHz		112	________			–
34.0 GHz		112	________			–
35.0 GHz		112	________			–
36.0 GHz		112	________			–
37.0 GHz		112	________			–
38.0 GHz		112	________			–
39.0 GHz		112	________			–
40.0 GHz		112	________			–
41.0 GHz		107	________			–
42.0 GHz		107	________			–
43.0 GHz		107	________			–
44.0 GHz		107	________			–
45.0 GHz		107	________			–
46.0 GHz		107	________			–
47.0 GHz		107	________			–
48.0 GHz		107	________			–
49.0 GHz		107	________			–
50.0 GHz		107	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with option generator and receiver attenuator or with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:		88	________			–
10.0 MHz		88	________			–
20.0 MHz		103	________			–
50.0 MHz		103	________			–
100.0 MHz		103	________			–
200.0 MHz		123	________			–
500.0 MHz		123	________			–
700.0 MHz		123	________			–
750.0 MHz		123	________			–
1.0 GHz		123	________			–
1.5 GHz		123	________			–
2.0 GHz		128	________			–
2.1 GHz		128	________			–
2.5 GHz		128	________			–
3.0 GHz		128	________			–
3.5 GHz		128	________			–
4.0 GHz		128	________			–
4.1 GHz		128	________			–
4.5 GHz		128	________			–
5.0 GHz		128	________			–
5.05 GHz		128	________			–
5.7 GHz		128	________			–
6.0 GHz		128	________			–
6.35 GHz		128	________			–
6.36 GHz		128	________			–
7.0 GHz		128	________			–
7.5 GHz		128	________			–
8.0 GHz		128	________			–
8.1 GHz		128	________			–
9.0 GHz		128	________			–
10.0 GHz		128	________			–
10.2 GHz		128	________			–
11.0 GHz		128	________			–
12.0 GHz		128	________			–
12.7 GHz		128	________			–
12.8 GHz		128	________			–
13.0 GHz		126	________			–
14.0 GHz		126	________			–
15.0 GHz		126	________			–
16.0 GHz		126	________			–
16.1 GHz		126	________			–
18.0 GHz		126	________			–
19.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** **ZVA440, ZVA50** (with option generator and receiver attenuator or with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
20.0 GHz		126	________			–
21.0 GHz		121	________			–
22.0 GHz		121	________			–
23.0 GHz		121	________			–
24.0 GHz		121	________			–
25.0 GHz		114	________			–
26.0 GHz		114	________			–
27.0 GHz		114	________			–
28.0 GHz		114	________			–
29.0 GHz		114	________			–
30.0 GHz		114	________			–
31.0 GHz		114	________			–
32.0 GHz		114	________			–
33.0 GHz		109	________			–
34.0 GHz		109	________			–
35.0 GHz		109	________			–
36.0 GHz		109	________			–
37.0 GHz		109	________			–
38.0 GHz		109	________			–
39.0 GHz		109	________			–
40.0 GHz		109	________			–
41.0 GHz		104	________			–
42.0 GHz		104	________			–
43.0 GHz		104	________			–
44.0 GHz		104	________			–
45.0 GHz		104	________			–
46.0 GHz		104	________			–
47.0 GHz		104	________			–
48.0 GHz		104	________			–
49.0 GHz		104	________			–
50.0 GHz		104	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with option generator or receiver attenuator and with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:		87	________			–
10.0 MHz		87	________			–
20.0 MHz		102	________			–
50.0 MHz		102	________			–
100.0 MHz		102	________			–
200.0 MHz		122	________			–
500.0 MHz		122	________			–
700.0 MHz		122	________			–
750.0 MHz		122	________			–
1.0 GHz		122	________			–
1.5 GHz		122	________			–
2.0 GHz		127	________			–
2.1 GHz		127	________			–
2.5 GHz		127	________			–
3.0 GHz		127	________			–
3.5 GHz		127	________			–
4.0 GHz		127	________			–
4.1 GHz		127	________			–
4.5 GHz		127	________			–
5.0 GHz		127	________			–
5.05 GHz		127	________			–
5.7 GHz		127	________			–
6.0 GHz		127	________			–
6.35 GHz		127	________			–
6.36 GHz		127	________			–
7.0 GHz		127	________			–
7.5 GHz		127	________			–
8.0 GHz		127	________			–
8.1 GHz		127	________			–
9.0 GHz		127	________			–
10.0 GHz		127	________			–
10.2 GHz		127	________			–
11.0 GHz		127	________			–
12.0 GHz		127	________			–
12.7 GHz		127	________			–
12.8 GHz		127	________			–
13.0 GHz		124	________			–
14.0 GHz		124	________			–
15.0 GHz		124	________			–
16.0 GHz		124	________			–
16.1 GHz		124	________			–
18.0 GHz		124	________			–
19.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** **ZVA440, ZVA50** (with option generator or receiver attenuator and with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
20.0 GHz		124	________			–
21.0 GHz		119	________			–
22.0 GHz		119	________			–
23.0 GHz		119	________			–
24.0 GHz		119	________			–
25.0 GHz		111	________			–
26.0 GHz		111	________			–
27.0 GHz		111	________			–
28.0 GHz		111	________			–
29.0 GHz		111	________			–
30.0 GHz		111	________			–
31.0 GHz		111	________			–
32.0 GHz		111	________			–
33.0 GHz		106	________			–
34.0 GHz		106	________			–
35.0 GHz		106	________			–
36.0 GHz		106	________			–
37.0 GHz		106	________			–
38.0 GHz		106	________			–
39.0 GHz		106	________			–
40.0 GHz		106	________			–
41.0 GHz		101	________			–
42.0 GHz		101	________			–
43.0 GHz		101	________			–
44.0 GHz		101	________			–
45.0 GHz		101	________			–
46.0 GHz		101	________			–
47.0 GHz		101	________			–
48.0 GHz		101	________			–
49.0 GHz		101	________			–
50.0 GHz		101	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with option generator and receiver attenuator and with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:		86	________			–
10.0 MHz		86	________			–
20.0 MHz		101	________			–
50.0 MHz		101	________			–
100.0 MHz		101	________			–
200.0 MHz		121	________			–
500.0 MHz		121	________			–
700.0 MHz		121	________			–
750.0 MHz		121	________			–
1.0 GHz		121	________			–
1.5 GHz		121	________			–
2.0 GHz		126	________			–
2.1 GHz		126	________			–
2.5 GHz		126	________			–
3.0 GHz		126	________			–
3.5 GHz		126	________			–
4.0 GHz		126	________			–
4.1 GHz		126	________			–
4.5 GHz		126	________			–
5.0 GHz		126	________			–
5.05 GHz		126	________			–
5.7 GHz		126	________			–
6.0 GHz		126	________			–
6.35 GHz		126	________			–
6.36 GHz		126	________			–
7.0 GHz		126	________			–
7.5 GHz		126	________			–
8.0 GHz		126	________			–
8.1 GHz		126	________			–
9.0 GHz		126	________			–
10.0 GHz		126	________			–
10.2 GHz		126	________			–
11.0 GHz		126	________			–
12.0 GHz		126	________			–
12.7 GHz		126	________			–
12.8 GHz		126	________			–
13.0 GHz		122	________			–
14.0 GHz		122	________			–
15.0 GHz		122	________			–
16.0 GHz		122	________			–
16.1 GHz		122	________			–
18.0 GHz		122	________			–
19.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with option generator and receiver attenuator and with option direct generator/receiver access)	Page 1.13				dB	
Test frequency:						
20.0 GHz		122	________			–
21.0 GHz		117	________			–
22.0 GHz		117	________			–
23.0 GHz		117	________			–
24.0 GHz		117	________			–
25.0 GHz		108	________			–
26.0 GHz		108	________			–
27.0 GHz		108	________			–
28.0 GHz		108	________			–
29.0 GHz		108	________			–
30.0 GHz		108	________			–
31.0 GHz		108	________			–
32.0 GHz		108	________			–
33.0 GHz		103	________			–
34.0 GHz		103	________			–
35.0 GHz		103	________			–
36.0 GHz		103	________			–
37.0 GHz		103	________			–
38.0 GHz		103	________			–
39.0 GHz		103	________			–
40.0 GHz		103	________			–
41.0 GHz		98	________			–
42.0 GHz		98	________			–
43.0 GHz		98	________			–
44.0 GHz		98	________			–
45.0 GHz		98	________			–
46.0 GHz		98	________			–
47.0 GHz		98	________			–
48.0 GHz		98	________			–
49.0 GHz		98	________			–
50.0 GHz		98	________			–

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten. Attenuation Accuracy Reference 0 dB**		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
5 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		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
	42.0 GHz		-2	________	2		
	44.0 GHz		-2	________	2		
	46.0 GHz		-2	________	2		
	48.0 GHz		-2	________	2		
	50.0 GHz		-2	________	2		
10 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		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	32.0 GHz		-2	________	2		
Port __ Receiver Step Atten. Attenuation Accuracy Reference 0 dB		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
10 dB	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
	42.0 GHz		-2	________	2		
	44.0 GHz		-2	________	2		
	46.0 GHz		-2	________	2		
	48.0 GHz		-2	________	2		
	50.0 GHz		-2	________	2		
20 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		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
	42.0 GHz		-2	________	2		
	44.0 GHz		-2	________	2		
	46.0 GHz		-2	________	2		
	48.0 GHz		-2	________	2		
	50.0 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		
	10.0 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	12.0 GHz		-2	________	2		
	14.0 GHz		-2	________	2		
	16.0 GHz		-2	________	2		
Port __ Receiver Step Atten. Attenuation Accuracy Reference 0 dB		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
35 dB	18.0GHz		-2	________	2		
	20.0 GHz		-2	________	2		
	22.0 GHz		-2	________	2		
	24.0 GHz		-2	________	2		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
	42.0 GHz		-2	________	2		
	44.0 GHz		-2	________	2		
	46.0 GHz		-2	________	2		
	48.0 GHz		-2	________	2		
	50.0 GHz		-2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Accuracy DC meas 1 V	Page 1.15				mV	1 mV
Pos. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Neg. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Accuracy DC meas 10 V	Page 1.15				V	0.01 V
Pos. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		
Neg. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		

Performance Test Report R&S® ZVA67

ROHDE&SCHWARZ	Vector Network Analyzer, 67 GHz, _ ports R&S® ZVA67	1145.1110K__
Serial number: Date: Person responsible: Signature:		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Frequency deviation @ 1 GHz	Page 1.5	- 8000	_________	+ 8000	Hz	1 Hz
With Option ZVAB-B4		- 100		+ 100		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Harmonics**	Page 1.5				dBc	1 dB
Source power +7dBm						
Freq. Harmonics						
50 MHz 100 MHz			________	-20		
150 MHz			________	-20		
Source power +10dBm						
100 MHz 200 MHz			________	-20		
300 MHz			________	-20		
200 MHz 400 MHz			________	-20		
600 MHz			________	-20		
500 MHz 1000 MHz			________	-20		
1500 MHz			________	-20		
750 MHz 1500 MHz			________	-20		
2250 MHz			________	-20		
1 GHz 2 GHz			________	-20		
3 GHz			________	-20		
1.5 GHz 3 GHz			________	-20		
4.5 GHz			________	-20		
2 GHz 4 GHz			________	-20		
6 GHz			________	-20		
2.1 GHz 4.2 GHz			________	-20		
6.3 GHz			________	-20		
2.5 GHz 5.0 GHz			________	-20		
7.5 GHz			________	-20		
3.0 GHz 6.0 GHz			________	-20		
9.0 GHz			________	-20		
3.5 GHz 7 GHz			________	-20		
10.5 GHz			________	-20		
4.0 GHz 8.0 GHz			________	-20		
12.0 GHz			________	-20		
4.1 GHz 8.2 GHz			________	-20		
12.3 GHz			________	-20		
5.0 GHz 10.0 GHz			________	-20		
15.0 GHz			________	-20		
Port __	Page 1.5				dBc	2 dB

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Harmonics **Source power +7dBm** **Freq. Harmonics**						
5.04 GHz 10.08 GHz			________	-20		
15.12 GHz			________	-20		
5.05 GHz 10.10 GHz			________	-20		
15.15 GHz			________	-20		
5.5 GHz 11.0 GHz			________	-20		
16.5 GHz			________	-20		
6.0 GHz 12.0 GHz			________	-20		
18.0 GHz			________	-20		
6.35 GHz 12.70 GHz			________	-20		
19.05 GHz			________	-20		
7.0 GHz 14.0 GHz			________	-20		
21.0 GHz			________	-20		
8.0 GHz 16.0 GHz			________	-20		
24.0 GHz			________	-20		
8.1 GHz 16.2 GHz			________	-20		
24.3 GHz			________	-20		
9.0 GHz 18.0 GHz			________	-20		
27.0 GHz			________	-20		
10.0 GHz 20.0 GHz			________	-20		
30.0 GHz			________	-20		
10.2 GHz 20.4 GHz			________	-20		
30.6 GHz			________	-20		
11.0 GHz 22.0 GHz			________	-20		
33.0 GHz			________	-20		
12.7 GHz 25.4 GHz			________	-20		
38.1 GHz			________	-20		
13.0 GHz 26.0 GHz			________	-20		
39.0 GHz			________	-20		
14.0 GHz 28.0 GHz			________	-20		
42.0 GHz			________	-20		
14.6 GHz 29.2 GHz			________	-20		
43.8 GHz			________	-20		
Port __	Page 1.5				dBc	2 dB

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Harmonics **Source power +10 dBm**						
Freq. **Harmonics**						
15.0 GHz 30.0 GHz			________	-20		
45.0 GHz			________	-20		
16.0 GHz 32.0 GHz			________	-20		
17.0 GHz 34.0 GHz			________	-20		
18.0 GHz 36.0 GHz			________	-20		
19.0 GHz 38.0 GHz			________	-20		
20.0 GHz 40.0 GHz			________	-20		
Source power +5dBm						
20.1 GHz 40.2 GHz			________	-20		
21.0 GHz 42.0 GHz			________	-20		
21.75 GHz 43.5 GHz			________	-20		
22.0 GHz 44.0 GHz			________	-20		
23.0 GHz 46.0 GHz			________	-20		
24.0 GHz 48.0 GHz			________	-20		
25.0 GHz 50.0 GHz			________	-20		
26.0 GHz 52.0 GHz			________	-20		
27.0 GHz 54.0 GHz			________	-20		
28.0 GHz 56.0 GHz			________	-20		
29.0 GHz 58.0 GHz			________	-20		
30.0 GHz 60.0 GHz			________	-20		
31.0 GHz 62.0 GHz			________	-20		
32.0 GHz 64.0 GHz			________	-20		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm**	Page 1.7				dB	0.2 dB
Test frequency						
10 MHz		- 3	________	3		
20 MHz		- 3	________	3		
50 MHz		- 3	________	3		
100 MHz		- 3	________	3		
200 MHz		- 3	________	3		
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		
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		
15.0 GHz		- 0.8	________	0.8		
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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power Accuracy** **Output power -10 dBm**	Page 1.7				dB	0.2 dB
Test frequency						
25 GHz		-2	________	2		
26 GHz		-2	________	2		
27 GHz		-2	________	2		
28 GHz		-2	________	2		
29 GHz		-2	________	2		
30 GHz		-2	________	2		
31 GHz		-2	________	2		
32 GHz		-2	________	2		
33 GHz		-2	________	2		
34 GHz		-2	________	2		
35 GHz		-2	________	2		
36 GHz		-2	________	2		
37 GHz		-2	________	2		
38 GHz		-2	________	2		
39 GHz		-2	________	2		
40 GHz		-2	________	2		
41 GHz		-2	________	2		
42 GHz		-2	________	2		
43 GHz		-2	________	2		
44 GHz		-2	________	2		
45 GHz		-2	________	2		
46 GHz		-2	________	2		
47 GHz		-2	________	2		
48 GHz		-2	________	2		
49 GHz		-2	________	2		
50 GHz		-2	________	2		
52 GHz		-2	________	2		
54 GHz		-2	________	2		
56 GHz		-2	________	2		
58 GHz		-2	________	2		
60 GHz		-2	________	2		
62 GHz		-2	________	2		
64 GHz		-2	________	2		
66 GHz		-2	________	2		
67 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
51 MHz	23 dB		-2	________	2		
	20 dB		-2	________	2		
	15 dB		-2	________	2		
	10 dB		-2	________	2		
	5 dB		-2	________	2		
	-5 dB		-2	________	2		
	-10 dB		-2	________	2		
	-15 dB		-2	________	2		
	-20 dB		-2	________	2		
500MHz	23 dB		- 0.8	________	0.8		
	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		
1 GHz	23 dB		- 0.8	________	0.8		
	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		
2 GHz	23 dB		- 0.8	________	0.8		
	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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
2.1 GHz 23 dB		- 0.8	________	0.8		
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		
3 GHz 23 dB		- 0.8	________	0.8		
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		
4 GHz 23 dB		- 0.8	________	0.8		
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		
4.1 GHz 23 dB		- 0.8	________	0.8		
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		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
6 GHz 23 dB		- 0.8	________	0.8		
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		
8 GHz 23 dB		- 0.8	________	0.8		
18 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		
10 GHz 23 dB		- 0.8	________	0.8		
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		
13 GHz 23 dB		- 0.8	________	0.8		
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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
16 GHz	23 dB		- 0.8	________	0.8		
	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		
20 GHz	23 dB		- 0.8	________	0.8		
	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		
24 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		
28 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		
35 GHz	16 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	-20 dB		- 0.8	________	0.8		
Port __ **Power linearity** (without Opt. Gen Att) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
40 GHz	16 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		
45 GHz	16 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		
50 GHz	16 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		
55 GHz	12 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		
60 GHz	12 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
		Page 1.8				dB	0.1 dB
Port __							
Power linearity							
(without Opt. Gen Att)							
Reference –10 dBm							
Freq.	**Level**						
65 GHz	12 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		
67 GHz	12 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		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
51 MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
500MHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
1 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
2 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. Level						
2.1 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		
3 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
4 GHz	22 dB		- 2	________	2		
	20 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
4.1 GHz	22 dB		- 2	________	2		
	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __		Page 1.8				dB	0.1 dB
Power linearity							
(with Opt. Gen Atten)							
Reference –10 dBm							
Freq.	**Level**						
6 GHz	22 dB		- 2	________	2		
	19 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
8 GHz	22 dB		- 2	________	2		
	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
10 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		
13 GHz 22 dB		- 2	________	2		
20 dB		- 2	________	2		
15 dB		- 2	________	2		
10 dB		- 2	________	2		
5 dB		- 2	________	2		
-5 dB		- 2	________	2		
-10 dB		- 2	________	2		
-15 dB		- 2	________	2		
-20 dB		- 2	________	2		
-25 dB		- 2	________	2		
-30 dB		- 2	________	2		
-35 dB		- 2	________	2		
-40 dB		- 3	________	3		
-45 dB		- 3	________	3		
-50 dB		- 3	________	3		
-55 dB		- 3	________	3		
-60 dB		- 3	________	3		
-65 dB		- 3	________	3		
-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
16 GHz	21 dB		- 2	________	2		
	18 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
20 GHz	21 dB		- 2	________	2		
	18 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
24 GHz	18 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
28 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
32 GHz	17 dB		- 2	________	2		
	15 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
40 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
Freq.	**Level**						
45 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		
50 GHz	13 dB		- 2	________	2		
	10 dB		- 2	________	2		
	5 dB		- 2	________	2		
	-5 dB		- 2	________	2		
	-10 dB		- 2	________	2		
	-15 dB		- 2	________	2		
	-20 dB		- 2	________	2		
	-25 dB		- 2	________	2		
	-30 dB		- 2	________	2		
	-35 dB		- 2	________	2		
	-40 dB		- 3	________	3		
	-45 dB		- 3	________	3		
	-50 dB		- 3	________	3		
	-55 dB		- 3	________	3		
	-60 dB		- 3	________	3		
	-65 dB		- 3	________	3		
	-70 dB		- 3	________	3		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**	Page 1.8				dB	0.1 dB
Freq. **Level**						
55 GHz 9 dB		- 2	________			
5 dB		- 2	________			
-5 dB		- 2	________			
-10 dB		- 2	________			
-15 dB		- 2	________			
-20 dB		- 2	________			
-25 dB		- 2	________			
-30 dB		- 2	________			
-35 dB		- 2	________			
-40 dB		- 2	________			
-45 dB		- 3	________			
-50 dB		- 3	________			
-55 dB		- 3	________			
-60 dB		- 3	________			
-65 dB		- 3	________			
-70 dB		- 3	________			
60 GHz 9 dB		- 2	________			
5 dB		- 2	________			
-5 dB		- 2	________			
-10 dB		- 2	________			
-15 dB		- 2	________			
-20 dB		- 2	________			
-25 dB		- 2	________			
-30 dB		- 2	________			
-35 dB		- 2	________			
-40 dB		- 2	________			
-45 dB		- 3	________			
-50 dB		- 3	________			
-55 dB		- 3	________			
-60 dB		- 3	________			
-65 dB		- 3	________			
-70 dB		- 3	________			

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power linearity** (with Opt. Gen Atten) **Reference –10 dBm**		Page 1.8				dB	0.1 dB
65 GHz	10 dB		- 2	________			
	5 dB		- 2	________			
	-5 dB		- 2	________			
	-10 dB		- 2	________			
	-15 dB		- 2	________			
	-20 dB		- 2	________			
	-25 dB		- 2	________			
	-30 dB		- 2	________			
	-35 dB		- 2	________			
	-40 dB		- 2	________			
	-45 dB		- 3	________			
	-50 dB		- 3	________			
	-55 dB		- 3	________			
	-60 dB		- 3	________			
	-65 dB		- 3	________			
	-70 dB		- 3	________			
67 GHz	9 dB		- 2	________			
	5 dB		- 2	________			
	-5 dB		- 2	________			
	-10 dB		- 2	________			
	-15 dB		- 2	________			
	-20 dB		- 2	________			
	-25 dB		- 2	________			
	-30 dB		- 2	________			
	-35 dB		- 2	________			
	-40 dB		- 2	________			
	-45 dB		- 3	________			
	-50 dB		- 3	________			
	-55 dB		- 3	________			
	-60 dB		- 3	________			
	-65 dB		- 3	________			
	-70 dB		- 3	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9				dB	0.3 dB
Test frequency:						
10 MHz		- 2	________	2		
20 MHz		- 2	________	2		
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		
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		
17.0 GHz		- 2	________	2		
18.0 GHz		- 2	________	2		
19.0 GHz		- 2	________	2		
20.0 GHz		- 2	________	2		
21.0 GHz		- 2	________	2		
22.0 GHz		- 2	________	2		
23.0 GHz		- 2	________	2		
24.0 GHz		- 2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Power measurement uncertainty**	Page 1.9				dB	0.3 dB
Test frequency:						
25.0 GHz		- 3	________	3		
26.0 GHz		- 3	________	3		
27.0 GHz		- 3	________	3		
28.0 GHz		- 3	________	3		
29.0 GHz		- 3	________	3		
30.0 GHz		- 3	________	3		
31.0 GHz		- 3	________	3		
32.0 GHz		- 3	________	3		
33.0 GHz		- 3	________	3		
34.0 GHz		- 3	________	3		
35.0 GHz		- 3	________	3		
36.0 GHz		- 3	________	3		
37.0 GHz		- 3	________	3		
38.0 GHz		- 3	________	3		
39.0 GHz		- 3	________	3		
40.0 GHz		- 3	________	3		
41.0 GHz		- 4	________	4		
42.0 GHz		- 4	________	4		
43.0 GHz		- 4	________	4		
44.0 GHz		- 4	________	4		
45.0 GHz		- 4	________	4		
46.0 GHz		- 4	________	4		
47.0 GHz		- 4	________	4		
48.0 GHz		- 4	________	4		
49.0 GHz		- 4	________	4		
50.0 GHz		- 4	________	4		
51.0 GHz		- 4	________	4		
52.0 GHz		- 4	________	4		
53.0 GHz		- 4	________	4		
54.0 GHz		- 4	________	4		
55.0 GHz		- 4	________	4		
56.0 GHz		- 4	________	4		
57.0 GHz		- 4	________	4		
58.0 GHz		- 4	________	4		
59.0 GHz		- 4	________	4		
60.0 GHz		- 4	________	4		
61.0 GHz		- 4	________	4		
62.0 GHz		- 4	________	4		
63.0 GHz		- 4	________	4		
64.0 GHz		- 4	________	4		
65.0 GHz		- 4	________	4		
66.0 GHz		- 4	________	4		
67.0 GHz		- 4	________	4		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**		Page 1.10				dB	0.01 dB
Freq.	**Level**						
50 MHz	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	10 dB		-0.3	________	0.3		
	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		
4 GHz	10 dB		-0.3	________	0.3		
	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	10 dB		-0.3	________	0.3		
	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	10 dB		-0.3	________	0.3		
	5 dB		-0.3	________	0.3		
	-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		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input linearity** **Reference –10 dBm**		Page 1.10				dB	0.01 dB
Freq.	**Level**						
24 GHz	10 dB		-0.3	________	0.3		
	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		
40 GHz	10 dB		-0.3	________	0.3		
	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		
50 GHz	10 dB		-0.3	________	0.3		
	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		
60 GHz	10 dB		-0.3	________	0.3		
	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		
67 GHz	10 dB		-0.3	________	0.3		
	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	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (without opt. gen/rec atten. and dir. gen/rec access	Page 1.11				dBm	
Test frequency			________	–90		–
100.12 MHz			________	–90		–
200.12 MHz			________	–105		–
500.12 MHz			________	–105		–
700.12 MHz			________	–105		–
750.12 MHz			________	–105		–
1.00012 GHz			________	–105		–
1.50012 GH			________	–115		–
2.00012 GHz			________	–115		–
2.10012 GHz			________	–115		–
2.50012 GHz			________	–115		–
3.00012 GHz			________	–115		–
3.50012 GHz			________	–115		–
4.00012 GMz			________	–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		–
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			________	–115		–
15.00012 GHz			________	–115		–
16.00012 GHz			________	–115		–
16.10012 GHz			________	–115		–
18.00012 GHz			________	–115		–
19.00012 GHz			________	–115		–
20.00012 GHz			________	–115		–
21.00012 GHz			________	–115		–
22.00012 GHz			________	–115		–
23.00012 GHz			________	–115		–
23.99988 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** **(**without opt. gen/rec atten. and dir. gen/rec access	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–105		–
26.0 GHz			________	–105		–
27.0 GHz			________	–105		–
28.0 GHz			________	–105		–
29.0 GHz			________	–105		–
30.0 GHz			________	–105		–
31.0 GHz			________	–105		–
32.0 GHz			________	–105		–
33.0 GHz			________	–105		–
34.0 GHz			________	–105		–
35.0 GHz			________	–105		–
36.0 GHz			________	–105		–
37.0 GHz			________	–105		–
38.0 GHz			________	–105		–
39.0 GHz			________	–105		–
40.0 GHz			________	–105		–
41.0 GHz			________	–100		–
42.0 GHz			________	–100		–
43.0 GHz			________	–100		–
44.0 GHz			________	–100		–
45.0 GHz			________	–100		–
46.0 GHz			________	–100		–
47.0 GHz			________	–100		–
48.0 GHz			________	–100		–
49.0 GHz			________	–100		–
50.0 GHz			________	–100		–
51.0 GHz			________	–95		–
52.0 GHz			________	–95		–
53.0 GHz			________	–95		–
54.0 GHz			________	–95		–
55.0 GHz			________	–95		–
56.0 GHz			________	–95		–
57.0 GHz			________	–95		–
58.0 GHz			________	–95		–
59.0 GHz			________	–95		–
60.0 GHz			________	–95		–
61.0 GHz			________	–95		–
62.0 GHz			________	–95		–
63.0 GHz			________	–95		–
64.0 GHz			________	–95		–
65.0 GHz			________	–95		–
66.0 GHz			________	–95		–
67.0 GHz			________	–95		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten.)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–89		–
200.12 MHz			________	–89		–
500.12 MHz			________	–104		–
700.12 MHz			________	–104		–
750.12 MHz			________	–104		–
1.00012 GHz			________	–104		–
1.50012 GH			________	–104		–
2.00012 GHz			________	–114		–
2.10012 GHz			________	–114		–
2.50012 GHz			________	–114		–
3.00012 GHz			________	–114		–
3.50012 GHz			________	–114		–
4.00012 GMz			________	–114		–
4.10012 GHz			________	–114		–
4.50012 GHz			________	–114		–
5.00012 GHz			________	–114		–
5.05012 GHz			________	–114		–
5.70012 GHz			________	–114		–
6.00012 GHz			________	–114		–
6.35012 GHz			________	–114		–
6.36012 GHz			________	–114		–
7.00012 GHz			________	–114		–
7.50012 GHz			________	–114		–
7.99988 GHz			________	–114		–
8.10012 GHz			________	–114		–
9.00012 GHz			________	–114		–
10.00012 GHz			________	–114		–
10.20012 GHz			________	–114		–
11.00012 GHz			________	–114		–
12.00012 GHz			________	–114		–
12.70012 GHz			________	–114		–
12.80012 GHz			________	–114		–
12.99988 GHz			________	–114		–
14.00012 GHz			________	–113		–
15.00012 GHz			________	–113		–
16.00012 GHz			________	–113		–
16.10012 GHz			________	–113		–
18.00012 GHz			________	–113		–
19.00012 GHz			________	–113		–
20.00012 GHz			________	–113		–
21.00012 GHz			________	–113		–
22.00012 GHz			________	–113		–
23.00012 GHz			________	–113		–
23.99988 GHz			________	–113		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten.)	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–102		–
26.0 GHz			________	–102		–
27.0 GHz			________	–102		–
28.0 GHz			________	–102		–
29.0 GHz			________	–102		–
30.0 GHz			________	–102		–
31.0 GHz			________	–102		–
32.0 GHz			________	–102		–
33.0 GHz			________	–102		–
34.0 GHz			________	–102		–
35.0 GHz			________	–102		–
36.0 GHz			________	–102		–
37.0 GHz			________	–102		–
38.0 GHz			________	–102		–
39.0 GHz			________	–102		–
40.0 GHz			________	–102		–
41.0 GHz			________	–97		–
42.0 GHz			________	–97		–
43.0 GHz			________	–97		–
44.0 GHz			________	–97		–
45.0 GHz			________	–97		–
46.0 GHz			________	–97		–
47.0 GHz			________	–97		–
48.0 GHz			________	–97		–
49.0 GHz			________	–97		–
50.0 GHz			________	–97		–
51.0 GHz			________	–92		–
52.0 GHz			________	–92		–
53.0 GHz			________	–92		–
54.0 GHz			________	–92		–
55.0 GHz			________	–92		–
56.0 GHz			________	–92		–
57.0 GHz			________	–92		–
58.0 GHz			________	–92		–
59.0 GHz			________	–92		–
60.0 GHz			________	–92		–
61.0 GHz			________	–92		–
62.0 GHz			________	–92		–
63.0 GHz			________	–92		–
64.0 GHz			________	–92		–
65.0 GHz			________	–92		–
66.0 GHz			________	–92		–
67.0 GHz			________	–92		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–88		–
200.12 MHz			________	–88		–
500.12 MHz			________	–103		–
700.12 MHz			________	–103		–
750.12 MHz			________	–103		–
1.00012 GHz			________	–103		–
1.50012 GH			________	–103		–
2.00012 GHz			________	–113		–
2.10012 GHz			________	–113		–
2.50012 GHz			________	–113		–
3.00012 GHz			________	–113		–
3.50012 GHz			________	–113		–
4.00012 GMz			________	–113		–
4.10012 GHz			________	–113		–
4.50012 GHz			________	–113		–
5.00012 GHz			________	–113		–
5.05012 GHz			________	–113		–
5.70012 GHz			________	–113		–
6.00012 GHz			________	–113		–
6.35012 GHz			________	–113		–
6.36012 GHz			________	–113		–
7.00012 GHz			________	–113		–
7.50012 GHz			________	–113		–
7.99988 GHz			________	–113		–
8.10012 GHz			________	–113		–
9.00012 GHz			________	–113		–
10.00012 GHz			________	–113		–
10.20012 GHz			________	–113		–
11.00012 GHz			________	–113		–
12.00012 GHz			________	–113		–
12.70012 GHz			________	–113		–
12.80012 GHz			________	–113		–
12.99988 GHz			________	–111		–
14.00012 GHz			________	–111		–
15.00012 GHz			________	–111		–
16.00012 GHz			________	–111		–
16.10012 GHz			________	–111		–
18.00012 GHz			________	–111		–
19.00012 GHz			________	–111		–
20.00012 GHz			________	–111		–
21.00012 GHz			________	–111		–
22.00012 GHz			________	–111		–
23.00012 GHz			________	–111		–
23.99988 GHz			________	–111		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** **(**with opt. dir. gen/rec access)	Page 1.11				dBm	
Test frequency						–
25.0 GHz			________	–99		–
26.0 GHz			________	–99		–
27.0 GHz			________	–99		–
28.0 GHz			________	–99		–
29.0 GHz			________	–99		–
30.0 GHz			________	–99		–
31.0 GHz			________	–99		–
32.0 GHz			________	–99		–
33.0 GHz			________	–99		–
34.0 GHz			________	–99		–
35.0 GHz			________	–99		–
36.0 GHz			________	–99		–
37.0 GHz			________	–99		–
38.0 GHz			________	–99		–
39.0 GHz			________	–99		–
40.0 GHz			________	–99		–
41.0 GHz			________	–94		–
42.0 GHz			________	–94		–
43.0 GHz			________	–94		–
44.0 GHz			________	–94		–
45.0 GHz			________	–94		–
46.0 GHz			________	–94		–
47.0 GHz			________	–94		–
48.0 GHz			________	–94		–
49.0 GHz			________	–94		–
50.0 GHz			________	–94		–
51.0 GHz			________	–89		–
52.0 GHz			________	–89		–
53.0 GHz			________	–89		–
54.0 GHz			________	–89		–
55.0 GHz			________	–89		–
56.0 GHz			________	–89		–
57.0 GHz			________	–89		–
58.0 GHz			________	–89		–
59.0 GHz			________	–89		–
60.0 GHz			________	–89		–
61.0 GHz			________	–89		–
62.0 GHz			________	–89		–
63.0 GHz			________	–89		–
64.0 GHz			________	–89		–
65.0 GHz			________	–89		–
66.0 GHz			________	–89		–
67.0 GHz			________	–89		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten. and dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
100.12 MHz			________	–87		–
200.12 MHz			________	–87		–
500.12 MHz			________	–102		–
700.12 MHz			________	–102		–
750.12 MHz			________	–102		–
1.00012 GHz			________	–102		–
1.50012 GH			________	–102		–
2.00012 GHz			________	–112		–
2.10012 GHz			________	–112		–
2.50012 GHz			________	–112		–
3.00012 GHz			________	–112		–
3.50012 GHz			________	–112		–
4.00012 GMz			________	–112		–
4.10012 GHz			________	–112		–
4.50012 GHz			________	–112		–
5.00012 GHz			________	–112		–
5.05012 GHz			________	–112		–
5.70012 GHz			________	–112		–
6.00012 GHz			________	–112		–
6.35012 GHz			________	–112		–
6.36012 GHz			________	–112		–
7.00012 GHz			________	–112		–
7.50012 GHz			________	–112		–
7.99988 GHz			________	–112		–
8.10012 GHz			________	–112		–
9.00012 GHz			________	–112		–
10.00012 GHz			________	–112		–
10.20012 GHz			________	–112		–
11.00012 GHz			________	–112		–
12.00012 GHz			________	–112		–
12.70012 GHz			________	–112		–
12.80012 GHz			________	–112		–
12.99988 GHz			________	–112		–
14.00012 GHz			________	–109		–
15.00012 GHz			________	–109		–
16.00012 GHz			________	–109		–
16.10012 GHz			________	–109		–
18.00012 GHz			________	–109		–
19.00012 GHz			________	–109		–
20.00012 GHz			________	–109		–
21.00012 GHz			________	–109		–
22.00012 GHz			________	–109		–
23.00012 GHz			________	–109		–
23.99988 GHz			________	–109		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Input noise level** (with opt. rec atten. and dir. gen/rec access)	Page 1.11				dBm	
Test frequency						
25.0 GHz			________	–96		–
26.0 GHz			________	–96		–
27.0 GHz			________	–96		–
28.0 GHz			________	–96		–
29.0 GHz			________	–96		–
30.0 GHz			________	–96		–
31.0 GHz			________	–96		–
32.0 GHz			________	–96		–
33.0 GHz			________	–96		–
34.0 GHz			________	–96		–
35.0 GHz			________	–96		–
36.0 GHz			________	–96		–
37.0 GHz			________	–96		–
38.0 GHz			________	–96		–
39.0 GHz			________	–96		–
40.0 GHz			________	–96		–
41.0 GHz			________	–91		–
42.0 GHz			________	–91		–
43.0 GHz			________	–91		–
44.0 GHz			________	–91		–
45.0 GHz			________	–91		–
46.0 GHz			________	–91		–
47.0 GHz			________	–91		–
48.0 GHz			________	–91		–
49.0 GHz			________	–91		–
50.0 GHz			________	–91		–
51.0 GHz			________	–86		–
52.0 GHz			________	–86		–
53.0 GHz			________	–86		–
54.0 GHz			________	–86		–
55.0 GHz			________	–86		–
56.0 GHz			________	–86		–
57.0 GHz			________	–86		–
58.0 GHz			________	–86		–
59.0 GHz			________	–86		–
60.0 GHz			________	–86		–
61.0 GHz			________	–86		–
62.0 GHz			________	–86		–
63.0 GHz			________	–86		–
64.0 GHz			________	–86		–
65.0 GHz			________	–86		–
66.0 GHz			________	–86		–
67.0 GHz			________	–86		–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Matching (raw)	Page 1.12				dB	1 dB
Test frequency						
10 MHz		8	________			
20 MHz		8	________			
50 MHz		10	________			
100 MHz		10	________			
200 MHz		10	________			
500 MHz		10	________			
750 MHz		10	________			
1.0 GHz		10	________			
1.5 GHz		10	________			
2.0 GHz		10	________			
2.5 GHz		10	________			
3.0 GHz		10	________			
3.5 GHz		10	________			
4.0 GHz		10	________			
4.5 GHz		10	________			
5.0 GHz		10	________			
5.5 GHz		10	________			
6.0 GHz		10	________			
6.5 GHz		10	________			
7.0 GHz		10	________			
7.5 GHz		10	________			
8.0 GHz		10	________			
9.0 GHz		10	________			
10.0 GHz		10	________			
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		6	________			
22.0 GHz		6	________			
23.0 GHz		6	________			
24.0 GHz		6	________			
25.0 GHz		6	________			
26.0 GHz		6	________			
27.0 GHz		6	________			
28.0 GHz		6	________			
29.0 GHz		6	________			
30.0 GHz		6	________			
31.0 GHz		6	________			
32.0 GHz		6	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ Matching (raw)	Page 1.12				dB	1 dB
Test frequency						
33.0 GHz		6	________			
34.0 GHz		6	________			
35.0 GHz		6	________			
36.0 GHz		6	________			
37.0 GHz		6	________			
38.0 GHz		6	________			
39.0 GHz		6	________			
40.0 GHz		6	________			
41.0 GHz		5	________			
42.0 GHz		5	________			
43.0 GHz		5	________			
44.0 GHz		5	________			
45.0 GHz		5	________			
46.0 GHz		5	________			
47.0 GHz		5	________			
48.0 GHz		5	________			
49.0 GHz		5	________			
50.0 GHz		5	________			
51.0 GHz		5	________			
52.0 GHz		5	________			
53.0 GHz		5	________			
54.0 GHz		5	________			
55.0 GHz		5	________			
56.0 GHz		5	________			
57.0 GHz		5	________			
58.0 GHz		5	________			
59.0 GHz		5	________			
60.0 GHz		5	________			
61.0 GHz		5	________			
62.0 GHz		5	________			
63.0 GHz		5	________			
64.0 GHz		5	________			
65.0 GHz		5	________			
66.0 GHz		5	________			
67.0 GHz		5	________			

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___	Page 1.13				dB	
Dynamic range						
(without option step attenuator and without option direct generator/receiver access)						
Test frequency:		70	________			–
10.0 MHz		70	________			–
20.0 MHz		100	________			–
50.0 MHz		100	________			–
100.0 MHz		100	________			–
200.0 MHz		115	________			–
500.0 MHz		115	________			–
700.0 MHz		115	________			–
750.0 MHz		115	________			–
1.0 GHz		115	________			–
1.5 GHz		125	________			–
2.0 GHz		125	________			–
2.1 GHz		125	________			–
2.5 GHz		125	________			–
3.0 GHz		125	________			–
3.5 GHz		125	________			–
4.0 GHz		125	________			–
4.1 GHz		125	________			–
4.5 GHz		125	________			–
5.0 GHz		125	________			–
5.05 GHz		125	________			–
5.7 GHz		125	________			–
6.0 GHz		125	________			–
6.35 GHz		125	________			–
6.36 GHz		125	________			–
7.0 GHz		125	________			–
7.5 GHz		125	________			–
8.0 GHz		125	________			–
8.1 GHz		125	________			–
9.0 GHz		125	________			–
10.0 GHz		125	________			–
10.2 GHz		125	________			–
11.0 GHz		125	________			–
12.0 GHz		125	________			–
12.7 GHz		125	________			–
12.8 GHz		125	________			–
13.0 GHz		125	________			–
14.0 GHz		125	________			–
15.0 GHz		125	________			–
16.0 GHz		125	________			–
16.1 GHz		125	________			–
18.0 GHz		125	________			–
19.0 GHz		125	________			–
20.0 GHz		125	________			–
21.0 GHz		125	________			–
22.0 GHz						

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (without option step attenuator and without option direct generator/receiver access)	Page 1.13				dB	
Test frequency:		125	________			–
23.0 GHz		125	________			–
24.0 GHz		120	________			–
25.0 GHz		120	________			–
26.0 GHz		120	________			–
27.0 GHz		120	________			–
28.0 GHz		120	________			–
29.0 GHz		120	________			–
30.0 GHz		120	________			–
31.0 GHz		120	________			–
32.0 GHz		115	________			–
33.0 GHz		115	________			–
34.0 GHz		115	________			–
35.0 GHz		115	________			–
36.0 GHz		115	________			–
37.0 GHz		115	________			–
38.0 GHz		115	________			–
39.0 GHz		115	________			–
40.0 GHz		110	________			–
41.0 GHz		110	________			–
42.0 GHz		110	________			–
43.0 GHz		110	________			–
44.0 GHz		110	________			–
45.0 GHz		110	________			–
46.0 GHz		110	________			–
47.0 GHz		110	________			–
48.0 GHz		110	________			–
49.0 GHz		110	________			–
50.0 GHz		100	________			–
51.0 GHz		100	________			–
52.0 GHz		100	________			–
53.0 GHz		100	________			–
54.0 GHz		100	________			–
55.0 GHz		100	________			–
56.0 GHz		100	________			–
57.0 GHz		100	________			–
58.0 GHz		100	________			–
59.0 GHz		100	________			–
60.0 GHz		100	________			–
61.0 GHz		100	________			–
62.0 GHz		100	________			–
63.0 GHz		100	________			–
64.0 GHz		100	________			–
65.0 GHz		100	________			–
66.0 GHz		100	________			–
67.0 GHz		100	________			–
		100	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ Dynamic range (with option generator or receiver step attenuator)	Page 1.13				dB	
Test frequency:						
10.0 MHz		69	________			–
20.0 MHz		69	________			–
50.0 MHz		99	________			–
100.0 MHz		99	________			–
200.0 MHz		99	________			–
500.0 MHz		114	________			–
700.0 MHz		114	________			–
750.0 MHz		114	________			–
1.0 GHz		114	________			–
1.5 GHz		114	________			–
2.0 GHz		124	________			–
2.1 GHz		124	________			–
2.5 GHz		124	________			–
3.0 GHz		124	________			–
3.5 GHz		124	________			–
4.0 GHz		124	________			–
4.1 GHz		124	________			–
4.5 GHz		124	________			–
5.0 GHz		124	________			–
5.05 GHz		124	________			–
5.7 GHz		124	________			–
6.0 GHz		124	________			–
6.35 GHz		124	________			–
6.36 GHz		124	________			–
7.0 GHz		124	________			–
7.5 GHz		124	________			–
8.0 GHz		124	________			–
8.1 GHz		124	________			–
9.0 GHz		124	________			–
10.0 GHz		124	________			–
10.2 GHz		124	________			–
11.0 GHz		124	________			–
12.0 GHz		124	________			–
12.7 GHz		124	________			–
12.8 GHz		124	________			–
13.0 GHz		124	________			–
14.0 GHz		123	________			–
15.0 GHz		123	________			–
16.0 GHz		123	________			–
16.1 GHz		123	________			–
18.0 GHz		123	________			–
19.0 GHz		123	________			–
20.0 GHz		123	________			–
21.0 GHz		123	________			–
22.0 GHz		123	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
					dB	
Port __ to Port ___ **Dynamic range** (with option generator or receiver step attenuator)	Page 1.13					
Test frequency:						
23.0 GHz		123	________			–
24.0 GHz		123	________			–
25.0 GHz		117	________			–
26.0 GHz		117	________			–
27.0 GHz		117	________			–
28.0 GHz		117	________			–
29.0 GHz		117	________			–
30.0 GHz		117	________			–
31.0 GHz		117	________			–
32.0 GHz		117	________			–
33.0 GHz		112	________			–
34.0 GHz		112	________			–
35.0 GHz		112	________			–
36.0 GHz		112	________			–
37.0 GHz		112	________			–
38.0 GHz		112	________			–
39.0 GHz		112	________			–
40.0 GHz		112	________			–
41.0 GHz		107	________			–
42.0 GHz		107	________			–
43.0 GHz		107	________			–
44.0 GHz		107	________			–
45.0 GHz		107	________			–
46.0 GHz		107	________			–
47.0 GHz		107	________			–
48.0 GHz		107	________			–
49.0 GHz		107	________			–
50.0 GHz		107	________			–
51.0 GHz		97	________			–
52.0 GHz		97	________			–
53.0 GHz		97	________			–
54.0 GHz		97	________			–
55.0 GHz		97	________			–
56.0 GHz		97	________			–
57.0 GHz		97	________			–
58.0 GHz		97	________			–
59.0 GHz		97	________			–
60.0 GHz		97	________			–
61.0 GHz		97	________			–
62.0 GHz		97	________			–
63.0 GHz		97	________			–
64.0 GHz		97	________			–
65.0 GHz		97	________			–
66.0 GHz		97	________			–
67.0 GHz		97	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ **Dynamic range** (with options gen. and rec. step attenuator or with opt. direct gen./rec. access)	Page 1.13				dB	
Test frequency:						
10.0 MHz		68	________			–
20.0 MHz		68	________			–
50.0 MHz		98	________			–
100.0 MHz		98	________			–
200.0 MHz		98	________			–
500.0 MHz		113	________			–
700.0 MHz		113	________			–
750.0 MHz		113	________			–
1.0 GHz		113	________			–
1.5 GHz		113	________			–
2.0 GHz		123	________			–
2.1 GHz		123	________			–
2.5 GHz		123	________			–
3.0 GHz		123	________			–
3.5 GHz		123	________			–
4.0 GHz		123	________			–
4.1 GHz		123	________			–
4.5 GHz		123	________			–
5.0 GHz		123	________			–
5.05 GHz		123	________			–
5.7 GHz		123	________			–
6.0 GHz		123	________			–
6.35 GHz		123	________			–
6.36 GHz		123	________			–
7.0 GHz		123	________			–
7.5 GHz		123	________			–
8.0 GHz		123	________			–
8.1 GHz		123	________			–
9.0 GHz		123	________			–
10.0 GHz		123	________			–
10.2 GHz		123	________			–
11.0 GHz		123	________			–
12.0 GHz		123	________			–
12.7 GHz		123	________			–
12.8 GHz		123	________			–
13.0 GHz		123	________			–
14.0 GHz		121	________			–
15.0 GHz		121	________			–
16.0 GHz		121	________			–
16.1 GHz		121	________			–
18.0 GHz		121	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
19.0 GHz		121	________			–
20.0 GHz		121	________			–
21.0 GHz		121	________			–
22.0 GHz		121	________		'	–
Port __ to Port ___	Page 1.13				dB	
Dynamic range						
(with options gen. and rec. step attenuator or with opt. direct gen./rec. access)						
Test frequency:						
23.0 GHz		121	________			–
24.0 GHz		121	________			–
25.0 GHz		114	________			–
26.0 GHz		114	________			–
27.0 GHz		114	________			–
28.0 GHz		114	________			–
29.0 GHz		114	________			–
30.0 GHz		114	________			–
31.0 GHz		114	________			–
32.0 GHz		114	________			–
33.0 GHz		109	________			–
34.0 GHz		109	________			–
35.0 GHz		109	________			–
36.0 GHz		109	________			–
37.0 GHz		109	________			–
38.0 GHz		109	________			–
39.0 GHz		109	________			–
40.0 GHz		109	________			–
41.0 GHz		104	________			–
42.0 GHz		104	________			–
43.0 GHz		104	________			–
44.0 GHz		104	________			–
45.0 GHz		104	________			–
46.0 GHz		104	________			–
47.0 GHz		104	________			–
48.0 GHz		104	________			–
49.0 GHz		104	________			–
50.0 GHz		104	________			–
51.0 GHz		94	________			–
52.0 GHz		94	________			–
53.0 GHz		94	________			–
54.0 GHz		94	________			–
55.0 GHz		94	________			–
56.0 GHz		94	________			–
57.0 GHz		94	________			–
58.0 GHz		94	________			–
59.0 GHz		94	________			–
60.0 GHz		94	________			–
61.0 GHz		94	________			–
62.0 GHz		94	________			–
63.0 GHz		94	________			–
64.0 GHz		94	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
65.0 GHz		94	________			–
66.0 GHz		94	________			–
67.0 GHz		94	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ Dynamic range (with option gen. or rec. step attenuator and with opt. direct gen./rec. access)	Page 1.13				dB	
Test frequency:						
10.0 MHz		67	________			–
20.0 MHz		67	________			–
50.0 MHz		97	________			–
100.0 MHz		97	________			–
200.0 MHz		97	________			–
500.0 MHz		112	________			–
700.0 MHz		112	________			–
750.0 MHz		112	________			–
1.0 GHz		112	________			–
1.5 GHz		112	________			–
2.0 GHz		122	________			–
2.1 GHz		122	________			–
2.5 GHz		122	________			–
3.0 GHz		122	________			–
3.5 GHz		122	________			–
4.0 GHz		122	________			–
4.1 GHz		122	________			–
4.5 GHz		122	________			–
5.0 GHz		122	________			–
5.05 GHz		122	________			–
5.7 GHz		122	________			–
6.0 GHz		122	________			–
6.35 GHz		122	________			–
6.36 GHz		122	________			–
7.0 GHz		122	________			–
7.5 GHz		122	________			–
8.0 GHz		122	________			–
8.1 GHz		122	________			–
9.0 GHz		122	________			–
10.0 GHz		122	________			–
10.2 GHz		122	________			–
11.0 GHz		122	________			–
12.0 GHz		122	________			–
12.7 GHz		122	________			–
12.8 GHz		122	________			–
13.0 GHz		122	________			–
14.0 GHz		119	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
15.0 GHz		119	________			–
16.0 GHz		119	________			–
16.1 GHz		119	________			–
18.0 GHz		119	________			–
19.0 GHz		119	________			–
20.0 GHz		119	________			–
21.0 GHz		119	________			–
22.0 GHz		119	________			–
					'	
Port __ to Port ___ **Dynamic range** (with options gen. or rec. step attenuator and with opt. direct gen./rec. access) **Test frequency:**	Page 1.13				dB	
23.0 GHz		119	________			–
24.0 GHz		119	________			–
25.0 GHz		111	________			–
26.0 GHz		111	________			–
27.0 GHz		111	________			–
28.0 GHz		111	________			–
29.0 GHz		111	________			–
30.0 GHz		111	________			–
31.0 GHz		111	________			–
32.0 GHz		111	________			–
33.0 GHz		106	________			–
34.0 GHz		106	________			–
35.0 GHz		106	________			–
36.0 GHz		106	________			–
37.0 GHz		106	________			–
38.0 GHz		109	________			–
39.0 GHz		106	________			–
40.0 GHz		106	________			–
41.0 GHz		101	________			–
42.0 GHz		101	________			–
43.0 GHz		101	________			–
44.0 GHz		101	________			–
45.0 GHz		101	________			–
46.0 GHz		101	________			–
47.0 GHz		101	________			–
48.0 GHz		101	________			–
49.0 GHz		101	________			–
50.0 GHz		101	________			–
51.0 GHz		91	________			–
52.0 GHz		91	________			–
53.0 GHz		91	________			–
54.0 GHz		91	________			–
55.0 GHz		91	________			–
56.0 GHz		91	________			–
57.0 GHz		91	________			–
58.0 GHz		91	________			–
59.0 GHz		91	________			–
60.0 GHz		91	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
61.0 GHz		91	________			–
62.0 GHz		91	________			–
63.0 GHz		91	________			–
64.0 GHz		91	________			–
65.0 GHz		91	________			–
66.0 GHz		91	________			–
67.0 GHz		91	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ to Port ___ Dynamic range (with options gen. and rec. step attenuator and with opt. direct gen./rec. access)	Page 1.13				dB	
Test frequency:						
10.0 MHz		66	________			–
20.0 MHz		66	________			–
50.0 MHz		96	________			–
100.0 MHz		96	________			–
200.0 MHz		96	________			–
500.0 MHz		111	________			–
700.0 MHz		111	________			–
750.0 MHz		111	________			–
1.0 GHz		111	________			–
1.5 GHz		111	________			–
2.0 GHz		121	________			–
2.1 GHz		121	________			–
2.5 GHz		121	________			–
3.0 GHz		121	________			–
3.5 GHz		121	________			–
4.0 GHz		121	________			–
4.1 GHz		121	________			–
4.5 GHz		121	________			–
5.0 GHz		121	________			–
5.05 GHz		121	________			–
5.7 GHz		121	________			–
6.0 GHz		121	________			–
6.35 GHz		121	________			–
6.36 GHz		121	________			–
7.0 GHz		121	________			–
7.5 GHz		121	________			–
8.0 GHz		121	________			–
8.1 GHz		121	________			–
9.0 GHz		121	________			–
10.0 GHz		121	________			–
10.2 GHz		121	________			–
11.0 GHz		121	________			–
12.0 GHz		121	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
12.7 GHz		121	________			–
12.8 GHz		121	________			–
13.0 GHz		121	________			–
14.0 GHz		117	________			–
15.0 GHz		117	________			–
16.0 GHz		117	________			–
16.1 GHz		117	________			–
18.0 GHz		117	________			–
19.0 GHz		117	________			–
20.0 GHz		117	________			–
21.0 GHz		117	________			–
22.0 GHz		117	________		'	–
Port __ to Port ___ Dynamic range (with options gen. and rec. step attenuator and with opt. direct gen./rec. access)	Page 1.13				dB	
Test frequency:						
23.0 GHz		117	________			–
24.0 GHz		117	________			–
25.0 GHz		108	________			–
26.0 GHz		108	________			–
27.0 GHz		108	________			–
28.0 GHz		108	________			–
29.0 GHz		108	________			–
30.0 GHz		108	________			–
31.0 GHz		108	________			–
32.0 GHz		108	________			–
33.0 GHz		103	________			–
34.0 GHz		103	________			–
35.0 GHz		103	________			–
36.0 GHz		103	________			–
37.0 GHz		103	________			–
38.0 GHz		103	________			–
39.0 GHz		103	________			–
40.0 GHz		103	________			–
41.0 GHz		98	________			–
42.0 GHz		98	________			–
43.0 GHz		98	________			–
44.0 GHz		98	________			–
45.0 GHz		98	________			–
46.0 GHz		98	________			–
47.0 GHz		98	________			–
48.0 GHz		98	________			–
49.0 GHz		98	________			–
50.0 GHz		98	________			–
51.0 GHz		88	________			–
52.0 GHz		88	________			–
53.0 GHz		88	________			–
54.0 GHz		88	________			–
55.0 GHz		88	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
56.0 GHz		88	________			–
57.0 GHz		88	________			–
58.0 GHz		88	________			–
59.0 GHz		88	________			–
60.0 GHz		88	________			–
61.0 GHz		88	________			–
62.0 GHz		88	________			–
63.0 GHz		88	________			–
64.0 GHz		88	________			–
65.0 GHz		88	________			–
66.0 GHz		88	________			–
67.0 GHz		88	________			–

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**	Page 1.14				dB	0.1 dB
Atten. **Frequ.**						
5 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		
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		
26.0 GHz		-2	________	2		
28.0 GHz		-2	________	2		
30.0 GHz		-2	________	2		
32.0 GHz		-2	________	2		
34.0 GHz		-2	________	2		
36.0 GHz		-2	________	2		
38.0 GHz		-2	________	2		
40.0 GHz		-2	________	2		
42.0 GHz		-2	________	2		
44.0 GHz		-2	________	2		
46.0 GHz		-2	________	2		
48.0 GHz		-2	________	2		
50.0 GHz		-2	________	2		
52.0 GHz		-2	________	2		
54.0 GHz		-2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
56.0 GHz		-2	________	2		
58.0 GHz		-2	________	2		
60.0 GHz		-2	________	2		
62.0 GHz		-2	________	2		
64.0 GHz		-2	________	2		
66.0 GHz		-2	________	2		
67.0 GHz		-2	________	2		
10 dB 10 MHz			________			
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		
10.0 GHz		-2	________	2		
12.0 GHz		-2	________	2		
14.0 GHz		-2	________	2		
Port __ Receiver Step Atten. Attenuation Accuracy Reference 0 dB	Page 1.14				dB	0.1 dB
Atten. Frequ.						
10 dB 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		
26.0 GHz		-2	________	2		
28.0 GHz		-2	________	2		
30.0 GHz		-2	________	2		
32.0 GHz		-2	________	2		
34.0 GHz		-2	________	2		
36.0 GHz		-2	________	2		
38.0 GHz		-2	________	2		
40.0 GHz		-2	________	2		
42.0 GHz		-2	________	2		
44.0 GHz		-2	________	2		
46.0 GHz		-2	________	2		
48.0 GHz		-2	________	2		
50.0 GHz		-2	________	2		
52.0 GHz		-2	________	2		
54.0 GHz		-2	________	2		
56.0 GHz		-2	________	2		
58.0 GHz		-2	________	2		
60.0 GHz		-2	________	2		
62.0 GHz		-2	________	2		
64.0 GHz		-2	________	2		
66.0 GHz		-2	________	2		
67.0 GHz		-2	________	2		
			________			
20 dB 10 MHz		-2	________	2		
1.0 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	2.0 GHz		-2	________	2		
	4.0 GHz		-2	________	2		
	5.8 GHz		-2	________	2		
	8.0 GHz		-2	________	2		
	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		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2		2		
Port __ Receiver Step Atten. Attenuation Accuracy Reference 0 dB		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
20 dB	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
	42.0 GHz		-2	________	2		
	44.0 GHz		-2	________	2		
	46.0 GHz		-2	________	2		
	48.0 GHz		-2	________	2		
	50.0 GHz		-2	________	2		
	52.0 GHz		-2	________	2		
	54.0 GHz		-2	________	2		
	56.0 GHz		-2	________	2		
	58.0 GHz		-2	________	2		
	60.0 GHz		-2	________	2		
	62.0 GHz		-2	________	2		
	64.0 GHz		-2	________	2		
	66.0 GHz		-2	________	2		
	67.0 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		
	10.0 GHz		-2	________	2		
	12.0 GHz		-2	________	2		
	14.0 GHz		-2	________	2		
	16.0 GHz		-2	________	2		
	18.0GHz		-2	________	2		
	20.0 GHz		-2	________	2		
	22.0 GHz		-2	________	2		

Parameter		Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
	24.0 GHz		-2	________	2		
	26.0 GHz		-2	________	2		
	28.0 GHz		-2	________	2		
	30.0 GHz		-2	________	2		
	32.0 GHz		-2	________	2		
	34.0 GHz		-2	________	2		
	36.0 GHz		-2	________	2		
	38.0 GHz		-2	________	2		
	40.0 GHz		-2	________	2		
	42.0 GHz		-2	________	2		
	44.0 GHz		-2	________	2		
	46.0 GHz		-2	________	2		
	48.0 GHz		-2	________	2		
	50.0 GHz		-2	________	2		
	52.0 GHz		-2	________	2		
	54.0 GHz		-2	________	2		
	56.0 GHz		-2	________	2		
	58.0 GHz		-2	________	2		
Port __ **Receiver Step Atten.** **Attenuation Accuracy** **Reference 0 dB**		Page 1.14				dB	0.1 dB
Atten.	**Frequ.**						
35 dB	60.0 GHz		-2	________	2		
	62.0 GHz		-2	________	2		
	64.0 GHz		-2	________	2		
	66.0 GHz		-2	________	2		
	67.0 GHz		-2	________	2		

Parameter	Reference	Min. value	Actual value	Max. value	Unit	Measurement uncertainty
Accuracy DC meas 1 V	Page 1.15				mV	1 mV
Pos. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Neg. Input						
-1000 m V		- 27.5	________	+ 27.5		
-300 mV		- 10.0	________	+ 10.0		
-10 mV		- 2.75	________	+ 2.75		
10 mV		- 2.75	________	+ 2.75		
300 mV		- 10.0	________	+ 10.0		
1000 m V		- 27.5	________	+ 27.5		
Accuracy DC meas 10 V	Page 1.15				V	0.01 V
Pos. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		
Neg. Input						
-10.0 V		- 0.275	________	+ 0.275		
-3.0 V		- 0.10	________	+ 0.10		
-0.1 V		- 0.0275	________	+ 0.0275		
0.1 V		- 0.0275	________	+ 0.0275		
3.0 V		- 0.10	________	+ 0.10		
10.0 V		- 0.275	________	+ 0.275		

Table of Contents - Chapter 2 "Alignment"

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 R&S ZVA:

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

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

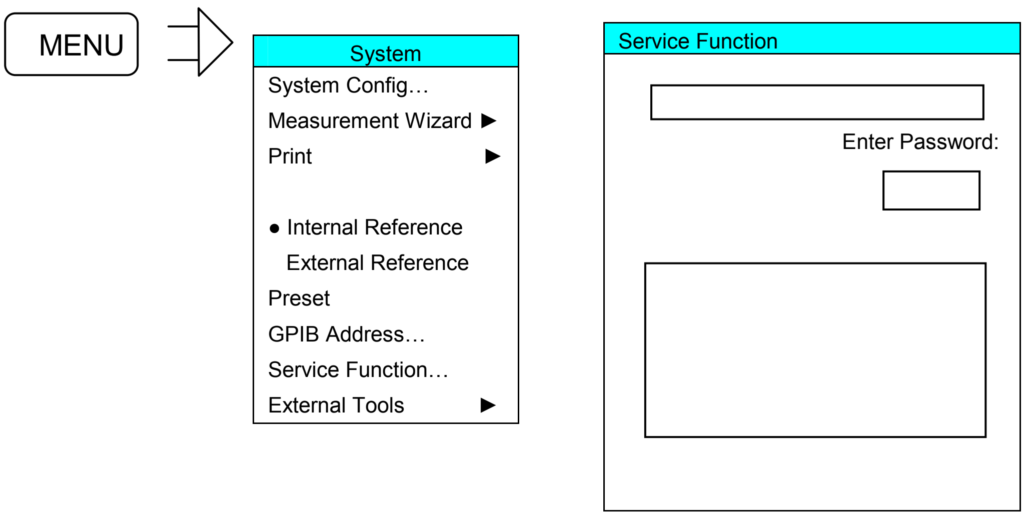
The alignments must be performed within an ambient temperature range of +22 °C to +24 °C after the appropriate warm-up time.

The R&S 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.

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 R&S 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 R&S ZVA

Item	Type of equipment	Recommended specifications	Recommended model	R&S Order No.	Application
1	Spectrum analyzer	Counter mode: Min. resolution: 100 Hz Max. rel. frequency deviation: 10^{-6}	R&S FSU26 or R&S FSU40 or R&S FSU50 or R&S FSU67		Frequency accuracy of the reference oscillator
2	Signal generator	300 kHz to 40 GHz, Power = -40 dBm to 10 dBm	R&S SML01 R&S SMR40 with Option R&SSMR-B17	1090.3000.11 1104.0002.40 1104.5233.02	Recording correction values
2	Signal generator	40 GHz to 67 GHz, Power = -40 dBm to 0 dBm	R&SSMR50 with Option R&S SMR-B20 and Adapter R&S FSU/R&S ZVA67	1134.9008.50 1135.2907.02 5009.5507.02	Recording correction values on R&S ZVA50 and R&S ZVA67
3	Power meter		R&S NRP + Sensor		Recording correction values
4	Power sensor	300 kHz to 8 GHz	R&S NRP-Z51		Recording correction values on R&S ZVA8
4	Power sensor	10 MHz to 24 GHz	R&S NRP-Z52		Recording correction values on R&S ZVA24
4	Power sensor	10 MHz to 40 GHz	R&S NRP-Z52		Recording correction values on R&S ZVA40
4	Power sensor	10 MHz to 50 GHz	R&S NRP-Z56		Recording correction values on R&S ZVA50
4	Power sensor	10 MHz to 67 GHz	R&S NRP-Z57		Recording correction values on R&S ZVA67
5	Power splitter	N, 50 Ohm, Γ_{eq} < 0.05 (50 MHz to 8 GHz) Output tracking < 0.15 dB	Weinschel 1870A	-	Recording correction values on R&S ZVA8

Item	Type of equipment	Recommended specifications	Recommended model	R&S Order No.	Application
5	Power splitter	3.5 mm, 50 Ohm, Output tracking < 0.25 dB	Weinschel 1593	-	Recording correction values on R&S ZVA24
5	Power splitter	2.92 mm, 50 Ohm, Output tracking < 0.5 dB	Weinschel 1534	-	Recording correction values on R&S ZVA40
6	Power splitter	1.85 mm, 50 Ohm, Output tracking < 0.5 dB	Anritsu SC6778	-	Recording correction values on R&S ZVA50, R&S ZVA67
6	PC with GPIB-Interface	Pentium, WinXP, WinNT GR AT-GPIB IEEE4888 IF PCI National Instruments	 NI-488 PCI-GPIB	 1072.6101.00	Recording correction values
7	Alignment Software	R&S ZVAB-Service		1302.4460.00	Recording correction values
8	Power supply	2x 0 to 10 V			Aligning the DC inputs
9	DC meter		R&S URE	0350.5315.03	Aligning the DC inputs
10	Calibration kit	N calibration kit	R&S ZV-Z270		Recording correction values on R&S ZVA8
10	Calibration kit	3.5 mm calibration kit	R&S ZV-Z235		Recording correction values on R&S ZVA24
10	Calibration kit	2.92 mm, 50 Ω. 10 MHz to 40 GHz.	R&S ZV-Z229		Recording correction values on R&S ZVA40
10	Calibration kit	2.40 mm, 50 Ω. 10 MHz to 50 GHz.	R&S ZV-Z224		Recording correction values on R&S ZVA50
10	Calibration kit	1.85 mm, 50 Ω. 10 MHz to 67 GHz.	ZR&S V-Z218		Recording correction values on R&S ZVA67
11	Test cable	Test cable N (m) to N (m).	R&S ZV-Z11	1085.6505.03	Recording correction values on R&S ZVA8
11	Test cable	Test cable 3.5 mm (m) to 3.5 mm (f).	R&S ZV-Z14	1134.4093.02	Recording correction values on R&S ZVA24
11	Test cable	Test cable 2.92 mm (m) to 2.92 mm (f)	Order No. 23005066 Huber & Suhner		Recording correction values on R&S ZVA40
7	Test cable	Test cable 1.85 mm (m) to 1.85 mm (f)	GORE EN0CB0CB0240	-	Recording correction values on R&S ZVA50 (67?)
12	Conn. Cables for DC Inputs	4-pin mini-DIN plug	R&S ZV-Z71	1164.1005.02	Aligning the DC inputs

Aligning the Frequency Accuracy

Test equipment	Spectrum analyzer (section "Test Equipment", item 1): Error <1 x 10^{-9}
Test setup:	Connect the spectrum analyzer to the 10-MHz reference output at the rear of the R&S ZVA.
R&S 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 R&S 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 **without** OCXO (Option B4) 10 MHz ± 80 Hz Model **with** OCXO (Option B4) 10 MHz ± 1 Hz

Alignment without Option R&S ZVAB-B4:

- Enter Service Function 2.1.1.6.209.0x000**000**
- 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 R&S ZVAB-B4:

- Enter Service Function 2.1.1.6.209.0 x **800**000.
- 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 **400**000 - instead of **800**000.
- 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.

Writing data to the hard disk:

- Change to computer application
- Select path
  C:\Documents and Settings\AllUsers\ApplicationData\Rohde&Schwarz\NWA\data\eeprom\FR\config.ini
- Transform data format to decimal
- Write decimal data to [TUNE] 128_PRETUNE = … (without option R&S ZVAB-B4)
  OCXO_TUNE = … (with option R&S ZVAB-B4)

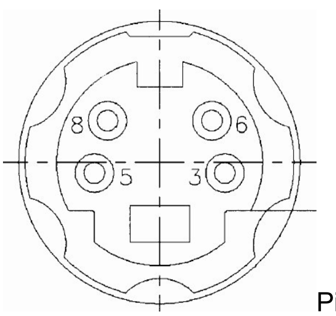
Writing to Eprom:

- Select Service Level 2 (see Service Functions)
- Set Service Function 3.9.0.2

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 + 1 V…………pin 6, pin 3 (Gnd) - 1 V…………pin 8, pin 5 (Gnd)	Connect DC voltage: + 10 V…………pin 6, pin 3 (Gnd) - 10 V…………pin 8, pin 5 (Gnd)
	Check voltages with the URE and correct if necessary.	
R&S ZVA settings:	**Measure :** DC Inputs : DC Meas ± 1 V	**Measure :** DC Inputs: DC Meas ± 10 V
Measurement	Read off the voltages displayed by the R&S ZVA: V1 = positive voltage V2 = negative voltage	
Calculating the corrections: M -> scaling factor F -> offset	M = (V1-V2)/2 F = (V1+V2)/(V1-V2)	M = (V1-V2)/20 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 R&S ZVA; when -1 V is applied, V2 = -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 and Factory System Error Calibration

Required test equipment (see Table 2-1):

- PC with IEC/IEEE bus interface
- R&S ZVAB service program
- Power meter with power sensor
- Signal generator
- 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, R&S 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.

Checking the Gauge

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

Table Connector pin depth tolerances

Connector type	Pin depth / mm	Pos. tolerance / mm	Neg. tolerance / mm
Type N (female)	5.258	+0.000	-0.076
3.5 mm (male)	0.000	+0.076	+0.000
2.92 mm (male)	0.000	+0.050	+0.000
2.4 mm (male)	0.000	+0.050	+0.000
1.85 mm (male)	0.000	+0.050	+0.000
1 mm (male)	0.000	+0.050	+0.000

Procedure

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

Table of Contents - Chapter 3 "Repairs"

3 Repairs

This chapter describes the R&S 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 R&S 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.

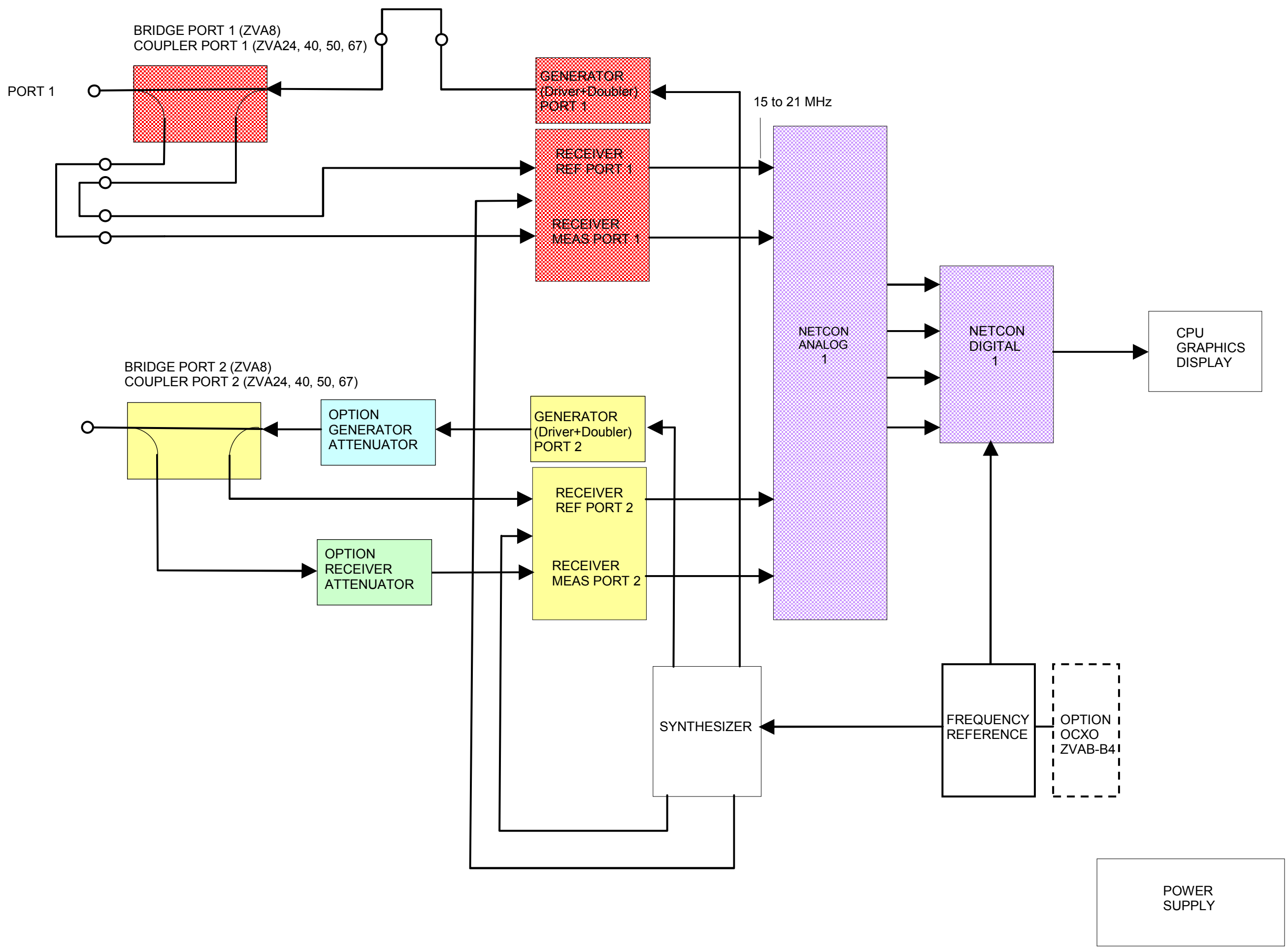


Fig. 3-1 Block diagram of the R&S ZVA8, R&S ZVA24, R&S ZVA40, R&S ZVA50 and R&S ZVA67 two ports

With option direct generator/receiver access on port1,
options generator and receiver attenuator on port2.

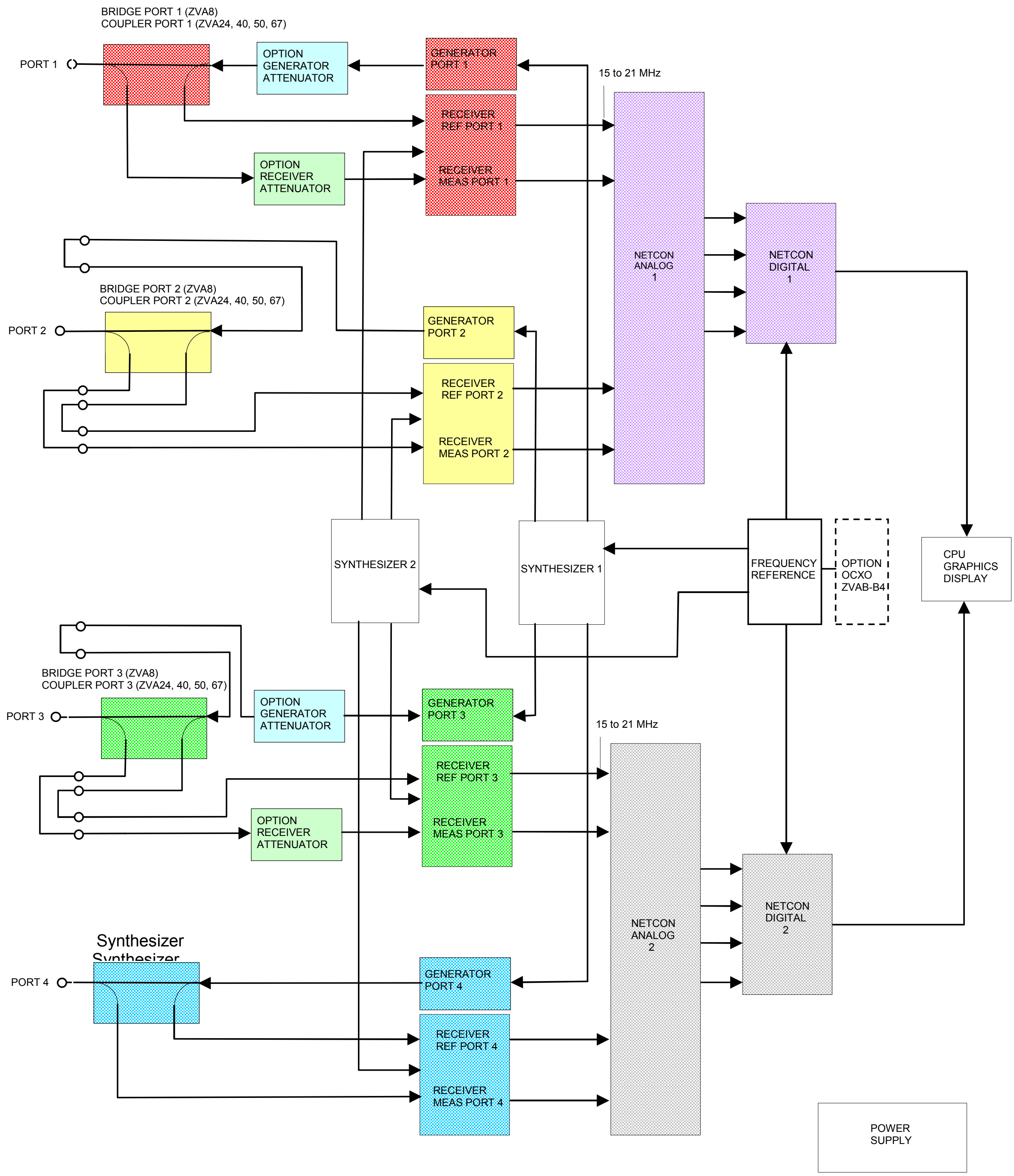


Fig. 3-2 Block diagram of the R&S ZVA8, R&S ZVA24, R&S ZVA40, R&S ZVA50 and R&S ZVA67 four ports
With option generator/receiver attenuator on port1,
option direct generator/receiver access on port2,
options generator/receiver attenuator and direct generator/receiver access on port3.

Description of the Block Diagram

The block diagrams shown in Fig. 3-1 and Fig. 3-2 apply to the R&S ZVA8, the R&S ZVA24, the R&S ZVA40, R&S ZVA50 and the R&S ZVA67 two-ports and four-ports.

The ZVA is a vector network analyzer covering 300 kHz to 8 GHz (R&S ZVA8), 10 MHz to 24 GHz (R&S ZVA24), 10 MHz to 40 GHz (R&S ZVA40), 10 MHz to 50 GHz (R&S ZVA50) or 10 MHz to 67 GHz (R&S ZVA67). All R&S ZVA 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, R&S ZVA40, R&S ZVA50 and R&S ZVA67 (10 MHz to 24 GHz, 10 MHz to 40 GHz, 10 MHz to 50 GHz, 10 MHz to 67 GHz) is generated on synthesizer board1, 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	x	16.0 GHz to 24.0 GHz

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

Reflectometer Unit R&S ZVA40

A reflectometer unit comprising a **coupler**, a **generator section (Driver24 and Doubler44)** and a **receiver section (Receiver44)** 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 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.

Driver24

The driver 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

Doubler44

The doubler contains a frequency doubler for the range 24 GHz to 44 GHz, a switchable filter unit and a broadband amplifier for the range 10 MHz to 44 GHz.

Range	Frequency range from driver24	Doubler	Output frequency
1	10 MHz to 24.0 GHz	---	10 MHz to 24.0 GHz
2	12.0 GHz to 14.9 GHz	x	24.0 GHz to 29.8 GHz
3	14.9 GHz to 18.5 GHz	x	29.8 GHz to 37.0 GHz
4	18.5 GHz to 22.0 GHz	x	37.0 GHz to 44.0 GHz

Receiver44

The receiver section has two channels (measurement channel and reference channel). 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 44 GHz, LO doublers, 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. In the frequency range 10 MHz to 24 GHz the mixers are used as basic wave mixers (IF = LO – RF). In the range 24 GHz to 44 GHz the mixer for the upper frequency range works as a harmonic mixer (IF = 3LO – RF).

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 RM1 and RM2 contain two voltage-controlled fans to perform optimum cooling.

Reflectometer Unit R&S ZVA50

A reflectometer unit comprising a **coupler**, a **generator section (Driver24 and Doubler50)** and a **receiver section (Receiver50)** 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 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.

Driver24

The driver is the same as it is used in ZVA40. Frequency range 6 is extended to 25 GHz.

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 6.25 GHz	x	10.0 GHz to 12.5 GHz	x	20.0 GHz to 25 GHz

Doubler50

The doubler contains a frequency doubler for the range 25 GHz to 50 GHz, a switchable filter unit and a broadband amplifier for the range 10 MHz to 50 GHz.

Range	Frequency range from driver24	Doubler	Output frequency
1	10 MHz to 25.0 GHz	---	10 MHz to 25.0 GHz
2	12.5 GHz to 14.9 GHz	x	25.0 GHz to 29.8 GHz
3	14.9 GHz to 18.5 GHz	x	29.8 GHz to 37.0 GHz
4	18.5 GHz to 25.0 GHz	x	37.0 GHz to 50.0 GHz

Receiver50

The receiver section has two channels (measurement channel and reference channel). 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 50 GHz, LO doublers, 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. In the frequency range 10 MHz to 24 GHz the mixers are used as basic wave mixers (IF = LO – RF). In the range 24 GHz to 50 GHz the mixer for the upper frequency range works as a harmonic mixer (IF = 3LO – RF).
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 RM1 and RM2 contain two voltage-controlled fans to perform optimum cooling.

Reflectometer Unit ZVA67

A reflectometer unit comprising a **coupler**, a **generator section (Driver42 and Doubler67)** and a **receiver section (Receiver67)** 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 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.

Driver42

The driver contains a frequency doubler for the range 12 GHz to 24 GHz with a switchable filter unit and a second frequency doubler with a switchable filter unit for the range 24 GHz to 42 GHz. Switchable amplifiers and attenuators and two adjustable attenuators are used 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 12.0 GHz	---	10 MHz to 12.0 GHz	---	10 MHz to 12.0 GHz
2	6.0 GHz to 6.75 GHz	x	12.0 GHz to 13.5 GHz	---	12.0 GHz to 13.5 GHz
3	6.75 GHz to 9.0 GHz	x	13.5 GHz to 18.0 GHz	---	13.5 GHz to 18.0 GHz
4	9.0 GHz to 12.0 GHz	x	18.0 GHz to 24.0 GHz	---	18.0 GHz to 24.0 GHz
5	6.0 GHz to 6.75 GHz	x	12.0 GHz to 13.5 GHz	x	24.0 GHz to 27.0 GHz
6	6.75 GHz to 9.0 GHz	x	13.5 GHz to 18.0 GHz	x	27.0 GHz to 36.0 GHz
7	9.0 GHz to 10.5 GHz	x	18.0 GHz to 21.0 GHz	x	36.0 GHz to 42.0 GHz

Doubler67

The doubler contains a frequency doubler for the range 40 GHz to 70 GHz, a switchable filter unit and a broadband amplifier for the range 10 MHz to 70 GHz.

Range	Frequency range from driver42	Doubler	Output frequency
1	10 MHz to 41.6 GHz	---	10 MHz to 41.6 GHz
2	20.8 GHz to 27.0 GHz	x	41.6 GHz to 54.0 GHz
3	27.0 GHz to 35.0 GHz	x	54.0 GHz to 70.0 GHz

Receiver67

The receiver section has two channels (measurement channel and reference channel). 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 70 GHz, LO doublers, 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 signal 17.5 MHz. In the frequency range 10 MHz to 24 GHz the mixers are used as basic wave mixers (IF = LO – RF). In the range 24 GHz to 70 GHz the mixer for the upper frequency range works as a harmonic mixer (IF = 3LO – RF).
The LO signal section contains a frequency doubler for the range 12 GHz to 24 GHz, a switchable filter unit, an adjustable attenuator and a broadband amplifier for the frequency range 30 MHz to 24 GHz.

Range	Basic frequency range from synthesizer	Doubler	Output frequency
1	30 MHz to 12.0 GHz	---	30 MHz to 12.0 GHz
2	6 GHz to 8.15 GHz	x	12.0 GHz to 16.3 GHz
3	8.15 GHz to 12.0 GHz	x	16.3 GHz to 24.0 GHz

Each of the reflectometers RM1 and RM2 contain two voltage-controlled fans 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 ZVA’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

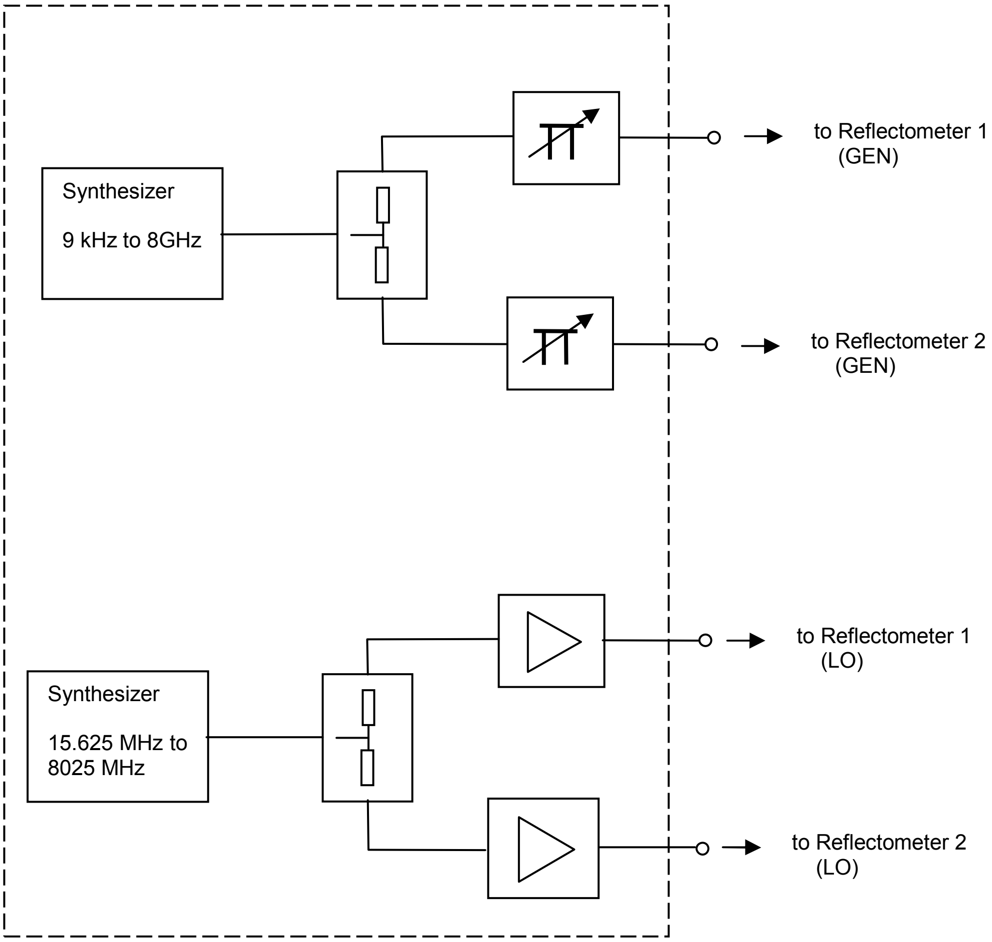
OCXO reference (option B4)

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.

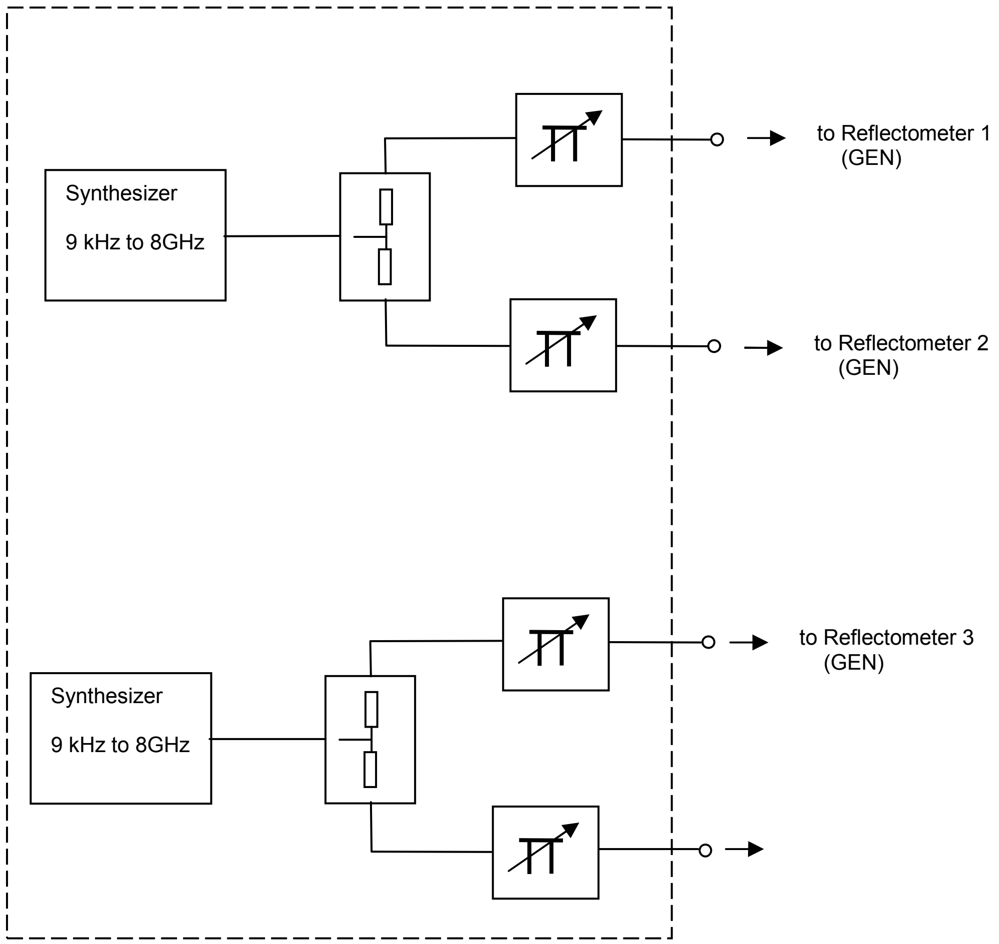
Synthesizers

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:

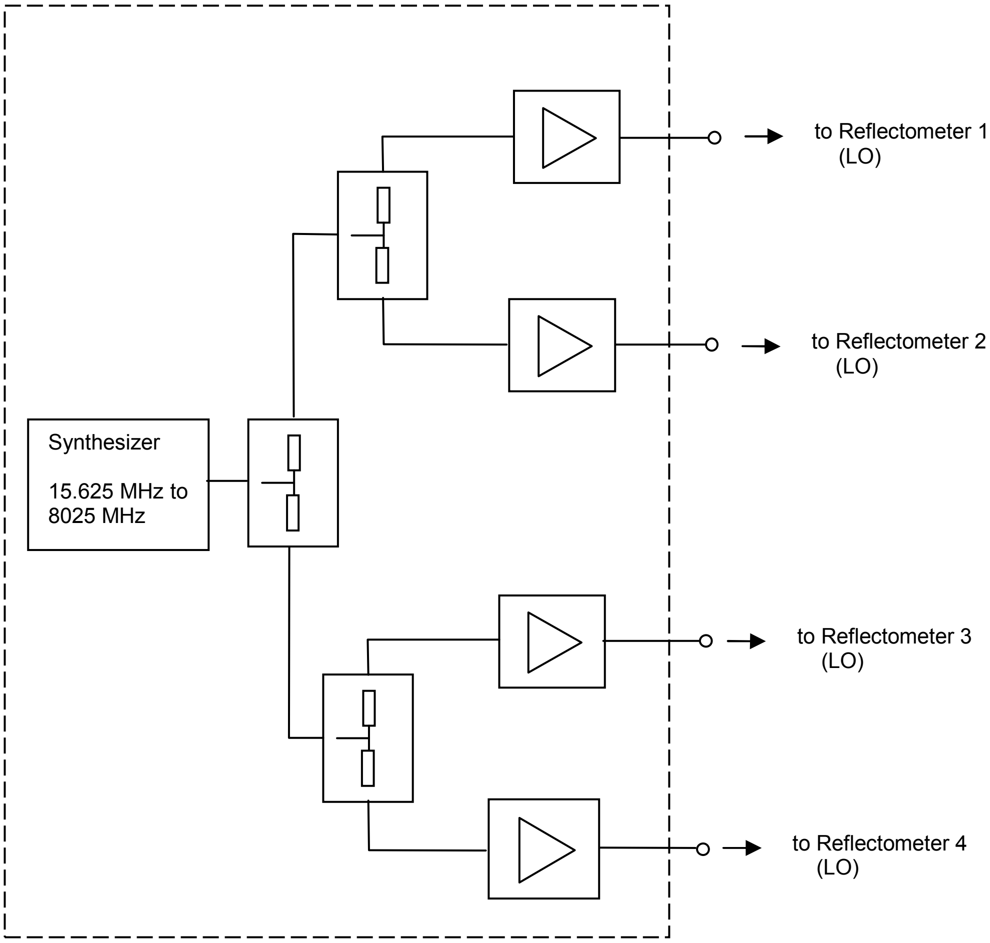
Synthesizer-LS



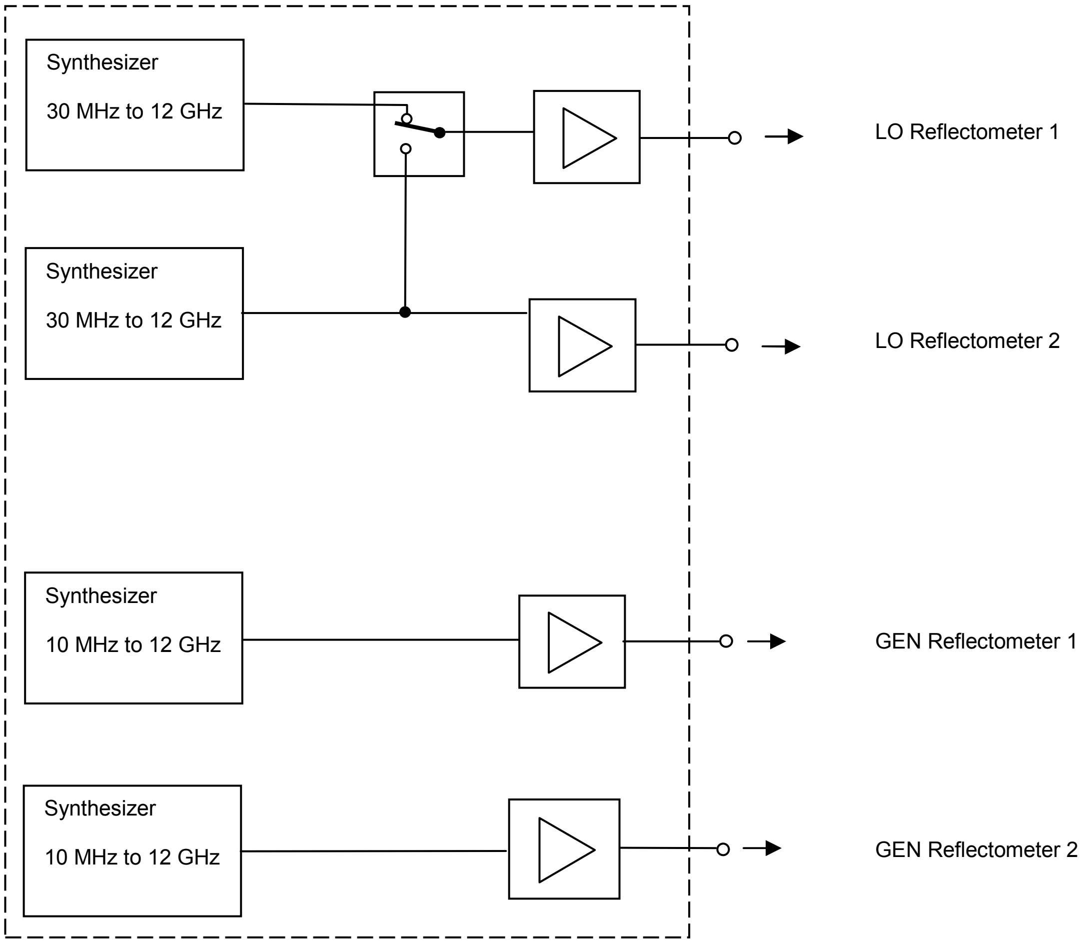
Synthesizer-DS



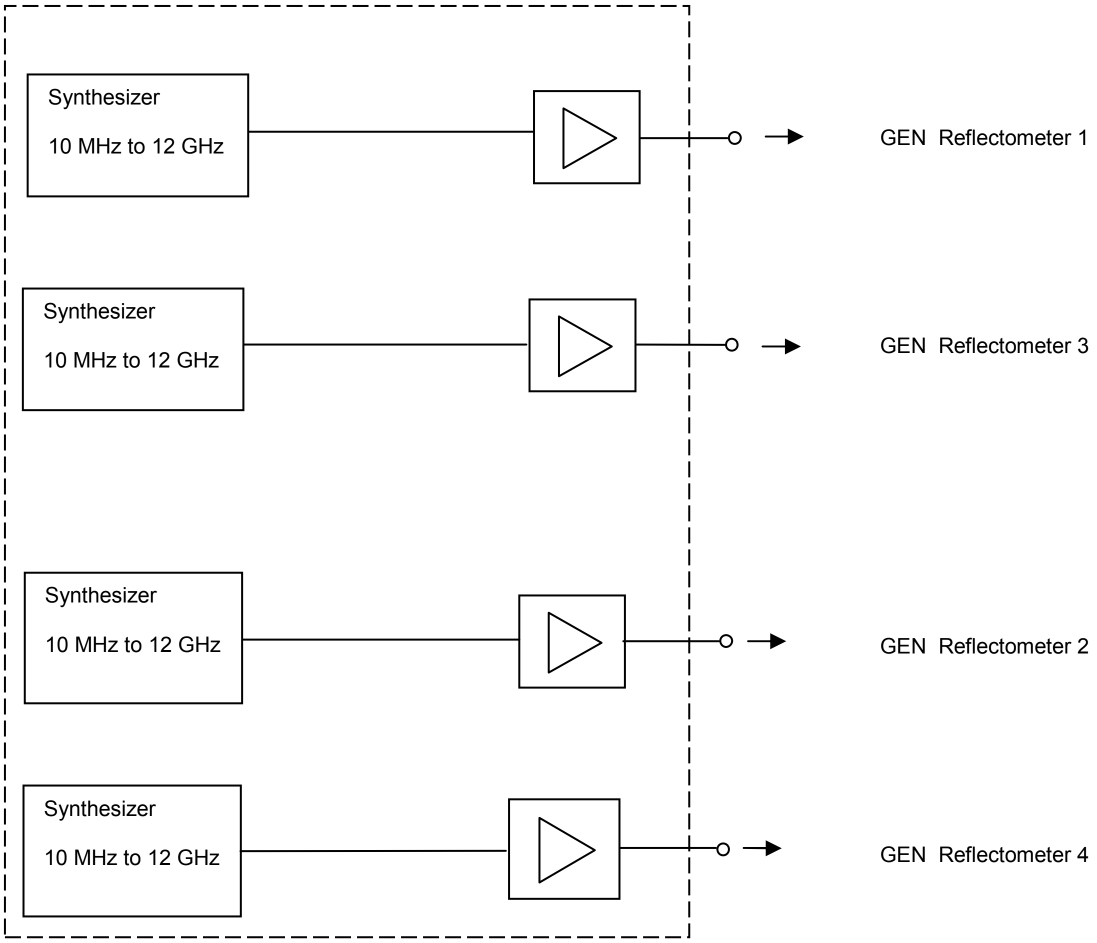
Synthesizer-LO



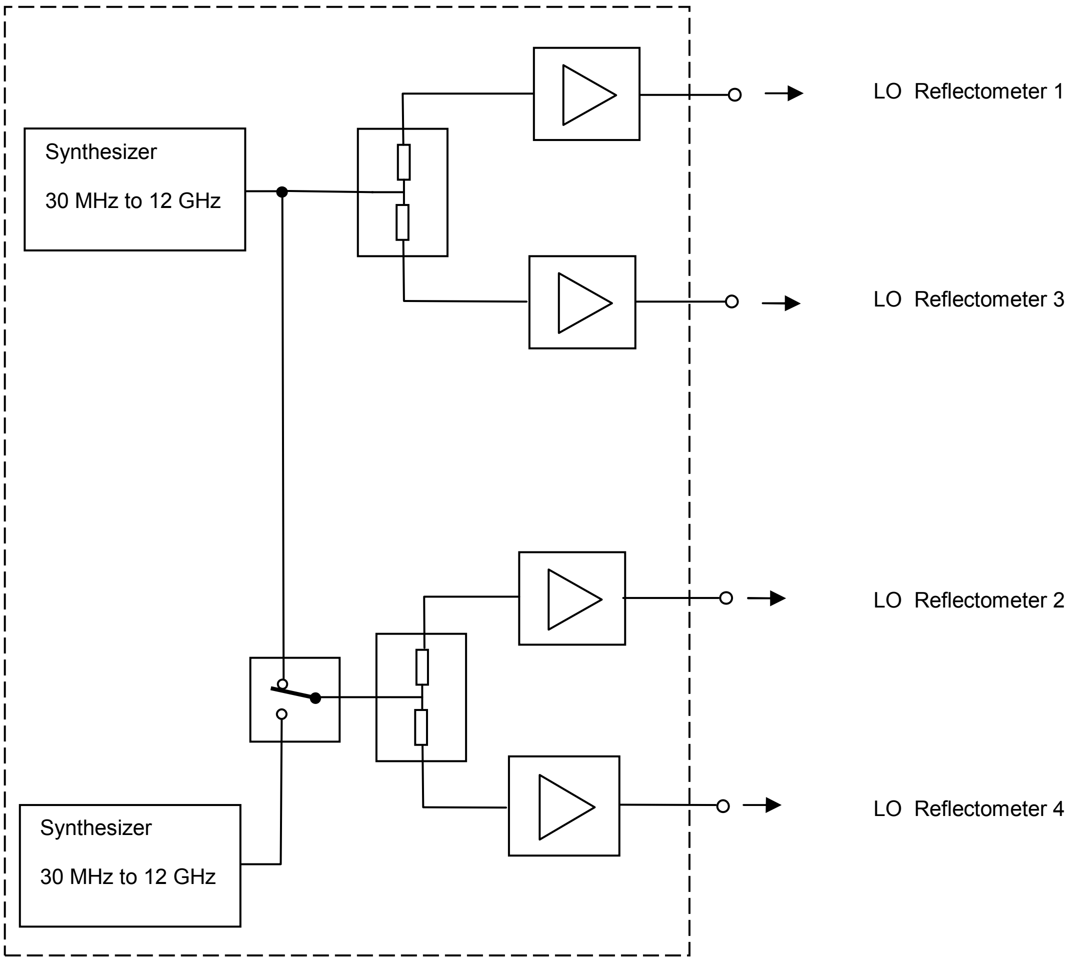
Synthesizer-12 1305.3020.02



Synthesizer-12 1305.1702.03



Synthesizer-12 1305.xxxx.04



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

Synthesizer-	LS 1302.4025.02	LS 1302.4025.20	DS 1302.5180.02	LO 1302.4248.02	LO 1302.4248.20	12 1305.3020.02
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	--------	--------
ZVA40 two-port	--------	2x SRC, 2x LO	--------	--------	--------	--------
ZVA40 four-port	--------	--------	4x SRC	--------	4x LO	--------
ZVA50 two-port	--------	2x SRC, 2x LO	--------	--------	--------	--------
ZVA50 four-port	--------	--------	4x SRC	--------	4x LO	--------
ZVA67 two-port	--------	--------	--------	--------	--------	2x SRC, 2x LO (one board)
ZVA67 four-port	--------	--------	--------	--------	--------	4x SRC, 4x LO (two boards)

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)
1145.1110 sheet 2, 3, 4, 5, 6, 7 (ZVA Network Analyzer)
1305.7002 sheet 1, 2, 3 (ZVA67 Network Analyzer)
1145.1290 sheet 2 (ZVB base instrument, power supply cabeling)
1145.1310 sheet 1, 2 (ZVA base instrument)
1145.1390 sheet 1 (ZVA display unit)
1164.1770 sheet 1 (ZVA Option B4)
1145.3593 sheet 1 (8GHz Bridge)
1145.4177 sheet 1 (RM8)
1145.4283 sheet 1 (RM24)
1145.4319 sheet 1 (RM40)
1305.3413 sheet 1 (RM50)
1305.6241 sheet 1 and 2 (RM67)
1164.0250 sheet 1 to 5 (ZVA8 Option B16)
1164.0267 sheet 1 to 5 (ZVA24 Option B16)
1164.0215 sheet 1 to 5 (ZVA8 Option B21 to B24 and B31 to B34)
1164.0221 sheet 1 to 5 (ZVA24 Option B21 to B24 and B31 to B34)
1164.0409 sheet 1 to 8 (ZVA40 Option B21 to B24 and B31 to B34)
1302.4960.08 sheet 1 (RM Unit ZVB4/8)
1302.5621 sheet 1 (RM44 Blower Attachement)

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 (R&S ZVA8 only)	Check error log	System error calibration	
Bridge unit (R&S ZVA8 only)	Check error log	Record correction values System error calibration	
Coupler unit (R&S ZVA24, R&S ZVA40, R&S ZVA50 and R&S ZVA67 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.

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. 3-1):

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.

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.

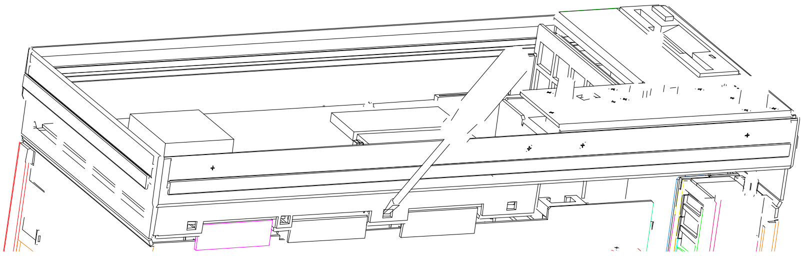


Fig. 3-1 Removing the front module controller Installing the new front module controller and putting the instrument back together.

- Carefully insert the new front module controller on the motherboard and screw into place with 10 sems 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

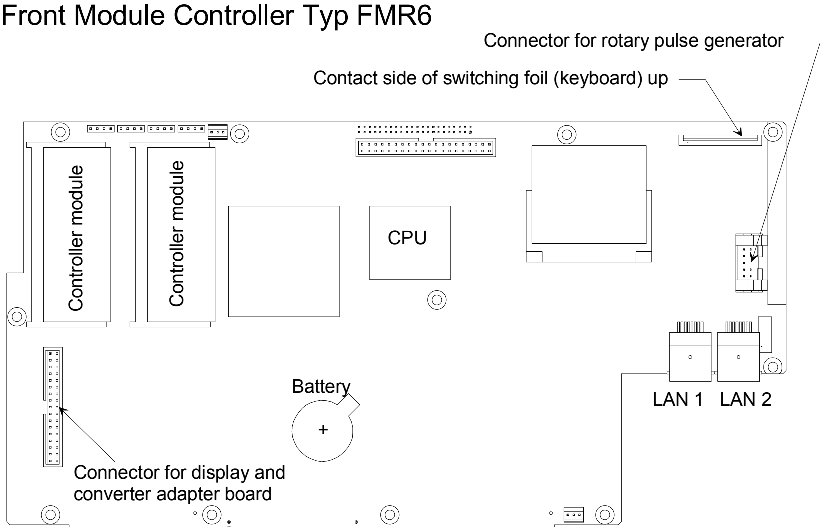


Fig. 3-2 Location of the edge connectors on the front module controller

- 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).

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

Danger of fire or intoxication

Lithium batteries must not be exposed to high temperatures or fire.

Keep away from children to avoid intoxication.

If the battery is replaced improperly, there is danger of explosion. Only replace the battery with R&S type *(See Chapter 5, Spare Parts List, Item 776 for type FMR6).*

Lithium batteries are hazardous waste and must be disposed of in dedicated containers. Observe local regulations regarding waste disposal.

Do not short-circuit the battery!

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.

NOTICE

Risk of instrument damage

Be careful when removing the front panel of the instrument because the connecting cables are still connected to the controller to avoid damage to the instrument.

Disconnecting cables

When pulling off the connecting cables be careful with the cable connecting to the keyboard. It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.

- 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

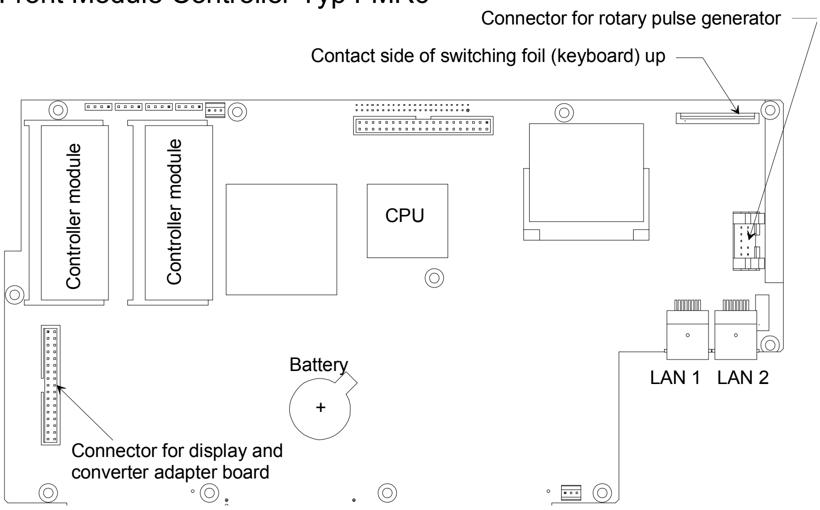


Fig. 3-3 Location of the lithium battery on the front module controller

Installing the new battery and reassembling the instrument

Risk of discharge

Do not short-curcuit 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).

NOTICE

Risk of instrument damage

Be careful when replacing the cables. Connect the cables to the proper connectors to avoid damage to the instrument.

- 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, turn on at the power 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 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, turn on at the mains switch and press the ON key.
- 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.

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

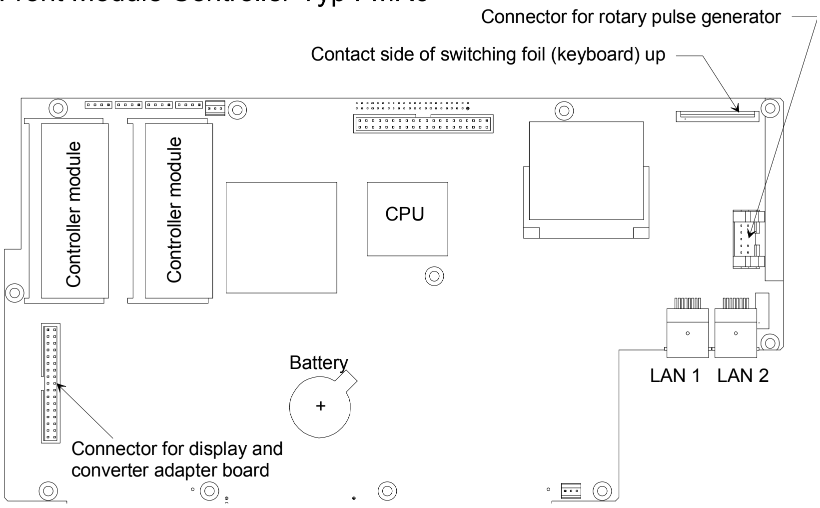


Fig. 3-4 Location of the edge contacts on the front module controller

- 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).

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.

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 countersunkl 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

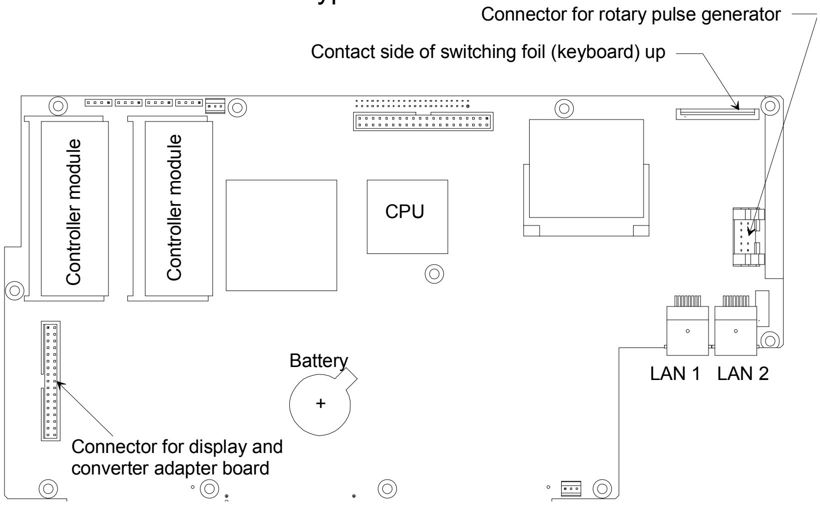


Fig. 3-5 Location of the edge contacts on the front module controller

➢ 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).

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, 1145.1290, 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
- If you refit a power supply 1145.5238, fit the cables from the removed one to the new one (see drawing 1145.1290)
- 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.

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 (Rosenberger).

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** in chapter 2)
- Write synthesizer mapping and shift data to the motherboard EPROM (see **Correction Value Recording** in chapter 2)

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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see **Factory System Error Calibration** in chapter 2).

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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see Factory System Error Calibration in chapter 2).

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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see Factory System Error Calibration in chapter 2).

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, 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]
- Record the receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see Factory System Error Calibration in chapter 2).

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, 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]
- Check the gauge (see **Checking the Gauge** in chapter 2)
- Perform factory system error calibration (see **Factory System Error Calibration** in chapter 2).

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, turn on at the mains switch and press the ON key.
- Select Service Level 2 (see Service Functions).
- Check the gauge (see **Checking the Gauge** in chapter 2)
- 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, 190, 200 and drawings 1145.1110, 1145.4283)

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 ZVA24-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 captive screws (see 1145.1110.01 sheet 4 / 5) and take out the reflectometer.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the captive screws.
- Reconnect any cables that have been disconnected.
- Fit the 3.5mm connection cables (only with option ZVA24-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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

Replacing a Reflectometer RM40 and RM50 A510 to 540

(See Chapter 5, Spare Parts List, Items 209, 222, 230, 232 and drawings 1145.1110, 1145.4319, 1305.3413)

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).
- 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 captive screws (see 1145.4319, 1305.3413) and take out the reflectometer.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the captive screws.
- Reconnect any cables that have been disconnected.
- 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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

Replacing a Reflectometer RM67 A510 to 540

(See Chapter 5, Spare Parts List, Items 300 and 350 and drawing 1305.7002)

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).
- 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 captive screws (see1305.7002) and take out the reflectometer.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the captive screws.
- Reconnect any cables that have been disconnected.
- 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, 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]
- 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, ZVA40, ZVA50)

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

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 ZVA24-B16).
- Remove the frontcover
- 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 ZVA24-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, 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]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing the Coupler Unit (ZVA67)

(See Chapter 5, Spare Parts List, item 245 and drawings 1305.7002 and 1305.6241)

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 ZVA24-B16).
- Remove the frontcover
- 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 ZVA24-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, 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]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing the Test Set (ZVA40 only)

N.B.: In case of defective Test Set please contact the Central Service in Munich.

Replacing the Reflectometer Fan

(See Chapter 5, Spare Parts List, Item 100, 190 and drawings 1145.1110, 1145.4177, 1145.4283, 1302.5621)

ZVA8 and ZVA24 only:

- 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 (ZVA8: cable outlet to the outside, ZVA24: cable outlet to the inside).
- 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, turn on at the mains switch. The instrument is now in the standby mode.

ZVA40, ZVA50 and ZVA67 only:

- Remove the cover plate (260) undoing 12 screws (261) and 4 screws (212)
- Remove blower attachement (210) undoing 2 screws (211)

Replacing the fan

- Disconnect the fan cable at the reflectometer.
- Remove the fan.
- Insert the new fan (cable outlet to the inside of the instrument) and cut the rubber pins (see 1302.5621).
- Connect the fan cable to the reflectometer and reinstall the blower attachement (210).

Reassembling the instrument

- Reinstall the cover plate (260)
- 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, 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 drawing 1145.1010)

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, 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]
- 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.

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.

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, turn on at the mains switch and press the ON key.
- Install firmware update, if necessary (version ≥ 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, 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]

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).

NOTICE

Risk of damage to the boards

Be careful not to cause short circuits when measuring voltages at pins placed close together!

Do not plug or unplug boards prior to disconnecting them from the AC supply.

The R&S ZVA has the following facilities to simplify diagnosis:

- Selftest
- Service functions

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		R&S URE	0350.5315.02	1
2	Power supply	0 to 10 V			
3	Spectrum analyzer	Frequency range 0 to 40 GHz	R&S FSU 40 (R&S FSU 50) (R&S FSU 67)		1
4	Power meter (if FSU50 or FSU67 not available)		R&S NRP + Sensor		1
4	Power sensor	10 MHz to 67 GHz	R&S NRP-Z57		
5	Test cable	0.6 m long K male to K female	-	1306.4688.00	1
5	Test cable	Test cable 1.85 mm (f) to 1.85 mm (m)	GORE EN0CB0CB024 0	-	1
5	Test cable				
6	Adapter cable	1 m long SMP male to SMA male	-	1129.8259.00	1
7	Adapter cable	0.5 m long SMP male to SMP male	-	1129.8265.00	1
8	SMA cable	0.5 m long SMA male to SMA male	-	1142.5895.00	2
9	SMA cable	1 m long SMA male to SMA male	-	1142.5889.00	2
10	BNC cable	1 m to 2 m long BNC male to BNC male	-	e.g. 1100.8850.00	1
11	Adapter	SMA female to N male	-	4012.5837.00	2
12	Adapter	N male to BNC female	-	0118.2812.00	1
13	Termination	SMA termination. 50 Ω male	-	0249.7823.00	3
14	Calibration kit	1.85mm, 50 Ω. DC to 67 GHz.	R&S ZV-Z218	5011.6571.02	1
15	R&S SMP adapter	SMP female to SMP female	-	1093.6869.00	1
16	Adapter board	Extension 150 mm high, 48 pins, 2 mm pitch	-	1100.3542.02	1
17	Conn. Cables for DC Inputs	4-pin mini-DIN plug	R&S ZV-Z71	1164.1005.02	1
18	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 ⇓	Mains switch OFF: Turn on at mains switch.
Check LED is yellow (standby) ⇓	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 to12 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.

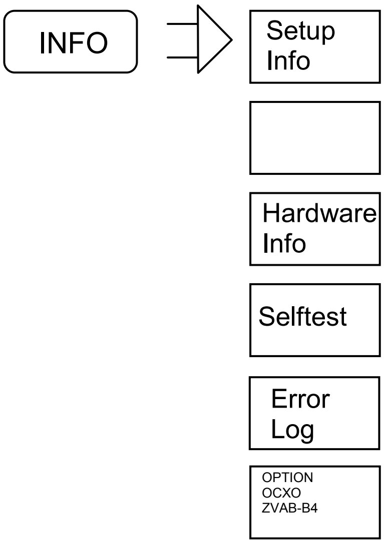
If the operating system on the hard disk has been corrupted and so cannot be loaded correctly, Windows XP outputs a “blue screen”.
This screen summarizes all the key information about the internal status of the processor.

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.

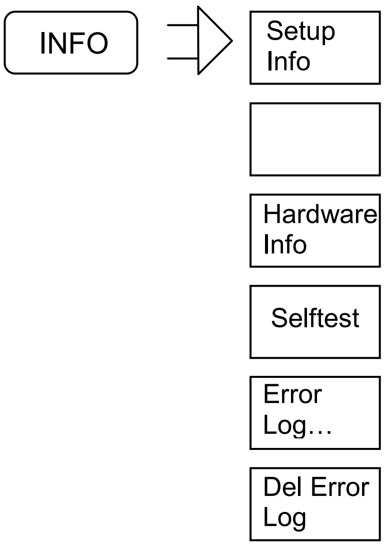
See: Troubleshooting with the Selftest

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-oort 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.

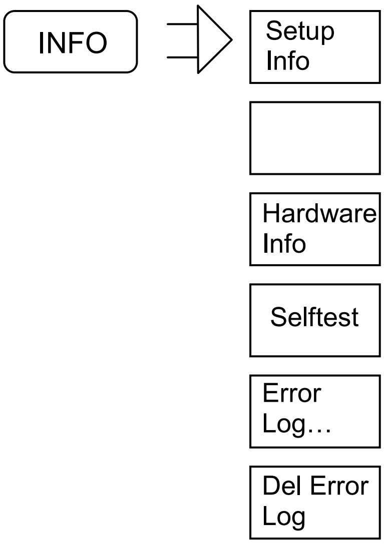
Power supply	**+3.4 V**	**+5.2 V**	**+6.5 V**	**+8.25 V**	**+12.25 V**	**-6.5 V**	**-12.25 V**
Fr			+5V_A +5V_REF		+10V_A +12V_STB	-5V_A	-10V_A
Nd	+2.5VD_MDD1 +2.5VD_MDD2 +1.5VD_FCON		+5VA_ADC			-5VA_ADC	
Sy			+5V_A +5V_REF		+7V_A +10V_A		
Rm			+5V		+10.5VA +10.5VB +12V +12V FAN		-12V

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:					

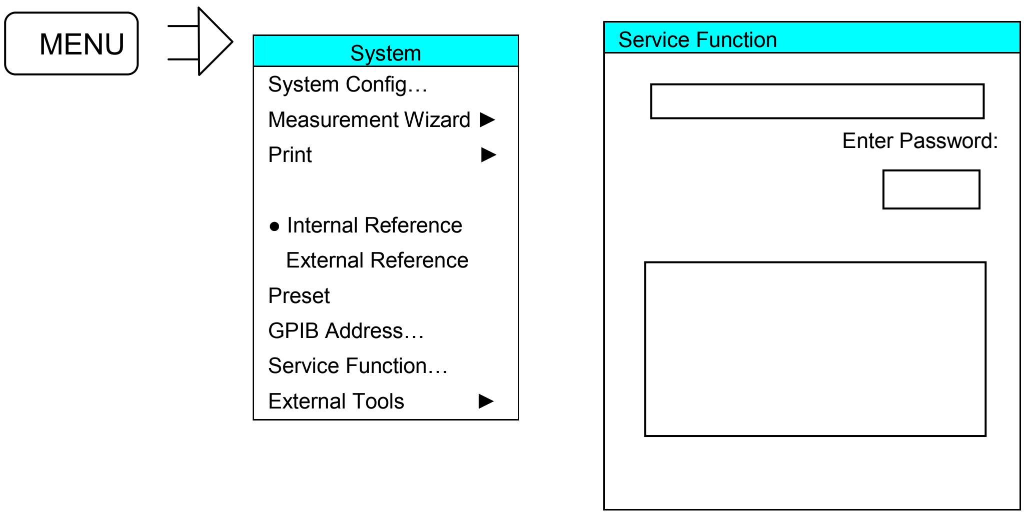
Highly elevated temperature values indicate a fan failure.

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	.	Main ID	.	Sub ID	.	Function	.	Address	.	Data

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.

	Defective board	
Problem with:	**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 ±1dB	
NA2_AD_CLK	X104	80 MHz	10 dBm ±1dB	
SY1_REF	X105	128 MHz	10 dBm ±1dB	
SY2_REF	X106	128 MHz	10 dBm ±1dB	
REF_10_OUTIN	X107	10 MHz	6 dBm ±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).
- [**Mode** : Spurious Avoidance : LO > RF]
- 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 1302.4025.xx

Source Mod. 02 and Mod. 20

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

Isolation of source switch1 to 4
ZVA frequency 8 GHz

Port no.	**Port setting**	**Source output**	**Isolation**
1	Port1 inactive	X168	-90 dBc ±5 dB
	Port2 active	X169	
2	Port1 active	X168	
	Port2 inactive	X169	-90 dBc ±5 dB

Local Mod. 02

Frequency (ZVA setting)	**LO-Frequency** (Spec analyzer setting)	**Local Level (**Mod. 02)	**2nd harmonic**	**3rd harmonic**
300 kHz	17.812345 MHz	+2 dBm to -15 dBm	< -5 dBc	< +2 dBc
100 MHz	117.512345 MHz	+2 dBm to -15 dBm	< -5 dBc	< +2 dBc
1 GHz	1017.512345 MHz	+2 dBm to -4 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	+2 dBm to -4 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.3 GHz	5317.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	+2 dBm to -5 dBm	< -5 dBc	< -5 dBc
8 GHz	8017.512345 MHz	+2 dBm to -5 dBm	< -5 dBc	< -5 dBc

Local Mod. 20

Frequency (ZVA setting)	**LO-Frequency** (Spec analyzer setting)	**Local Level (**Mod. 24)	**2nd harmonic**	**3rd harmonic**
10 MHz	27.512345 MHz	-3 dBm to -20 dBm	< -5 dBc	< +2 dBc
100 MHz	117.512345 MHz	-3 dBm to -20 dBm	< -5 dBc	< +2 dBc
1 GHz	1017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.3 GHz	5317.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	< -5 dBc
8 GHz	8017.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	< -5 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 Port2 active	X165 X166	-90 dBc ±5 dB
2	Port1 active Port2 inactive	X165 X166	 -90 dBc ±5 dB
3	Port3 inactive Port4 active	X168 X169	-90 dBc ±5 dB
4	Port3 active Port4 inactive	X168 X169	 -90 dBc ±5 dB

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	2 dBm to -15 dBm	< -5 dBc	< 2 dBc
100 MHz	117.512345 MHz	2 dBm to -15 dBm	< -5 dBc	< 2 dBc
1 GHz	1017.512345 MHz	2 dBm to -4 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	2 dBm to -4 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.5 GHz	5517.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	3 dBm to -4 dBm	< -5 dBc	---
8 GHz	8017.512345 MHz	3 dBm to -4 dBm	< -5 dBc	---

Synthesizer-LO 1302.4248.20

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 -20 dBm	< -5 dBc	< 2 dBc
100 MHz	117.512345 MHz	-3 dBm to -20 dBm	< -5 dBc	< 2 dBc
1 GHz	1017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.5 GHz	5517.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	---
8 GHz	8017.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	---

Synthesizer-12

Source signals (W168, W169) with synth. 1305.3002.02 and synth. 1305.3002.04
(W165, W166, W168, W169) with synth. 1305.7220.02

Frequency (ZVA setting)	**Source Level** (Mod. 02)	**2nd harmonic**
10 MHz	+10 dBm to -10 dBm	-----
100 MHz	+10 dBm to -10 dBm	-----
300 MHz	+10 dBm to -10 dBm	< -25 dBc
1 GHz	+10 dBm to -10 dBm	-----
2 GHz	+10 dBm to -10 dBm	-----
2.5 GHz	+10 dBm to -10 dBm	< -25 dBc
3 GHz	+10 dBm to -10 dBm	-----
4 GHz	+10 dBm to -10 dBm	-----
6 GHz	+10 dBm to -10 dBm	-----
8 GHz	+10 dBm to -10 dBm	-----
10 GHz	+10 dBm to -10 dBm	-----
12 GHz	+10 dBm to -10 dBm	-----

Local signals (W165, W166) with synth. 1305.3002.02 and synth. 1305.3002.03
(W155, W156, W158, W159) with synth. 1305.7220.02

Frequency (ZVA setting)	**LO-Frequency** (Spec analyzer setting)	**Source Level** (Mod. 02)
30 MHz	47.512345 MHz	+10 dBm to -10 dBm
100 MHz	117.512345 MHz	+10 dBm to -10 dBm
1 GHz	1.017512345 GHz	+10 dBm to -10 dBm
2 GHz	2.017512345 GHz	+10 dBm to -10 dBm
3 GHz	3.017512345 GHz	+10 dBm to -10 dBm
4 GHz	4.017512345 GHz	+10 dBm to -10 dBm
6 GHz	6.017512345 GHz	+10 dBm to -10 dBm
8 GHz	8.017512345 GHz	+10 dBm to -10 dBm
10 GHz	10.017512345 GHz	+10 dBm to -10 dBm
12 GHz	12.017512345 GHz	+10 dBm to -10 dBm

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 (measure wave quantity bx). Terminate the bridge unit output that is not used with an SMA termination.
- Screw the SHORT from a N-calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def
- 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 the SHORT from a N-calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def
- 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	Level ax and bx
300 kHz	8 dBm	0 dBm
50 MHz	8 dBm	0 dBm
1 GHz	8 dBm	0 dBm
3 GHz	8 dBm	0 dBm
6 GHz	8 dBm	0 dBm
8 GHz	8 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.

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.

- Perform a sweep from 300 kHz to 8 GHz, measure Ratio bx/ax Source Portx
- Screw the SHORT from a N-calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- Screw the MATCH from the calibration kit to the port connector.
- Select   User Def Math : linMag(Data) / ((linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- 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 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 ± 3 dB
100 MHz	-30 dBm	+5 dBm ± 3 dB
1 GHz	-20 dBm	-5 dBm ± 3 dB
2.5 GHz	-20 dBm	-10 dBm ± 3 dB
3 GHz	-20 dBm	-10 dBm ± 3 dB
8 GHz	-20 dBm	-10 dBm ± 3 dB
9 GHz	-20 dBm	-10 dBm ± 3 dB
12 GHz	-20 dBm	-10 dBm ± 3 dB
15 GHz	-20 dBm	-8 dBm ± 4 dB
18 GHz	-20 dBm	-8 dBm ± 4 dB
20 GHz	-20 dBm	-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 (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 coupler unit.
- ➢ Connect the coupler unit output (MEAS = connector W515 or REF = connector W518) to a functioning port using the SMA cable. Terminate the coupler unit output that is not used with an SMA termination.
- ➢ Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- ➢ Screw the OPEN from the calibration kit to the port connector.
- ➢ Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- ➢ Select Math = User Def
- ➢ 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
24 GHz	0 dBm	-12 dBm ± 4 dB	-1 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 the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def
- 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	Level ax and bx
10 MHz	0 dBm	-3 dBm ± 1 dB
100 MHz	0 dBm	-3 dBm ± 1 dB
1 GHz	0 dBm	-3.2 dBm ± 1 dB
2 GHz	0 dBm	-3.3 dBm ± 1 dB
8 GHz	0 dBm	-4.3 dBm ± 1 dB
12 GHz	0 dBm	-5 dBm ± 1 dB
16 GHz	0 dBm	-5.7 dBm ± 1 dB
20 GHz	0 dBm	-6.3 dBm ± 1 dB
24 GHz	0 dBm	-7 dBm ± 1 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.

- Perform a sweep from 10 MHz to 24 GHz, measure Ratio bx/ax Source Portx
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- Screw the MATCH from the calibration kit to the port connector.
- Select   User Def Math : linMag(Data) / ((linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- 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 Reflectometer RM44 and RM50

Generator levels

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

- Loosen cable W514A (GEN -> coupler unit) or W512 (GEN -> attenuator) at both ends and screw off at the generator output GEN.
- Connect the generator output to the spectrum analyzer using the K-cable (ZVA40) or V-cable (ZVA50).
- 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 (without GenAtt)	Set power to (with GenAtt)	Level on GEN output	2nd harmonic	3rd harmonic
10 MHz	10 dBm	9 dBm	12.0 dBm	---	---
50 MHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
1 GHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
4 GHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
8 GHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
10 GHz	10 dBm	9 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
13 GHz	10 dBm	9 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
15 GHz	10 dBm	8 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
18 GHz	10 dBm	8 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
20 GHz	10 dBm	8 dBm	14.0 dBm	< - 21 dBc	---
24 GHz	10 dBm	8 dBm	14.5 dBm	< - 21 dBc	---
28 GHz	10 dBm	7 dBm	14.5 dBm	< - 21 dBc	---
32 GHz	10 dBm	7 dBm	14.5 dBm	---	---
36 GHz	6 dBm	3 dBm	10.5 dBm	---	---
40 GHz	6 dBm	3 dBm	10.5 dBm	---	---
45 GHz (ZVA50 only)	6 dBm	3 dBm	10.5 dBm	---	---
50 GHz (ZVA50 only)	6 dBm	3 dBm	10.5 dBm	---	---

With the stated levels, the cable loss must still be taken into account.

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 the cable to the receiver input MEAS (X6) and the cable to the receiver input REF (X5) at both ends and screw off at the receiver inputs.

➢ Connect the receiver input (MEAS or REF) to a functioning instrument port using the K-cable (ZVA40) or V-cable (ZVA50).

➢ Set the ZVA to the CW sweep mode.

➢ Set the frequencies and output levels (check with power meter) 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**	**Displayed level bx**
10 MHz	-40 dBm	+15 dBm ± 4 dB	+7 dBm ± 4 dB
100 MHz	-40 dBm	-5 dBm ± 4 dB	-13 dBm ± 4 dB
1 GHz	-20 dBm	-2 dBm ± 4 dB	-10 dBm ± 4 dB
3 GHz	-20 dBm	-1 dBm ± 4 dB	-9 dBm ± 3 dB
8 GHz	-20 dBm	-1 dBm ± 4 dB	-9 dBm ± 3 dB
10 GHz	-20 dBm	-1 dBm ± 4 dB	-9 dBm ± 3 dB
12 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
15 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
18 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
20 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
25 GHz	-20 dBm	-0 dBm ± 4 dB	-8 dBm ± 3 dB
30 GHz	-20 dBm	-0 dBm ± 4 dB	-8 dBm ± 3 dB
35 GHz	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB
40 GHz	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB
45 GHz (ZVA50 only)	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB
50 GHz (ZVA50 only)	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.

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

Coupler 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 at coupler MEAS_OUT and at coupler REF_OUT at both ends and disconnect at the coupler.
- Connect the coupler output (MEAS = connector X3 or REF = connector X4) to a functioning port using the K cable . Terminate the coupler output that is not used with an K-termination (V-termination).
- Set the frequencies and levels listed in the table for the reflectometer associated with the coupler (port) and measure the level (wave quantity bx) at the port used for the measurement as follows:
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-47 dBm ± 4 dB	-55 dBm ± 4 dB
100 MHz	0 dBm	-27 dBm ± 4 dB	-35 dBm ± 4 dB
1 GHz	0 dBm	-10 dBm ± 4 dB	-18 dBm ± 4 dB
3 GHz	0 dBm	-11 dBm ± 3 dB	-19 dBm ± 4 dB
8 GHz	0 dBm	-11 dBm ± 3 dB	-19 dBm ± 4 dB
10 GHz	0 dBm	-11 dBm ± 3 dB	-19 dBm ± 4 dB
12 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
15 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
18 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
20 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
25 GHz	0 dBm	-12 dBm ± 3 dB	-20 dBm ± 4 dB
30 GHz	0 dBm	-12 dBm ± 3 dB	-20 dBm ± 4 dB
35 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB
40 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB
45 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB
50 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.

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

Method 2:

The receiver section of the associated reflectometer is OK.

- Loosen the cable at coupler GEN_IN at both ends and screw off at the coupler.
- Connect the coupler (connector X1) to a functioning port using the K-cable (ZVA40) or V-cable (ZVA50).
- 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 (port) as follows:
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def

Frequency	Level	level ax and bx (ZVA40)	level ax and bx (ZVA50)
10 MHz	0 dBm	> -2 dBm	> -2 dBm
100 MHz	0 dBm	> -2 dBm	> -2 dBm
1 GHz	0 dBm	> -2 dBm	> -2 dBm
3 GHz	0 dBm	> -2 dBm	> -2 dBm
8 GHz	0 dBm	> -2 dBm	> -2 dBm
10 GHz	0 dBm	> -2 dBm	> -2 dBm
12 GHz	0 dBm	> -2 dBm	> -2.5 dBm
15 GHz	0 dBm	> -2 dBm	> -2.5 dBm
18 GHz	0 dBm	> -2 dBm	> -2.5 dBm
20 GHz	0 dBm	> -2 dBm	> -2.5 dBm
25 GHz	0 dBm	> -2.5 dBm	> -3 dBm
30 GHz	0 dBm	> -2.5 dBm	> -3 dBm
35 GHz	0 dBm	> -3 dBm	> -3 dBm
40 GHz	0 dBm	> -3 dBm	> -3 dBm
45 GHz	0 dBm	--------	> -3.5 dBm
50 GHz	0 dBm	--------	> -3.5 dBm

With the stated levels, the cable loss must still be taken into account.

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 are OK.

- ➢ Perform a sweep from 10 MHz to 40 GHz, measure Ratio bx/ax Source Portx
- ➢ Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- ➢ Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- ➢ Screw the MATCH from the calibration kit to the port connector.
- ➢ Select User Def Math : linMag(Data) / ((linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- ➢ The trace gives the directivity.

	Frequency range	Directivity
	10 MHz to 20 GHz	< -14 dB
	20 GHz to 35 GHz	< -10 dB
	35 GHz to 40 GHz	< -9 dB
ZVA50 only	35 GHz to 40 GHz	< -8 dB
ZVA50 only	40 GHz to 50 GHz	< -6 dB

If the measured values are more than 2 dB greater than the values stated in the table, the coupler must be replaced.

Coupler Port Matching

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

- ➢ Loosen cables W514A (GEN -> coupler), W515A (coupler -> MEAS) and W518A (coupler -> REF) at both ends and unscrew at the coupler.
- ➢ Terminate the coupler input and coupler outputs with three K-terminations (three V-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 under test and display the Sxx magnitude on the screen.

	Frequency range	Sxx dB
	10 MHz to 5GHz	< -20 dB
	5 GHz to 20 GHz	< -15 dB
	20 GHz to 30 GHz	< -12 dB
	30 GHz to 40 GHz	< -11 dB
ZVA50 only	40 GHz to 50 GHz	< -10 dB

If the measured values are more than 2 dB greater than the values stated in the table, the coupler must be replaced.

Testing the Reflectometer RM67

Generator levels

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

- Loosen cable W514A (GEN -> BIAS 67) or W512A (GEN -> attenuator) at both ends and screw off at the generator output GEN.
- Connect the generator output to the spectrum analyzer using the V-cable (if FSU50 or FSU67 is not available use a power meter for level measurements).
- 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 (without GenAtt)	Set power to (with GenAtt)	Level on GEN output	2nd harmonic
10 MHz	10 dBm	9 dBm	13.0 dBm	< - 30 dBm
500 MHz	13 dBm	12 dBm	16.0 dBm	< - 30 dBc
4 GHz	13 dBm	12 dBm	16.4 dBm	< - 30 dBc
8 GHz	13 dBm	12 dBm	16.7 dBm	< - 30 dBc
12 GHz	13 dBm	12 dBm	17.1 dBm	< - 25 dBc
16 GHz	13 dBm	11 dBm	17.4 dBm	< - 25 dBc
20 GHz	13 dBm	11 dBm	17.8 dBm	< - 25 dBc
24 GHz	10 dBm	6 dBm	15.2 dBm	---
28 GHz	10 dBm	7 dBm	15.5 dBm	---
32 GHz	10 dBm	7 dBm	15.9 dBm	---
36 GHz	6 dBm	3 dBm	12.3 dBm	---
40 GHz	6 dBm	3 dBm	12.6 dBm	---
45 GHz	6 dBm	3 dBm	13.1 dBm	---
50 GHz	6 dBm	3 dBm	13.5 dBm	---
55 GHz	2 dBm	- 1 dBm	10.0 dBm	---
60 GHz	2 dBm	- 1 dBm	10.4 dBm	---
67 GHz	2 dBm	- 1 dBm	11.1 dBm	---

With the stated levels, the cable loss must still be taken into account.

Receiver levels

The following is assumed:

- The LO synthesizer section 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 the cable to the receiver input MEAS (X6) and the cable to the receiver input REF (X5) at both ends and screw off at the receiver inputs.
- Connect the receiver input (MEAS or REF) to a functioning instrument port using the V-cable.
- Set the ZVA to the CW sweep mode.
- Set the frequencies and output levels (check with power meter) 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	Displayed level bx (w/o Rec Att)	Displayed level bx (with Rec Att)
10 MHz	-40 dBm	+16 dBm ± 5 dB	+6 dBm ± 5 dB	+7 dBm ± 4 dB
100 MHz	-40 dBm	-4 dBm ± 4 dB	-14 dBm ± 4 dB	-13 dBm ± 4 dB
1 GHz	-20 dBm	1 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
3 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
8 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
10 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
12 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
15 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-7 dBm ± 4 dB
18 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-7 dBm ± 4 dB
20 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-7 dBm ± 4 dB
25 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-6 dBm ± 4 dB
30 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-6 dBm ± 4 dB
35 GHz	-20 dBm	3 dBm ± 4 dB	-8 dBm ± 4 dB	-5 dBm ± 4 dB
40 GHz	-20 dBm	3 dBm ± 4 dB	-8 dBm ± 4 dB	-5 dBm ± 4 dB
45 GHz	-20 dBm	5 dBm ± 4 dB	-8 dBm ± 4 dB	-5 dBm ± 4 dB
50 GHz	-20 dBm	5 dBm ± 4 dB	-7 dBm ± 4 dB	-4 dBm ± 4 dB
55 GHz	-20 dBm	5 dBm ± 4 dB	-7 dBm ± 4 dB	-4 dBm ± 4 dB
60 GHz	-20 dBm	7 dBm ± 4 dB	-6 dBm ± 4 dB	-3 dBm ± 4 dB
67 GHz	-20 dBm	7 dBm ± 4 dB	-6 dBm ± 4 dB	-3 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.

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

Coupler 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 at coupler MEAS_OUT and at coupler REF_OUT at both ends and disconnect at the coupler.
- Connect the coupler output (MEAS = connector X3 or REF = connector X4) to a functioning port. Terminate the coupler output that is not used.
- Set the frequencies and levels listed in the table for the reflectometer associated with the coupler (port) and measure the level (wave quantity bx) at the port used for the measurement as follows:
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-46 dBm ± 4 dB	-54 dBm ± 4 dB
100 MHz	0 dBm	-26 dBm ± 4 dB	-34 dBm ± 4 dB
1 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
3 GHz	0 dBm	-11 dBm ± 4 dB	-20 dBm ± 4 dB
8 GHz	0 dBm	-11 dBm ± 4 dB	-19.5 dBm ± 4 dB
10 GHz	0 dBm	-11 dBm ± 4 dB	-19.5 dBm ± 4 dB
12 GHz	0 dBm	-11 dBm ± 4 dB	-19.5 dBm ± 4 dB
15 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
18 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
20 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
25 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
30 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
35 GHz	0 dBm	-12 dBm ± 4 dB	-19.5 dBm ± 4 dB
40 GHz	0 dBm	-12 dBm ± 4 dB	-19.5 dBm ± 4 dB
45 GHz	0 dBm	-12 dBm ± 4 dB	-21 dBm ± 4 dB
50 GHz	0 dBm	-13 dBm ± 4 dB	-21 dBm ± 4 dB
55 GHz	0 dBm	-13 dBm ± 4 dB	-21 dBm ± 4 dB
60 GHz	0 dBm	-14 dBm ± 4 dB	-22.5 dBm ± 4 dB
67 GHz	0 dBm	-14 dBm ± 4 dB	-22 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.
If the measured values are more than 2 dB below the levels in the table, the coupler must be replaced.

Method 2:

The receiver section of the associated reflectometer is OK.

- Loosen the cable at coupler GEN_IN at both ends and screw off at the coupler.
- Connect the coupler (connector X1) to a functioning port.
- 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 (port) as follows:
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def

Frequency	Level	level ax and bx
10 MHz	0 dBm	> -2 dBm
100 MHz	0 dBm	> -2 dBm
1 GHz	0 dBm	> -2 dBm
3 GHz	0 dBm	> -2.1 dBm
8 GHz	0 dBm	> -2.3 dBm
10 GHz	0 dBm	> -2.4 dBm
12 GHz	0 dBm	> -2.5 dBm
15 GHz	0 dBm	> -2.6 dBm
18 GHz	0 dBm	> -2.7 dBm
20 GHz	0 dBm	> -2.8 dBm
25 GHz	0 dBm	> -3 dBm
30 GHz	0 dBm	> -3.2 dBm
35 GHz	0 dBm	> -3.4 dBm
40 GHz	0 dBm	> -3.6 dBm
45 GHz	0 dBm	> -3.8 dBm
50 GHz	0 dBm	> -4 dBm
55 GHz	0 dBm	> -4.2 dBm
60 GHz	0 dBm	> -4.4 dBm
67 GHz	0 dBm	> -4.7 dBm

With the stated levels, the cable loss must still be taken into account.

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 are OK.

- Perform a sweep from 10 MHz to 67 GHz, measure Ratio bx/ax Source Portx
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- Screw the MATCH from the calibration kit to the port connector.
- Select   User Def Math : linMag(Data) / (linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- The trace gives the directivity.

Frequency range	Directivity
10 MHz to 20 GHz	< -14 dB
20 GHz to 35 GHz	< -10 dB
35 GHz to 40 GHz	< -8 dB
40 GHz to 50 GHz	< -6 dB
50 GHz to 67 GHz	< -3 dB

If the measured values are more than 2 dB greater than the values stated in the table, the coupler must be replaced.

Coupler Port Matching

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

- Loosen cables W514A (GEN -> coupler), W515A (coupler -> MEAS) and W518A (coupler -> REF) at both ends and unscrew at the coupler.
- Terminate the coupler input and coupler outputs with three K-terminations (three V-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 under test and display the Sxx magnitude on the screen.

Frequency range	Sxx dB
10 MHz to 5GHz	< -20 dB
5 GHz to 20 GHz	< -15 dB
20 GHz to 30 GHz	< -12 dB
30 GHz to 40 GHz	< -11 dB
40 GHz to 60 GHz	< -10 dB
60 GHz to 67 GHz	< -6 dB

If the measured values are more than 2 dB greater than the values stated in the table, 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 dBm ± 2 dB, the board must be replaced.

Testing the Motherboard

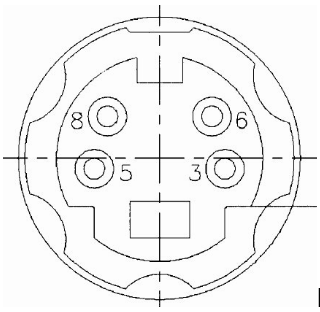
28 V supply

Using a multimeter, measure the voltage at X 100.B5 (wrt ground).
Permissible deviation: ± 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 3 "Repairs"

3 Repairs

This chapter describes the R&S 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 R&S 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.

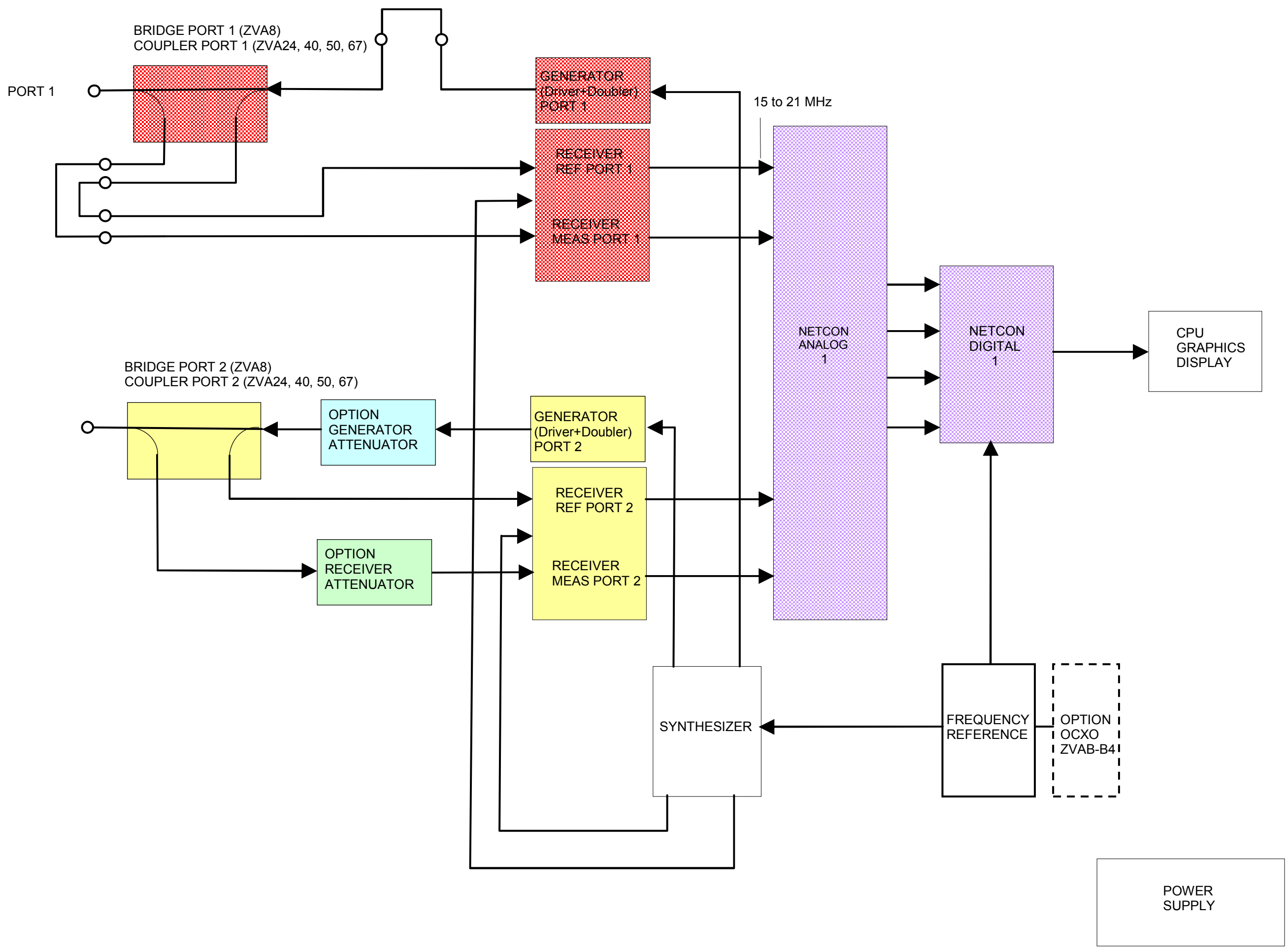


Fig. 3-1 Block diagram of the R&S ZVA8, R&S ZVA24, R&S ZVA40, R&S ZVA50 and R&S ZVA67 two ports

With option direct generator/receiver access on port1,
options generator and receiver attenuator on port2.

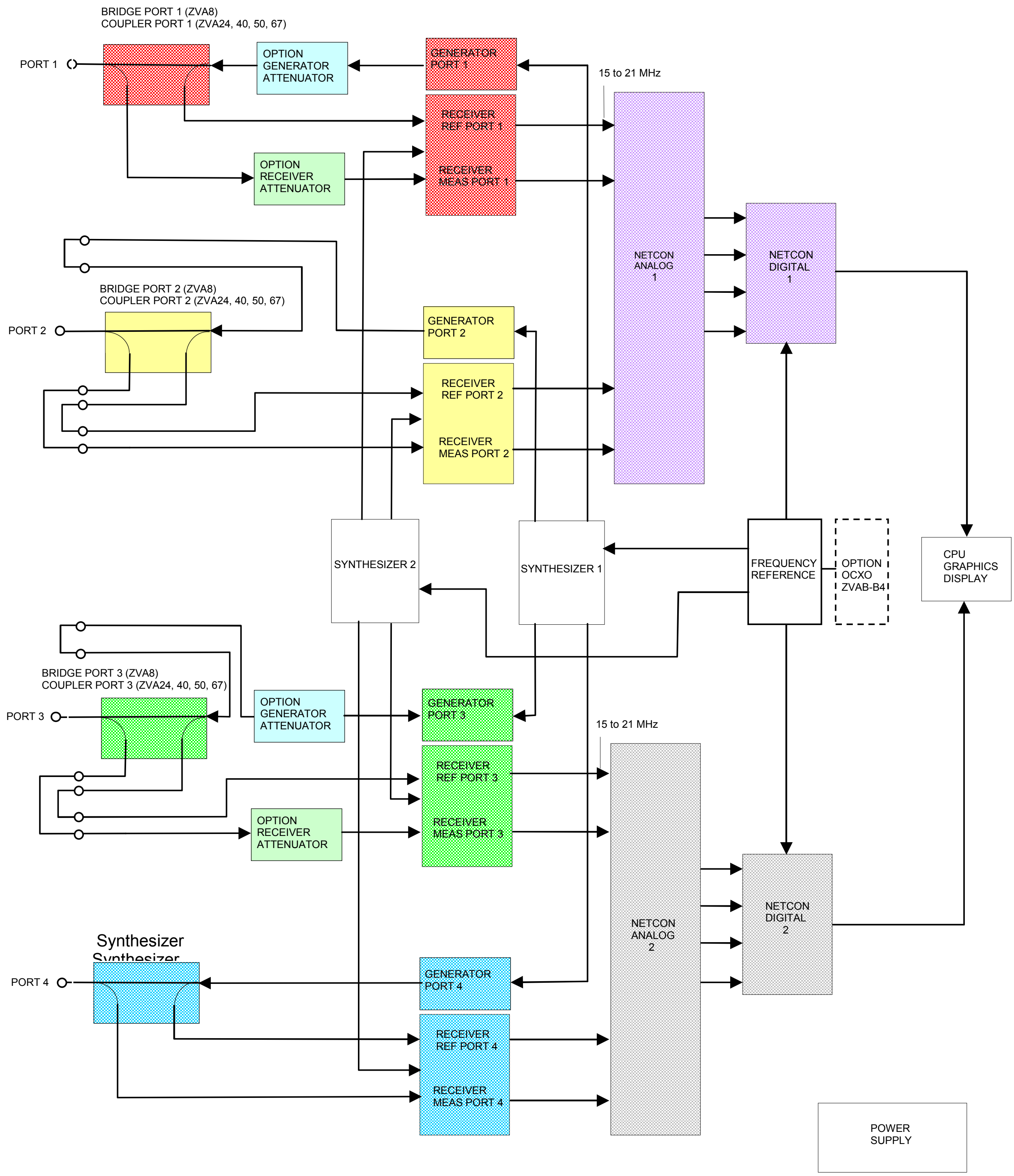


Fig. 3-2 Block diagram of the R&S ZVA8, R&S ZVA24, R&S ZVA40, R&S ZVA50 and R&S ZVA67 four ports
With option generator/receiver attenuator on port1,
option direct generator/receiver access on port2,
options generator/receiver attenuator and direct generator/receiver access on port3.

Description of the Block Diagram

The block diagrams shown in Fig. 3-1 and Fig. 3-2 apply to the R&S ZVA8, the R&S ZVA24, the R&S ZVA40, R&S ZVA50 and the R&S ZVA67 two-ports and four-ports.

The ZVA is a vector network analyzer covering 300 kHz to 8 GHz (R&S ZVA8), 10 MHz to 24 GHz (R&S ZVA24), 10 MHz to 40 GHz (R&S ZVA40), 10 MHz to 50 GHz (R&S ZVA50) or 10 MHz to 67 GHz (R&S ZVA67). All R&S ZVA 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, R&S ZVA40, R&S ZVA50 and R&S ZVA67 (10 MHz to 24 GHz, 10 MHz to 40 GHz, 10 MHz to 50 GHz, 10 MHz to 67 GHz) is generated on synthesizer board1, 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	x	16.0 GHz to 24.0 GHz

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

Reflectometer Unit R&S ZVA40

A reflectometer unit comprising a **coupler**, a **generator section (Driver24 and Doubler44)** and a **receiver section (Receiver44)** 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 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.

Driver24

The driver 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

Doubler44

The doubler contains a frequency doubler for the range 24 GHz to 44 GHz, a switchable filter unit and a broadband amplifier for the range 10 MHz to 44 GHz.

Range	Frequency range from driver24	Doubler	Output frequency
1	10 MHz to 24.0 GHz	---	10 MHz to 24.0 GHz
2	12.0 GHz to 14.9 GHz	x	24.0 GHz to 29.8 GHz
3	14.9 GHz to 18.5 GHz	x	29.8 GHz to 37.0 GHz
4	18.5 GHz to 22.0 GHz	x	37.0 GHz to 44.0 GHz

Receiver44

The receiver section has two channels (measurement channel and reference channel). 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 44 GHz, LO doublers, 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. In the frequency range 10 MHz to 24 GHz the mixers are used as basic wave mixers (IF = LO – RF). In the range 24 GHz to 44 GHz the mixer for the upper frequency range works as a harmonic mixer (IF = 3LO – RF).

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 RM1 and RM2 contain two voltage-controlled fans to perform optimum cooling.

Reflectometer Unit R&S ZVA50

A reflectometer unit comprising a **coupler**, a **generator section (Driver24 and Doubler50)** and a **receiver section (Receiver50)** 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 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.

Driver24

The driver is the same as it is used in ZVA40. Frequency range 6 is extended to 25 GHz.

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 6.25 GHz	x	10.0 GHz to 12.5 GHz	x	20.0 GHz to 25 GHz

Doubler50

The doubler contains a frequency doubler for the range 25 GHz to 50 GHz, a switchable filter unit and a broadband amplifier for the range 10 MHz to 50 GHz.

Range	Frequency range from driver24	Doubler	Output frequency
1	10 MHz to 25.0 GHz	---	10 MHz to 25.0 GHz
2	12.5 GHz to 14.9 GHz	x	25.0 GHz to 29.8 GHz
3	14.9 GHz to 18.5 GHz	x	29.8 GHz to 37.0 GHz
4	18.5 GHz to 25.0 GHz	x	37.0 GHz to 50.0 GHz

Receiver50

The receiver section has two channels (measurement channel and reference channel). 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 50 GHz, LO doublers, 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. In the frequency range 10 MHz to 24 GHz the mixers are used as basic wave mixers (IF = LO – RF). In the range 24 GHz to 50 GHz the mixer for the upper frequency range works as a harmonic mixer (IF = 3LO – RF).
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 RM1 and RM2 contain two voltage-controlled fans to perform optimum cooling.

Reflectometer Unit ZVA67

A reflectometer unit comprising a **coupler**, a **generator section (Driver42 and Doubler67)** and a **receiver section (Receiver67)** 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 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.

Driver42

The driver contains a frequency doubler for the range 12 GHz to 24 GHz with a switchable filter unit and a second frequency doubler with a switchable filter unit for the range 24 GHz to 42 GHz. Switchable amplifiers and attenuators and two adjustable attenuators are used 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 12.0 GHz	---	10 MHz to 12.0 GHz	---	10 MHz to 12.0 GHz
2	6.0 GHz to 6.75 GHz	x	12.0 GHz to 13.5 GHz	---	12.0 GHz to 13.5 GHz
3	6.75 GHz to 9.0 GHz	x	13.5 GHz to 18.0 GHz	---	13.5 GHz to 18.0 GHz
4	9.0 GHz to 12.0 GHz	x	18.0 GHz to 24.0 GHz	---	18.0 GHz to 24.0 GHz
5	6.0 GHz to 6.75 GHz	x	12.0 GHz to 13.5 GHz	x	24.0 GHz to 27.0 GHz
6	6.75 GHz to 9.0 GHz	x	13.5 GHz to 18.0 GHz	x	27.0 GHz to 36.0 GHz
7	9.0 GHz to 10.5 GHz	x	18.0 GHz to 21.0 GHz	x	36.0 GHz to 42.0 GHz

Doubler67

The doubler contains a frequency doubler for the range 40 GHz to 70 GHz, a switchable filter unit and a broadband amplifier for the range 10 MHz to 70 GHz.

Range	Frequency range from driver42	Doubler	Output frequency
1	10 MHz to 41.6 GHz	---	10 MHz to 41.6 GHz
2	20.8 GHz to 27.0 GHz	x	41.6 GHz to 54.0 GHz
3	27.0 GHz to 35.0 GHz	x	54.0 GHz to 70.0 GHz

Receiver67

The receiver section has two channels (measurement channel and reference channel). 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 70 GHz, LO doublers, 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 signal 17.5 MHz. In the frequency range 10 MHz to 24 GHz the mixers are used as basic wave mixers (IF = LO – RF). In the range 24 GHz to 70 GHz the mixer for the upper frequency range works as a harmonic mixer (IF = 3LO – RF).
The LO signal section contains a frequency doubler for the range 12 GHz to 24 GHz, a switchable filter unit, an adjustable attenuator and a broadband amplifier for the frequency range 30 MHz to 24 GHz.

Range	Basic frequency range from synthesizer	Doubler	Output frequency
1	30 MHz to 12.0 GHz	---	30 MHz to 12.0 GHz
2	6 GHz to 8.15 GHz	x	12.0 GHz to 16.3 GHz
3	8.15 GHz to 12.0 GHz	x	16.3 GHz to 24.0 GHz

Each of the reflectometers RM1 and RM2 contain two voltage-controlled fans 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 ZVA'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

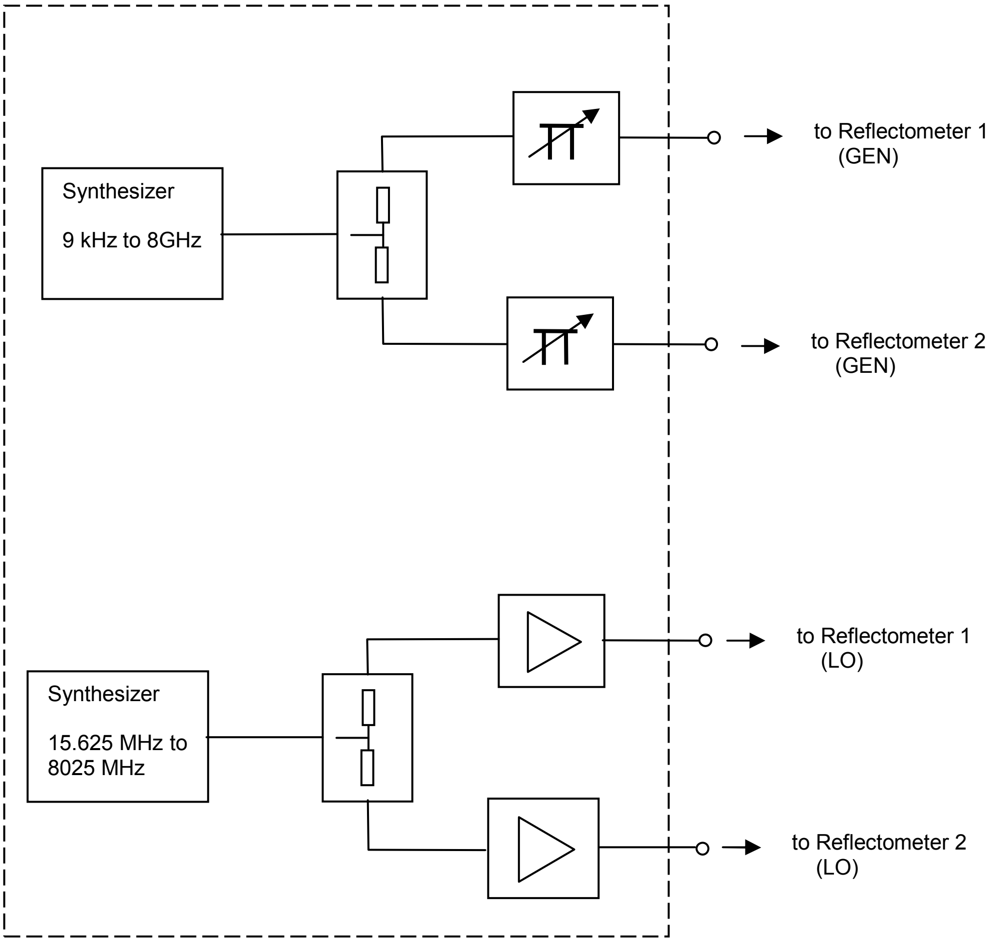
OCXO reference (option B4)

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.

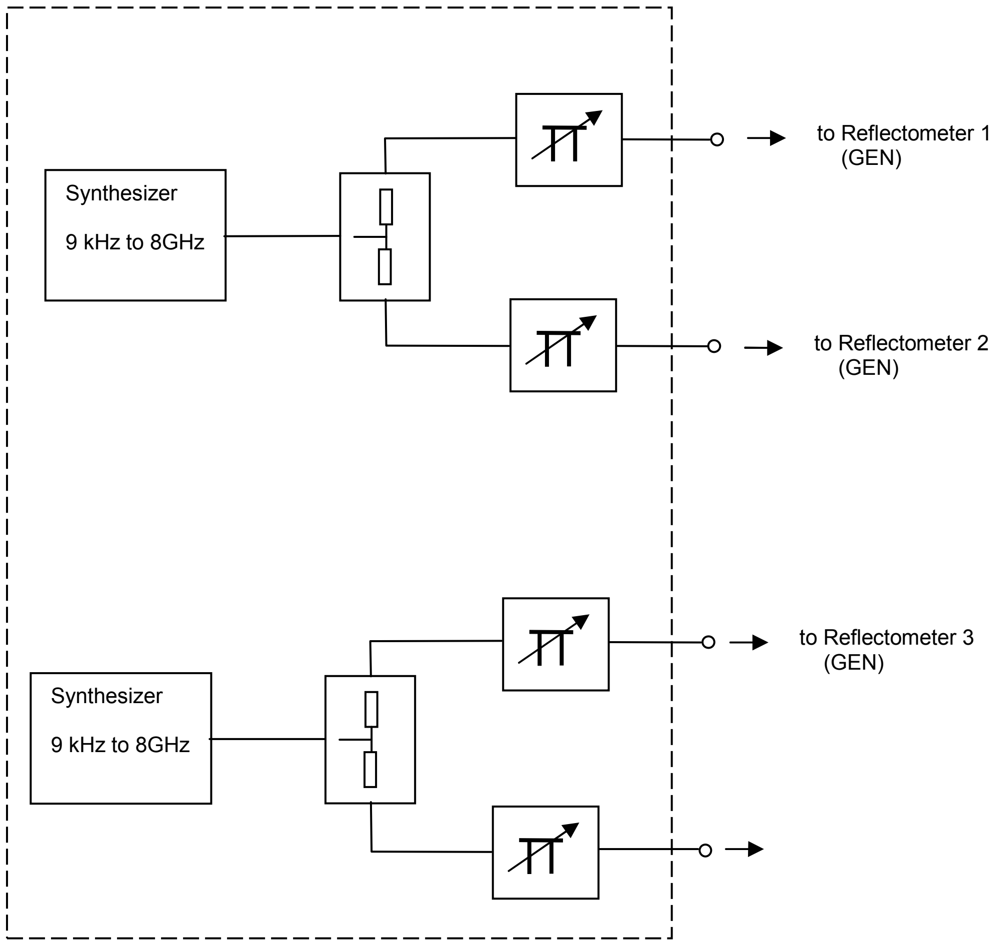
Synthesizers

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:

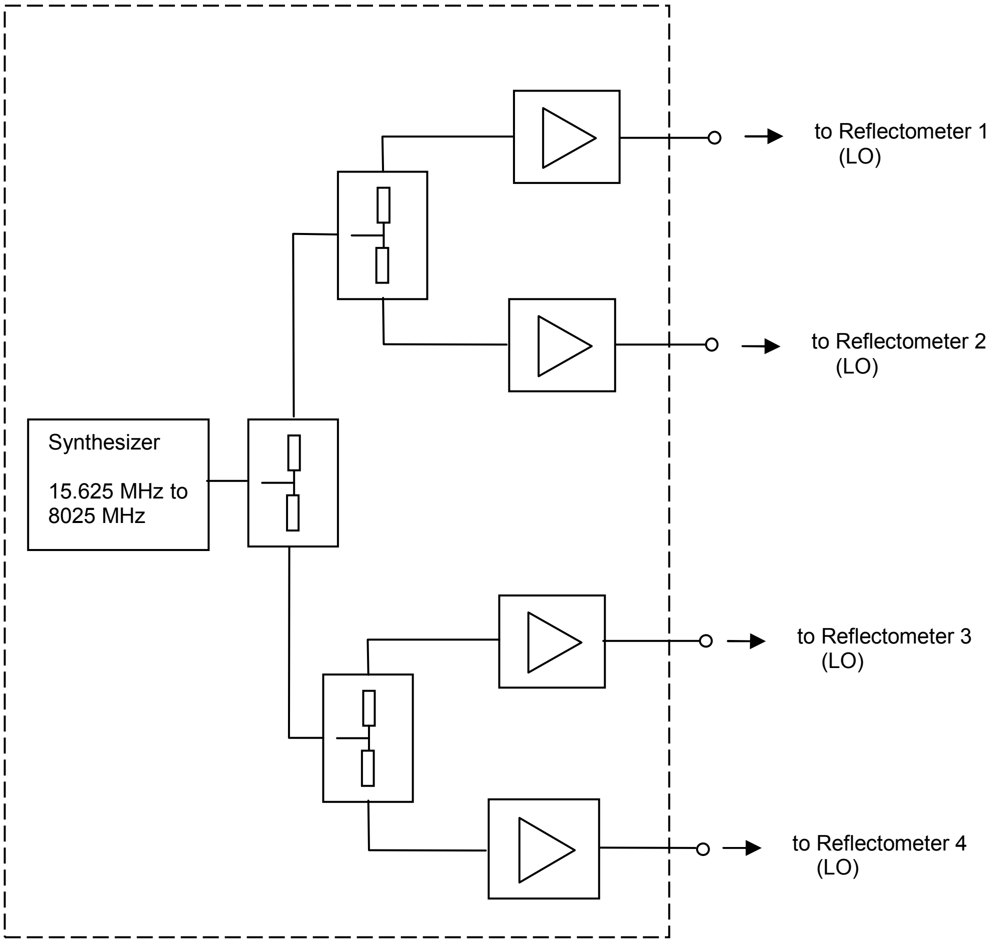
Synthesizer-LS



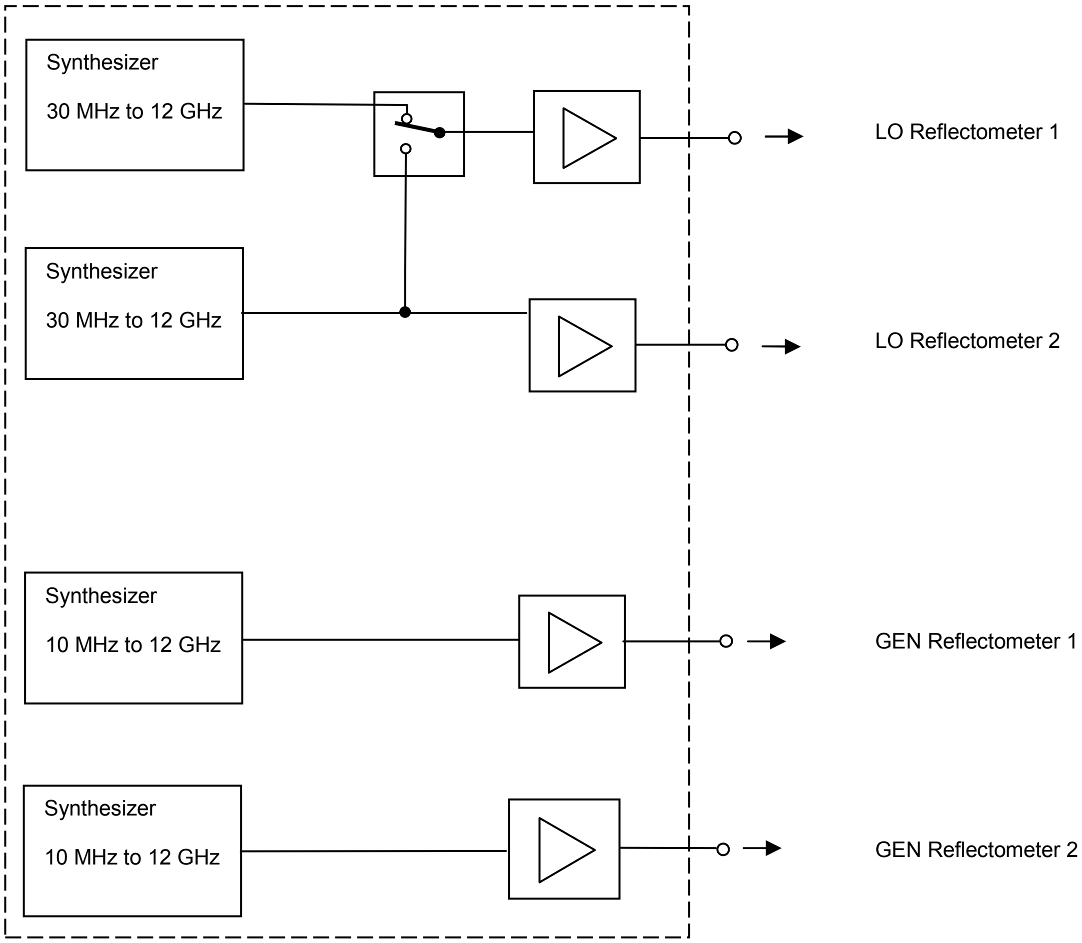
Synthesizer-DS



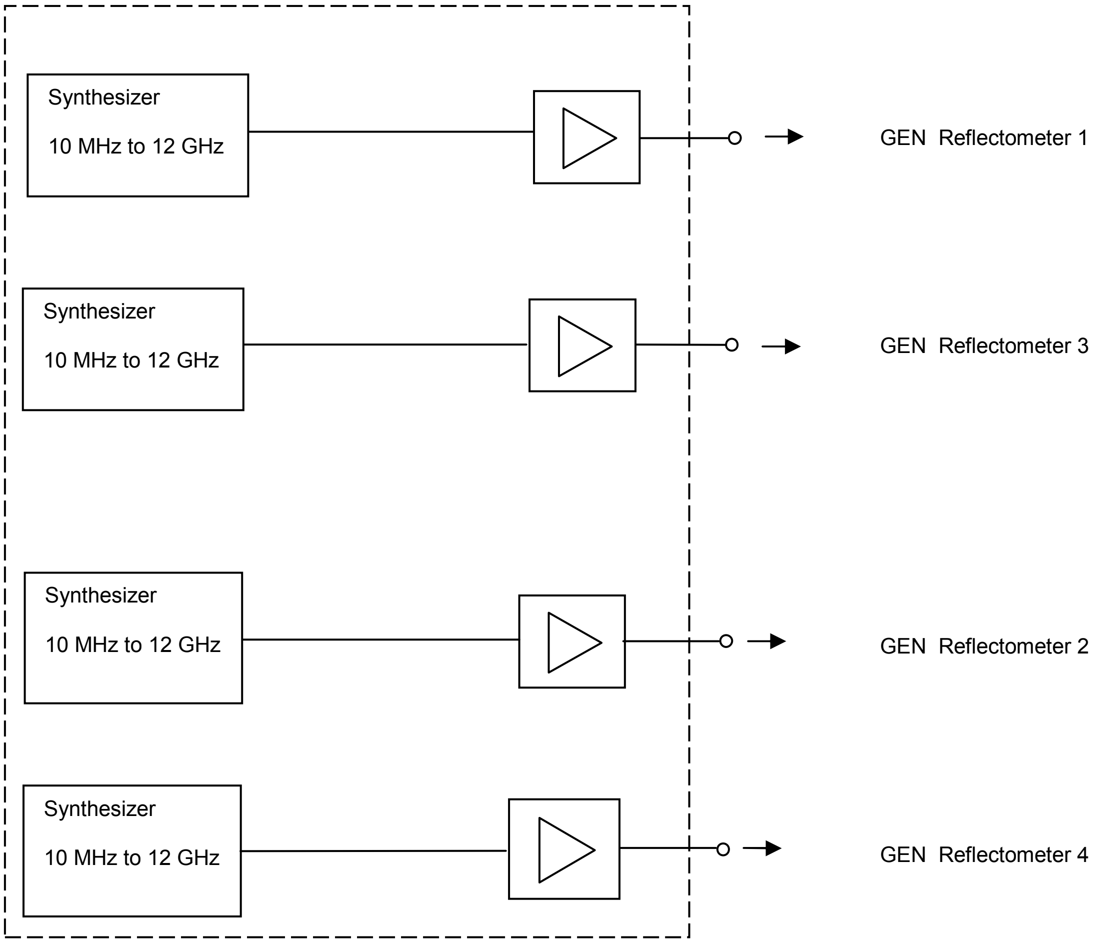
Synthesizer-LO



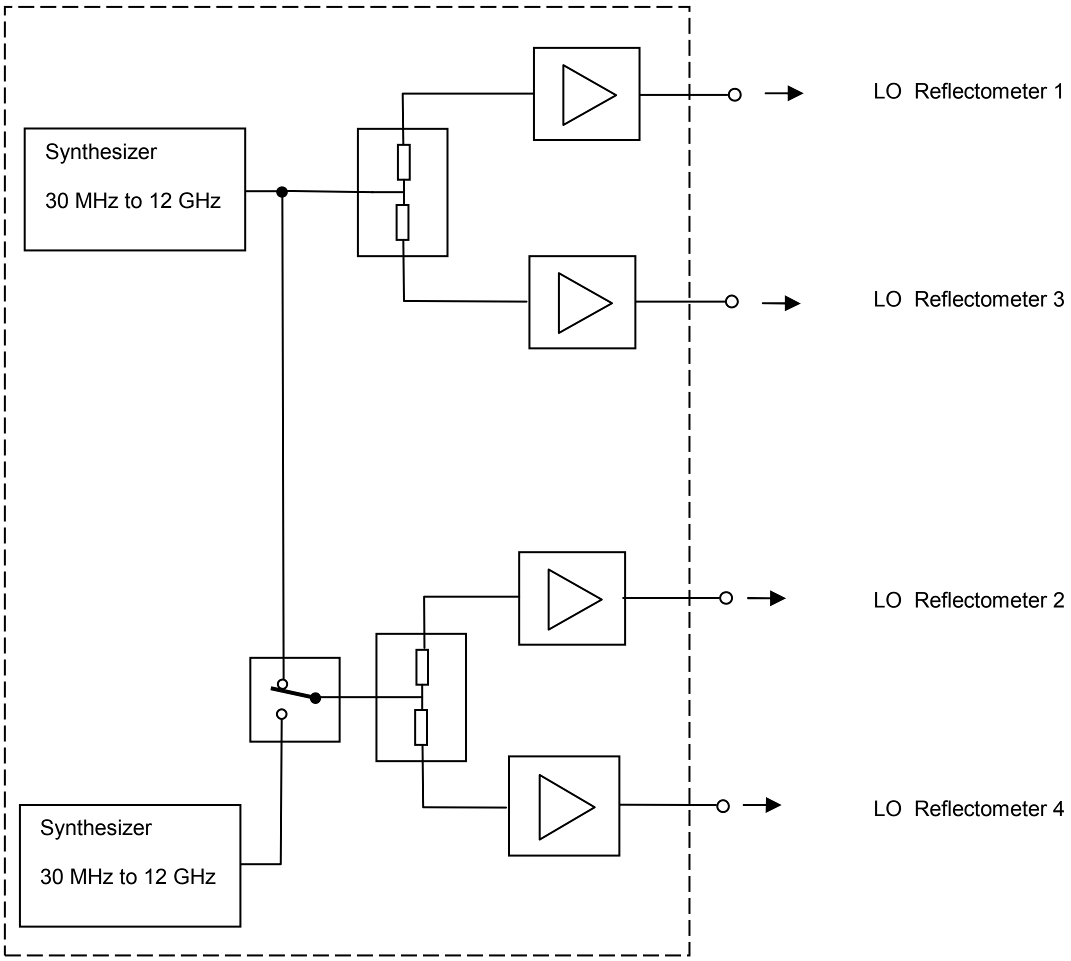
Synthesizer-12 1305.3020.02



Synthesizer-12 1305.1702.03



Synthesizer-12 1305.xxxx.04



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

Synthesizer-	LS 1302.4025.02	LS 1302.4025.20	DS 1302.5180.02	LO 1302.4248.02	LO 1302.4248.20	12 1305.3020.02
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	--------	--------
ZVA40 two-port	--------	2x SRC, 2x LO	--------	--------	--------	--------
ZVA40 four-port	--------	--------	4x SRC	--------	4x LO	--------
ZVA50 two-port	--------	2x SRC, 2x LO	--------	--------	--------	--------
ZVA50 four-port	--------	--------	4x SRC	--------	4x LO	--------
ZVA67 two-port	--------	--------	--------	--------	--------	2x SRC, 2x LO (one board)
ZVA67 four-port	--------	--------	--------	--------	--------	4x SRC, 4x LO (two boards)

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)

1145.1110 sheet 2, 3, 4, 5, 6, 7 (ZVA Network Analyzer)

1305.7002 sheet 1, 2, 3 (ZVA67 Network Analyzer)

1145.1290 sheet 2 (ZVB base instrument, power supply cabeling)

1145.1310 sheet 1, 2 (ZVA base instrument)

1145.1390 sheet 1 (ZVA display unit)

1164.1770 sheet 1 (ZVA Option B4)

1145.3593 sheet 1 (8GHz Bridge)

1145.4177 sheet 1 (RM8)

1145.4283 sheet 1 (RM24)

1145.4319 sheet 1 (RM40)

1305.3413 sheet 1 (RM50)

1305.6241 sheet 1 and 2 (RM67)

1164.0250 sheet 1 to 5 (ZVA8 Option B16)

1164.0267 sheet 1 to 5 (ZVA24 Option B16)

1164.0215 sheet 1 to 5 (ZVA8 Option B21 to B24 and B31 to B34)

1164.0221 sheet 1 to 5 (ZVA24 Option B21 to B24 and B31 to B34)

1164.0409 sheet 1 to 8 (ZVA40 Option B21 to B24 and B31 to B34)

1302.4960.08 sheet 1 (RM Unit ZVB4/8)

1302.5621 sheet 1 (RM44 Blower Attachement)

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 (R&S ZVA8 only)	Check error log	System error calibration	
Bridge unit (R&S ZVA8 only)	Check error log	Record correction values System error calibration	
Coupler unit (R&S ZVA24, R&S ZVA40, R&S ZVA50 and R&S ZVA67 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.

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. 3-1):

  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.

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.

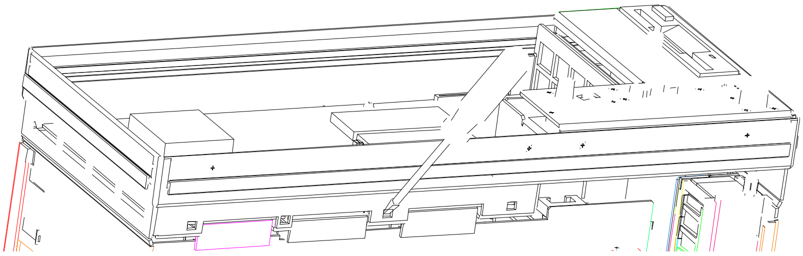


Fig. 3-1 Removing the front module controller Installing the new front module controller and putting the instrument back together.

- Carefully insert the new front module controller on the motherboard and screw into place with 10 sems 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

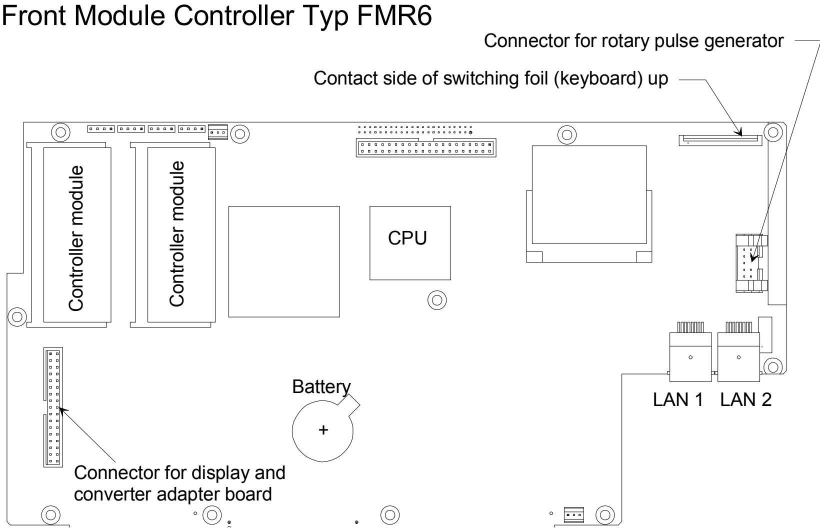


Fig. 3-2 Location of the edge connectors on the front module controller

- 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).

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

Danger of fire or intoxication

Lithium batteries must not be exposed to high temperatures or fire.

Keep away from children to avoid intoxication.

If the battery is replaced improperly, there is danger of explosion. Only replace the battery with R&S type *(See Chapter 5, Spare Parts List, Item 776 for type FMR6).*

Lithium batteries are hazardous waste and must be disposed of in dedicated containers. Observe local regulations regarding waste disposal.

Do not short-circuit the battery!

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.

NOTICE

Risk of instrument damage

Be careful when removing the front panel of the instrument because the connecting cables are still connected to the controller to avoid damage to the instrument.

Disconnecting cables

When pulling off the connecting cables be careful with the cable connecting to the keyboard. It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.

- 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

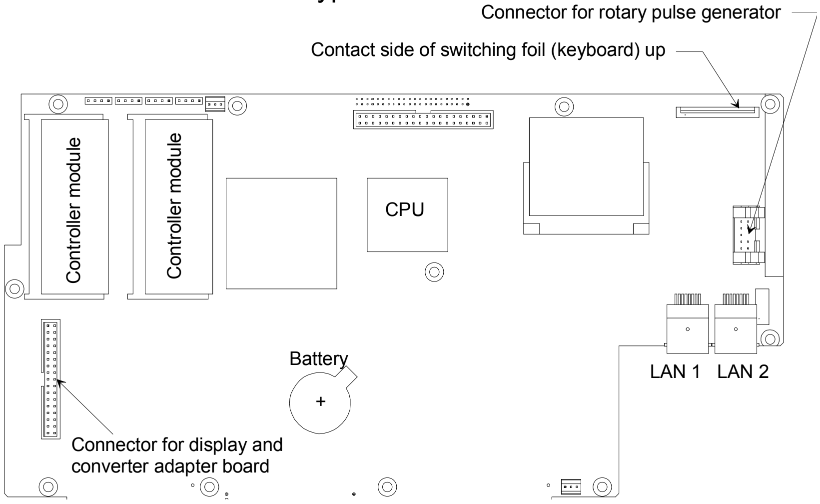


Fig. 3-3 Location of the lithium battery on the front module controller

Installing the new battery and reassembling the instrument

Risk of discharge

Do not short-curcuit 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).

NOTICE

Risk of instrument damage

Be careful when replacing the cables. Connect the cables to the proper connectors to avoid damage to the instrument.

➢ 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, turn on at the power 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 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, turn on at the mains switch and press the ON key.
- 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.

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

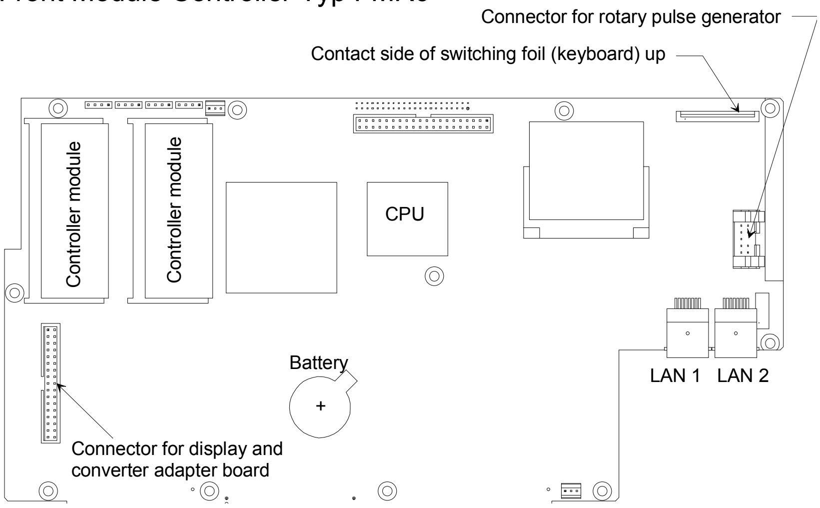


Fig. 3-4 Location of the edge contacts on the front module controller

- 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).

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.

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 countersunkl 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

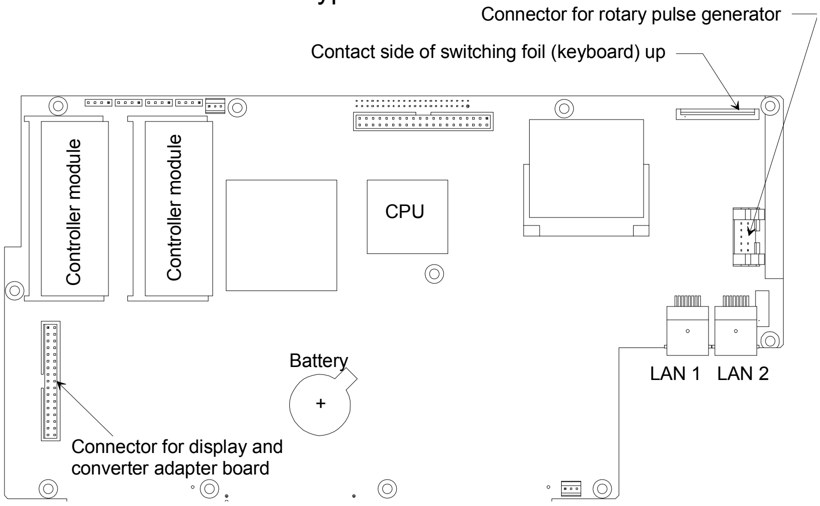


Fig. 3-5 Location of the edge contacts on the front module controller

- 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).

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, 1145.1290, 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
- If you refit a power supply 1145.5238, fit the cables from the removed one to the new one (see drawing 1145.1290)
- 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.

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 (Rosenberger).

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** in chapter 2)
- Write synthesizer mapping and shift data to the motherboard EPROM (see **Correction Value Recording** in chapter 2)

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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see **Factory System Error Calibration** in chapter 2).

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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see Factory System Error Calibration in chapter 2).

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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see Factory System Error Calibration in chapter 2).

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, 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]
- Record the receiver correction data (see **Recording Correction Values** in chapter 2).
- Perform the factory system error calibration (see Factory System Error Calibration in chapter 2).

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, 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]
- Check the gauge (see **Checking the Gauge** in chapter 2)
- Perform factory system error calibration (see **Factory System Error Calibration** in chapter 2).

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, turn on at the mains switch and press the ON key.
- Select Service Level 2 (see Service Functions).
- Check the gauge (see **Checking the Gauge** in chapter 2)
- 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, 190, 200 and drawings 1145.1110, 1145.4283)

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 ZVA24-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 captive screws (see 1145.1110.01 sheet 4 / 5) and take out the reflectometer.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the captive screws.
- Reconnect any cables that have been disconnected.
- Fit the 3.5mm connection cables (only with option ZVA24-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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

Replacing a Reflectometer RM40 and RM50 A510 to 540

(See Chapter 5, Spare Parts List, Items 209, 222, 230, 232 and drawings 1145.1110, 1145.4319, 1305.3413)

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).
- 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 captive screws (see 1145.4319, 1305.3413) and take out the reflectometer.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the captive screws.
- Reconnect any cables that have been disconnected.
- 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, 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]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

Replacing a Reflectometer RM67 A510 to 540

(See Chapter 5, Spare Parts List, Items 300 and 350 and drawing 1305.7002)

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).
- 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 captive screws (see1305.7002) and take out the reflectometer.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Screw in the captive screws.
- Reconnect any cables that have been disconnected.
- 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, 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]
- 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, ZVA40, ZVA50)

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

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 ZVA24-B16).
- Remove the frontcover
- 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 ZVA24-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, 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]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing the Coupler Unit (ZVA67)

(See Chapter 5, Spare Parts List, item 245 and drawings 1305.7002 and 1305.6241)

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 ZVA24-B16).
- Remove the frontcover
- 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 ZVA24-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, 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]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing the Test Set (ZVA40 only)

N.B.: In case of defective Test Set please contact the Central Service in Munich.

Replacing the Reflectometer Fan

(See Chapter 5, Spare Parts List, Item 100, 190 and drawings 1145.1110, 1145.4177, 1145.4283, 1302.5621)

ZVA8 and ZVA24 only:

- 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 (ZVA8: cable outlet to the outside, ZVA24: cable outlet to the inside).
- 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, turn on at the mains switch. The instrument is now in the standby mode.

ZVA40, ZVA50 and ZVA67 only:

- Remove the cover plate (260) undoing 12 screws (261) and 4 screws (212)
- Remove blower attachement (210) undoing 2 screws (211)

Replacing the fan

- Disconnect the fan cable at the reflectometer.
- Remove the fan.
- Insert the new fan (cable outlet to the inside of the instrument) and cut the rubber pins (see 1302.5621).
- Connect the fan cable to the reflectometer and reinstall the blower attachement (210).

Reassembling the instrument

- Reinstall the cover plate (260)
- 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, 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 drawing 1145.1010)

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, 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]
- 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.

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.

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, turn on at the mains switch and press the ON key.
- Install firmware update, if necessary (version ≥ 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, 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]

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).

NOTICE

Risk of damage to the boards

Be careful not to cause short circuits when measuring voltages at pins placed close together!

Do not plug or unplug boards prior to disconnecting them from the AC supply.

The R&S ZVA has the following facilities to simplify diagnosis:

- Selftest
- Service functions

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	Recommende d model	R&S Order No.	Qty.
1	DC meter		R&S URE	0350.5315.02	1
2	Power supply	0 to 10 V			
3	Spectrum analyzer	Frequency range 0 to 40 GHz	R&S FSU 40 (R&S FSU 50) (R&S FSU 67)		1
4	Power meter (if FSU50 or FSU67 not available)		R&S NRP + Sensor		1
4	Power sensor	10 MHz to 67 GHz	R&S NRP-Z57		
5	Test cable	0.6 m long K male to K female	-	1306.4688.00	1
5	Test cable	Test cable 1.85 mm (f) to 1.85 mm (m)	GORE EN0CB0CB024 0	-	1
5	Test cable				
6	Adapter cable	1 m long SMP male to SMA male	-	1129.8259.00	1
7	Adapter cable	0.5 m long SMP male to SMP male	-	1129.8265.00	1
8	SMA cable	0.5 m long SMA male to SMA male	-	1142.5895.00	2
9	SMA cable	1 m long SMA male to SMA male	-	1142.5889.00	2
10	BNC cable	1 m to 2 m long BNC male to BNC male	-	e.g. 1100.8850.00	1
11	Adapter	SMA female to N male	-	4012.5837.00	2
12	Adapter	N male to BNC female	-	0118.2812.00	1
13	Termination	SMA termination. 50 Ω male	-	0249.7823.00	3
14	Calibration kit	1.85mm, 50 Ω. DC to 67 GHz.	R&S ZV-Z218	5011.6571.02	1
15	R&S SMP adapter	SMP female to SMP female	-	1093.6869.00	1
16	Adapter board	Extension 150 mm high, 48 pins, 2 mm pitch	-	1100.3542.02	1
17	Conn. Cables for DC Inputs	4-pin mini-DIN plug	R&S ZV-Z71	1164.1005.02	1
18	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 ⇓	Mains switch OFF: Turn on at mains switch.
Check LED is yellow (standby) ⇓	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 to12 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.

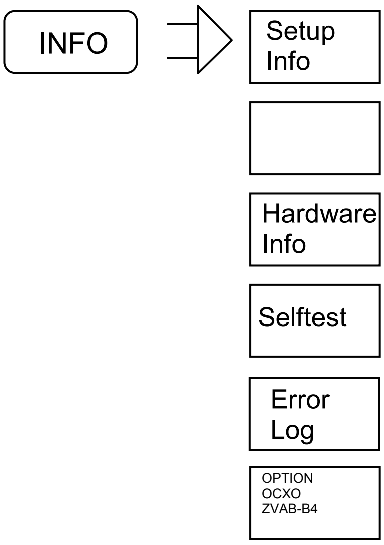
If the operating system on the hard disk has been corrupted and so cannot be loaded correctly, Windows XP outputs a “blue screen”.
This screen summarizes all the key information about the internal status of the processor.

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.

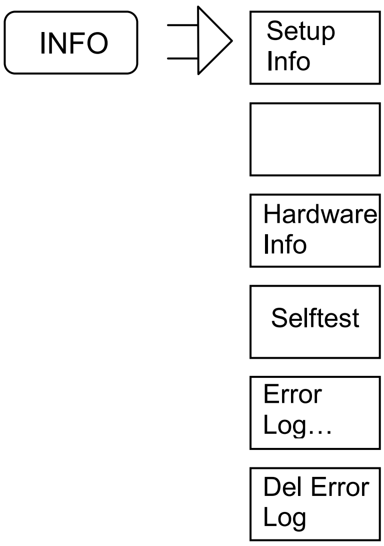
See: Troubleshooting with the Selftest

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-oort 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.

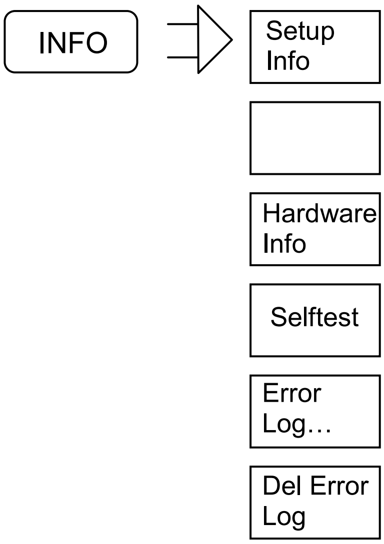
Power supply	+3.4 V	+5.2 V	+6.5 V	+8.25 V	+12.25 V	-6.5 V	-12.25 V
Fr			+5V_A +5V_REF		+10V_A +12V_STB	-5V_A	-10V_A
Nd	+2.5VD_MDD1 +2.5VD_MDD2 +1.5VD_FCON		+5VA_ADC			-5VA_ADC	
Sy			+5V_A +5V_REF		+7V_A +10V_A		
Rm			+5V		+10.5VA +10.5VB +12V +12V FAN		-12V

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:					

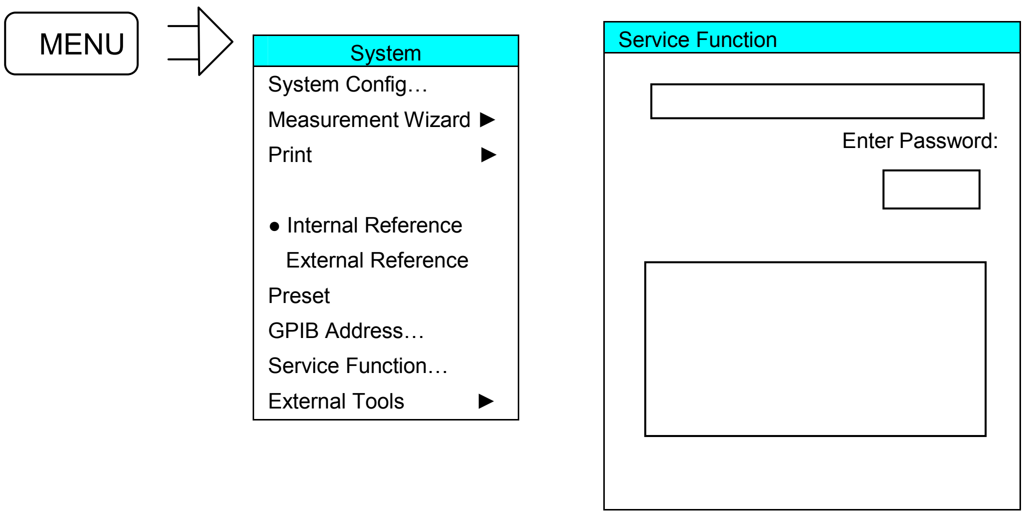
Highly elevated temperature values indicate a fan failure.

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	.	Main ID	.	Sub ID	.	Function	.	Address	.	Data

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.

	Defective board	
Problem with:	**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 ±1dB	
NA2_AD_CLK	X104	80 MHz	10 dBm ±1dB	
SY1_REF	X105	128 MHz	10 dBm ±1dB	
SY2_REF	X106	128 MHz	10 dBm ±1dB	
REF_10_OUTIN	X107	10 MHz	6 dBm ±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).
- [**Mode** : Spurious Avoidance : LO > RF]
- 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 1302.4025.xx

Source Mod. 02 and Mod. 20

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

Isolation of source switch1 to 4
ZVA frequency 8 GHz

Port no.	**Port setting**	**Source output**	**Isolation**
1	Port1 inactive Port2 active	X168 X169	-90 dBc ±5 dB
2	Port1 active Port2 inactive	X168 X169	 -90 dBc ±5 dB

Local Mod. 02

Frequency (ZVA setting)	**LO-Frequency** (Spec analyzer setting)	**Local Level** **(**Mod. 02)	**2nd harmonic**	**3rd harmonic**
300 kHz	17.812345 MHz	+2 dBm to -15 dBm	< -5 dBc	< +2 dBc
100 MHz	117.512345 MHz	+2 dBm to -15 dBm	< -5 dBc	< +2 dBc
1 GHz	1017.512345 MHz	+2 dBm to -4 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	+2 dBm to -4 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.3 GHz	5317.512345 MHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	+2 dBm to -5 dBm	< -5 dBc	< -5 dBc
8 GHz	8017.512345 MHz	+2 dBm to -5 dBm	< -5 dBc	< -5 dBc

Local Mod. 20

Frequency (ZVA setting)	**LO-Frequency** (Spec analyzer setting)	**Local Level** **(**Mod. 24)	**2nd harmonic**	**3rd harmonic**
10 MHz	27.512345 MHz	-3 dBm to -20 dBm	< -5 dBc	< +2 dBc
100 MHz	117.512345 MHz	-3 dBm to -20 dBm	< -5 dBc	< +2 dBc
1 GHz	1017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.3 GHz	5317.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	< -5 dBc
8 GHz	8017.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	< -5 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 Port2 active	X165 X166	-90 dBc ±5 dB
2	Port1 active Port2 inactive	X165 X166	-90 dBc ±5 dB
3	Port3 inactive Port4 active	X168 X169	-90 dBc ±5 dB
4	Port3 active Port4 inactive	X168 X169	-90 dBc ±5 dB

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	2 dBm to -15 dBm	< -5 dBc	< 2 dBc
100 MHz	117.512345 MHz	2 dBm to -15 dBm	< -5 dBc	< 2 dBc
1 GHz	1017.512345 MHz	2 dBm to -4 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	2 dBm to -4 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
5.5 GHz	5517.512345 MHz	2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	3 dBm to -4 dBm	< -5 dBc	---
8 GHz	8017.512345 MHz	3 dBm to -4 dBm	< -5 dBc	---

Synthesizer-LO 1302.4248.20

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 -20 dBm	< -5 dBc	< 2 dBc
100 MHz	117.512345 MHz	-3 dBm to -20 dBm	< -5 dBc	< 2 dBc
1 GHz	1017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
2 GHz	2017.512345 MHz	-3 dBm to -9 dBm	< -5 dBc	< -5 dBc
3 GHz	3017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	3817.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
4 GHz	4017.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.2 GHz	5217.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5.5 GHz	5517.512345 MHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
7.2 GHz	7217.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	---
8 GHz	8017.512345 MHz	-3 dBm to -10 dBm	< -5 dBc	---

Synthesizer-12

Source signals (W168, W169) with synth. 1305.3002.02 and synth. 1305.3002.04
(W165, W166, W168, W169) with synth. 1305.7220.02

Frequency (ZVA setting)	**Source Level** (Mod. 02)	**2nd harmonic**
10 MHz	+10 dBm to -10 dBm	-----
100 MHz	+10 dBm to -10 dBm	-----
300 MHz	+10 dBm to -10 dBm	< -25 dBc
1 GHz	+10 dBm to -10 dBm	-----
2 GHz	+10 dBm to -10 dBm	-----
2.5 GHz	+10 dBm to -10 dBm	< -25 dBc
3 GHz	+10 dBm to -10 dBm	-----
4 GHz	+10 dBm to -10 dBm	-----
6 GHz	+10 dBm to -10 dBm	-----
8 GHz	+10 dBm to -10 dBm	-----
10 GHz	+10 dBm to -10 dBm	-----
12 GHz	+10 dBm to -10 dBm	-----

Local signals (W165, W166) with synth. 1305.3002.02 and synth. 1305.3002.03
(W155, W156, W158, W159) with synth. 1305.7220.02

Frequency (ZVA setting)	**LO-Frequency** (Spec analyzer setting)	**Source Level** (Mod. 02)
30 MHz	47.512345 MHz	+10 dBm to -10 dBm
100 MHz	117.512345 MHz	+10 dBm to -10 dBm
1 GHz	1.017512345 GHz	+10 dBm to -10 dBm
2 GHz	2.017512345 GHz	+10 dBm to -10 dBm
3 GHz	3.017512345 GHz	+10 dBm to -10 dBm
4 GHz	4.017512345 GHz	+10 dBm to -10 dBm
6 GHz	6.017512345 GHz	+10 dBm to -10 dBm
8 GHz	8.017512345 GHz	+10 dBm to -10 dBm
10 GHz	10.017512345 GHz	+10 dBm to -10 dBm
12 GHz	12.017512345 GHz	+10 dBm to -10 dBm

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 (measure wave quantity bx). Terminate the bridge unit output that is not used with an SMA termination.

➢ Screw the SHORT from a N-calibration kit to the port connector, save measured values (Data -> Mem).

➢ Screw the OPEN from the calibration kit to the port connector.

➢ Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity

➢ Select Math = User Def

➢ 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 the SHORT from a N-calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def
- 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	Level ax and bx
300 kHz	8 dBm	0 dBm
50 MHz	8 dBm	0 dBm
1 GHz	8 dBm	0 dBm
3 GHz	8 dBm	0 dBm
6 GHz	8 dBm	0 dBm
8 GHz	8 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.

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.

- Perform a sweep from 300 kHz to 8 GHz, measure Ratio bx/ax Source Portx
- Screw the SHORT from a N-calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- Screw the MATCH from the calibration kit to the port connector.
- Select   User Def Math : linMag(Data) / ((linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- 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 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 ± 3 dB
100 MHz	-30 dBm	+5 dBm ± 3 dB
1 GHz	-20 dBm	-5 dBm ± 3 dB
2.5 GHz	-20 dBm	-10 dBm ± 3 dB
3 GHz	-20 dBm	-10 dBm ± 3 dB
8 GHz	-20 dBm	-10 dBm ± 3 dB
9 GHz	-20 dBm	-10 dBm ± 3 dB
12 GHz	-20 dBm	-10 dBm ± 3 dB
15 GHz	-20 dBm	-8 dBm ± 4 dB
18 GHz	-20 dBm	-8 dBm ± 4 dB
20 GHz	-20 dBm	-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 (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 coupler unit.
- Connect the coupler unit output (MEAS = connector W515 or REF = connector W518) to a functioning port using the SMA cable. Terminate the coupler unit output that is not used with an SMA termination.
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def
- 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
24 GHz	0 dBm	-12 dBm ± 4 dB	-1 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 the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def
- 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	Level ax and bx
10 MHz	0 dBm	-3 dBm ± 1 dB
100 MHz	0 dBm	-3 dBm ± 1 dB
1 GHz	0 dBm	-3.2 dBm ± 1 dB
2 GHz	0 dBm	-3.3 dBm ± 1 dB
8 GHz	0 dBm	-4.3 dBm ± 1 dB
12 GHz	0 dBm	-5 dBm ± 1 dB
16 GHz	0 dBm	-5.7 dBm ± 1 dB
20 GHz	0 dBm	-6.3 dBm ± 1 dB
24 GHz	0 dBm	-7 dBm ± 1 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.

- Perform a sweep from 10 MHz to 24 GHz, measure Ratio bx/ax Source Portx
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- Screw the MATCH from the calibration kit to the port connector.
- Select   User Def Math : linMag(Data) / ((linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- 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 Reflectometer RM44 and RM50

Generator levels

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

- Loosen cable W514A (GEN -> coupler unit) or W512 (GEN -> attenuator) at both ends and screw off at the generator output GEN.
- Connect the generator output to the spectrum analyzer using the K-cable (ZVA40) or V-cable (ZVA50).
- 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 (without GenAtt)	Set power to (with GenAtt)	Level on GEN output	2nd harmonic	3rd harmonic
10 MHz	10 dBm	9 dBm	12.0 dBm	---	---
50 MHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
1 GHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
4 GHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
8 GHz	10 dBm	9 dBm	12.0 dBm	< - 21 dBc	< - 21 dBc
10 GHz	10 dBm	9 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
13 GHz	10 dBm	9 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
15 GHz	10 dBm	8 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
18 GHz	10 dBm	8 dBm	14.0 dBm	< - 21 dBc	< - 21 dBc
20 GHz	10 dBm	8 dBm	14.0 dBm	< - 21 dBc	---
24 GHz	10 dBm	8 dBm	14.5 dBm	< - 21 dBc	---
28 GHz	10 dBm	7 dBm	14.5 dBm	< - 21 dBc	---
32 GHz	10 dBm	7 dBm	14.5 dBm	---	---
36 GHz	6 dBm	3 dBm	10.5 dBm	---	---
40 GHz	6 dBm	3 dBm	10.5 dBm	---	---
45 GHz (ZVA50 only)	6 dBm	3 dBm	10.5 dBm	---	---
50 GHz (ZVA50 only)	6 dBm	3 dBm	10.5 dBm	---	---

With the stated levels, the cable loss must still be taken into account.

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 the cable to the receiver input MEAS (X6) and the cable to the receiver input REF (X5) at both ends and screw off at the receiver inputs.

➢ Connect the receiver input (MEAS or REF) to a functioning instrument port using the K-cable (ZVA40) or V-cable (ZVA50).

➢ Set the ZVA to the CW sweep mode.

➢ Set the frequencies and output levels (check with power meter) 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**	**Displayed level bx**
10 MHz	-40 dBm	+15 dBm ± 4 dB	+7 dBm ± 4 dB
100 MHz	-40 dBm	-5 dBm ± 4 dB	-13 dBm ± 4 dB
1 GHz	-20 dBm	-2 dBm ± 4 dB	-10 dBm ± 4 dB
3 GHz	-20 dBm	-1 dBm ± 4 dB	-9 dBm ± 3 dB
8 GHz	-20 dBm	-1 dBm ± 4 dB	-9 dBm ± 3 dB
10 GHz	-20 dBm	-1 dBm ± 4 dB	-9 dBm ± 3 dB
12 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
15 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
18 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
20 GHz	-20 dBm	-0 dBm ± 4 dB	-9 dBm ± 3 dB
25 GHz	-20 dBm	-0 dBm ± 4 dB	-8 dBm ± 3 dB
30 GHz	-20 dBm	-0 dBm ± 4 dB	-8 dBm ± 3 dB
35 GHz	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB
40 GHz	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB
45 GHz (ZVA50 only)	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB
50 GHz (ZVA50 only)	-20 dBm	-0.5 dBm ± 4 dB	-7 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.

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

Coupler 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 at coupler MEAS_OUT and at coupler REF_OUT at both ends and disconnect at the coupler.
- ➢ Connect the coupler output (MEAS = connector X3 or REF = connector X4) to a functioning port using the K cable . Terminate the coupler output that is not used with an K-termination (V-termination).
- ➢ Set the frequencies and levels listed in the table for the reflectometer associated with the coupler (port) and measure the level (wave quantity bx) at the port used for the measurement as follows:
- ➢ Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- ➢ Screw the OPEN from the calibration kit to the port connector.
- ➢ Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- ➢ Select Math = User Def

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-47 dBm ± 4 dB	-55 dBm ± 4 dB
100 MHz	0 dBm	-27 dBm ± 4 dB	-35 dBm ± 4 dB
1 GHz	0 dBm	-10 dBm ± 4 dB	-18 dBm ± 4 dB
3 GHz	0 dBm	-11 dBm ± 3 dB	-19 dBm ± 4 dB
8 GHz	0 dBm	-11 dBm ± 3 dB	-19 dBm ± 4 dB
10 GHz	0 dBm	-11 dBm ± 3 dB	-19 dBm ± 4 dB
12 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
15 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
18 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
20 GHz	0 dBm	-11 dBm ± 3 dB	-20 dBm ± 4 dB
25 GHz	0 dBm	-12 dBm ± 3 dB	-20 dBm ± 4 dB
30 GHz	0 dBm	-12 dBm ± 3 dB	-20 dBm ± 4 dB
35 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB
40 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB
45 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB
50 GHz	0 dBm	-13 dBm ± 4 dB	-19.5 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.

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

Method 2:

The receiver section of the associated reflectometer is OK.

- Loosen the cable at coupler GEN_IN at both ends and screw off at the coupler.
- Connect the coupler (connector X1) to a functioning port using the K-cable (ZVA40) or V-cable (ZVA50).
- 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 (port) as follows:
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + (linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def

Frequency	Level	level ax and bx (ZVA40)	level ax and bx (ZVA50)
10 MHz	0 dBm	> -2 dBm	> -2 dBm
100 MHz	0 dBm	> -2 dBm	> -2 dBm
1 GHz	0 dBm	> -2 dBm	> -2 dBm
3 GHz	0 dBm	> -2 dBm	> -2 dBm
8 GHz	0 dBm	> -2 dBm	> -2 dBm
10 GHz	0 dBm	> -2 dBm	> -2 dBm
12 GHz	0 dBm	> -2 dBm	> -2.5 dBm
15 GHz	0 dBm	> -2 dBm	> -2.5 dBm
18 GHz	0 dBm	> -2 dBm	> -2.5 dBm
20 GHz	0 dBm	> -2 dBm	> -2.5 dBm
25 GHz	0 dBm	> -2.5 dBm	> -3 dBm
30 GHz	0 dBm	> -2.5 dBm	> -3 dBm
35 GHz	0 dBm	> -3 dBm	> -3 dBm
40 GHz	0 dBm	> -3 dBm	> -3 dBm
45 GHz	0 dBm	--------	> -3.5 dBm
50 GHz	0 dBm	--------	> -3.5 dBm

With the stated levels, the cable loss must still be taken into account.

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 are OK.

➢ Perform a sweep from 10 MHz to 40 GHz, measure Ratio bx/ax Source Portx

➢ Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).

➢ Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).

➢ Screw the MATCH from the calibration kit to the port connector.

➢ Select User Def Math : linMag(Data) / ((linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def

➢ The trace gives the directivity.

	Frequency range	Directivity
	10 MHz to 20 GHz	< -14 dB
	20 GHz to 35 GHz	< -10 dB
	35 GHz to 40 GHz	< -9 dB
ZVA50 only	35 GHz to 40 GHz	< -8 dB
ZVA50 only	40 GHz to 50 GHz	< -6 dB

If the measured values are more than 2 dB greater than the values stated in the table, the coupler must be replaced.

Coupler Port Matching

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

➢ Loosen cables W514A (GEN -> coupler), W515A (coupler -> MEAS) and W518A (coupler -> REF) at both ends and unscrew at the coupler.

➢ Terminate the coupler input and coupler outputs with three K-terminations (three V-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 under test and display the Sxx magnitude on the screen.

	Frequency range	Sxx dB
	10 MHz to 5GHz	< -20 dB
	5 GHz to 20 GHz	< -15 dB
	20 GHz to 30 GHz	< -12 dB
	30 GHz to 40 GHz	< -11 dB
ZVA50 only	40 GHz to 50 GHz	< -10 dB

If the measured values are more than 2 dB greater than the values stated in the table, the coupler must be replaced.

Testing the Reflectometer RM67

Generator levels

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

- Loosen cable W514A (GEN -> BIAS 67) or W512A (GEN -> attenuator) at both ends and screw off at the generator output GEN.
- Connect the generator output to the spectrum analyzer using the V-cable (if FSU50 or FSU67 is not available use a power meter for level measurements).
- 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 (without GenAtt)	Set power to (with GenAtt)	Level on GEN output	2nd harmonic
10 MHz	10 dBm	9 dBm	13.0 dBm	< - 30 dBm
500 MHz	13 dBm	12 dBm	16.0 dBm	< - 30 dBc
4 GHz	13 dBm	12 dBm	16.4 dBm	< - 30 dBc
8 GHz	13 dBm	12 dBm	16.7 dBm	< - 30 dBc
12 GHz	13 dBm	12 dBm	17.1 dBm	< - 25 dBc
16 GHz	13 dBm	11 dBm	17.4 dBm	< - 25 dBc
20 GHz	13 dBm	11 dBm	17.8 dBm	< - 25 dBc
24 GHz	10 dBm	6 dBm	15.2 dBm	---
28 GHz	10 dBm	7 dBm	15.5 dBm	---
32 GHz	10 dBm	7 dBm	15.9 dBm	---
36 GHz	6 dBm	3 dBm	12.3 dBm	---
40 GHz	6 dBm	3 dBm	12.6 dBm	---
45 GHz	6 dBm	3 dBm	13.1 dBm	---
50 GHz	6 dBm	3 dBm	13.5 dBm	---
55 GHz	2 dBm	- 1 dBm	10.0 dBm	---
60 GHz	2 dBm	- 1 dBm	10.4 dBm	---
67 GHz	2 dBm	- 1 dBm	11.1 dBm	---

With the stated levels, the cable loss must still be taken into account.

Receiver levels

The following is assumed:

- The LO synthesizer section 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 the cable to the receiver input MEAS (X6) and the cable to the receiver input REF (X5) at both ends and screw off at the receiver inputs.

➢ Connect the receiver input (MEAS or REF) to a functioning instrument port using the V-cable.

➢ Set the ZVA to the CW sweep mode.

➢ Set the frequencies and output levels (check with power meter) 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	Displayed level bx (w/o Rec Att)	Displayed level bx (with Rec Att)
10 MHz	-40 dBm	+16 dBm ± 5 dB	+6 dBm ± 5 dB	+7 dBm ± 4 dB
100 MHz	-40 dBm	-4 dBm ± 4 dB	-14 dBm ± 4 dB	-13 dBm ± 4 dB
1 GHz	-20 dBm	1 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
3 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
8 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
10 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
12 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-8 dBm ± 4 dB
15 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-7 dBm ± 4 dB
18 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-7 dBm ± 4 dB
20 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-7 dBm ± 4 dB
25 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-6 dBm ± 4 dB
30 GHz	-20 dBm	2 dBm ± 4 dB	-9 dBm ± 4 dB	-6 dBm ± 4 dB
35 GHz	-20 dBm	3 dBm ± 4 dB	-8 dBm ± 4 dB	-5 dBm ± 4 dB
40 GHz	-20 dBm	3 dBm ± 4 dB	-8 dBm ± 4 dB	-5 dBm ± 4 dB
45 GHz	-20 dBm	5 dBm ± 4 dB	-8 dBm ± 4 dB	-5 dBm ± 4 dB
50 GHz	-20 dBm	5 dBm ± 4 dB	-7 dBm ± 4 dB	-4 dBm ± 4 dB
55 GHz	-20 dBm	5 dBm ± 4 dB	-7 dBm ± 4 dB	-4 dBm ± 4 dB
60 GHz	-20 dBm	7 dBm ± 4 dB	-6 dBm ± 4 dB	-3 dBm ± 4 dB
67 GHz	-20 dBm	7 dBm ± 4 dB	-6 dBm ± 4 dB	-3 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.

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

Coupler 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 at coupler MEAS_OUT and at coupler REF_OUT at both ends and disconnect at the coupler.
- ➢ Connect the coupler output (MEAS = connector X3 or REF = connector X4) to a functioning port. Terminate the coupler output that is not used.
- ➢ Set the frequencies and levels listed in the table for the reflectometer associated with the coupler (port) and measure the level (wave quantity bx) at the port used for the measurement as follows:
- ➢ Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- ➢ Screw the OPEN from the calibration kit to the port connector.
- ➢ Select User Def Math : (lin Mag(Data) + linMag(Mem2)) / 2 , activate Result is Wave Quantity
- ➢ Select Math = User Def

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-46 dBm ± 4 dB	-54 dBm ± 4 dB
100 MHz	0 dBm	-26 dBm ± 4 dB	-34 dBm ± 4 dB
1 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
3 GHz	0 dBm	-11 dBm ± 4 dB	-20 dBm ± 4 dB
8 GHz	0 dBm	-11 dBm ± 4 dB	-19.5 dBm ± 4 dB
10 GHz	0 dBm	-11 dBm ± 4 dB	-19.5 dBm ± 4 dB
12 GHz	0 dBm	-11 dBm ± 4 dB	-19.5 dBm ± 4 dB
15 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
18 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
20 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
25 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
30 GHz	0 dBm	-11 dBm ± 4 dB	-19 dBm ± 4 dB
35 GHz	0 dBm	-12 dBm ± 4 dB	-19.5 dBm ± 4 dB
40 GHz	0 dBm	-12 dBm ± 4 dB	-19.5 dBm ± 4 dB
45 GHz	0 dBm	-12 dBm ± 4 dB	-21 dBm ± 4 dB
50 GHz	0 dBm	-13 dBm ± 4 dB	-21 dBm ± 4 dB
55 GHz	0 dBm	-13 dBm ± 4 dB	-21 dBm ± 4 dB
60 GHz	0 dBm	-14 dBm ± 4 dB	-22.5 dBm ± 4 dB
67 GHz	0 dBm	-14 dBm ± 4 dB	-22 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account.
If the measured values are more than 2 dB below the levels in the table, the coupler must be replaced.

Method 2:

The receiver section of the associated reflectometer is OK.

- Loosen the cable at coupler GEN_IN at both ends and screw off at the coupler.
- Connect the coupler (connector X1) to a functioning port.
- 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 (port) as follows:
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector.
- Select User Def Math : (lin Mag(Data) + linMag(Mem2)) / 2 , activate Result is Wave Quantity
- Select Math = User Def

Frequency	Level	level ax and bx
10 MHz	0 dBm	> -2 dBm
100 MHz	0 dBm	> -2 dBm
1 GHz	0 dBm	> -2 dBm
3 GHz	0 dBm	> -2.1 dBm
8 GHz	0 dBm	> -2.3 dBm
10 GHz	0 dBm	> -2.4 dBm
12 GHz	0 dBm	> -2.5 dBm
15 GHz	0 dBm	> -2.6 dBm
18 GHz	0 dBm	> -2.7 dBm
20 GHz	0 dBm	> -2.8 dBm
25 GHz	0 dBm	> -3 dBm
30 GHz	0 dBm	> -3.2 dBm
35 GHz	0 dBm	> -3.4 dBm
40 GHz	0 dBm	> -3.6 dBm
45 GHz	0 dBm	> -3.8 dBm
50 GHz	0 dBm	> -4 dBm
55 GHz	0 dBm	> -4.2 dBm
60 GHz	0 dBm	> -4.4 dBm
67 GHz	0 dBm	> -4.7 dBm

With the stated levels, the cable loss must still be taken into account.

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 are OK.

- Perform a sweep from 10 MHz to 67 GHz, measure Ratio bx/ax Source Portx
- Screw the SHORT from the calibration kit to the port connector, save measured values (Data -> Mem).
- Screw the OPEN from the calibration kit to the port connector, save measured values (More Mem : Data -> Mem3).
- Screw the MATCH from the calibration kit to the port connector.
- Select   User Def Math : linMag(Data) / (linMag(Mem2) + linMag(Mem3)) / 2 : Math = User Def
- The trace gives the directivity.

Frequency range	Directivity
10 MHz to 20 GHz	< -14 dB
20 GHz to 35 GHz	< -10 dB
35 GHz to 40 GHz	< -8 dB
40 GHz to 50 GHz	< -6 dB
50 GHz to 67 GHz	< -3 dB

If the measured values are more than 2 dB greater than the values stated in the table, the coupler must be replaced.

Coupler Port Matching

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

- Loosen cables W514A (GEN -> coupler), W515A (coupler -> MEAS) and W518A (coupler -> REF) at both ends and unscrew at the coupler.
- Terminate the coupler input and coupler outputs with three K-terminations (three V-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 under test and display the Sxx magnitude on the screen.

Frequency range	Sxx dB
10 MHz to 5GHz	< -20 dB
5 GHz to 20 GHz	< -15 dB
20 GHz to 30 GHz	< -12 dB
30 GHz to 40 GHz	< -11 dB
40 GHz to 60 GHz	< -10 dB
60 GHz to 67 GHz	< -6 dB

If the measured values are more than 2 dB greater than the values stated in the table, 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 dBm ± 2 dB, the board must be replaced.

Testing the Motherboard

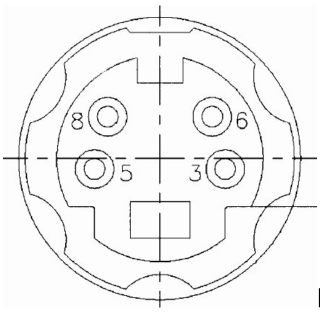
28 V supply

Using a multimeter, measure the voltage at X 100.B5 (wrt ground).
Permissible deviation: ± 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"

This page has been left blank intentionally.

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 R&S ZVA Software

The instrument firmware can be downloaded from the R&S website (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 R&S ZVA:

Direct Generator/Receiver Access		
for R&S ZVA8 with two ports	R&S R&S ZVA8-B16	1164.0209.08
for R&S ZVA8 with four ports	R&S R&S ZVA8-B16	1164.0209.10
for R&S ZVA24 with two ports	R&S R&S ZVA24-B16	1164.0209.24
for R&S ZVA24 with four ports	R&S R&S ZVA24-B16	1164.0209.26
for R&S ZVA40 with two ports	R&S R&S ZVA40-B16	1164.0209.40
for R&S ZVA40 with four ports	R&S R&S ZVA40-B16	1164.0209.42
for R&S ZVA50 with two ports	R&S R&S ZVA50-B16	1164.0209.50
for R&S ZVA50 with four ports	R&S R&S ZVA50-B16	1164.0209.52
for R&S ZVA67 with two ports	R&S R&S ZVA67-B16	1164.0209.67
for R&S ZVA67 with four ports	R&S R&S ZVA67-B16	1164.0209.69
Generator Step Attenuator Port 1		
for R&S ZVA8	R&S R&S ZVA8-B21	1164.0009.02
for R&S ZVA24	R&S R&S ZVA24-B21	1164.0109.02
for R&S ZVA40	R&S R&S ZVA40-B21	1302.5409.02
for R&S ZVA50	R&S R&S ZVA50-B21	1305.5616.02
for R&S ZVA67	R&S R&S ZVA67-B21	1305.7077.02
Generator Step Attenuator Port 2		
for R&S ZVA8	R&S R&S ZVA8-B22	1164.0015.02
for R&S ZVA24	R&S R&S ZVA24-B22	1164.0115.02
for R&S ZVA40	R&S R&S ZVA40-B22	1302.5415.02
for R&S ZVA50	R&S R&S ZVA50-B22	1305.5622.02
for R&S ZVA67	R&S R&S ZVA67-B22	1305.7083.02
Generator Step Attenuator Port 3		
for R&S ZVA8 with four ports	R&S R&S ZVA8-B23	1164.0021.02
for R&S ZVA24 with four ports	R&S R&S ZVA24-B23	1164.0121.02
for R&S ZVA40 with four ports	R&S R&S ZVA40-B23	1302.5421.02
for R&S ZVA50 with four ports	R&S R&S ZVA50-B23	1305.5639.02
for R&S ZVA67 with four ports	R&S R&S ZVA67-B23	1305.7090.02
Generator Step Attenuator Port 4		
for R&S ZVA8 with four ports	R&S R&S ZVA8-B24	1164.0038.02
for R&S ZVA24 with four ports	R&S R&S ZVA24-B24	1164.0138.02
for R&S ZVA40 with four ports	R&S R&S ZVA40-B23	1302.5438.02
for R&S ZVA50 with four ports	R&S R&S ZVA50-B23	1305.5645.02
for R&S ZVA67 with four ports	R&S R&S ZVA67-B23	1305.7102.02

Receiver Step Attenuator Port 1	R&S R&S ZVA8-B31	1164.0044.02
for R&S ZVA8	R&S ZVA24-B31	1164.0144.02
for R&S ZVA24	R&S ZVA40-B31	1302.5444.02
for R&S ZVA40	R&S ZVA50-B31	1305.5716.02
for R&S ZVA50	R&S ZVA67-B31	1305.7119.02
for R&S ZVA67		
Receiver Step Attenuator Port 2	R&S ZVA8-B32	1164.0050.02
for R&S ZVA8	R&S ZVA24-B32	1164.0150.02
for R&S ZVA24	R&S ZVA40-B32	1302.5450.02
for R&S ZVA40	R&S ZVA50-B32	1305.5722.02
for R&S ZVA50	R&S ZVA67-B32	1305.7125.02
for R&S ZVA67		
Receiver Step Attenuator Port 3	R&S ZVA8-B33	1164.0067.02
for R&S ZVA8 with four ports	R&S ZVA24-B33	1164.0167.02
for R&S ZVA24 with four ports	R&S ZVA40-B33	1302.5467.02
for R&S ZVA40 with four ports	R&S ZVA50-B33	1305.5739.02
for R&S ZVA50 with four ports	R&S ZVA67-B33	1305.7131.02
for R&S ZVA67 with four ports		
Receiver Step Attenuator Port 4	R&S ZVA8-B34	1164.0073.02
for R&S ZVA8 with four ports	R&S ZVA24-B34	1164.0173.02
for R&S ZVA24 with four ports	R&S ZVA40-B34	1302.5473.02
for R&S ZVA40 with four ports	R&S ZVA50-B34	1305.5745.02
for R&S ZVA50 with four ports	R&S ZVA67-B34	1305.7148.02
for R&S ZVA67 with four ports		
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 ZVAB-K4	1164.1863.02
True Differencial Mode	R&S ZVAB-K6	1164.1540.02
Pulsed Measurements	R&S ZVAB-K7	1164.1511.02
Pulsed Measurements with increased recording time for 2-port models	R&S ZVAB-B7	1164.1492.02
Pulsed Measurements with increased recording time for 4-port models	R&S ZVAB-B7	1164.1492.03

Mixer Delay w/o LO Access	R&S ZVAB-K9	1311.3128.0
5 MHz Receiver Bandwidth	R&S ZVAB-K17	1164.1070.02
Internal Pulse Generators	R&S ZVAB-K27	1164.1892.02

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:

NOTICE

Risk of Electrostatic Discharge

Disconnect the instrument from the mains before opening the casing. Also note the safety instructions at the beginning of this manual.

The components used in the instrument are sensitive to electrostatic discharges which is why they are to be dealt with according to the ESD regulations.

- ➢ 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 back-panel feet.

NOTICE

Risk of cable damage

When replacing the tube, be sure not to damage or pull off cables.

- ➢ Connect the mains cable and turn on the instrument.

Contents - Chapter 5 "Documents"

Figures

--

This page is left blank intentionally.

5 Documents

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

Spare Parts

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

Important Note

When replacing a module please note the safety instructions and the repair instructions given in chapter 3 and at the beginning of this service manual

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

Available Power Cables

Table 5-1 List of power cables available

Stock No.	Earthed-contact connector	Preferably used in
DS 006.7013	BS1363: 1967' complying with IEC 83: 1975 standard B2	Great Britain
DS 006.7020	Type 12 complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 006.7036	Type 498/13 complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 006.7107	Type SAA3 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365 DS 0099.1456	DIN 49 441, 10 A, 250 V, angular DIN 49 441, 10 A, 250 V, straight	Europe (except Switzerland)

ROHDE&SCHWARZ

Spare Parts List

Mechanical Drawings

This page is left blank intentionally.

List of Receiver parts including spare parts

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

Overall dimension: B x H x T: 465.1 x 286.2 x 417.0
Rackmount: 6E 1/1 T350 MOD. 22
Accessories: 19" Adapter ZZA-611, Stock No. 1096.3302.00

The recommended spare parts are marked with an x in the like column.

Table 5-2 List of all R&S ZVA parts and spare parts.

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
DRAWING 1145.1110.01 (R&S ZVA NETWORK ANALYZER)					
10	ZM FUNDAMENTAL UNIT ZVA Model 08 09 10	1145.1310.08	1		
12	ZM FUNDAMENTAL UNIT ZVA Model 24 25 26	1145.1310.24	1		
14	ZM FUNDAMENTAL UNIT ZVA Model 40 41 42 43 45 50 51 52	1145.1310.40	1		
15	ZM FAN ZVB Mounted in frame 1145.1355.00	1145.2200.00	0	E1 E2 E3	x
100	ZE NETWORK CONTROLLER	1145.3635.02	1	A140	x
105	ZE NETWORK CONTROLLER Model 09 10 25 26 41 42 45 51 52	1145.3635.02	1	A130	x
110	EE SYNTH-LS Model 08 24	1302.4025.02	1	A160	x
111	EE SYNTH-LS Model 40 43 50	1302.4025.20	1	A160	x
113	EE SYNTH-DS Model 09 10 25 26 41 42 45 51 52	1302.5180.02	1	A160	x
115	EE SYNTH-LO Model 09 10 25 26	1302.4248.02	1	A150	x
116	EE SYNTH-L0 Model 41 42 45 51 52	1302.4248.20	1	A150	x
120	EE FREQ. REFERENCE	1145.3835.04	1	A100	x
121	EE PCI BALANCE (not used if motherboard 1305.3007.02 is installed)	1300.1687.02	1	A199	x
130	ED PORT BIAS	1145.3935.02	1	A18	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
135	ED PORT BIAS Model 09 10 25 26 41 42 45 51 52	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		
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 Model 08	1145.4177.02	2	A510 A520	
151	VS 6900/ISR-M2.5X6-A2 Model 08	1148.3059.00	4		
152	ZM CABLE SET ZVA8 2PORT Model 08	1302.5050.08	1		
153	VS 965/ISR-M2.5X8-A4-PA Model 08	1148.3294.00	4		
154	VS 965/ISR-M2.5X6-A4-PA Model 08	1148.3288.00	8		
155	ZM RM UNIT ZVA 8GHz Model 09	1145.4177.02	3	A510 A520 A530	
156	VS 6900/ISR-M2.5X6-A2 Model 09	1148.3059.00	6		
157	ZM CABLE SET ZVA Model 09	1145.5050.09	1		
158	VS 965/ISR-M2.5X8-A4-PA Model 09	1148.3294.00	6		
159	VS 965/ISR-M2.5X6-A4-PA Model 09	1148.3288.00	12		
160	ZM RM UNIT ZVA 8GHz Model 10	1145.4177.02	4	A510 A520 A530 A540	
161	VS 6900/ISR-M2.5X6-A2 Model 10	1148.3059.00	8		
162	ZM CABLE SET ZVA Model 10	1145.5050.10	1		
163	VS 965/ISR-M2.5X8-A4-PA Model 10	1148.3294.00	8		
164	VS 965/ISR-M2.5X6-A4-PA Model 10	1148.3288.00	16		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
166	DW RF CABLE W509/A520 Model 08 09 10	1145.3041.00	1	W509	
167	MZ EXT. ANALYZER MOUNT Model 08 09 10	1145.3058.00	1		
168	VS 965/ISR-M2.5X6-A4-PA Model 08 09 10	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 Model 24	1145.4302.02	2	A510 A520	
182	VS 965/ISR-M3X8-A4-PA Model 24	1300.0868.00	8		
185	ZM CABLE SET ZVA24 2PORT Model 24	1302.5050.24	1		
186	VS 965/ISR-M2.5X6-A4-PA Model 24	1148.3288.00	8		
190	ZE RM UNIT ZVA 24 GHz Model 25	1145.4302.02	3	A510 A520 A530	
192	VS 965/ISR-M3X8-A4-PA Model 25	1300.0868.00	12		
195	ZM CABLE SET ZVA Model 25	1145.5050.25	1		
196	VS 965/ISR-M2.5X6-A4-PA Model 25	1148.3288.00	12		
200	ZE RM UNIT ZVA 24 GHz Model 26	1145.4302.02	4	A510 A520 A530 A540	
202	VS 965/ISR-M3X8-A4-PA Model 26	1148.2798.00	16		
205	ZM CABLE SET ZVA Model 26	1145.5050.26	1		
206	VS 965/ISR-M2.5X6-A4-PA Model 26	1148.3288.00	16		
207	ZM RM UNIT2 ZVA40 GHz Model 43 45, Port1 and 2 2.4 mm	1305.3420.12	2	A510 A520	
208	ZM RM UNIT2 ZVA40 GHz Model 43 45, Port3 and 4 2.4 mm	1305.3420.13	2	A530 A540	
209	ZM RM UNIT2 ZVA40 GHz Model 40	1305.3420.02	2	A510 A520	
210	MZ RM44 BLOWER ATTACHEMENT (included in RM Unit ZVA40) Model 40 41 42 4345 50 51 52	1302.5621.00	0		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
211	VS 965ISR-M2.5X6-A4-PA Model 40 41 42 4345 50 51 52	1148.3288.00	4		
212	VS 6900/ISR-M2.5X6-A2 Model 40 41 42 4345 50 51 52	1148.3059.00	4		
213	MZ RM44 SUPPORT PLATE RM1-2 Model 40 41 42 4345 50 51 52	1302.5596.00	1		
214	VS 965ISR-M2.5X6-A4-PA Model 40 41 42 4345 50 51 52	1148.3288.00	4		
215	VS 6900/ISR-M2.5X8-A2 Model 40 41 42 4345 50 51 52	0041.1653.00	2		
216	VS 6900/ISR-M2.5X8-A2 Model 40 41 42 50 51 52	0041.1653.00	4		
217	VS 965ISR-M3X10-A4-PA Model 40 43 50	1148.3320.00	8		
218	VS 965ISR-M2.5X6-A4-PA Model 40 43 50	1148.3288.00	4		
219	ZM CABLE SET ZVA40 2PORT Model 40 43	1302.5050.40	1		
220	ZM RM UNIT2 ZVA40 GHz Model 41	1305.3420.02	2	A510 A520	
222	ZM RM UNIT2 ZVA40 GHz Model 41	1305.3420.03	2	A510 A520	
223	MZ RM44 SUPPORT PLATE RM3-4 Model 40 41 42 4345 50 51 52	1302.5609.00	1		
224	VS 965ISR-M2.5X6-A4-PA Model 41 42 45 51 52	1148.3288.00	6		
226	VS 6900/ISR-M2.5X8-A2 Model 41 51	0041.1653.00	2		
227	VS 965ISR-M3X10-A4-PA Model 41 51	1148.3320.00	12		
228	VS 965ISR-M2.5X6-A4-PA Model 41 51	1148.3288.00	6		
229	ZM CABLE SET ZVA40 2PORT Model 41	1302.5050.41	1		
230	ZM RM UNIT2 ZVA40 GHz Model 42	1305.3420.02	2	A510 A520	
232	ZM RM UNIT2 ZVA40 GHz Model 42	1305.3420.03	2	A530 A540	
233	MZ RM44 SUPPORT PLATE RM3-4 Model 42 45 52	1305.3494.00	1		
234	VS 965ISR-M2.5X6-A4-PA	1148.3288.00	4		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
	Model 42 45 52				
236	VS 6900/ISR-M2.5X8-A2 Model 42 45 52	0041.1653.00	2		
237	VS 965ISR-M3X10-A4-PA Model 42 45 52	1148.3320.00	16		
238	VS 965ISR-M2.5X6-A4-PA Model 42 45 52	1148.3288.00	6		
239	ZM CABLE SET ZVA40 2PORT Model 42 45	1302.5050.42	1		
240	ZM RM UNIT ZVA 50 GHz Model 50	1305.3407.02	2	A510 A520	
241	ZM CABLE SET ZVA50 2PORT Model 42 45	1302.5050.50	1		
242	ZM RM UNIT ZVA 50 GHz Model 51	1305.3407.02	2	A510 A520	
243	ZM RM UNIT ZVA 50 GHz Model 51	1305.3407.03	1	A530	
244	ZM CABLE SET ZVA50 3PORT Model 42 45	1302.5050.51	1		
245	ZM RM UNIT ZVA 50 GHz Model 52	1305.3407.02	2	A510 A520	
246	ZM RM UNIT ZVA 50 GHz Model 52	1305.3407.03	2	A530 A540	
247	ZM CABLE SET ZVA50 4PORT Model 42 45	1302.5050.52	1		
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-M2.5X4-A4-PA	1148.3271.00	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	
272	SILICONE CORD 4X8 mm	1130.0164.00	2		
275	LAN CABLE WITH SPRING	1166.1819.00	2	W241 W242	
280	IEC-BUS CABLE W21	1129.7252.00	1	W21	
282	WASHER DIN125-A3.2-A4	0082.4670.00	2		
284	WAVE SPRING WASHER DIN137-A3-A2	0005.0296.00	2		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
286	VS DIN934-M3-A4	0016.4398.00	2		
287	COVER 30X20 SW	1093.9051.00	2		
288	COVER 30X20 SW	1093.9051.00	1		
289	COVER 30X20 SW	1093.9051.00	1		
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	44		
300	KB FRONT COVER ZVA 8 2PORT Model 08	1145.1555.00	1		
303	KB FRONT COVER ZVA 8 3PORT Model 09	1145.1549.00	1		
306	KB FRONT COVER ZVA 8 4PORT Model 10	1145.1503.00	1		
310	KB FRONT COVER ZVA24 2PORT Model 24	1145.2380.00	1		
313	KB FRONT COVER ZVA24 3PORT Model 25	1145.2397.00	1		
316	KB FRONT COVER ZVA 24 4PORT Model 26	1145.1510.00	1		
320	KB FRONT COVER ZVA 40 Model 40	1145.1526.00	1		
321	KB FRONT COVER ZVA 40 2P 2.4MM Model 43	1305.5268.00	1		
323	KB FRONT COVER ZVA 44 3P Model 41	1302.4860.00	1		
326	KB FRONT COVER ZVA 44 4P Model 42	1302.4877.00	1		
327	KB FRONT COVER ZVA 44 4P 2.4MM Model 45	1305.5274.00	1		
330	KB FRONT COVER ZVA 50 2P Model 50	1305.3388.00	1		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
334	KB FRONT COVER ZVA 50 4P Model 52	1305.3394.00	1		
390	KB COUNTERSUNK SCREW M1.6X3 LIGHT-GREY	0396.1070.00	1		
400	KR TUBE 6HU1/1T450 ZVA	1305.3442.00	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
455	VS 965/ISR-M4X12-A4-PA	1148.2830.00	4		
460	KR BW2 REAR PANEL FOOT	1096.2487.00	4		x
470	OS BW2 REAR PANEL FOOT LABEL	1096.2435.00	1		
471	FJ CAP Model 08	0092.6375.00	2		
472	FJ CAP Model 09	0092.6375.00	3		
473	FJ CAP Model 10	0092.6375.00	4		
490	FJ CAP Model 24 40 43 50	0114.1770.00	2		
492	FJ CAP Model 26 42 45 52	0114.1770.00	4		
DRAWING 1305.7002.01 (R&S ZVA67 NETWORK ANALYZER)					
30	ZM FUNDAMENTAL UNIT ZVA	1145.1310.42	1		
40	ZM FAN ZVB Mounted in frame 1145.1355.00	1145.2200.00	0	E1 E2 E3	x
50	VS 7985/SR-M4X8-A4-PA	1148.2652.00	0		
60	VS DIN433-4.3-A4	0082.4586.00	0		
70	ZE NETWORK CONTROLLER Model 02 04	1145.3635.04	1	A140	x
80	ZE NETWORK CONTROLLER Model 02 04	1145.3635.04	1	A130	x
90	EE SYNTH-12	1305.3020.02	1	A150	x

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
	Model 02 04				
100	EE SYNTH-12 Model 04	1305.3020.02	1	A160	x
120	EE FREQ. REFERENCE	1145.3835.04	1	A100	x
130	ED PORT BIAS	1145.3935.02	1	A18	
140	FJ HEX 14 NUT 1/-28UNEF (for A18)	3583.1578.00	2		
150	SERRATED LOCKWASHER (for A18)	3583.1578.00	2		
160	ED PORT BIAS Model 04	1145.3935.02	1	A19	
170	FJ HEX 14 NUT 1/-28UNEF (for A19)	3583.1578.00	2		
180	SERRATED LOCKWASHER (for A19)	3583.1578.00	2		
190	MZ MOTHERB. RAIL 1 ZVA	1145.2168.00	1		
200	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
210	VS 6900/ISR-M2.5X8-A2	0041.1653.00	1		
220	MZ RAIL CONTACT ZVB 8/20	1300.0874.00	1		
230	MZ RM44 BLOWER ATTACHEMENT (in-cluded in RM Unit)	1302.5621.00	0		
240	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
245	VS 6900/ISR-M2.5X6-A2	1148.3059.00	4		
250	VS 6900/ISR-M2.5X6-A2	1148.3059.00	4		
260	MZ RM44 SUPPORT PLATE RM1-2	1302.5596.00	1		
270	VS 6900/ISR-M2.5X8-A2	0041.1653.00	4		
275	VS 6900/ISR-M2.5X8-A2	0041.1653.00	2		
280	VS 965/ISR-M3X10-A4-PA	1148.3320.00	8		
290	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
300	ZM RM UNIT ZVA67 Model 02 04	1305.6241.02	2	A510, A520	x
310	MZ RM44 SUPPORT PLATE RM3-4 Model 04	1305.3494.00	1		
315	MZ RM44 SUPPORT PLATE RM3-4 Model 04	1305.3494.00	1		
320	VS 965/ISR-M2.5X6-A4-PA Model 04	1148.3288.00	4		
330	VS 965/ISR-M2.5X6-A4-PA Model 04	1148.3288.00	8		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
335	VS 965/ISR-M2.5X6-A4-PA Model 04	1148.3288.00	6		
340	VS 965ISR-M3X10-A4-PA Model 41 51	1148.3320.00	16		
345	VS 6900/ISR-M2.5X6-A2 Model 04	1148.3059.00	8		
350	ZM RM UNIT ZVA67 Model 04	1305.6241.02	2	A530, A540	x
360	ZM CABLE SET ZVA50 2PORT Model 02	1302.5050.50	1		
370	ZM CABLE SET ZVA50 4PORT Model 04	1302.5050.52	1		
380	KB COVER PLATE ZVA	1145.3029.00	1		
390	VS 6900/ISR-M2.5X6-A2	1148.3059.00	13		
400	ZN COVER HOLDING	1300.0974.00	2		
410	VS 965/ISR-M2.5X4-A4-PA	1148.3271.00	4		
420	KB REAR PANEL PLATE	1145.1226.00	1		
421	KB COVER REAR PANEL	1145.1232.00	1		
422	VS 6900/ISR-M3X6-A2	0041.1682.00	2		
430	VS 6900/ISR-M2.5X6-A2	1148.3059.00	5		
440	2XRJ45 COUPLER JACK STRAIGHT	1093.9122.00	2	X241, X242	x
450	SILICONE CORD	1130.0164.00	2		
460	LAN CABLE WITH SPRING	1166.1819.00	2	W241, W242	
470	IEC-BUS CABLE W21	1129.7252.00	1	W21	
480	WASHER DIN125-A3.2-A4	0082.4670.00	2		
490	WAVE SPRING WASHER DIN137-A3-A2	0005.0296.00	2		
500	VS DIN934-M3-A4	0016.4398.00	2		
510	COVER 30X20 SW	1093.9051.00	2		
520	COVER 30X20 SW	1093.9051.00	1		
550	MP CAP	0570.5187.00	2		
560	MP CAP	0344.4591.00	2		
580	MP ADHESIVE FOIL 33X68	1300.0597.00	4		
590	MZ TOP COVER ZVA	1145.1855.00	1		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
600	MZ BOTTOM COVER ZVA	1145.1955.00	1		
610	VS 6900/ISR-M2.5X6-A2	1148.3059.00	44		
620	KB FRONT COVER ZVA67 2T Model 02	1305.7025.00	1		
630	KB FRONT COVER ZVA67 4T Model 04	1305.7048.00	1		
640	KB COUNTERSUNK SCREW M1.6X3 LIGHT-GREY	0396.1070.00	1		
650	KR TUBE 6HU1/1T450 ZVA	1305.3442.00	1		x
660	KR HOLDING HOOK	1096.4796.00	6		x
670	KR BW2 FRONT HANDLE 6E	1096.1500.00	2		x
680	VS SCREW M4X14-ISR	1096.4896.00	6		
690	KR BW2 INSTRUMENT FOOT	1096.2506.00	4		x
700	KR BW2 MOUNTING FOOT	1096.2529.00	2		x
710	KR BW2 SIDE CARRYING HANDLE T450	1096.2670.00	2		x
720	VS 965/ISR-M4X12-A4-PA	1148.2830.00	4		
730	KR BW2 REAR PANEL FOOT	1096.2487.00	4		x
740	OS BW2 REAR PANEL FOOT LABEL	1096.2435.00	1		
750	FJ CAP Model 02 04	0114.1770.00	2		
760	FJ CAP Model 04	0114.1770.00	2		
770	ZB ACCESS. ZVA	1145.1149.00	1		
DRAWING 1145.1310.01 (FUNDAMENTAL UNIT R&S ZVA)					
500	ZM METAL FRAME ZVA	1145.1355.00	1		
516	ED MOTHERBOARD ZVA Model 08 24 40 41	1305.6470.02	1	A10	x
517	ED MOTHERBOARD ZVA67 Model 42	1305.6570.02	1	A10	x
520	VS 6900/ISR-M2.5X6-A2	1148.3059.00	17		
530	FM LOCKING SCREW H=4.5	1093.9180.00	2		
535	VS SCREW M2.5X10 A2	0088.7706.00	0		
540	FM LOCKING SCREW M3	0009.6501.00	2		
551	EMC GASKET	1300.1806.00	2		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
552	SERRATED LOCKWASHER	3583.1578.00	3		
553	HEX 14 NUT 1/2 -28UNEF	3583.1561.00	3		
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	0		
580	GR FRONT MOD. CONTROLLER 7/3	1091.3104.00	1	A90	x
581	BIOS ZVAB FOR FMR7	1300.1529.00	1		
582	LITHIUM BATTERY CR2032	0858.2049.00	0		x
585	BIOS ZVAB	1145.1190.00	0		
590	VS 6900/ISR-M2.5X6-A2	1148.3059.00	9		
595	DF CABLE 4X2 AND SHIELDING 630	1145.5115.00	1	W12	
596	DZ FEED THROUGH	0099.1440.00	1		
598	DZ CABLE TIE	0015.9038.00	4		
600	ZM DISPLAY UNIT ZVA Model 08	1145.1390.08	1	A1	
604	ZM DISPLAY UNIT ZVA Model 24 40 41 42	1145.1390.24	1	A1	
610	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	5		
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 WASHER DIN127-B2.5-A4	0082.4786.00	3		
710	ZE HD WITH FIRMWARE ZVT	1145.1178.03	1	A60	x
715	DY SATA CABLE 265	1091.3440.00	1	W11	x
716	DY SATA POWERCABLE 285	1091.3427.00	1	W13	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

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
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 ZVAB POWER SUPPLY Model 08 24 40 41	1145.5544.00	1	W22	x
741	DX POWER SUPPLY CABLE 2X6 Model 42	1300.2448.00	1	W20	
742	DY CABLE FOR ZVT POWER SUPPLY Model 42	1145.5544.00	1	W21	x
745	DX POWER SUPPLY CABLE 6P Model 08 24 40 41	1145.5515.00	1	W22	
746	DX POWER SUPPLY CABLE 4P Model 42	1300.1941.00	1	W22	
750	DX POWER SUPPLY CABLE 8P Model 08 24 40 41	1145.5521.00	1	W24	
751	DX POWER SUPPLY CABLE 8P Model 42	1300.1987.00	1	W24	
754	DX POWER SUPPLY CABLE 10P Model 42	1300.1993.00	1	W25	
755	DX POWER SUPPLY CABLE 10P	1145.5538.00	1	W25	
756	VS DIN137-A3-A2	0005.0296.00	8		
757	VS DIN137-A4-A2	0005.0315.00	6		
758	LOCK WASHER	0016.2820.00	8		
759	LOCK WASHER	0016.2837.00	6		
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	SCREW	1096.4838.00	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	1		
789	PROTECTION COVER ZVA	1145.3193.00	1		
790	GJ SWITCHING POWER SUPPLY	1145.5238.00	1	A20	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
	AC90-264V SPARE PART	1145.5473.00			x
791	VS WASHER DIN433-4.3-A4	0082.4586.00	4		
792	VS 7985/ISR-M4X8-A4-PA	1148.2652.00	4		
794	GJ SWITCHING POWER SUPPLY Model 42 SPARE PART	1300.2490.00 1145.1278.00	1	A20	 x
797	HS IMAGE SOFTWARE	0048.7540.00	1		
798	HS WINDOWS XP EMBEDDED	1099.8570.00			
799	OS BARCODE LABEL	0071.7714.00			
DRAWING 1145.1390.01 (DISPLAY UNIT ZVA)					
800	ZM MOUNTING PLATE ZVA 8	1145.1703.00	1		
805	ZM MOUNTING PLATE 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		
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	WW ADHESIVE FOAM RIBBON	0852.1805.00	.77 m		
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	2		
925	VS 6900/ISR-M3.0X6-A2	0041.1682.00	2		
930	BP 8MA22368 DC TO AC CONVERTER	1145.5267.00	1	T10	x

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
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)	0852.2760.00	1	B10	x
980	EM COLLAR	0852.1105.00	1		
990	OK KNOB	0852.1086.00	1		
1000	MZ HOLDING BRACKET FOR PCB	1302.5873.00	1		
1010	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	2		
1020	GR DISPLAY CONNECTION	1300.1741.00	1	A19	
1030	DF DISPLAY CABLE NEC-ADAPTER	1302.5396.00	1	W70	x
1040	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
1050	ED USB BOARD	1305.3207.02	1	A40	x
1070	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	2		
DRAWING 1145.4177.01 (RM UNIT R&S 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		
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	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
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	1302.5067.00	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 R&S 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		
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	
30	ZE GENERATOR 24	1151.6503.02	1	A506	
40	MN COVER A-SIDE GEN 24GHZ	1145.4648.00	1		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
50	ED RM24 RECEIVER	1145.4360.02	1	A503	
60	ZE RECEIVER 24	1151.7022.02	1	A507	
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 1145.4319.01 (RM UNIT R&S ZVA40 GHz)					
400	ZE REFLECTOMETER ZVA40	1145.4390.02	1	A500	x
430	ZE TEST SET 44	1302.3503.02	1	A501	x
440	MZ COUPLEHOLDER 2 ZVA40	1305.3436.00	1		
467	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
470	MZ SMA-HOLDER ZVA40	1302.5767.00	1		
475	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	1		
480	DY CABLE W700	1305.3820.00	1		
485	DV RF CABLE	1305.3842.00	1		
490	MZ RM44 BLOWER ATTACHEMENT	1302.5621.00	1		
500	DW RF CABLE W518A REF	1305.3965.00	1		
510	DW RF CABLE W515A MEAS	1305.3959.00	1		
520	DW RF CABLE W514A GEN	1305.3942.00	1		
600	DW RF CABLE W518B REF	1305.5750.00	1		
610	DW RF CABLE W515B MEAS	1305.5744.00	1		
620	DW RF CABLE W514B GEN	1305.5738.00	1		
DRAWING 1305.3420.01 (RM UNIT 2 R&S ZVA40 GHz)					
400	ZE REFLECTOMETER ZVA40	1145.4390.02	1	A500	x
430	ZE COUPLER 44 Model 02 03	1306.7506.02	1	A501	x

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
431	ZE COUPLER 44 Model 12 13	1306.7506.03	1	A501	x
440	MZ COUPLEHOLDER 2 ZVA40	1302.5773.00	1		
445	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
450	ZE BIAS 44	1304.2007.02	1		x
460	MZ HOLDER	1304.4651.00	1		
470	MZ SMA-HOLDER ZVA40	1302.5767.00	1		
480	DY CABLE W700	1305.3820.00	1	W700	
485	DV RF CABLE	1305.3842.00	1	W541	
490	MZ RM44 BLOWER ATTACHEMENT Model 02 12	1302.5621.00	1		
500	DW RF CABLE W518A REF Model 02 12	1145.4448.00	1	W518A	
510	DW RF CABLE W515A MEAS Model 02 12	1302.5715.00	1	W515A	
520	DW RF CABLE W514A GEN Model 02 12	1302.5709.00	1	W514A	
600	DW RF CABLE W518B REF Model 03 13	1145.445400	1	W518B	
610	DW RF CABLE W515B MEAS Model 03 13	1302.5744.00	1	W515B	
620	DW RF CABLE W514B GEN Model 03 13	1302.5738.00	1	W514B	
DRAWING 1305.3407.01 (RM UNIT R&S ZVA50 GHz)					
400	ZE REFLECTOMETER R&S ZVA50	1305.3413.02	1	A500	x
430	ZE COUPLER 50	1306.9009.02	1	A501	x
440	MZ COUPLEHOLDER ZVA40	1302.5773.00	1		
445	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
450	ZE BIAS 50	1306.9509.02	1		x
460	MZ HOLDER	1304.4651.00	1		
470	MZ SMA-HOLDER ZVA50	1305.5516.00	1		
475	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
480	DY CABLE W700	1305.3820.00	1	W700	
485	DV RF CABLE	1305.3842.00	1	W541	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
490	MZ RM44 BLOWER ATTACHEMENT Model 02	1302.5621.00	1		
500	DW RF CABLE W518A REF Model 02	1305.5245.00	1	W518A	
510	DW RF CABLE W515A MEAS Model 02	1305.5222.00	1	W515A	
520	DW RF CABLE W514A GEN Model 02	1305.5200.00	1	W514A	
600	DW RF CABLE W518B REF Model 03	1305.5252.00	1	W518B	
610	DW RF CABLE W515B MEAS Model 03	1305.5239.00	1	W515B	
620	DW RF CABLE W514B GEN Model 03	1305.5216.00	1	W514B	
DRAWING 1305.6241.01 (RM UNIT R&S ZVA67 GHz)					
400	ZE REFLECTOMETER ZVA67	1305.6258.02	1	A500	x
430	ZE COUPLER 67	1310.5504.02	1	A501	x
440	MZ COUPLEHOLDER ZVA40	1302.5773.00	1		
445	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
450	ZE MICROSTRIP BIAS 67	1310.4008.02	1		x
460	MZ HOLDER BIAS67	1305.6464.00	1		
470	MZ SMA-HOLDER ZVA50	1305.5516.00	1		
475	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
480	DY CABLE W700	1305.3820.00	1	W700	x
485	DV RF CABLE	1305.3842.00	1	W541	
490	MZ RM44 BLOWER ATTACHEMENT Model 02	1302.5621.00	1		
500	DW RF CABLE W518 REF Model 02	1305.6641.00	1	W518A	
510	DW RF CABLE W515 MEAS Model 02	1305.6670.00	1	W515A	
520	DW RF CABLE W514 GEN Model 02	1305.6664.00	1	W514A	
600	DW RF CABLE W518B REF Model 03	1305.6858.00	1	W518B	
610	DW RF CABLE W515B MEAS Model 03	1305.6864.00	1	W515B	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
620	DW RF CABLE W514B GEN Model 03	1305.6841.00	1	W514B	
DRAWING 1164.1770.00 (OPTION ZVAB-B4 1164.1757.02)					
20	EE FREQUENCY REFERENCE	1145.3835.05	1	A100	x
30	PD INSTALLATION INSTRUCTION ZVAB-B4	1164.1770.00	1		
DRAWING 1164.0250.00 (OPTION R&S ZVA8-B16 DIRECT GENERATOR/RECEIVER ACCESS 1164.0209.08/09/10)					
1120	DW RF CABLE W503 REF OUT Model 08 09 10	1145.2968.00	2	W503	
1122	DW RF CABLE W503 REF OUT Model 09 10	1145.2968.00	1	W503	
1124	DW RF CABLE W503 REF OUT Model 10	1145.2968.00	1	W503	
1130	DW RF CABLE W501 REF IN Model 08 09 10	1145.2951.00	2	W501	
1132	DW RF CABLE W501 REF IN Model 09 10	1145.2951.00	1	W501	
1134	DW RF CABLE W501 REF IN Model 10	1145.2951.00	1	W501	
1140	DW RF CABLE W513 SRC OUT Model 08 09 10 (only w. Gen Att)	1164.0321.00	2	W513	
1142	DW RF CABLE W513 SRC OUT Model 09 10 (only w. Gen Att)	1164.0321.00	1	W513	
1144	DW RF CABLE W513 SRC OUT Model 10 (only w. Gen Att)	1164.0321.00	1	W513	
1150	DW RF CABLE W534 SRC IN Model 08 09 10	1145.2997.00	2	W534	
1152	DW RF CABLE W534 SRC IN Model 09 10	1145.2997.00	1	W534	
1154	DW RF CABLE W534 SRC IN Model 10	1145.2997.00	1	W534	
1160	DW RF CABLE W505 MEAS OUT Model 08 09 10	1145.2980.00	2	W505	
1162	DW RF CABLE W505 MEAS OUT Model 09 10	1145.2980.00	1	W505	
1164	DW RF CABLE W505 MEAS OUT Model 10	1145.2980.00	1	W505	
1170	DW RF CABLE W506 MEAS IN Model 08 09 10 (only w. Rec Att)	1164.0280.00	2	W506	
1172	DW RF CABLE W506 MEAS IN Model 09 10 (only w. Rec Att)	1164.0280.00	1	W506	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
1174	DW RF CABLE W506 MEAS IN Model 10 (only w. Rec Att)	1164.0280.00	1	W506	
1180	DW RF CABLE W535 SRC OUT Model 08 09 10 (only w. Gen Att or Com-biner)	1145.3006.00	2	W535	
1182	DW RF CABLE W535 SRC OUT Model 09 10 (only w. Gen Att or Combiner)	1145.3006.00	1	W535	
1184	DW RF CABLE W535 SRC OUT Model 10 (only w. Gen Att or Combiner)	1145.3006.00	1	W535	
1190	DW RF CABLE W504 MEAS IN Model 08 09 10 (only w. Rec Att)	1145.2974.00	2	W504	
1192	DW RF CABLE W504 MEAS IN Model 09 10 (only w. Rec Att)	1145.2974.00	1	W504	
1194	DW RF CABLE W504 MEAS IN Model 10 (only w. Rec Att)	1145.2974.00	1	W504	
1200	DW RF CABLE W513 SRC OUT Model 08 09 10 (only w. Combiner Att)	1300.0480.00	2	W513	
1202	DW RF CABLE W513 SRC OUT Model 09 10 (only w. Combiner Att)	1300.0480.00	1	W513	
1204	DW RF CABLE W513 SRC OUT Model 10 (only w. Combiner Att)	1300.0480.00	1	W513	
1210	DW CABLE EXT. 3.6 Model 08 09 10	1300.1729.00	6	W611 W612 W613 W621 W622 W623	
1212	DW CABLE EXT. 3.6 Model 09 10	1300.1729.00	3	W631 W632 W633	
1214	DW CABLE EXT. 3.6 Model 10	1300.1729.00	3	W641 W642 W643	
1215	PD INSTALLATION INSTRUCTION	1164.0250.00	1		
DRAWING 1164.0267.00 (OPTION R&S ZVA24-B16 DIRECT GENERATOR/RECEIVER ACCESS 1164.0209.24/25/26)					
1220	DW RF CABLE W503 REF OUT Model 24 25 26	1300.0380.00	2	W503	
1222	DW RF CABLE W503 REF OUT Model 25 26	1300.0380.00	1	W503	
1224	DW RF CABLE W503 REF OUT Model 26	1300.0380.00	1	W503	
1230	DW RF CABLE W501 REF IN Model 24 25 26	1300.0397.00	2	W501	
1232	DW RF CABLE W501 REF IN Model 25 26	1300.0397.00	1	W501	
1234	DW RF CABLE W501 REF IN Model 26	1300.0397.00	1	W501	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
1240	DW RF CABLE W513 SRC OUT Model 24 25 26 (only w. Gen Att)	1300.0474.00	2	W513	
1242	DW RF CABLE W513 SRC OUT Model 25 26 (only w. Gen Att)	1300.0474.00	1	W513	
1244	DW RF CABLE W513 SRC OUT Model 26 (only w. Gen Att)	1300.0474.00	1	W513	
1250	DW RF CABLE W534 SRC IN Model 24 25 26	1300.0422.00	2	W534	
1252	DW RF CABLE W534 SRC IN Model 25 26	1300.0422.00	1	W534	
1254	DW RF CABLE W534 SRC IN Model 26	1300.0422.00	1	W534	
1260	DW RF CABLE W505 MEAS OUT Model 24 25 26	1300.0416.00	2	W505	
1262	DW RF CABLE W505 MEAS OUT Model 25 26	1300.0416.00	1	W505	
1264	DW RF CABLE W505 MEAS OUT Model 26	1300.0416.00	1	W505	
1270	DW RF CABLE W506 MEAS IN Model 24 25 26 (only w. Rec Att)	1300.0468.00	2	W506	
1272	DW RF CABLE W506 MEAS IN Model 25 26 (only w. Rec Att)	1300.0468.00	1	W506	
1274	DW RF CABLE W506 MEAS IN Model 26 (only w. Rec Att)	1300.0468.00	1	W506	
1280	DW RF CABLE W535 SRC OUT Model 24 25 26 (only w. Gen Att)	1300.0439.00	2	W535	
1282	DW RF CABLE W535 SRC OUT Model 25 26 (only w. Gen Att)	1300.0439.00	1	W535	
1284	DW RF CABLE W535 SRC OUT Model 26 (only w. Gen Att)	1300.0439.00	1	W535	
1290	DW RF CABLE W504 MEAS IN Model 24 25 26 (only w. Rec Att)	1300.0400.00	2	W504	x
1292	DW RF CABLE W504 MEAS IN Model 25 26 (only w. Rec Att)	1300.0400.00	1	W504	
1294	DW RF CABLE W504 MEAS IN Model 26 (only w. Rec Att)	1300.0400.00	1	W504	
1300	DW CABLE EXT. (AL3.6 PC3.5) Model 24 25 26	1145.2580.00	6	W611 W612 W613 W621 W622 W623	X
1302	DW CABLE EXT. (AL3.6 PC3.5) Model 25 26	1145.2580.00	3	W631 W632 W633	
1304	DW CABLE EXT. (AL3.6 PC3.5)	1145.2580.00	3	W641 W642	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
	Model 26			W643	
1310	PD INSTALLATION INSTRUCTION	1164.0267.00	1		
DRAWING 1164.0238.00 (OPTION R&S ZVA40-B16 DIRECT GENERATOR/RECEIVER ACCESS 1164.0209.40/41/42)					
1320	DW RF CABLE W503 REF OUT Model 40 41 42	1145.4525.00	2	W503	
1322	DW RF CABLE W503 REF OUT Model 41 42	1145.4525.00	1	W503	
1324	DW RF CABLE W503 REF OUT Model 42	1145.4525.00	1	W503	
1330	DW RF CABLE W501A REF IN Model 40 41 42	1305.3594.00	2	W501A	
1332	DW RF CABLE W501B REF IN Model 41 42	1305.3620.00	1	W501B	
1334	DW RF CABLE W501B REF IN Model 42	1305.3620.00	1	W501B	
1340	DW RF CABLE W513 SRC OUT Model 40 41 42 (only w. Gen Att)	1300.0474.00	2	W513	
1342	DW RF CABLE W513 SRC OUT Model 41 42 (only w. Gen Att)	1300.0474.00	1	W513	
1344	DW RF CABLE W513 SRC OUT Model 42 (only w. Gen Att)	1300.0474.00	1	W513	
1350	DW RF CABLE W534 SRC IN Model 40 41 42	1305.3542.00	2	W534	
1352	DW RF CABLE W534 SRC IN Model 41 42	1305.3542.00	1	W534	
1354	DW RF CABLE W534 SRC IN Model 42	1305.3542.00	1	W534	
1360	DW RF CABLE W505 MEAS OUT Model 40 41 42	1305.3565.00	2	W505	
1362	DW RF CABLE W505 MEAS OUT Model 41 42	1305.3565.00	1	W505	
1364	DW RF CABLE W505 MEAS OUT Model 42	1305.3565.00	1	W505	
1370	DW RF CABLE W506 MEAS IN Model 40 41 42 (only w. Rec Att)	1300.0468.00	2	W506	
1372	DW RF CABLE W506 MEAS IN Model 41 42 (only w. Rec Att)	1300.0468.00	1	W506	
1374	DW RF CABLE W506 MEAS IN Model 42 (only w. Rec Att)	1300.0468.00	1	W506	
1380	DW RF CABLE W535A SRC OUT Model 40 41 42 (only without Gen Att)	1305.3559.00	2	W535A	

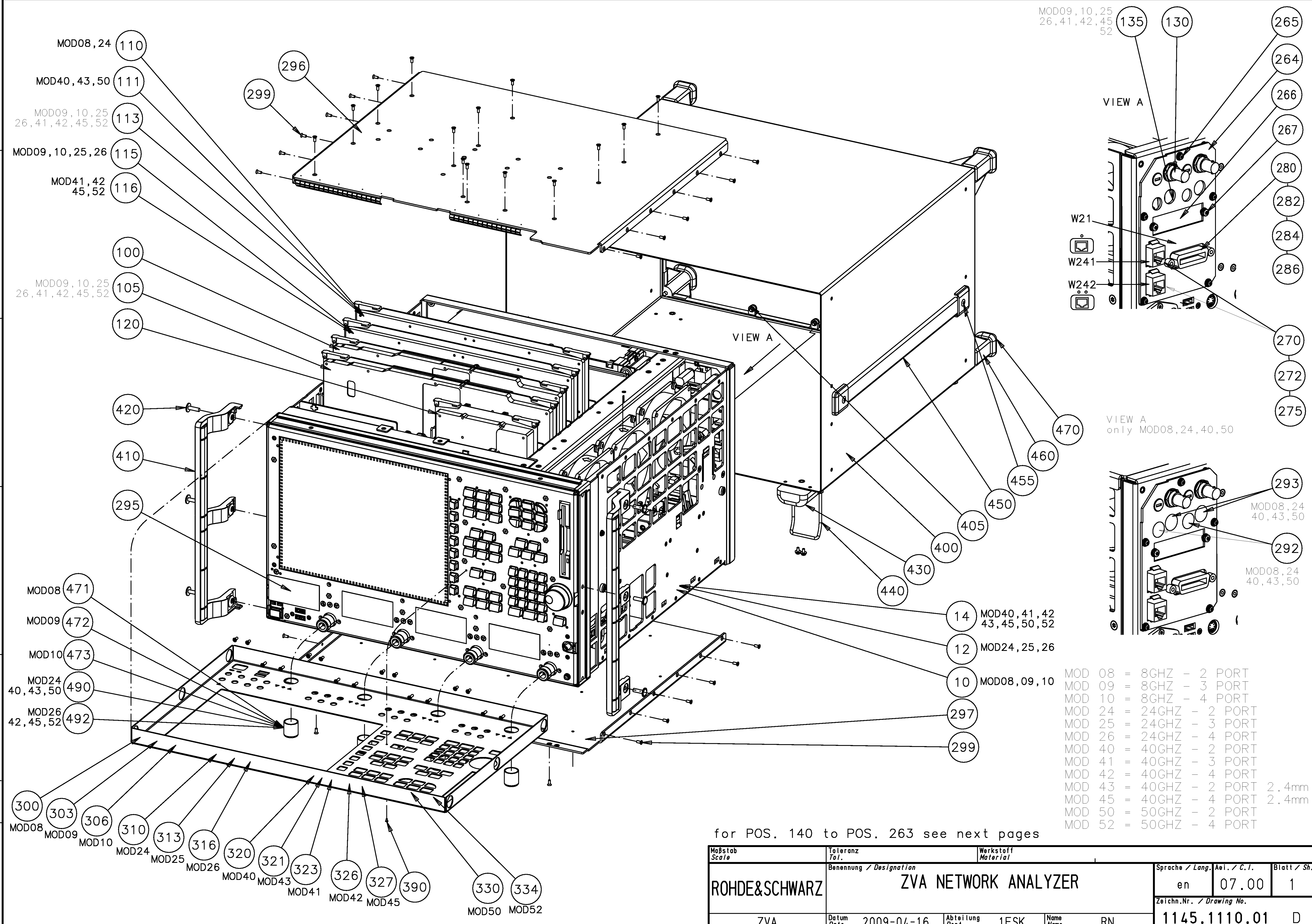
Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
1382	DW RF CABLE W535B SRC OUT Model 41 42 (only without Gen Att)	1305.3607.00	1	W535B	
1384	DW RF CABLE W535B SRC OUT Model 42 (only without Gen Att)	1305.3607.00	1	W535B	
1390	DW RF CABLE W504A MEAS IN Model 49 41 42 (only without Rec Att)	1305.3571.00	2	W504A	
1392	DW RF CABLE W504B MEAS IN Model 41 42 (only without Rec Att)	1305.3613.00	1	W504B	
1394	DW RF CABLE W504B MEAS IN Model 42 (only without Rec Att)	1305.3513.00	1	W504B	
1400	DW CABLE EXT. (AL3.6 PC3.5) Model 40 41 42	1145.2580.00	6	W611 W612 W613 W621 W622 W623	
1402	DW CABLE EXT. (AL3.6 PC3.5) Model 41 42	1145.2580.00	3	W631 W632 W633	
1404	DW CABLE EXT. (AL3.6 PC3.5) Model 42	1145.2580.00	3	W641 W642 W643	
1410	PD INSTALLATION INSTRUCTION	1164.0238.00	1		
DRAWING 1305.5322.00 (OPTION R&S ZVA50-B16 DIRECT GENERATOR/RECEIVER ACCESS 1164.0209.54/52)					
1420	DW RF CABLE W503 REF OUT Model 50 52	1305.5451.00	2	W503	
1424	DW RF CABLE W503 REF OUT Model 52	1305.5451.00	1	W503	
1430	DW RF CABLE W501A REF IN Model 50 52	1305.5445.00	2	W501A	
1434	DW RF CABLE W501B REF IN Model 52	1305.5480.00	1	W501B	
1440	DW RF CABLE W513 SRC OUT Model 50 52 (only w. Gen Att)	1305.5500.00	2	W513	
1444	DW RF CABLE W513 SRC OUT Model 52 (only w. Gen Att)	1305.5500.00	1	W513	
1450	DW RF CABLE W534 SRC IN Model 50 52	1305.5400.00	2	W534	
1454	DW RF CABLE W534 SRC IN Model 52	1305.5400.00	1	W534	
1460	DW RF CABLE W505 MEAS OUT Model 50 52	1305.5439.00	2	W505	
1464	DW RF CABLE W505 MEAS OUT Model 42	1305.5439.00	1	W505	
1470	DW RF CABLE W506 MEAS IN Model 50 52 (only w. Rec Att)	1305.5497.00	2	W506	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
1474	DW RF CABLE W506 MEAS IN Model 52 (only w. Rec Att)	1300.5497.00	1	W506	
1480	DW RF CABLE W535A SRC OUT Model 50 52 (only without Gen Att)	1305.5416.00	2	W535A	
1484	DW RF CABLE W535B SRC OUT Model 52 (only without Gen Att)	1305.5416.00	1	W535B	
1490	DW RF CABLE W504A MEAS IN Model 50 52 (only without Rec Att)	1305.5422.00	2	W504A	
1494	DW RF CABLE W504B MEAS IN Model 52 (only without Rec Att)	1305.5474.00	1	W504B	
1500	VS DIN912-M1.6X5-A2 Model 50 52	0920.8428.00	48		
1504	VS DIN912-M1.6X5-A2 Model 52	0920.8428.00	48		
1510	DW CABLE EXT. (AL3.6 PC3.5) Model 50 52	1305.5397.00	6	W611 W612 W613 W621 W622 W623	
1514	DW CABLE EXT. (AL3.6 PC3.5) Model 41 42	1305.5397.00	6	W631 W632 W633 W641 W642 W643	
1520	PD INSTALLATION INSTRUCTION	1305.5322.00	1		
DRAWING	1164.0215.00 (OPTION R&S ZVA8-B21 GEN.ATTENUATOR PORT 1 1164.0009.02) (OPTION R&S ZVA8-B22 GEN.ATTENUATOR PORT 2 1164.0015.02) (OPTION R&S ZVA8-B23 GEN.ATTENUATOR PORT 3 1164.0021.02) (OPTION R&S ZVA8-B24 GEN.ATTENUATOR PORT 4 1164.0038.02)				
20	ZE ATTENUATOR COMB 8	1137.1595.02	1	A550	x
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		
DRAWING	1164.0215.00 (OPTION R&S ZVA8-B31 REC.ATTENUATOR PORT 1 1164.0044.02) (OPTION R&S ZVA8-B32 REC.ATTENUATOR PORT 2 1164.0050.02) (OPTION R&S ZVA8-B33 REC.ATTENUATOR PORT 3 1164.0067.02) (OPTION R&S ZVA8-B34 REC.ATTENUATOR PORT 4 1164.0073.02)				
20	ZE ATTENUATOR REC8	1137.1543.02	1	A550	x
40	VS DIN6900-M2.5X6 -A2	0071.5040.00	2		
50	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
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		
DRAWING	1164.0221.00 (OPTION R&S ZVA24-B21 GEN.ATTENUATOR PORT 1 1164.0109.02) (OPTION R&S ZVA24-B22 GEN.ATTENUATOR PORT 2 1164.0115.02) (OPTION R&S ZVA24-B23 GEN.ATTENUATOR PORT 3 1164.0121.02) (OPTION R&S ZVA24-B24 GEN.ATTENUATOR PORT 4 1164.0138.02)				
20	ZE ATTENUATOR GEN24	1046.5082.04	1	A550	x
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		
DRAWING	1164.0221.00 (OPTION R&S ZVA24-B31 REC.ATTENUATOR PORT 1 1164.0144.02) (OPTION R&S ZVA24-B32 REC.ATTENUATOR PORT 2 1164.0150.02) (OPTION R&S ZVA24-B33 REC.ATTENUATOR PORT 3 1164.0167.02) (OPTION R&S ZVA24-B34 REC.ATTENUATOR PORT 4 1164.0173.02)				
20	ZE ATTENUATOR REC24	1046.5082.05	1	A550	x
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	
DRAWING	1164.0409.00 (OPTION R&S ZVA40-B21 GEN.ATTENUATOR PORT 1 1302.5409.02) (OPTION R&S ZVA40-B22 GEN.ATTENUATOR PORT 2 1302.5415.02)				
2010	ZE ATTENUATOR GEN44	1046.5082.02	1	A550	x
2020	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2030	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
2040	DW RF CABLE W512A ATT-GEN	1305.3636.00	1	W512A	
2060	DW RF CABLE W536 SRC	1305.3671.00	1	W536	
2070	DW RF CABLE W513 SRC OUT	1300.0474.00	1	W513	
2090	PD INSTALLATION INSTRUCTION	1164.0409.00	1		

Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
DRAWING	1164.0409.00 (OPTION R&S ZVA40-B23 GEN.ATTENUATOR PORT 3 1302.5421.02) (OPTION R&S ZVA40-B24 GEN.ATTENUATOR PORT 4 1302.5438.02)				
2010	ZE ATTENUATOR GEN44	1046.5082.02	1	A550	x
2020	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2030	DY ATT-CTRL_CABLE GENERATOR 240 MM	1164.0396.00	1	W550	
2040	DW RF CABLE W512B ATT-GEN	1305.3659.00	1	W512B	
2060	DW RF CABLE W536 SRC	1305.3671.00	1	W536	
2070	DW RF CABLE W513 SRC OUT	1300.0474.00	1	W513	
2090	PD INSTALLATION INSTRUCTION	1164.0409.00	1		
DRAWING	1164.0409.00 (OPTION R&S ZVA40-B31 REC.ATTENUATOR PORT 1 1302.5444.02) (OPTION R&S ZVA40-B32 REC.ATTENUATOR PORT 2 1302.5450.02)				
2110	ZE ATTENUATOR REC44	1046.5082.03	1	A550	x
2120	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2130	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
2140	DW RF CABLE W507A ATT-REC	1305.3642.00	1	W507A	
2160	DW RF CABLE W508 MEAS	1305.3688.00	1	W508	
2170	DW RF CABLE W506 MEAS IN	1305.0468.00	1	W506	
2190	PD INSTALLATION INSTRUCTION	1164.0409.00	1		
DRAWING	1164.0409.00 (OPTION R&S ZVA40-B33 REC.ATTENUATOR PORT 3 1302.5467.02) (OPTION R&S ZVA40-B34 REC.ATTENUATOR PORT 4 1302.5473.02)				
2110	ZE ATTENUATOR REC44	1046.5082.03	1	A550	x
2120	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2130	DY ATT-CTRL_CABLE GENERATOR 240 MM	1164.0396.00	1	W550	
2140	DW RF CABLE W507B ATT-REC	1305.3665.00	1	W507B	
2160	DW RF CABLE W508 MEAS	1305.3688.00	1	W508	
2170	DW RF CABLE W506 MEAS IN	1305.0468.00	1	W506	
2190	PD INSTALLATION INSTRUCTION	1164.0409.00	1		
DRAWING	1164.0409.00 (OPTION R&S ZVA50-B21 GEN.ATTENUATOR PORT 1 1305.5616.02) (OPTION R&S ZVA50-B22 GEN.ATTENUATOR PORT 2 1305.5622.02)				
2010	ZE ATTENUATOR 50 DB	1170.0065.02	1	A550	x
2020	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		

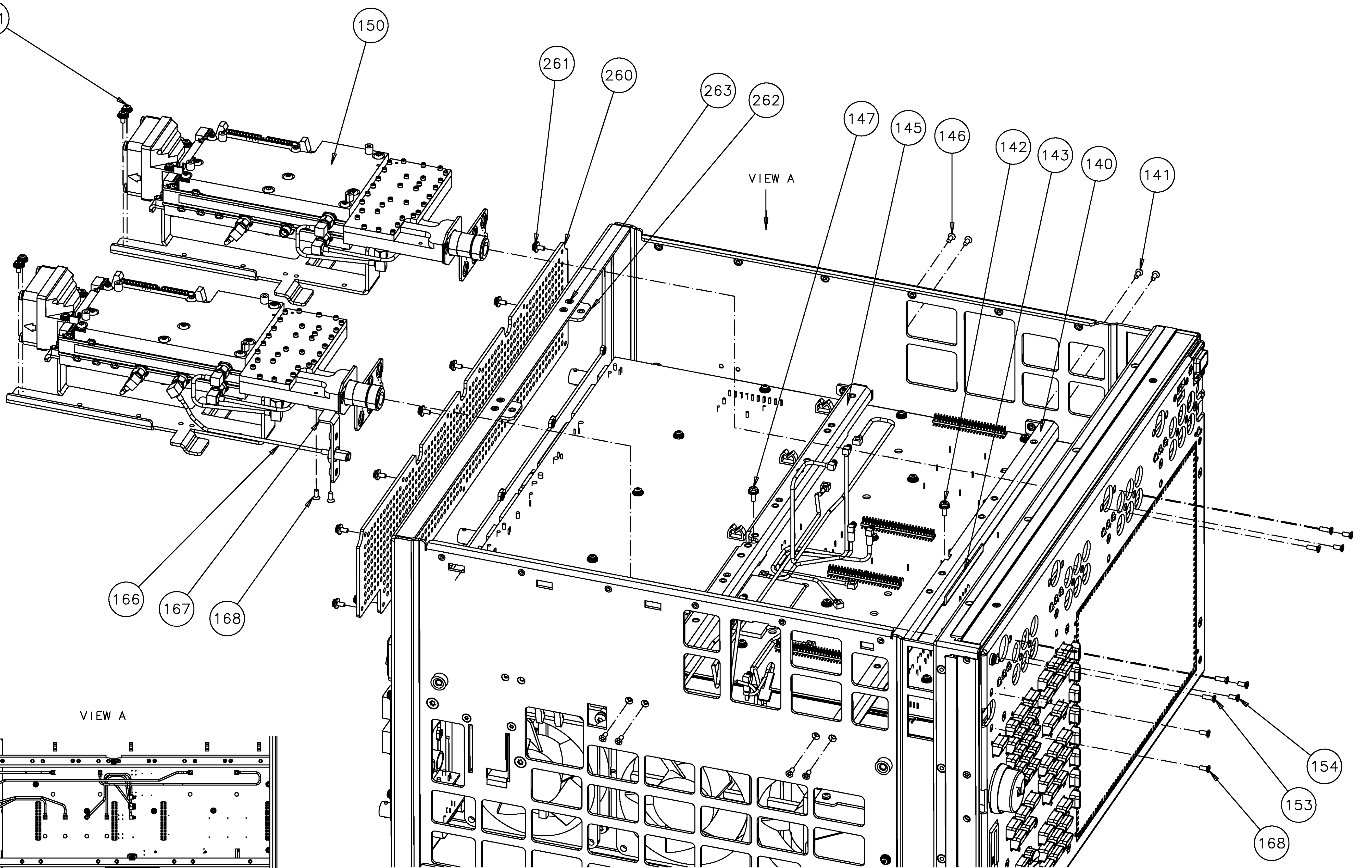
Position	Designation	Stock No.	Number	Electrical Designation	Recommended Spare Parts
2030	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
2040	DW RF CABLE W512A ATT-GEN	1305.5345.00	1	W512A	
2060	DW RF CABLE W536 SRC	1305.5339.00	1	W536	
2070	DW RF CABLE W513 SRC OUT	1305.5500.00	1	W513	
2090	PD INSTALLATION INSTRUCTION	1305.5322.00	1		
DRAWING	1164.0409.00 (OPTION R&S ZVA50-B23 GEN.ATTENUATOR PORT 3 1305.5639.02) (OPTION R&S ZVA50-B24 GEN.ATTENUATOR PORT 4 1305.5645.02)				
2010	ZE ATTENUATOR 50 DB	1170.0065.02	1	A550	x
2020	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2030	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
2040	DW RF CABLE W512B ATT-GEN	1305.5351.00	1	W512B	
2060	DW RF CABLE W536 SRC	1305.5339.00	1	W536	
2070	DW RF CABLE W513 SRC OUT	1305.5500.00	1	W513	
2090	PD INSTALLATION INSTRUCTION	1305.5322.00	1		
DRAWING	1164.0409.00 (OPTION R&S ZVA50-B31 REC.ATTENUATOR PORT 1 1302.5716.02) (OPTION R&S ZVA50-B32 REC.ATTENUATOR PORT 2 1302.5722.02)				
2110	ZE ATTENUATOR 35 DB	1170.0065.03	1	A550	x
2120	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2130	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
2140	DW RF CABLE W507A ATT-REC	1305.5374.00	1	W507A	
2160	DW RF CABLE W508 MEAS	1305.3568.00	1	W508	
2170	DW RF CABLE W506 MEAS IN	1305.5497.00	1	W506	
2190	PD INSTALLATION INSTRUCTION	1305.5322.00	1		
DRAWING	1164.0409.00 (OPTION R&S ZVA50-B33 REC.ATTENUATOR PORT 3 1302.5739.02) (OPTION R&S ZVA50-B34 REC.ATTENUATOR PORT 4 1302.5745.02)				
2110	ZE ATTENUATOR 35 DB	1170.0065.03	1	A550	x
2120	VS DIN6900-M2.5X6 -A2	1148.3059.00	2		
2130	DY ATT-CTRL_CABLE 90	1164.0244.00	1	W550	
2140	DW RF CABLE W507B ATT-REC	1305.5380.00	1	W507B	
2160	DW RF CABLE W508 MEAS	1305.5368.00	1	W508	
2170	DW RF CABLE W506 MEAS IN	1305.5497.00	1	W506	
2190	PD INSTALLATION INSTRUCTION	1305.5322.00	1		



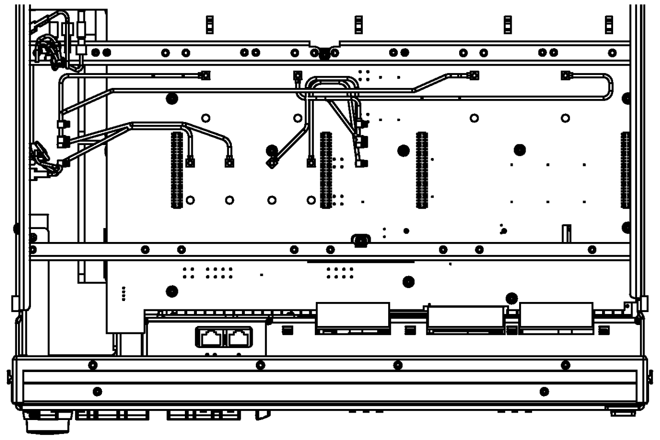
MOD 08 = 8GHZ - 2 PORT
MOD 09 = 8GHZ - 3 PORT
MOD 10 = 8GHZ - 4 PORT
MOD 24 = 24GHZ - 2 PORT
MOD 25 = 24GHZ - 3 PORT
MOD 26 = 24GHZ - 4 PORT
MOD 40 = 40GHZ - 2 PORT
MOD 41 = 40GHZ - 3 PORT
MOD 42 = 40GHZ - 4 PORT
MOD 43 = 40GHZ - 2 PORT 2.4mm
MOD 45 = 40GHZ - 4 PORT 2.4mm
MOD 50 = 50GHZ - 2 PORT
MOD 52 = 50GHZ - 4 PORT

for POS. 140 to POS. 263 see next pages

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*		
ROHDE&SCHWARZ	Benennung / *Designation* ZVA NETWORK ANALYZER		Sprache / *Lang.* en	Aei. / *C.I.* 07.00 — Blatt / *Sh.* 1
ZVA	Datum *Date* 2009-04-16	Abteilung *Dept.* 1ESK — Name *Name* RN	Zeichn.Nr. / *Drawing No.* 1145.1110.01 D	



VIEW A

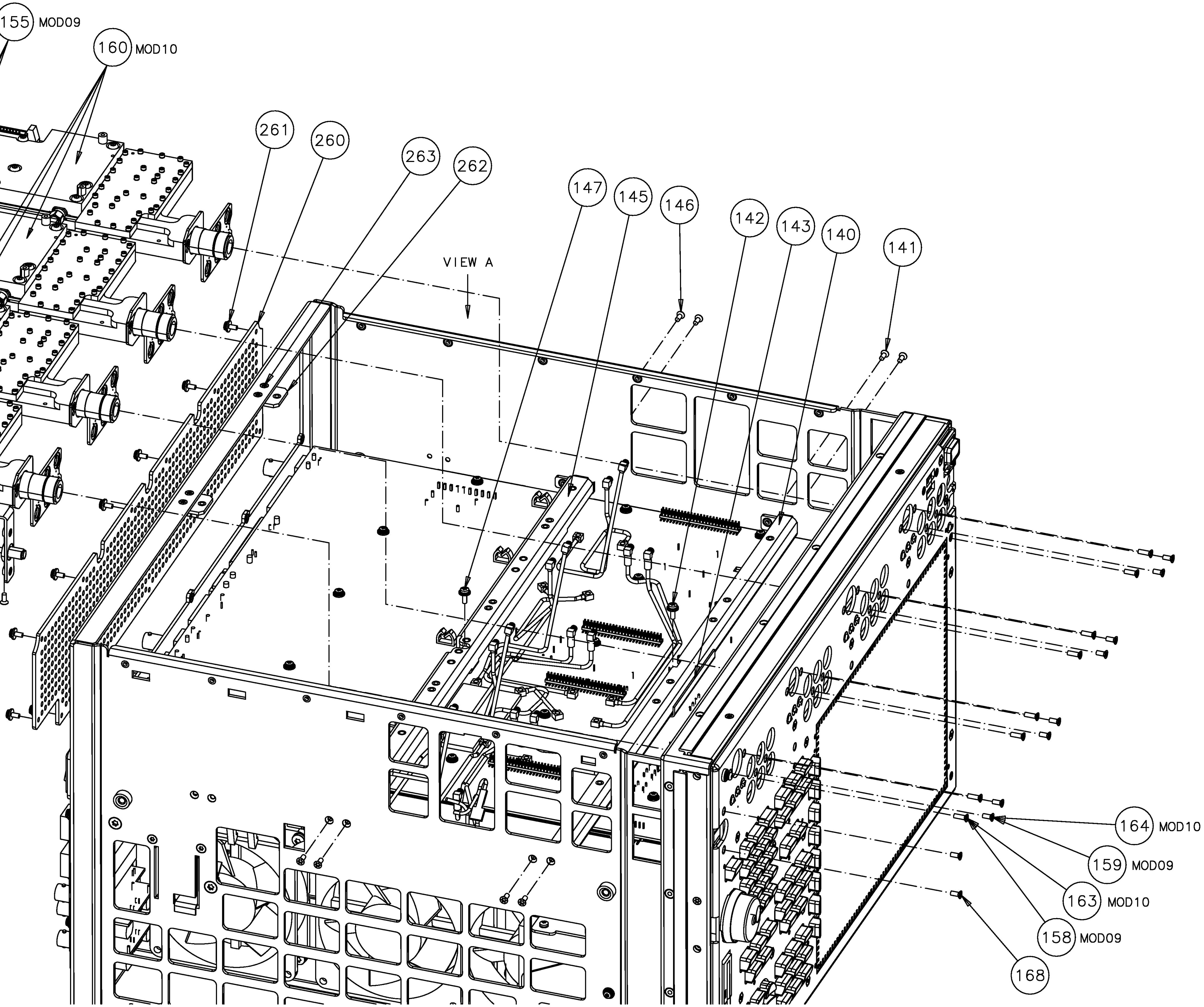


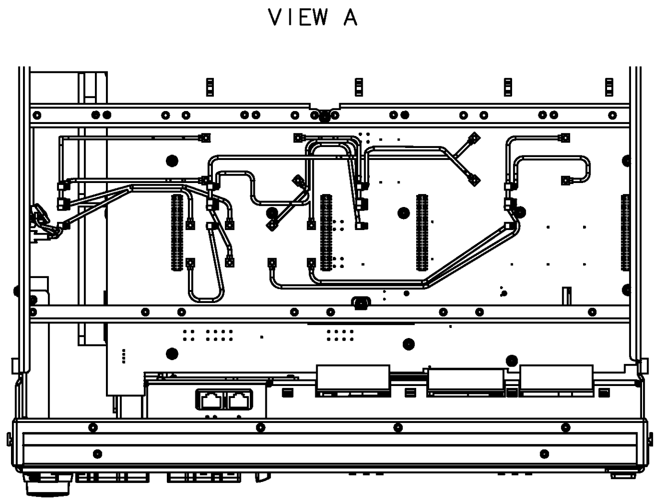
152 see connector designation of cables and motherboard for cable mounting

THIS PAGE IS ONLY FOR MOD08

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

Projektions-methode
Projection Method



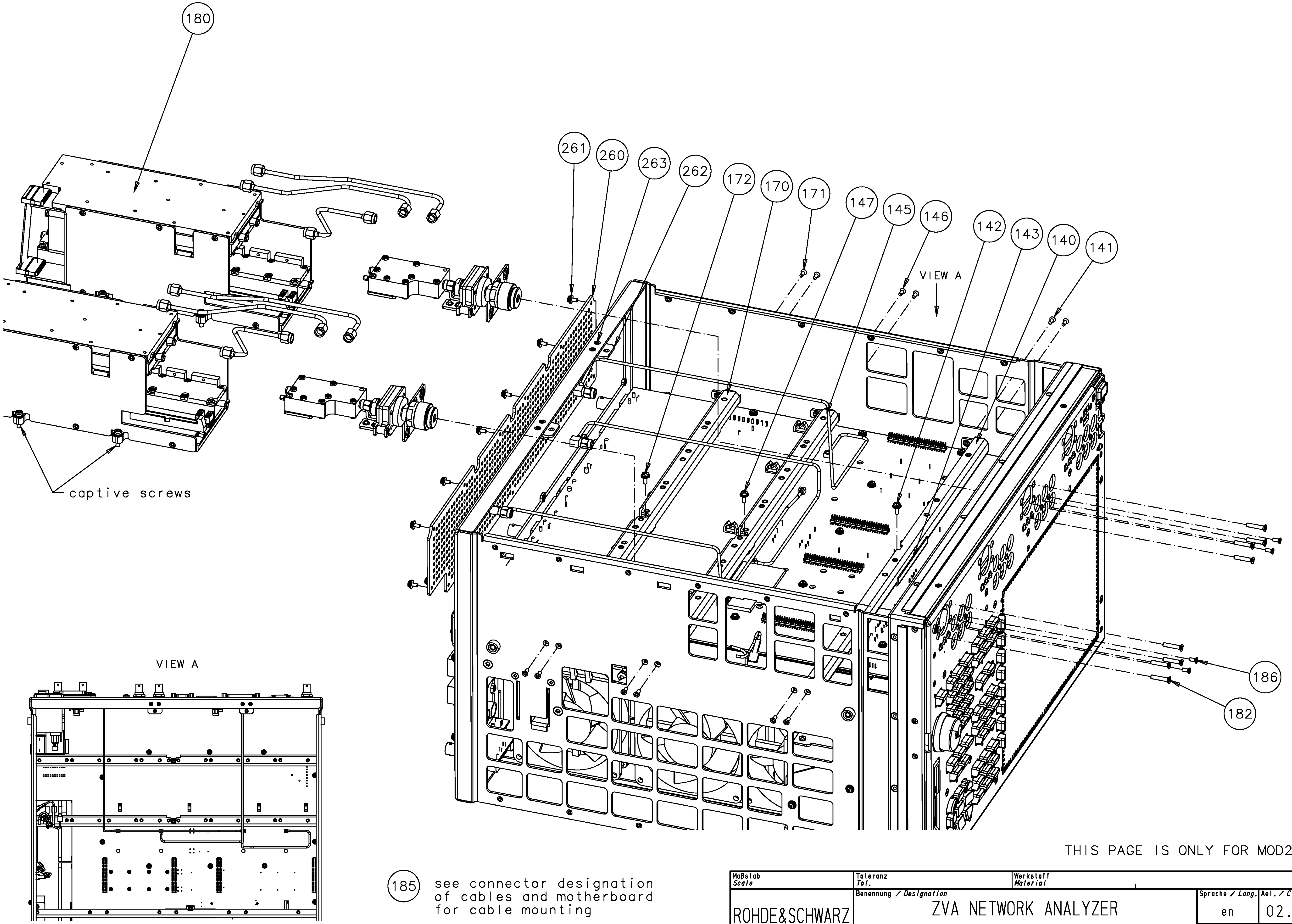


157 MOD09, 162 MOD10: see connector designation of cables and motherboard for cable mounting

THIS PAGE IS ONLY FOR MOD09, 10

Projektions-methode / Projection Method

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

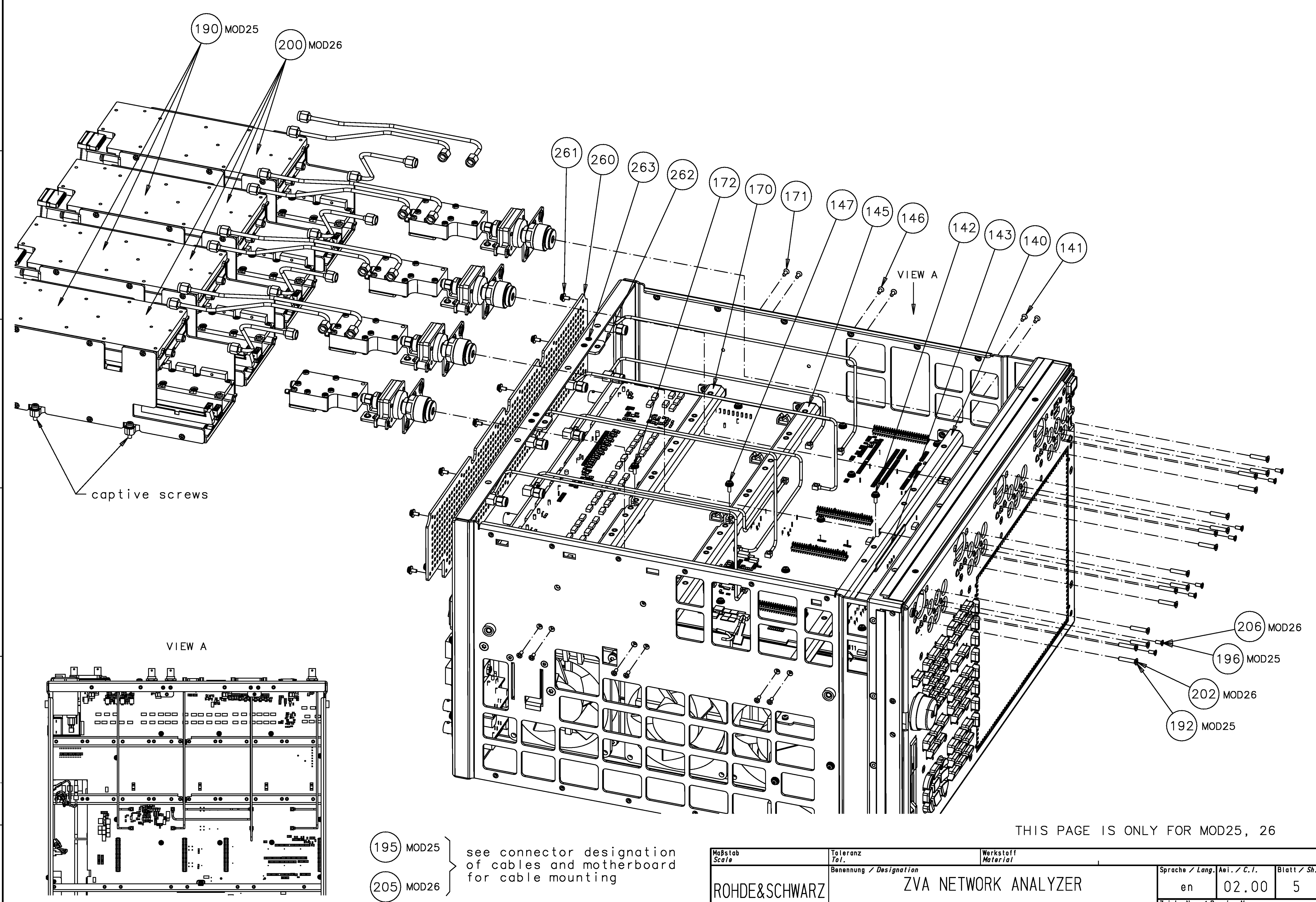


THIS PAGE IS ONLY FOR MOD24

185 see connector designation of cables and motherboard for cable mounting

Projektionsmethode
Projection Method

Maßstab Scale	Toleranz Tol.		Werkstoff Material			
ROHDE&SCHWARZ	Benennung / Designation ZVA NETWORK ANALYZER			Sprache / Lang. en	Aei. / C.I. 02.00	Blatt / Sh. 4
				Zeichn.Nr. / Drawing No. 1145.1110.01 D		
ZVA	Datum Date 2006-10-25	Abteilung Dept. 1ESK	Name Name Wn			

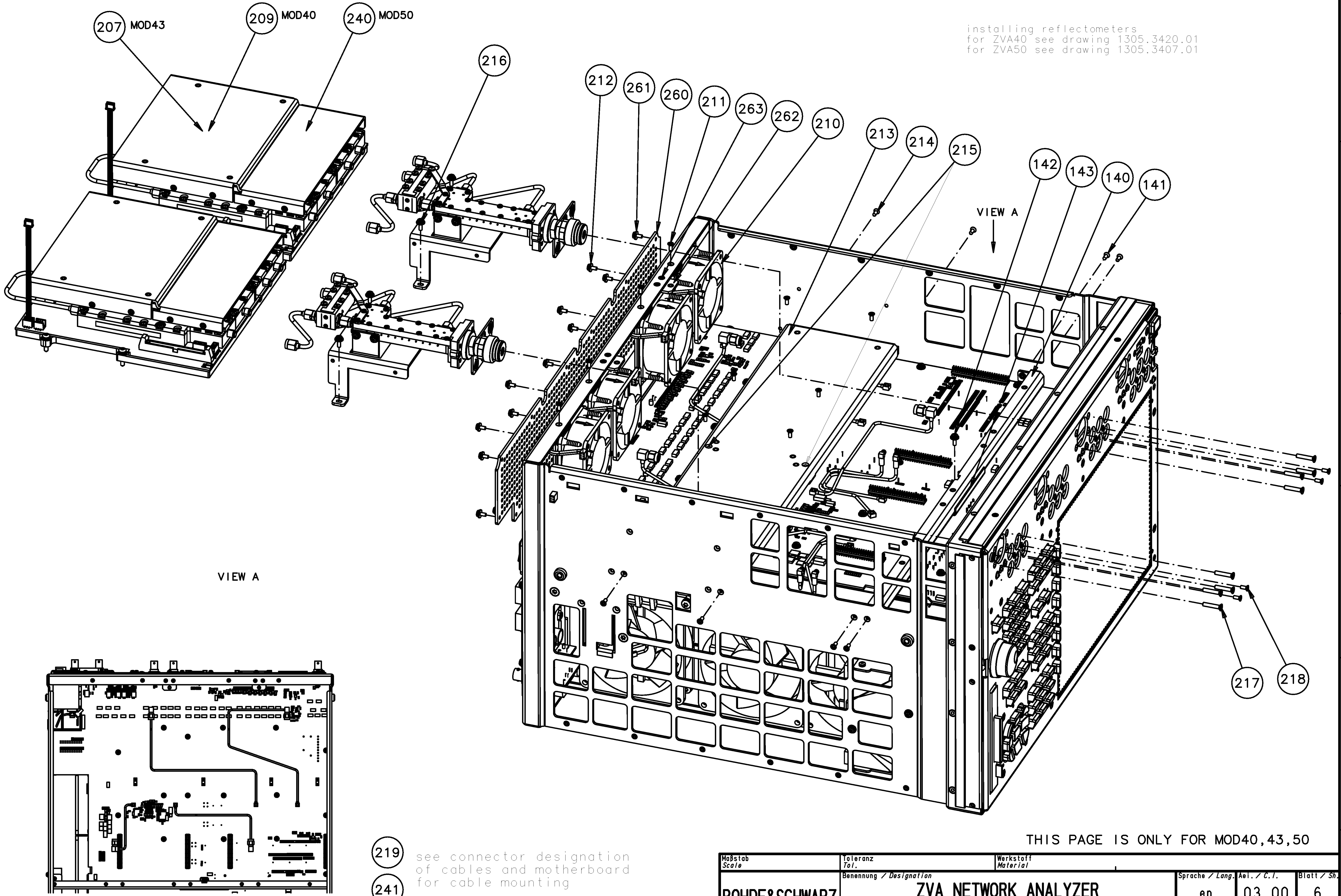


THIS PAGE IS ONLY FOR MOD25, 26

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

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: ZVA NETWORK ANALYZER	Sprache / Lang.: en	Aei. / C.I.: 02.00	Blatt / Sh.: 5
ZVA	Datum / Date: 2006-10-26	Abteilung / Dept.: 1ESK	Name / Name: Wn	Zeichn.Nr. / Drawing No.: 1145.1110.01 D

Projektions-methode / Projection Method

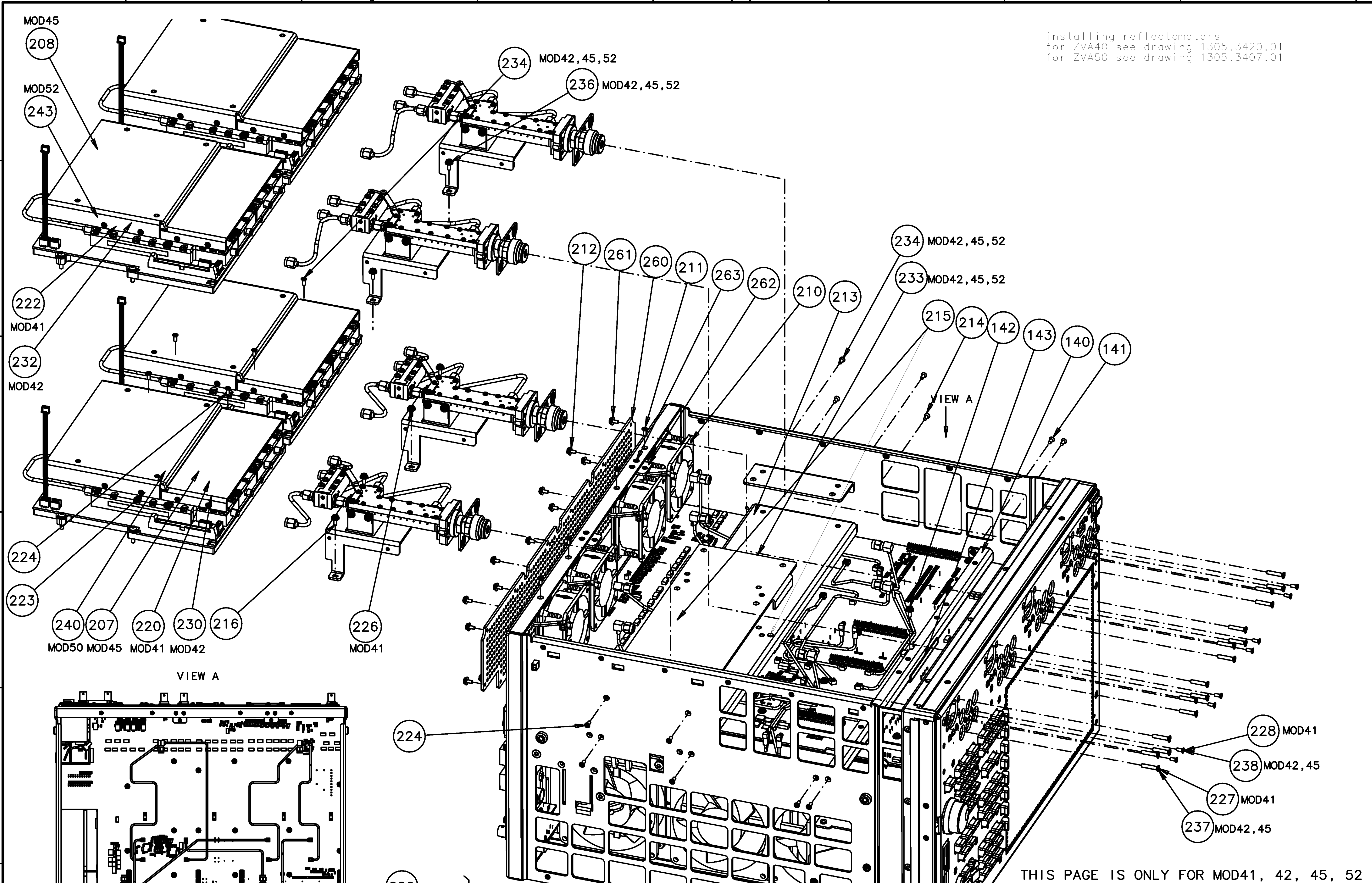


THIS PAGE IS ONLY FOR MOD40,43,50

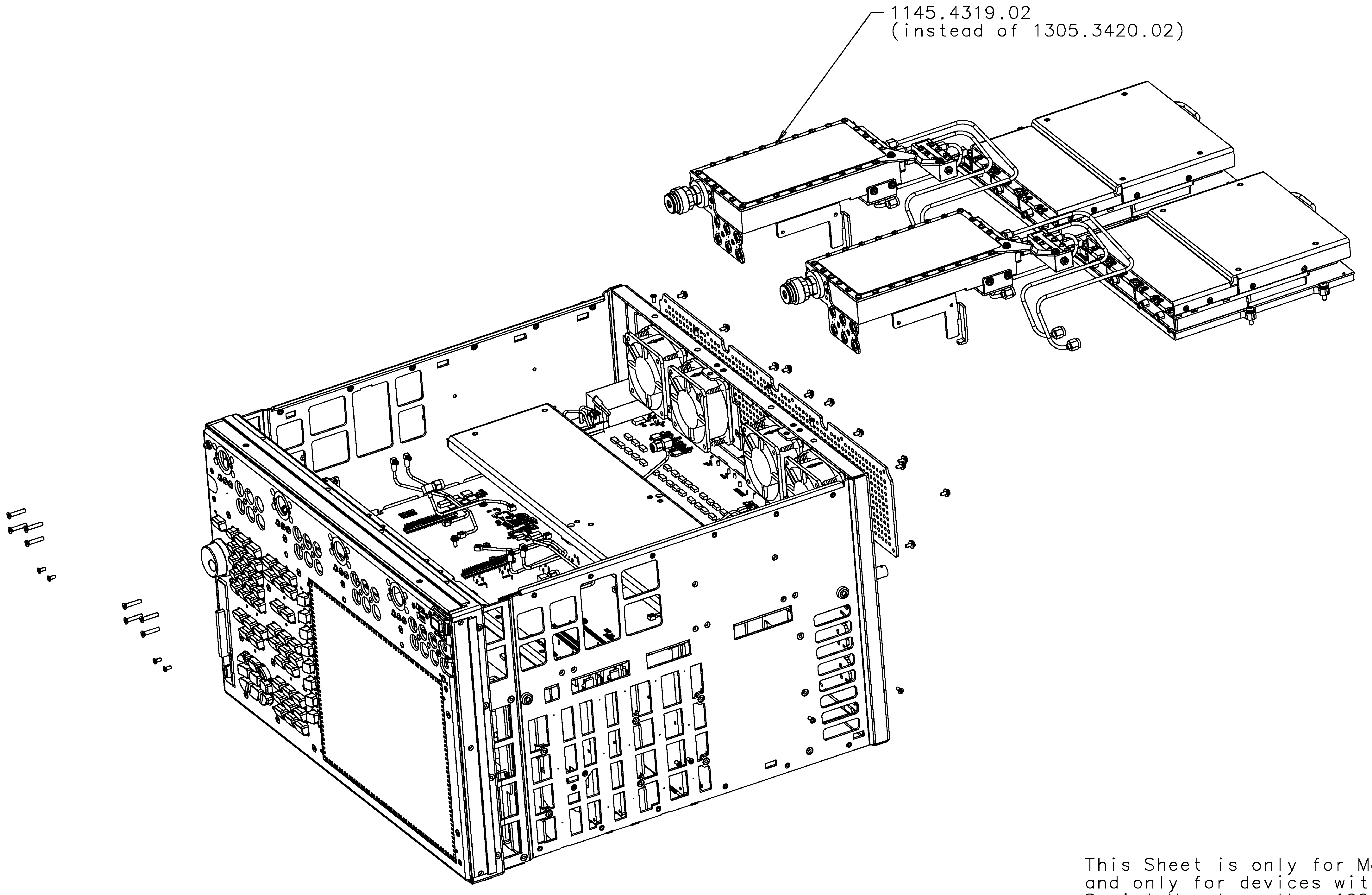
219 241 see connector designation of cables and motherboard for cable mounting

Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: ZVA NETWORK ANALYZER	Sprache / *Lang.*: en	Aei. / *C.I.*: 03.00	Blatt / *Sh.*: 6
ZVA	Datum / *Date*: 2007-04-23; Abteilung / *Dept.*: 1ESK; Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1145.1110.01 D		



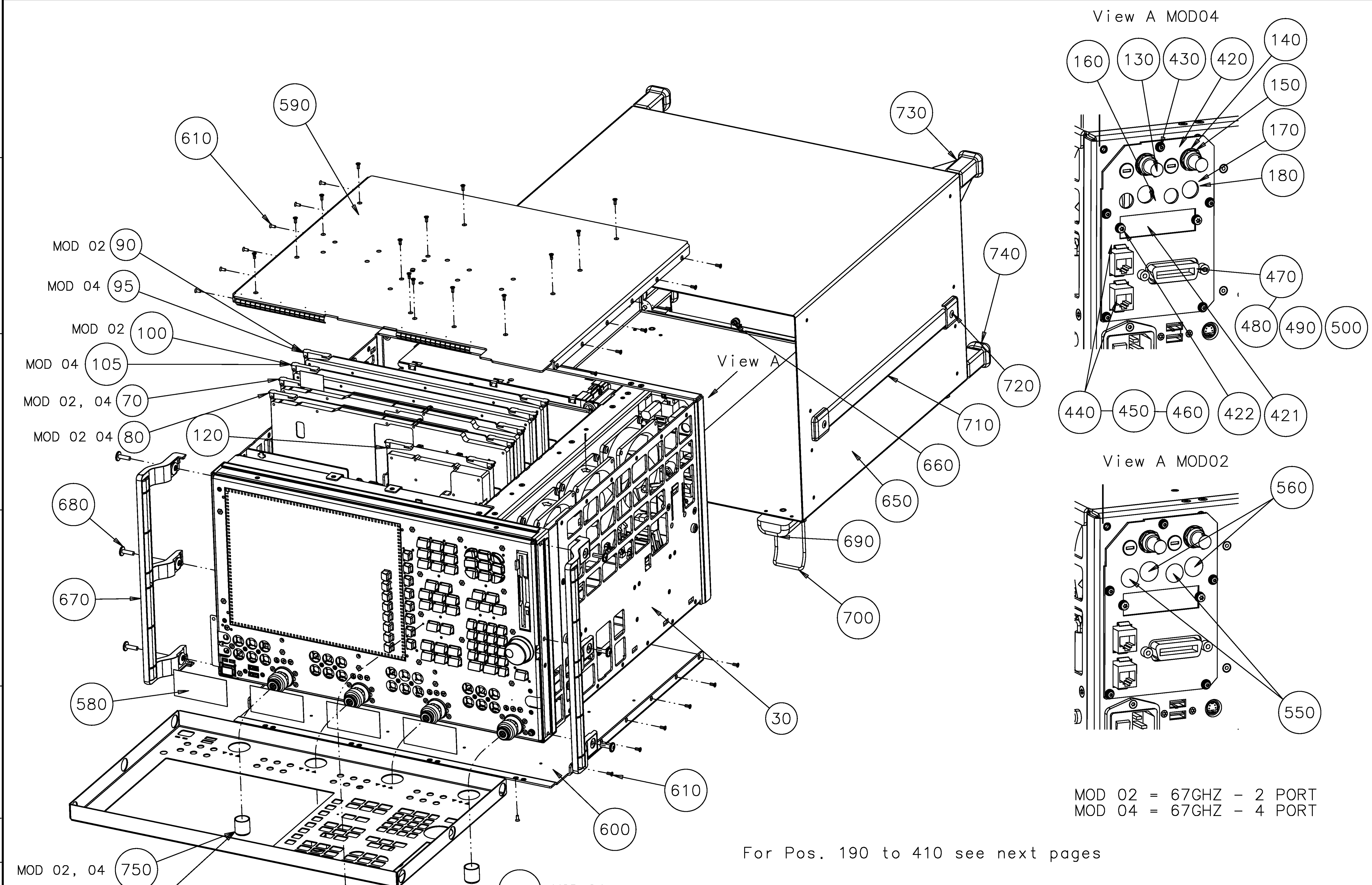
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: ZVA NETWORK ANALYZER	Sprache / Lang.: en	Aei. / C.I.: 03.00	Blatt / Sh.: 7
ZVA	Datum / Date: 2007-04-23	Abteilung / Dept.: 1ESK	Name: LA	Zeichn.Nr. / Drawing No.: 1145.1110.01 D



Projektions-methode
Projection Method

This Sheet is only for Mod40
and only for devices with
Serial No. less than 100140

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: ZVA NETWORK ANALYZER		Sprache / Lang.: en	Aei. / C.I.: 01.00	Blatt / Sh.: 8
ZVA	Datum / Date: 2007-02-20	Abteilung / Dept.: 1ESK	Name: la	Zeichn.Nr. / Drawing No.: 1145.1110.01	D

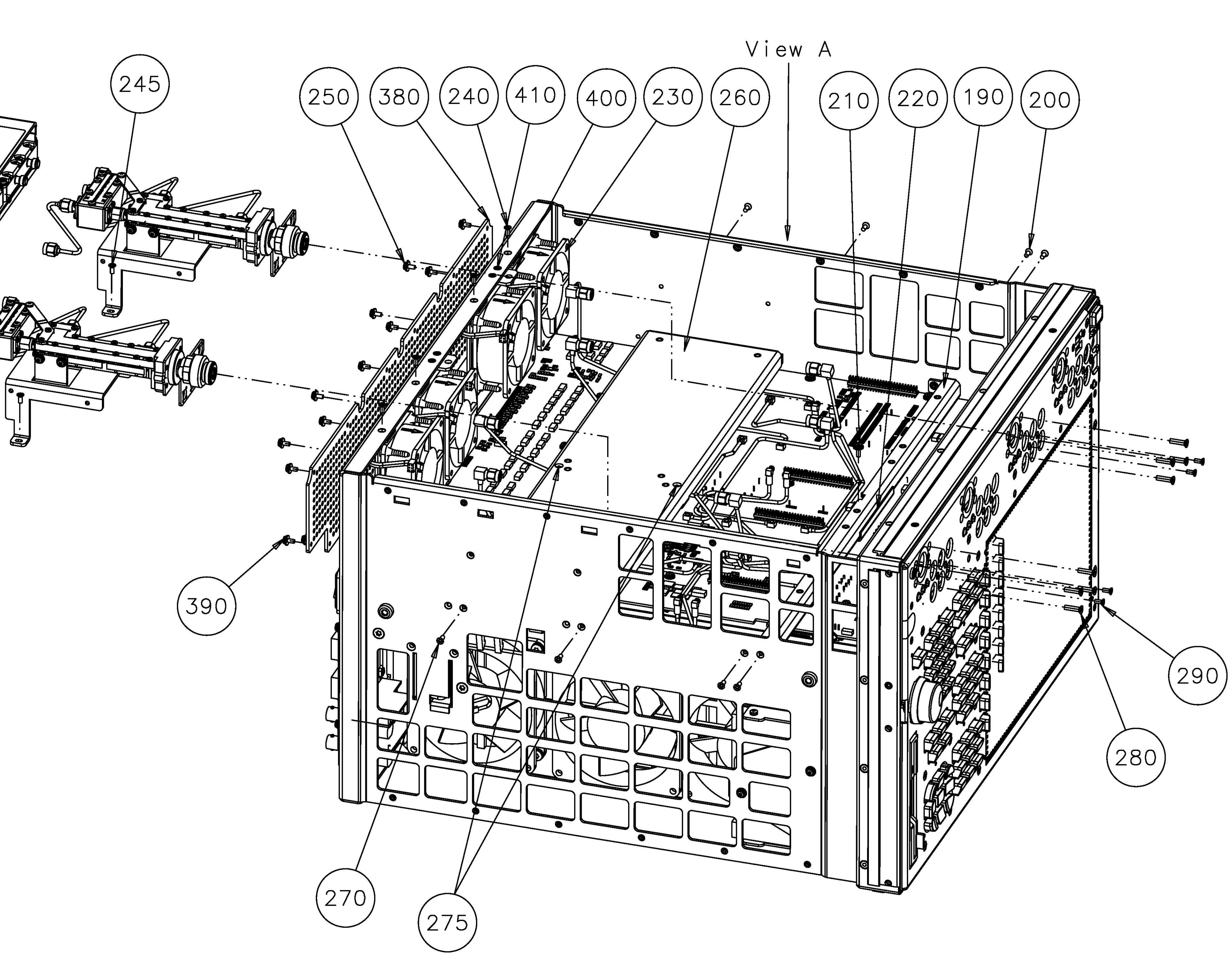


For Pos. 190 to 410 see next pages

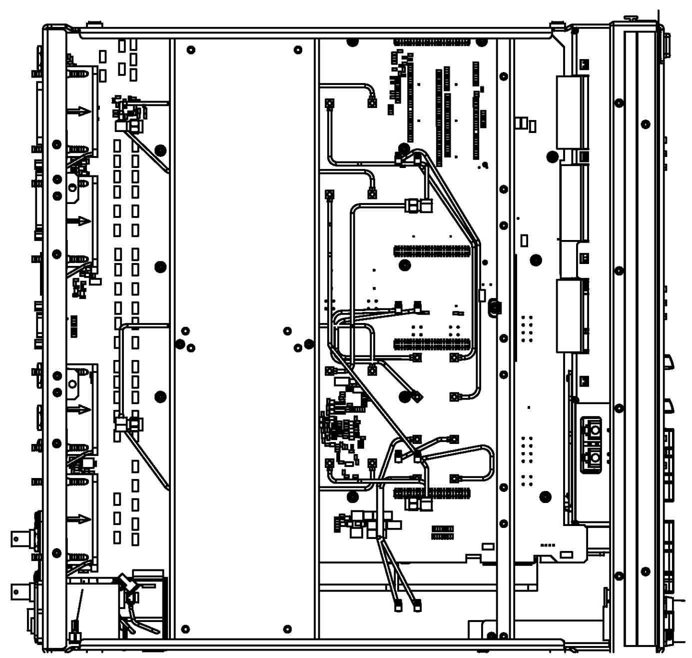
Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: ZVA67 NETWORK ANALYZER ZVA67 NETWORK ANALYZER		Sprache / Lang.: de en	Aei. / C.I.: 05.00	Blatt / Sh.: 1
ZVA	Datum / Date: 2009-06-24	Abteilung / Dept.: 1ESK	Name / Name: rn	Zeichn.Nr. / Drawing No.: 1305.7002.01	D

for installing reflectometers see 1305.6241.01



View A

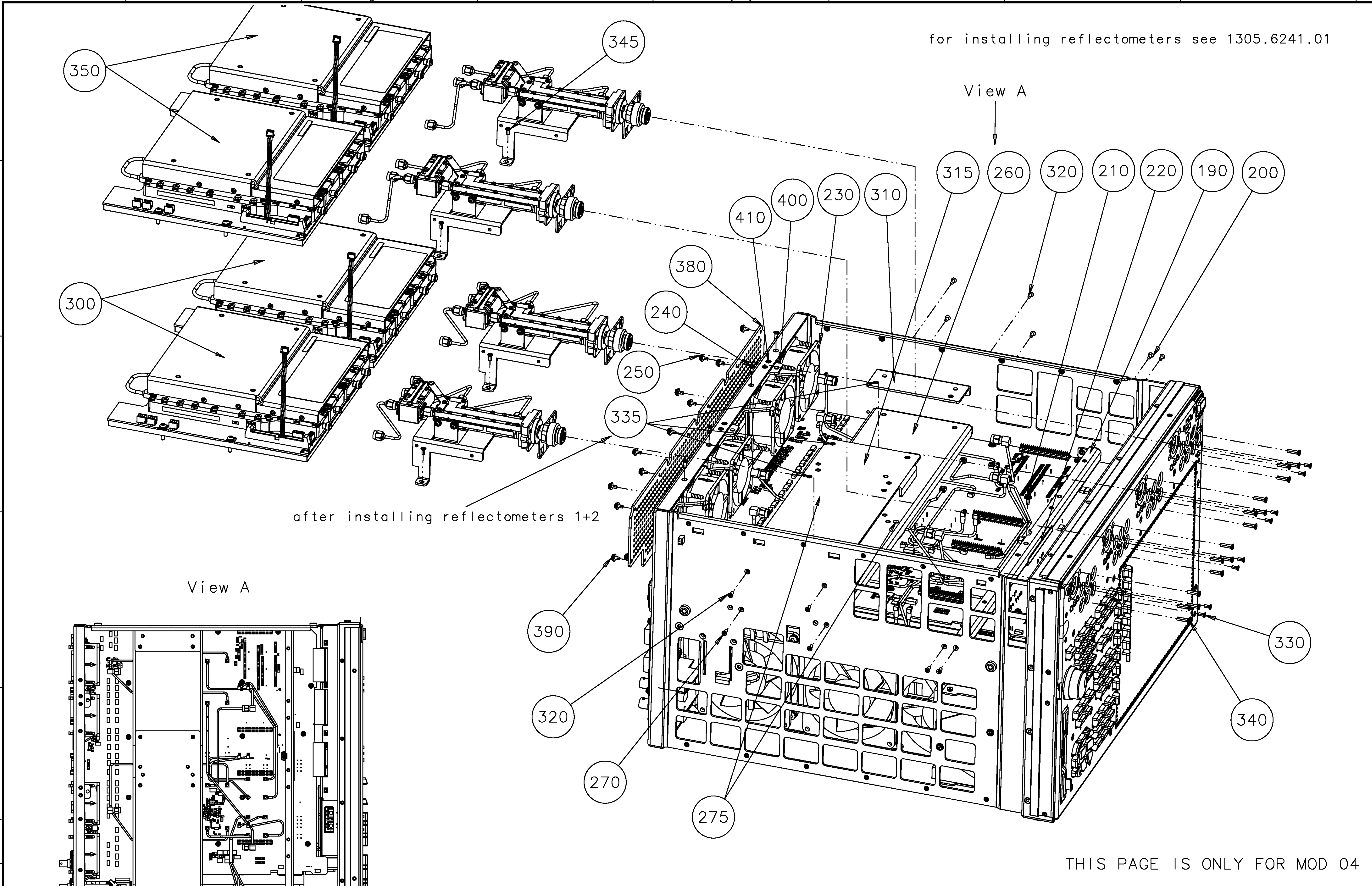


360 see conector designation of cables and motherboard for cabel mounting
View A is not complete!

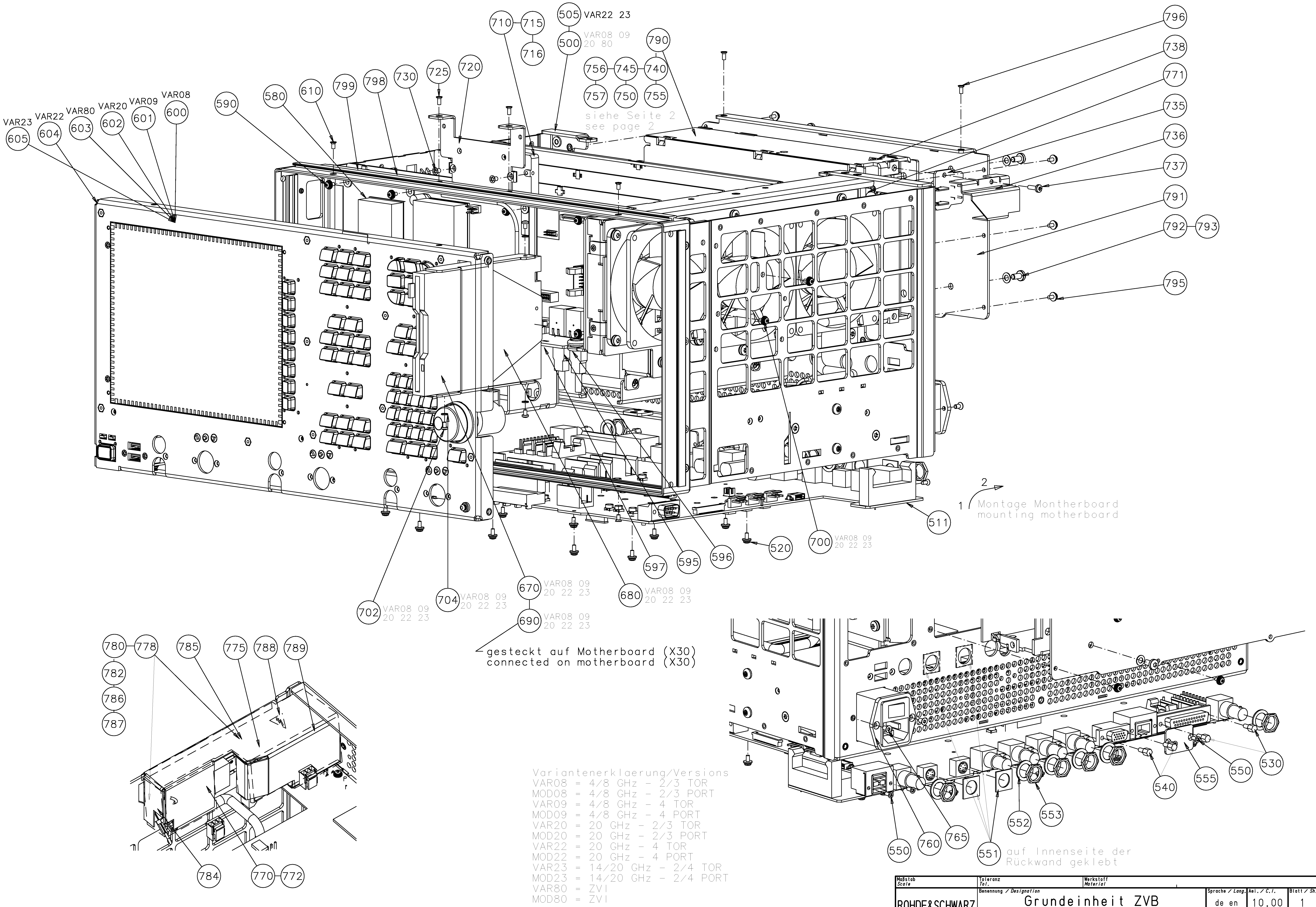
THIS PAGE IS ONLY FOR MOD 02

Projektions-methode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: ZVA67 NETWORK ANALYZER ZVA67 NETWORK ANALYZER		Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 2
ZVA	Datum / Date: 2008-12-18	Abteilung / Dept.: 1ESK	Name / Name: rn	Zeichn.Nr. / Drawing No.: 1305.7002.01	D



Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: ZVA67 NETWORK ANALYZER ZVA67 NETWORK ANALYZER		Sprache / Lang.: de en	Aei. / C.I.: 02.00
			Blatt / Sh.: 3	
ZVA	Datum / Date: 2008-12-18	Abteilung / Dept.: 1ESK	Name / Name: rn	Zeichn.Nr. / Drawing No.: 1305.7002.01 D



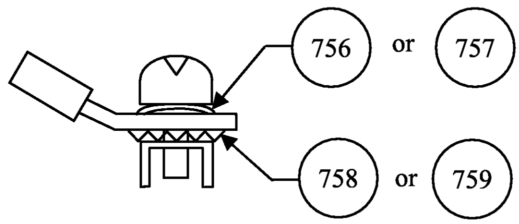
Projektionsmethode / Projection Method

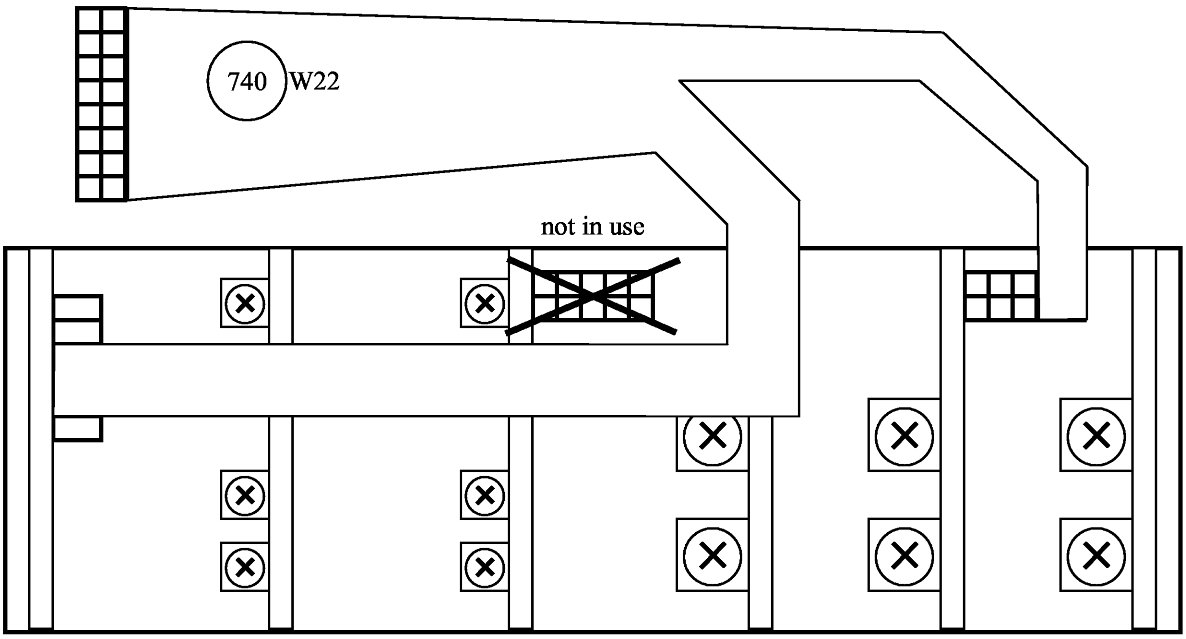
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Grundeinheit ZVB / Fundamental Unit		Sprache / Lang.: de en	Ausg. / C.I.: 10.00 — Blatt / Sh.: 1
	Datum / Date: 2009-05-19	Abteilung / Dept.: 1ESK — Name: Wn	Zeichn.Nr. / Drawing No.: 1145.1290.01	D

Verdrahtungsplan Netzteil
wire connections for power supply

Pos. 755		Pos. 755		Pos. 750		Pos. 745		Pos. 750	
W25 (Cable 10p)		W25 (Cable 10p)		W24 (Cable 8p)		W23 (Cable 6p)		W24 (Cable 8p)	
12V		6,5V		8V		3,6V		5,2V	
+	+12V (red)	+	+6V (orange)						
-	GND(+12V) (black)	-	GND(+6V) (black)						
+	GND(-12V) (black)	+	GND(-6V) (black)	+	+8V (orange)	+	+3,3V (red)	+	+5V (red)
-	-12V (blue)	-	-6V (violet)	-	GND(+8V) (black)	-	GND(+3,3V) (black)	-	GND(+5V) (black)

Connection for upper table:





Maßstab: / *Scale:*	Toleranz: / *Tol.:*	Rauht.: /*Roughn.:*	Kanten: / *Edges:*	Werkstoff: / *Material:*	Werknormen: / *Company Standards:*

ROHDE&SCHWARZ

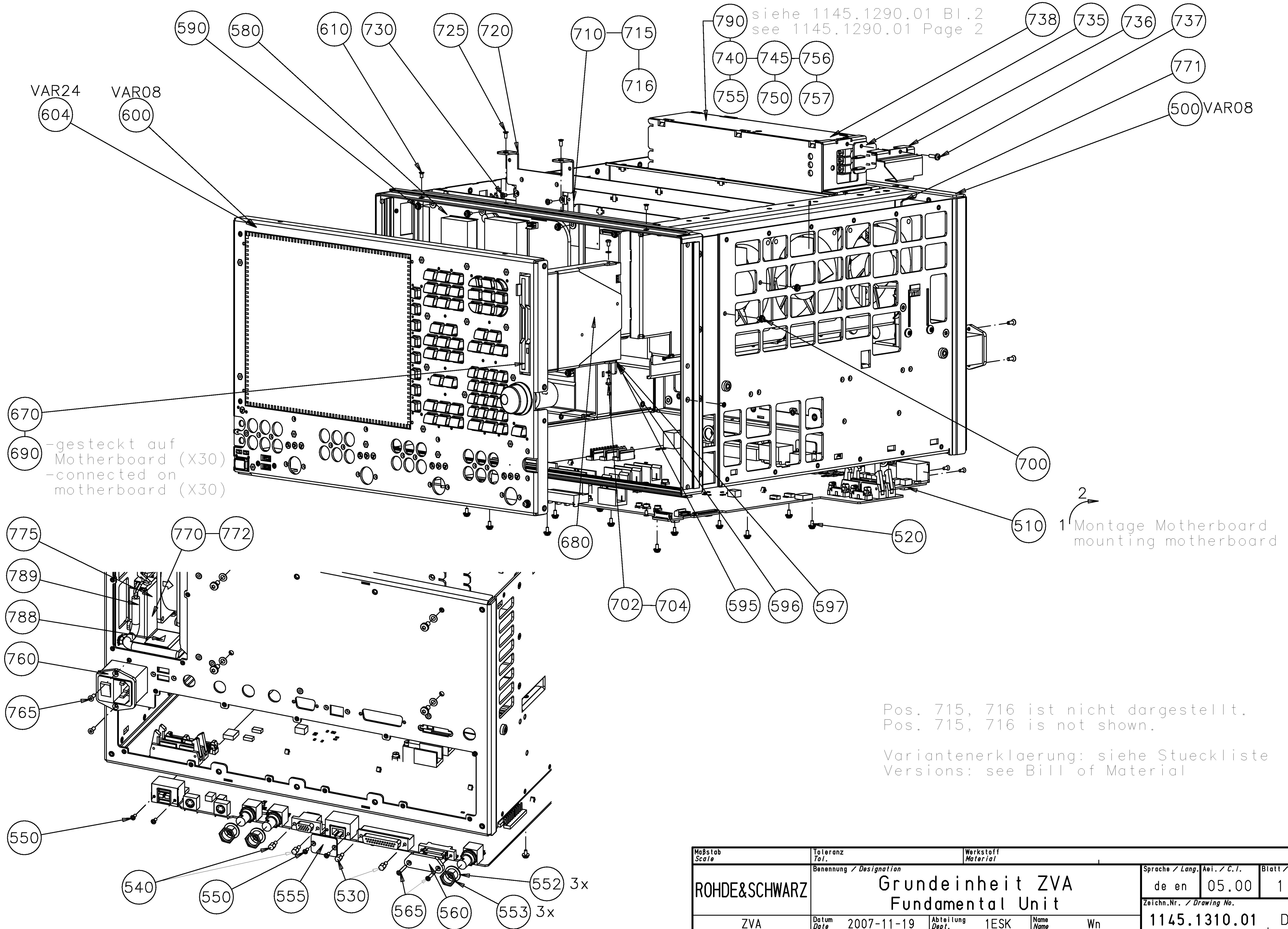
Benennung: / *Designation:* Grundeinheit ZVB / Fundamental Unit

Sprache: / *Lang.:* de — Aei: / *C.I.:* 04.00 — Blatt: / *Sh.:* 2

Typ: / *Type:* ZVB — Datum: / *Date:* 25.03.08 — Abteilung: / *Dept.:* 1ESK — Name: / *Name:* Wn

1. Z.: / *used in:*

Zeichn. Nr.: / *Drawing Nr.:* **1145.1290.01**

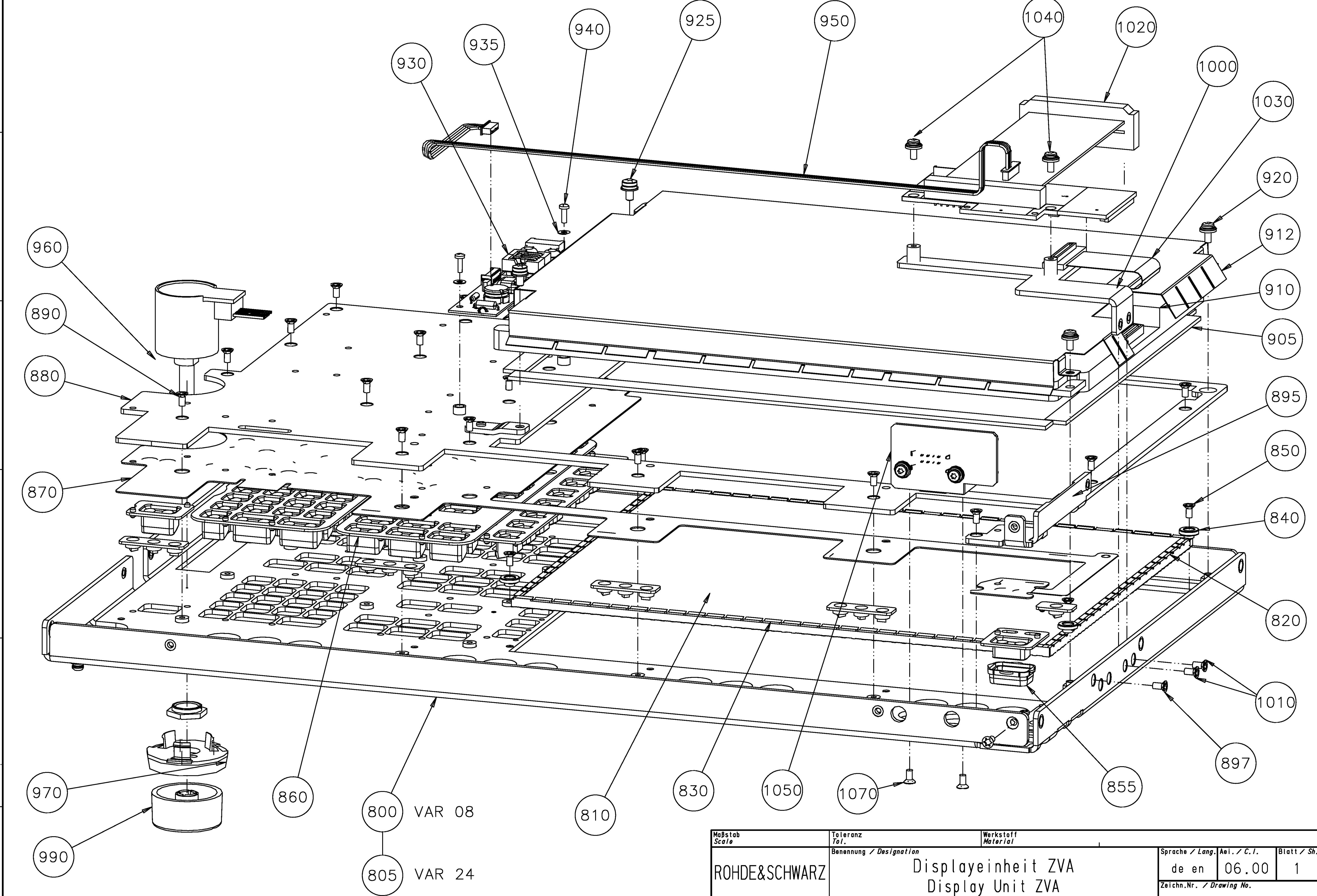


Pos. 715, 716 ist nicht dargestellt.
Pos. 715, 716 is not shown.

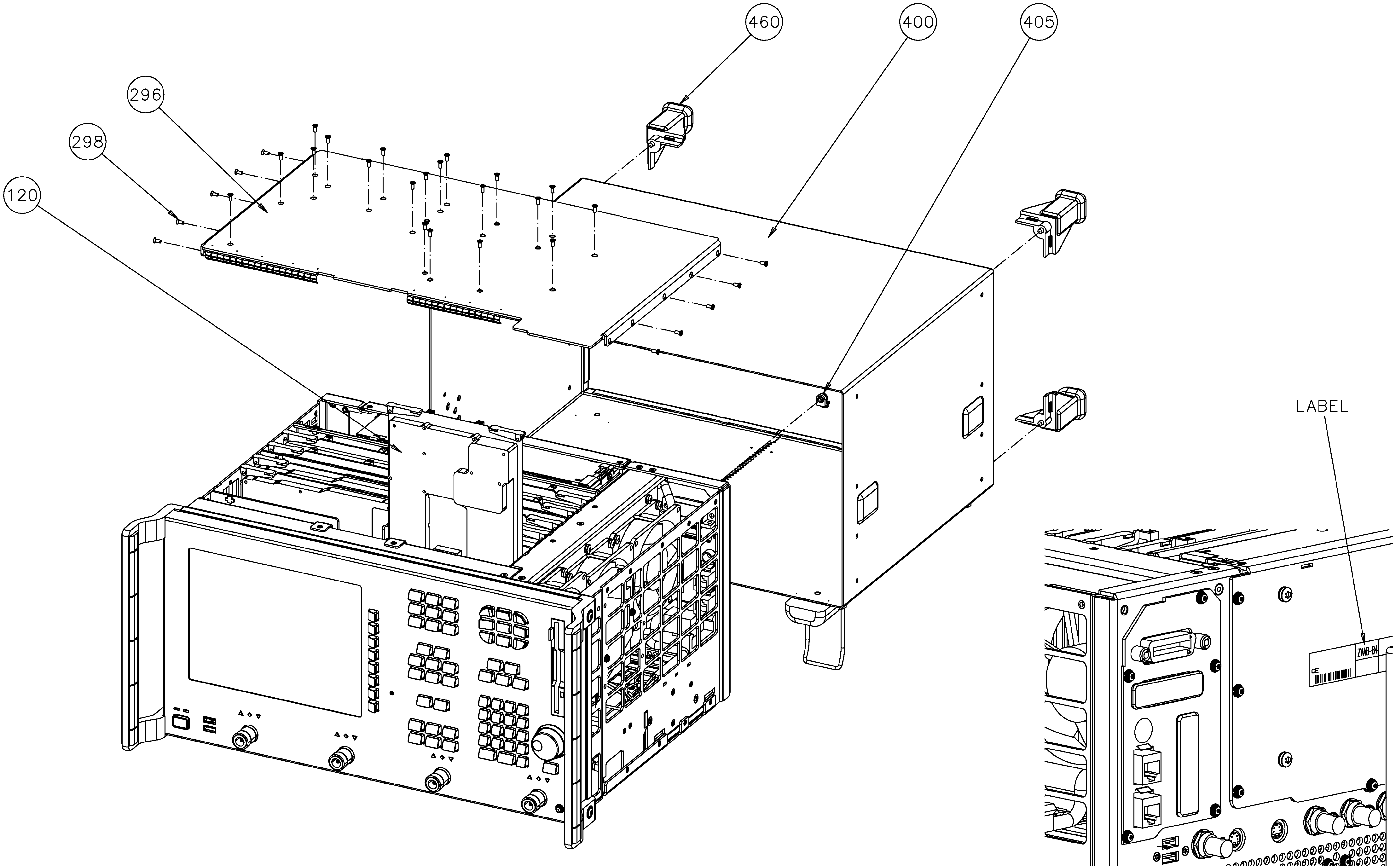
Variantenerklaerung: siehe Stueckliste
Versions: see Bill of Material

Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Grundeinheit ZVA Fundamental Unit		Sprache / Lang.: de en	Aei. / C.I.: 05.00 — Blatt / Sh.: 1
ZVA	Datum / Date: 2007-11-19	Abteilung / Dept.: 1ESK — Name: Wn	Zeichn.Nr. / Drawing No.: 1145.1310.01	D

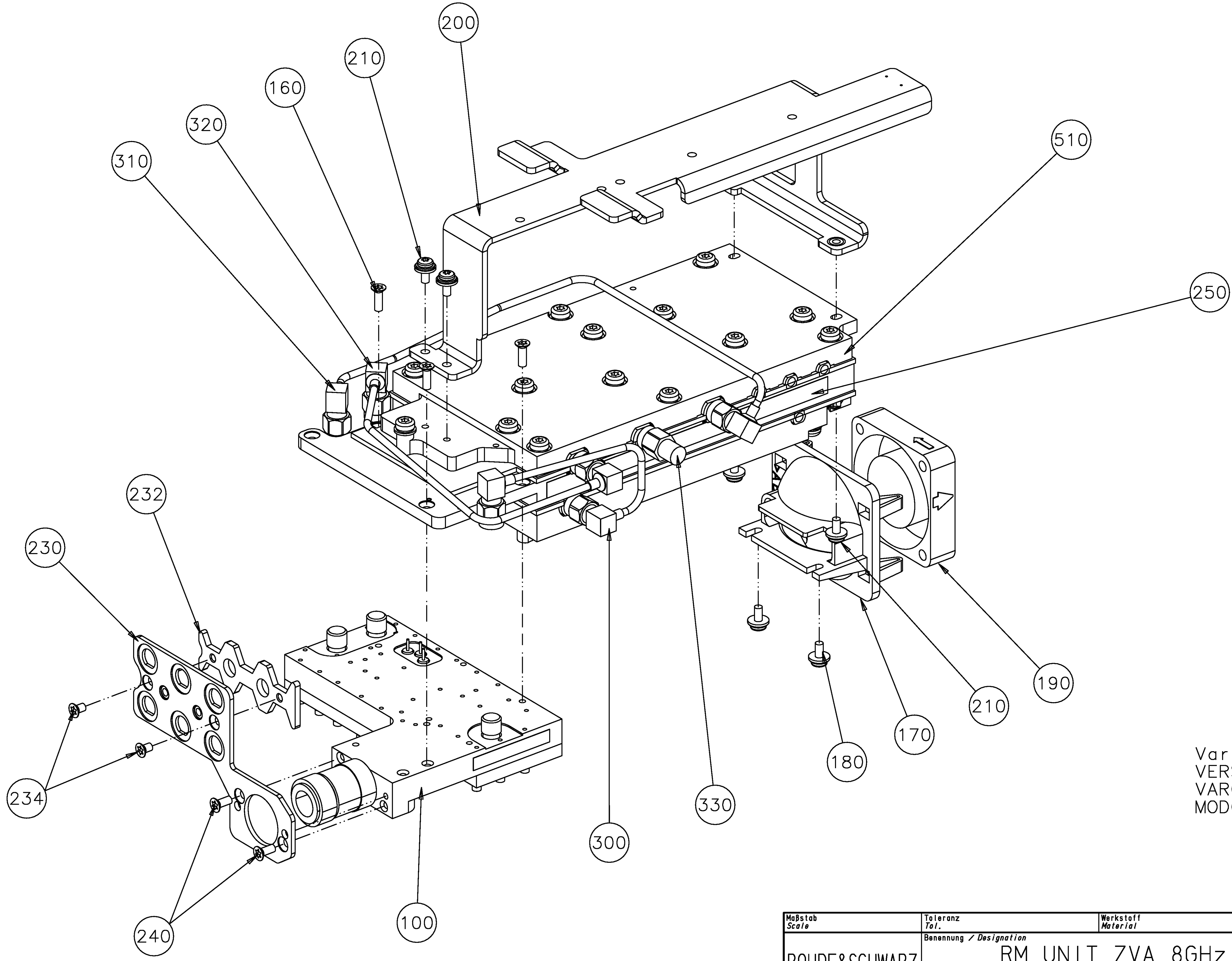


Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Displayeinheit ZVA / Display Unit ZVA		Sprache / Lang.: de en	Aei. / C.I.: 06.00 / Blatt / Sh.: 1
ZVA	Datum / Date: 2007-10-29	Abteilung / Dept.: 1ESK / Name: Wn	Zeichn.Nr. / Drawing No.: 1145.1390.01 D	



Projektions-methode
Projection Method

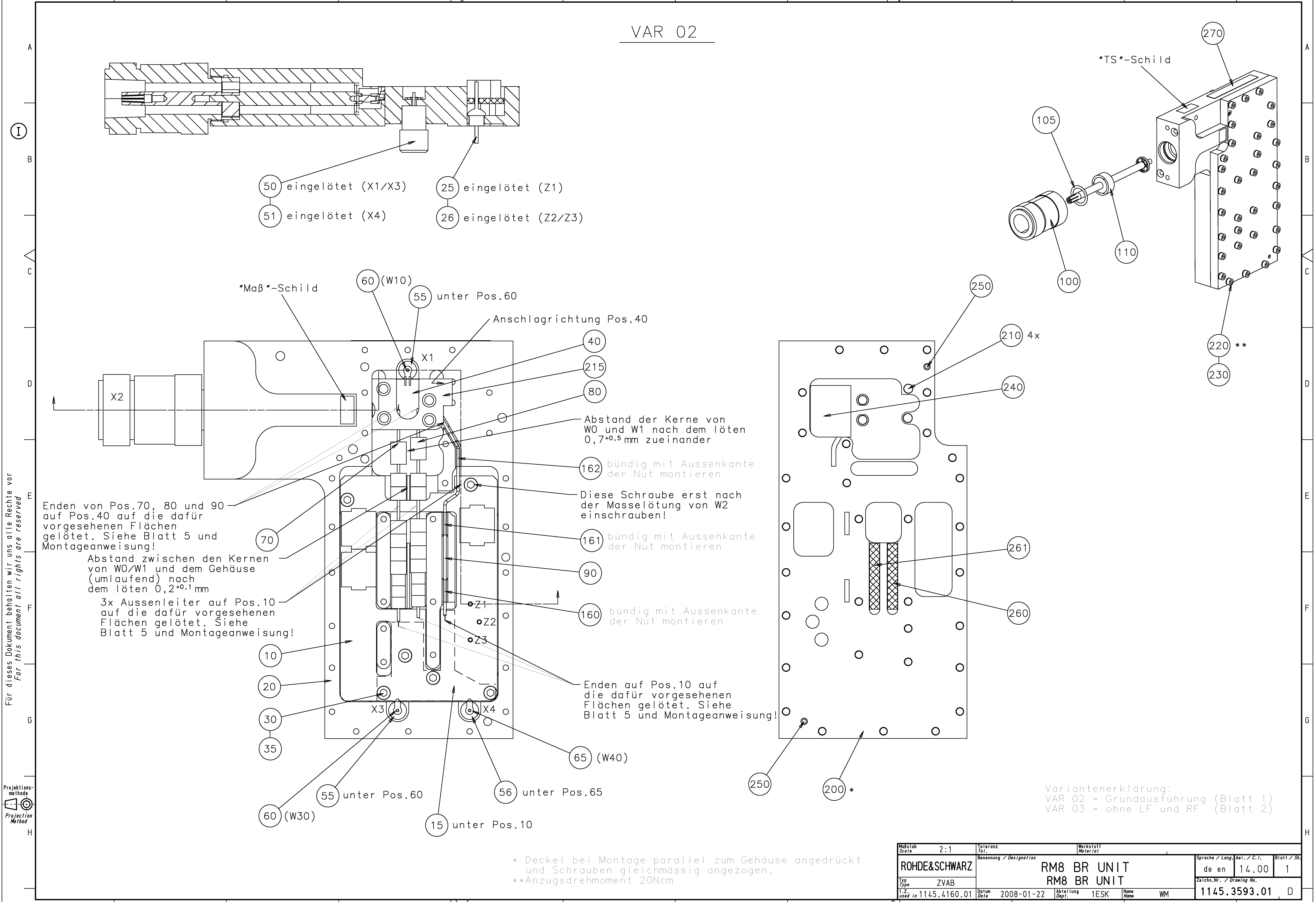
Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*				
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVAB-B4 INSTALL.INSTR.ZVAB-B4			Sprache / *Lang.*: en	Aei. / *C.I.*: 01.00	Blatt / *Sh.*: 1
	Datum / *Date*: 04.05.2004	Abteilung / *Dept.*: 1ESK	Name / *Name*: FR	Zeichn.Nr. / *Drawing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

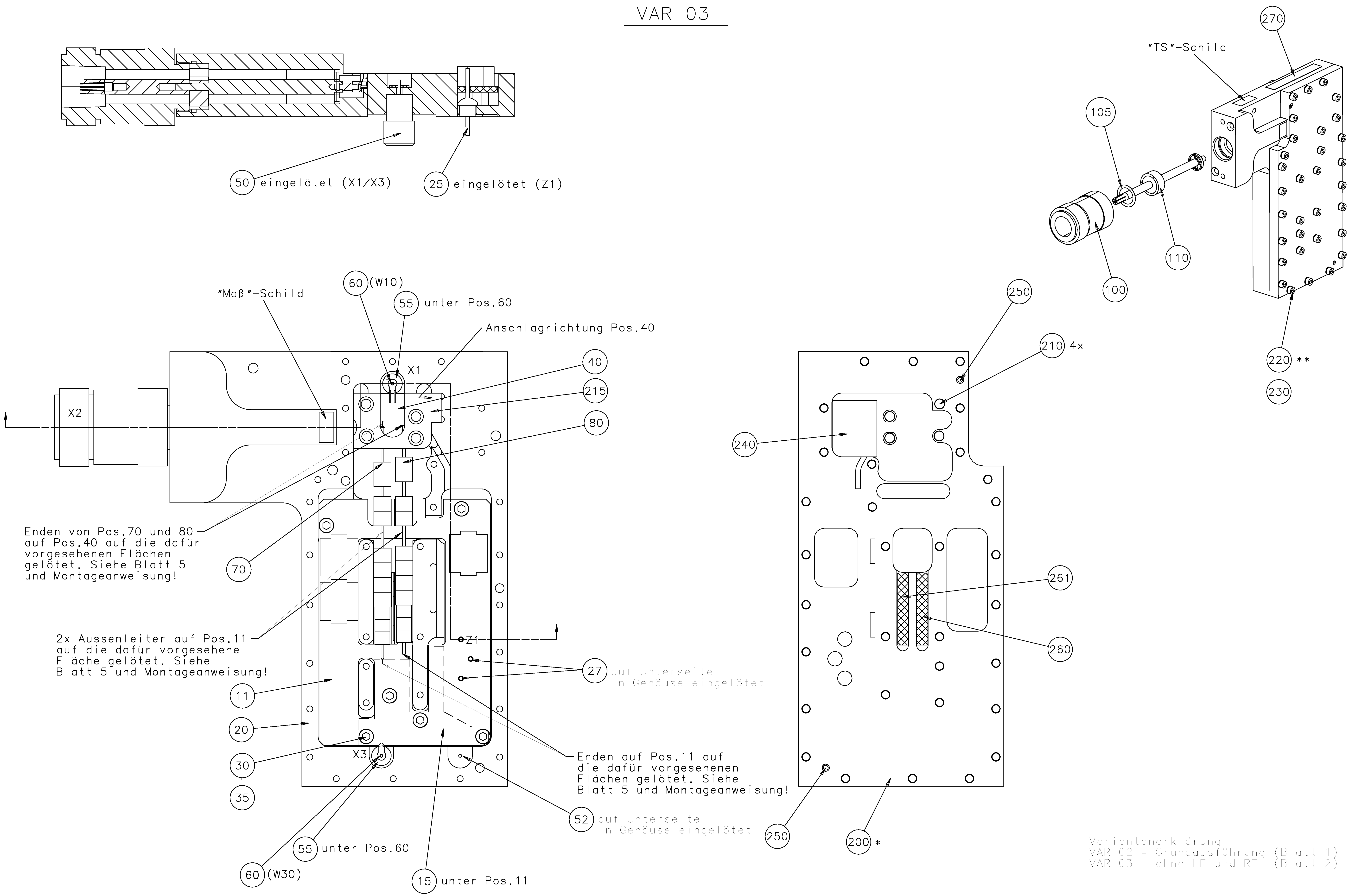


Variantenerklaerung/
VERSIONS:
VAR02 = Grundvariante
MOD02 = BASIC MODEL

Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: RM UNIT ZVA 8GHz / RM UNIT ZVA 8GHz	Sprache / Lang.: de en	Aei. / C.I.: 04.00
	Blatt / Sh.: 1		
	Datum / Date: 2007-10-18	Abteilung / Dept.: 1ESK	Name / Name: Wn
	Zeichn.Nr. / Drawing No.: 1145.4177.01 D		


VAR 02
50 eingelötet (X1/X3)
51 eingelötet (X4)
25 eingelötet (Z1)
26 eingelötet (Z2/Z3)
"TS"-Schild
270
105
110
100
220 **
230
"Maß"-Schild
60 (W10)
55 unter Pos.60
Anschlagrichtung Pos.40
40
215
80
X1
X2
Abstand der Kerne von W0 und W1 nach dem löten 0,7+0,5 mm zueinander
162 bündig mit Aussenkante der Nut montieren
Diese Schraube erst nach der Masselötung von W2 einschrauben!
161 bündig mit Aussenkante der Nut montieren
90
160 bündig mit Aussenkante der Nut montieren
Enden von Pos.70, 80 und 90 auf Pos.40 auf die dafür vorgesehenen Flächen gelötet. Siehe Blatt 5 und Montageanweisung!
70
Abstand zwischen den Kernen von W0/W1 und dem Gehäuse (umlaufend) nach dem löten 0,2+0,1 mm
3x Aussenleiter auf Pos.10 auf die dafür vorgesehenen Flächen gelötet. Siehe Blatt 5 und Montageanweisung!
Z1
Z2
Z3
10
20
30
35
X3
X4
Enden auf Pos.10 auf die dafür vorgesehenen Flächen gelötet. Siehe Blatt 5 und Montageanweisung!
65 (W40)
55 unter Pos.60
56 unter Pos.65
60 (W30)
15 unter Pos.10
250
210 4x
240
261
260
250
200 *
Variantenerklärung:
VAR 02 = Grundausführung (Blatt 1)
VAR 03 = ohne LF und RF (Blatt 2)
* Deckel bei Montage parallel zum Gehäuse angedrückt und Schrauben gleichmässig angezogen.
** Anzugsdrehmoment 20Ncm
Projektions-methode
Projection Method
Maßstab Scale 2:1
Toleranz Tol.
Werkstoff Material
ROHDE&SCHWARZ
Benennung / Designation RM8 BR UNIT RM8 BR UNIT
Typ Type ZVAB
i.Z. used in 1145.4160.01
Datum Date 2008-01-22
Abteilung Dept. 1ESK
Name WM
Sprache / Lang. de en
Ånl. / C.I. 14.00
Blatt / Sh. 1
Zeichn.Nr. / Drawing No. 1145.3593.01 D



Variantenerklärung:
VAR 02 = Grundausführung (Blatt 1)
VAR 03 = ohne LF und RF (Blatt 2)

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

Projektionsmethode / Projection Method

Maßstab / Scale: 2:1	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: RM8 BR UNIT RM8 BR UNIT		Sprache / Lang.: de en	Änd. / C.I.: 08.00	Blatt / Sh.: 2
Typ / Type: ZVAB			Zeichn.Nr. / Drawing No.: 1145.3593.01		D
i.Z. used in: 1145.4160.01	Datum / Date: 2008-01-22	Abteilung / Dept.: 1ESK	Name: WM		

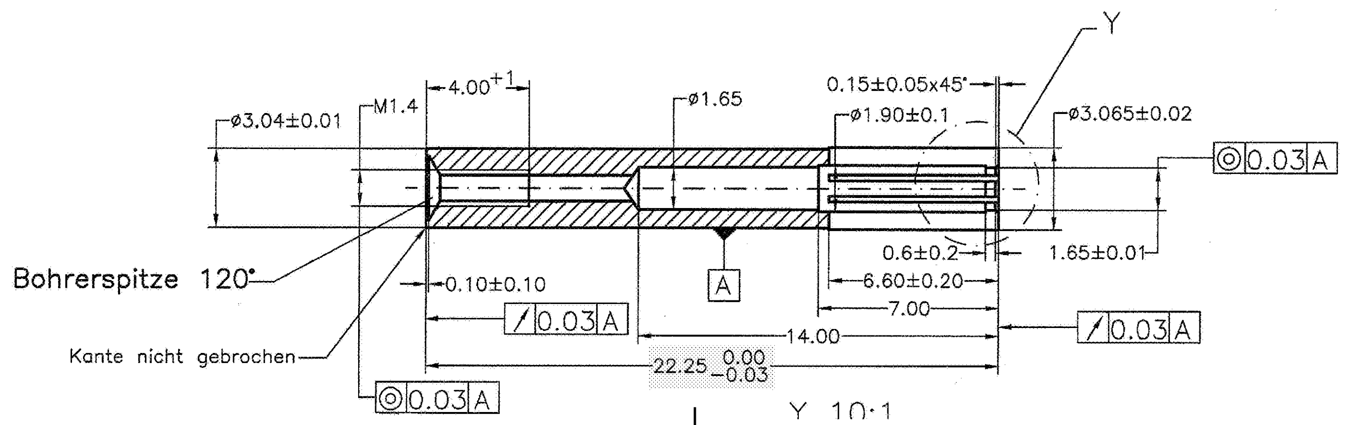
MIL-STD-348

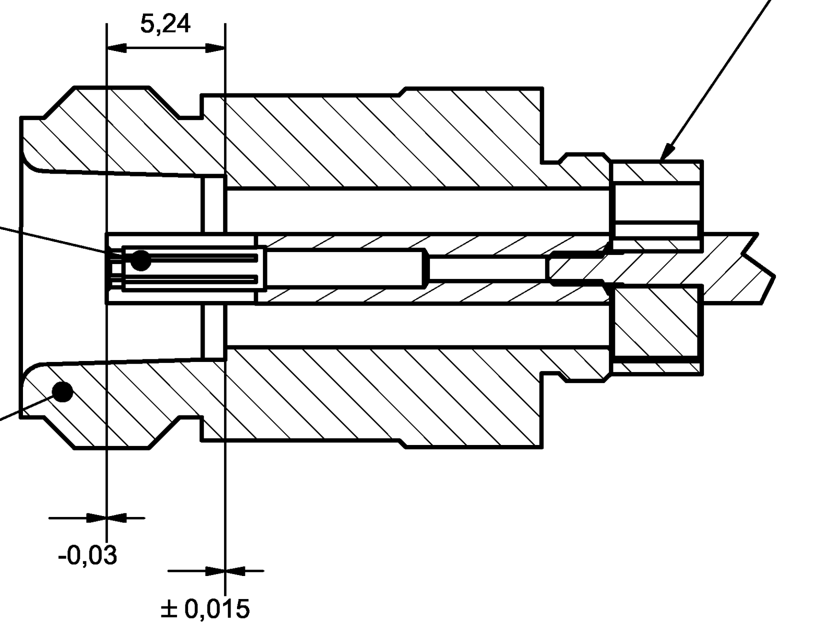
Interface, test connector, series N, socket contact

Toleranzbereich

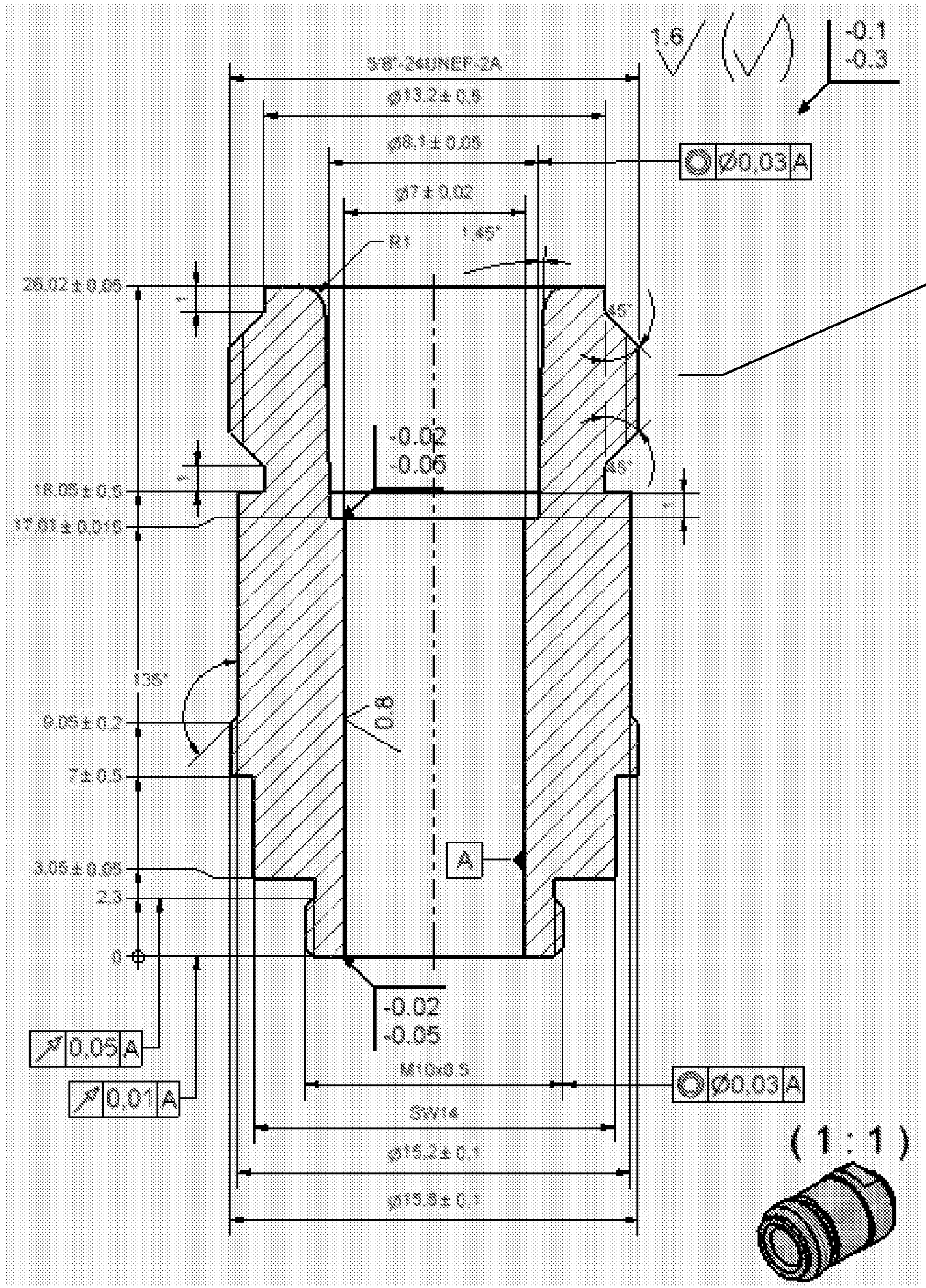
5,183 ↔ 5,257

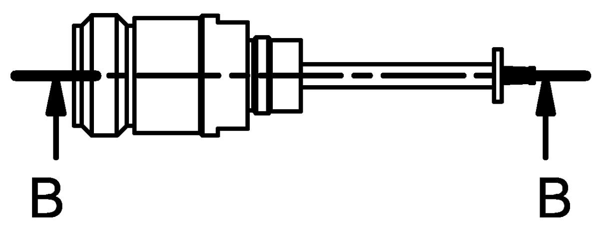
B-B (3 : 1)





Toleranzen der Stütze sind vernachlässigbar klein,
bzw. werden derzeit aus Kostengründen nicht berücksichtigt.



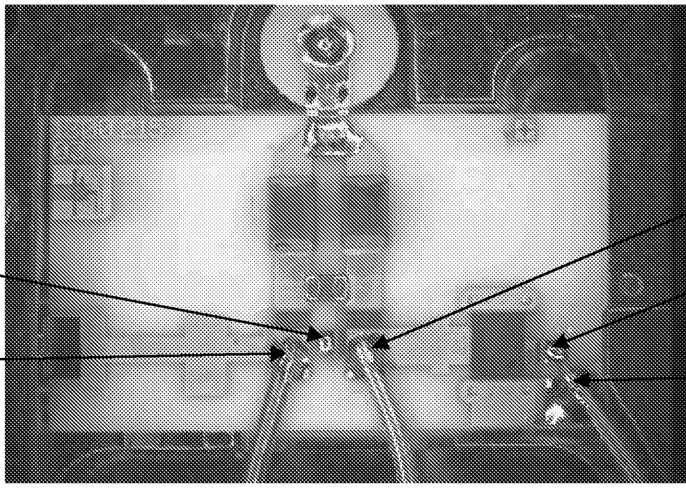


Für dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

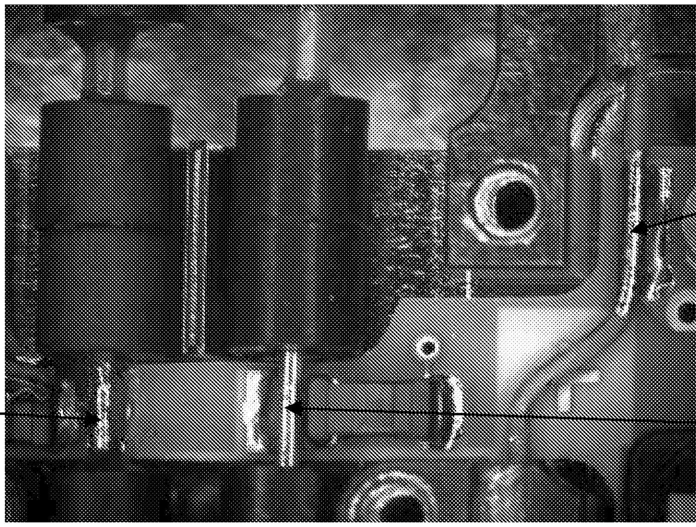
Projektionsmethode
Projection Method

Maßstab / Scale 1:1(3:1)	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: RM8 BR UNIT RM BR UNIT		Sprache/Lang.	Aei./C.I. 02.00	Blatt/Sh. 4/5
	Datum / Date 27.09.2006	Abteilung / Dept. 1EST1	Name FREISSL	Zeichn. Nr. / Drawing No. 1145.3593.01	

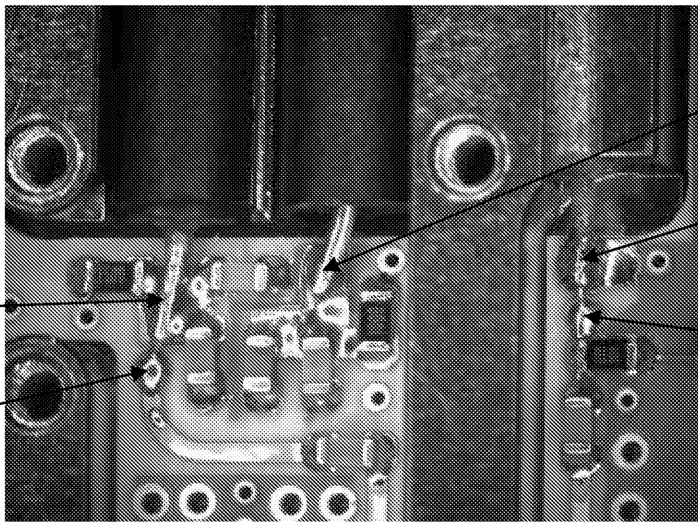
Anschluß an BR Substrat 8GHz

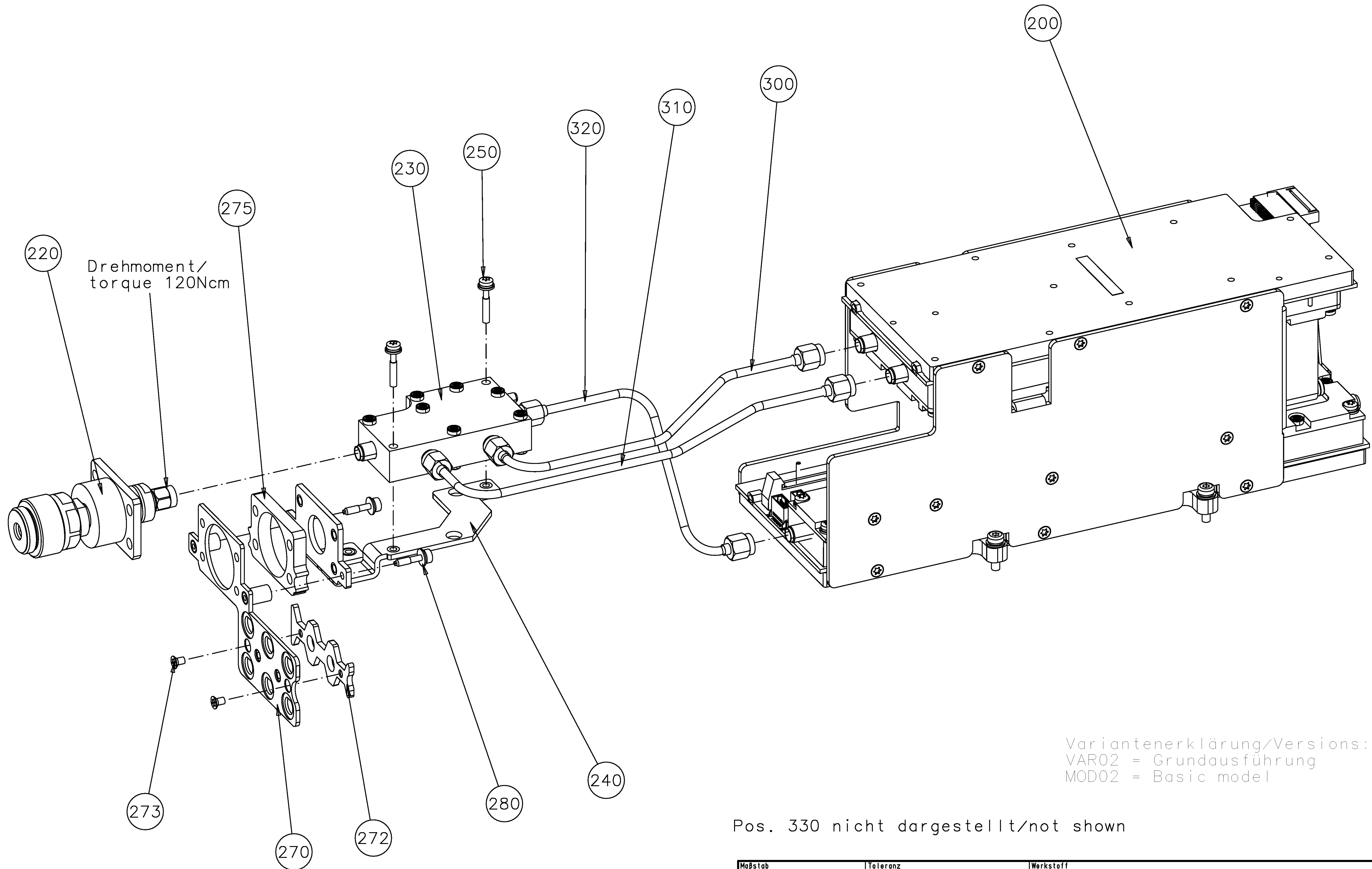


Anschluß an RM8 BR-LF_FILT (Kabelmitte)



Anschluß an RM8 BR-LF_FILT (Kabelende)



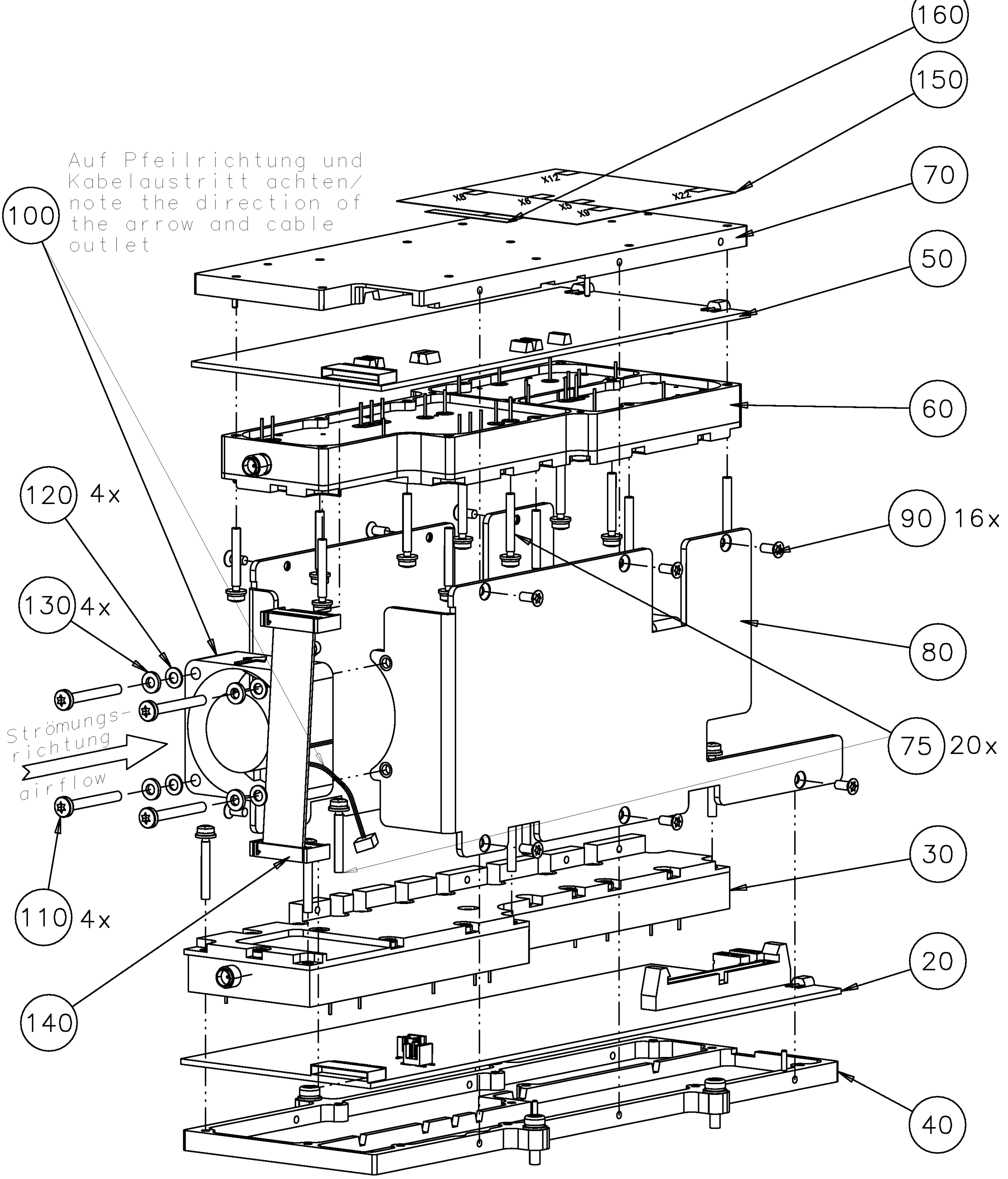


Variantenerklärung/Versions:
VAR02 = Grundausführung
MOD02 = Basic model

Pos. 330 nicht dargestellt/not shown

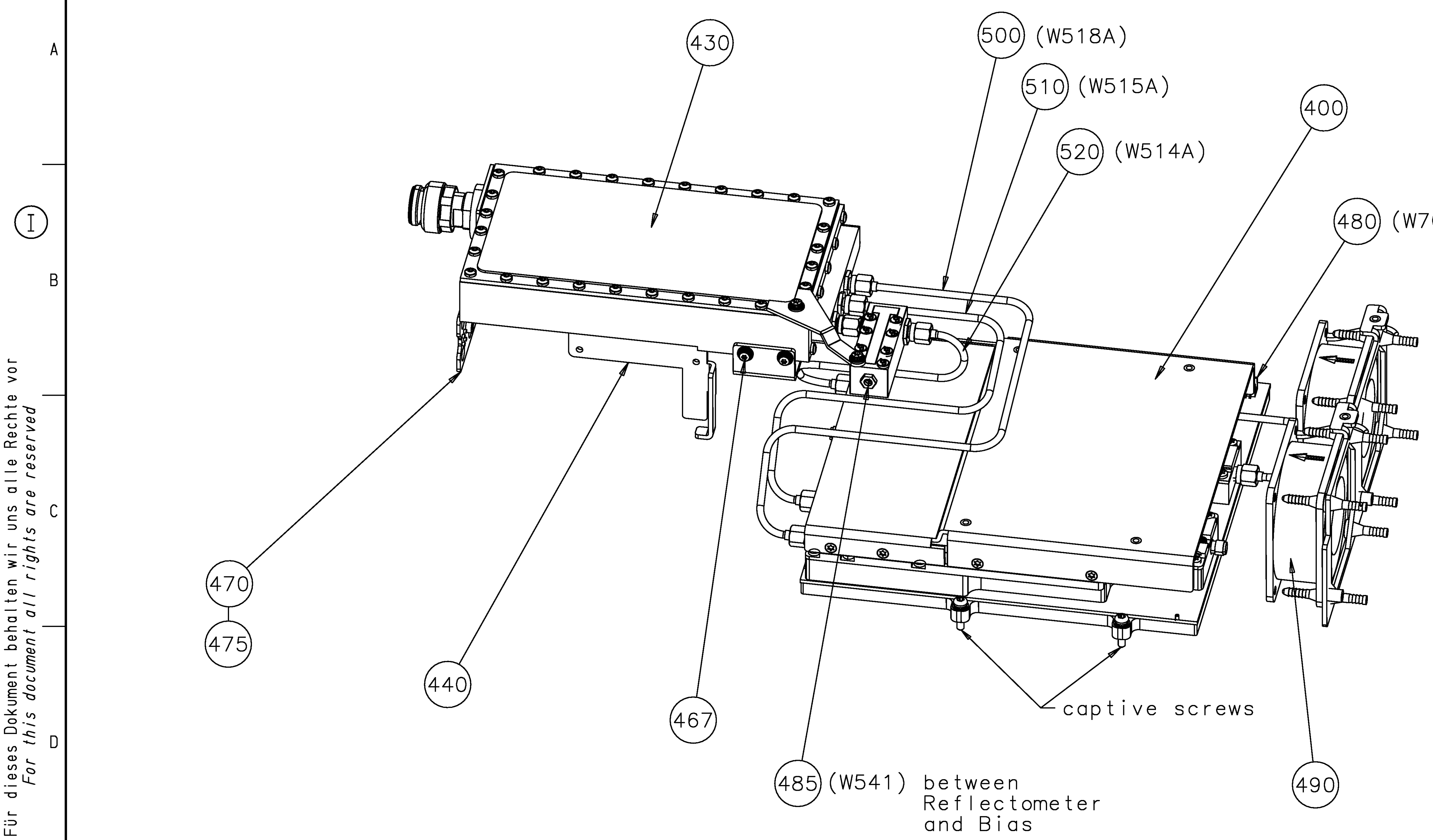
Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: RM UNIT ZVA 24 GHz		Sprache / *Lang.*: de en	Aei. / *C.I.*: 04.00	Blatt / *Sh.*: 1
ZVA	Datum *Date*: 2008-02-25	Abteilung *Dept.*: 1ESK	Name *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1145.4302.01	D



Projektionsmethode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*		Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: REFLECTOMETER 24			Sprache / *Lang.*: de en	Aei. / *C.I.*: 07.00	Blatt / *Sh.*: 1
ZVA	Datum / *Date*: 2008-01-23	Abteilung / *Dept.*: 1ESK	Name / *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1145.4283.01		D

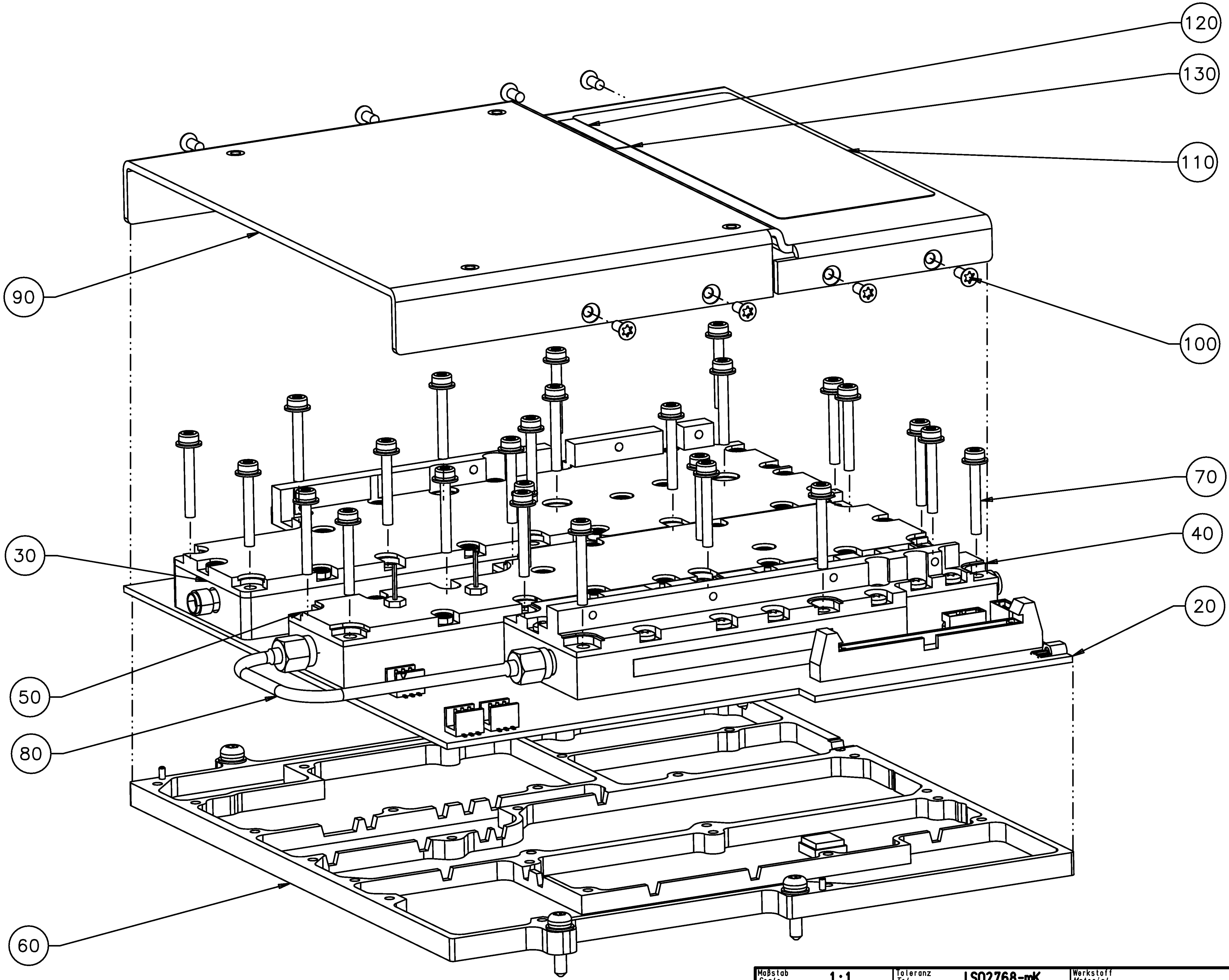


Projektions-methode
Projection Method

Versions:
MOD02 = PORT 1 and 2

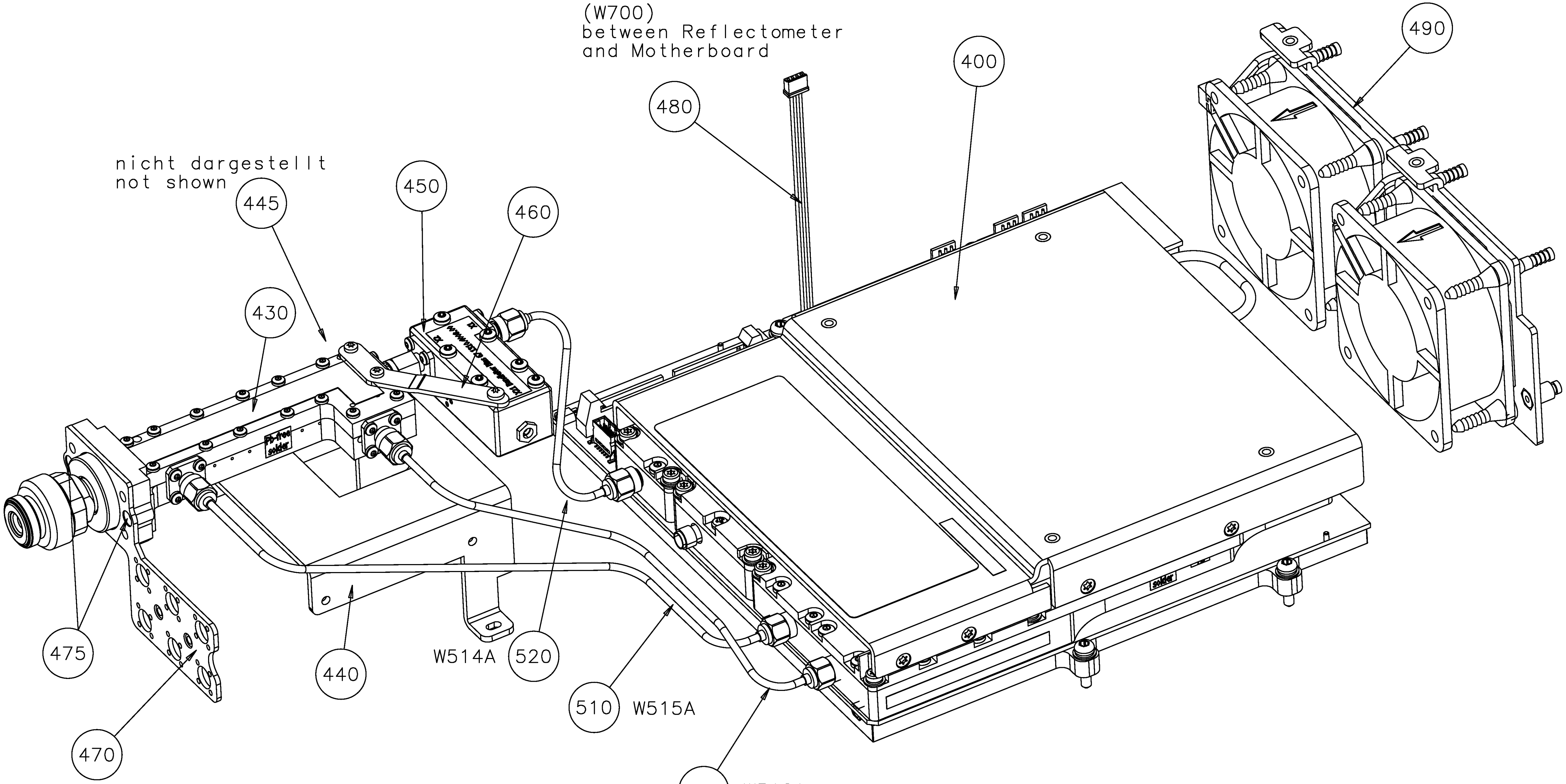
Pos. 480(W700) and 490(W541) not shown

Maßstab *Scale*	1:2	Toleranz *Tol.*		Werkstoff *Material*					
ROHDE&SCHWARZ		Benennung / *Designation* RM UNIT ZVA 40 GHz					Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 1
ZVA		Datum *Date*	2006-10-25	Abteilung *Dept.*	1ESK	Name *Name* Wn	Zeichn.Nr. / *Drawing No.* 1145.4319.01		D



Projektions-methode
Projection Method

Maßstab / *Scale* 1:1	Toleranz / *Tol.* ISO2768-mK		Werkstoff / *Material*					
ROHDE&SCHWARZ	Benennung / *Designation* REFLECTOMETER ZVA 50 REFLECTOMETER ZVA 50				Sprache / *Lang.* de en	Aei. / *C.I.* 03.00	Blatt / *Sh.* 1	
ZVA50	Datum / *Date* 2007-03-28	Abteilung / *Dept.* 1ESK	Name / *Name* la		Zeichn.Nr. / *Drawing No.* 1305.3413.01 D			

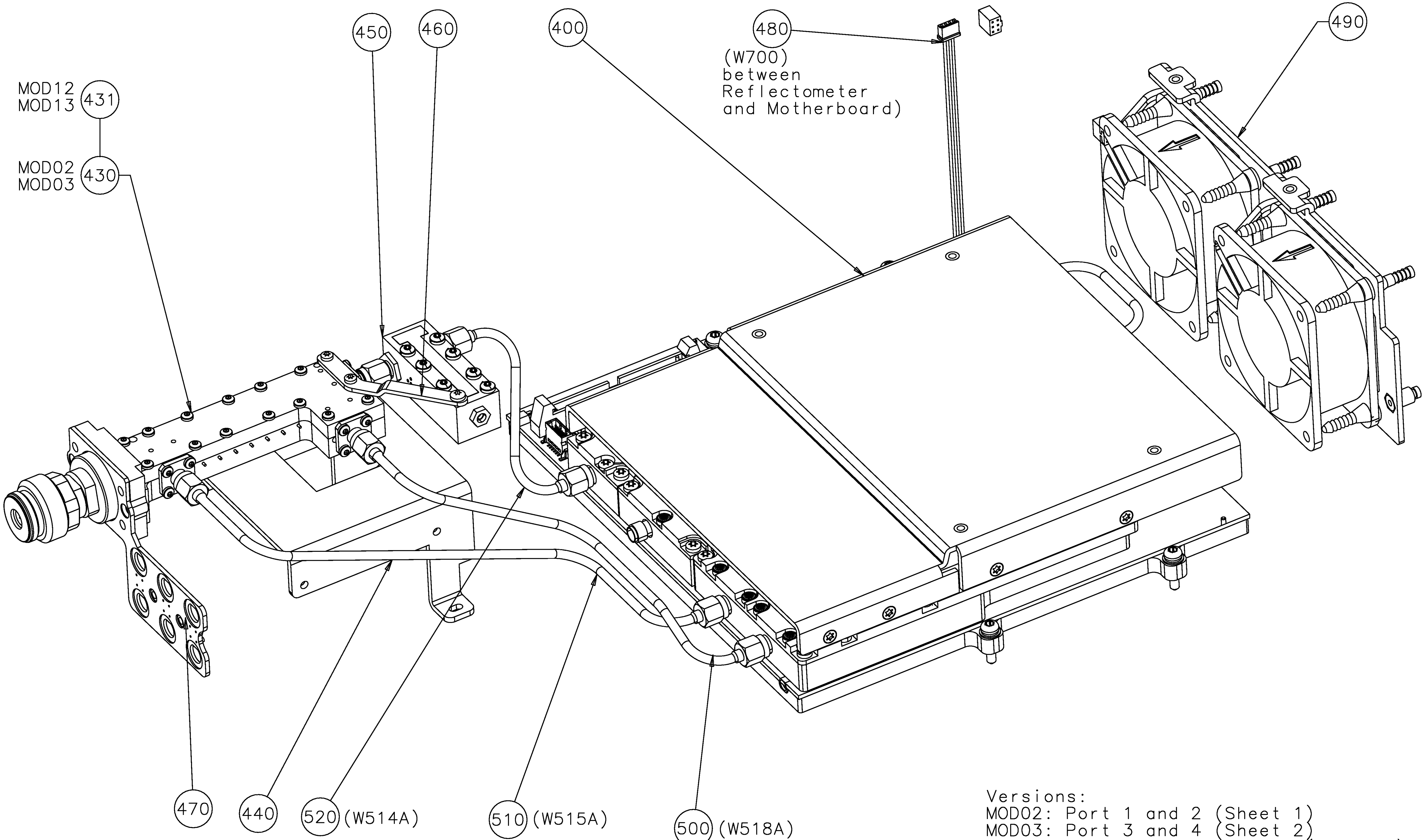


Pos. 485(W451) ist nicht dargestellt
Pos. 485(W451) not shown

Versions:
MOD02: Port 1 and 2 (Sheet 1)
MOD03: Port 3 and 4 (Sheet 2)

Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol. ISO2768-m		Werkstoff / Material				
ROHDE&SCHWARZ	Benennung / Designation: RM UNIT ZVA67 RM UNIT ZVA67				Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 1
ZVA67	Datum / Date: 2009-04-28	Abteilung / Dept.: 1ESK	Name / Name: rn		Zeichn.Nr. / Drawing No.: 1305.6241.01 D		

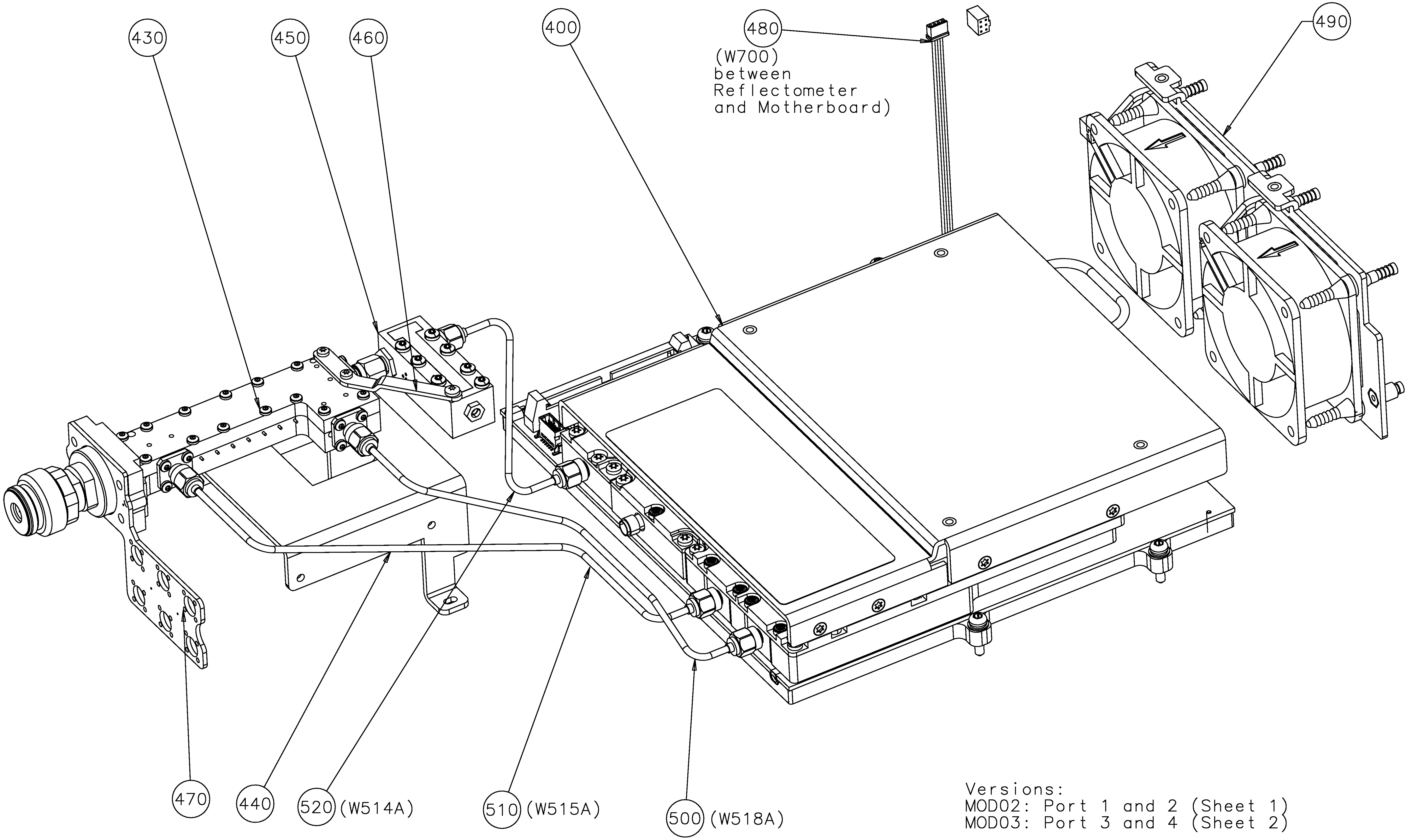


Versions:
MOD02: Port 1 and 2 (Sheet 1)
MOD03: Port 3 and 4 (Sheet 2)
MOD12: Port 1 and 2 - 2.4mm (Sheet 1)
MOD13: Port 3 and 4 - 2.4mm (Sheet 2)

Pos 445, 485(W541) ist nicht dargestellt.
Pos 445, 485(W541) not shown.

Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*	
ROHDE&SCHWARZ	Benennung / *Designation*: RM UNIT 2 ZVA 40 GHz RM UNIT 2 ZVA 40 GHZ	Sprache / *Lang.*: de en Aei. / *C.I.*: 05.00 Blatt / *Sh.*: 1	
ZVA40	Datum / *Date*: 2007-03-26 Abteilung / *Dept.*: 1ESK Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1305.3420.01 D	



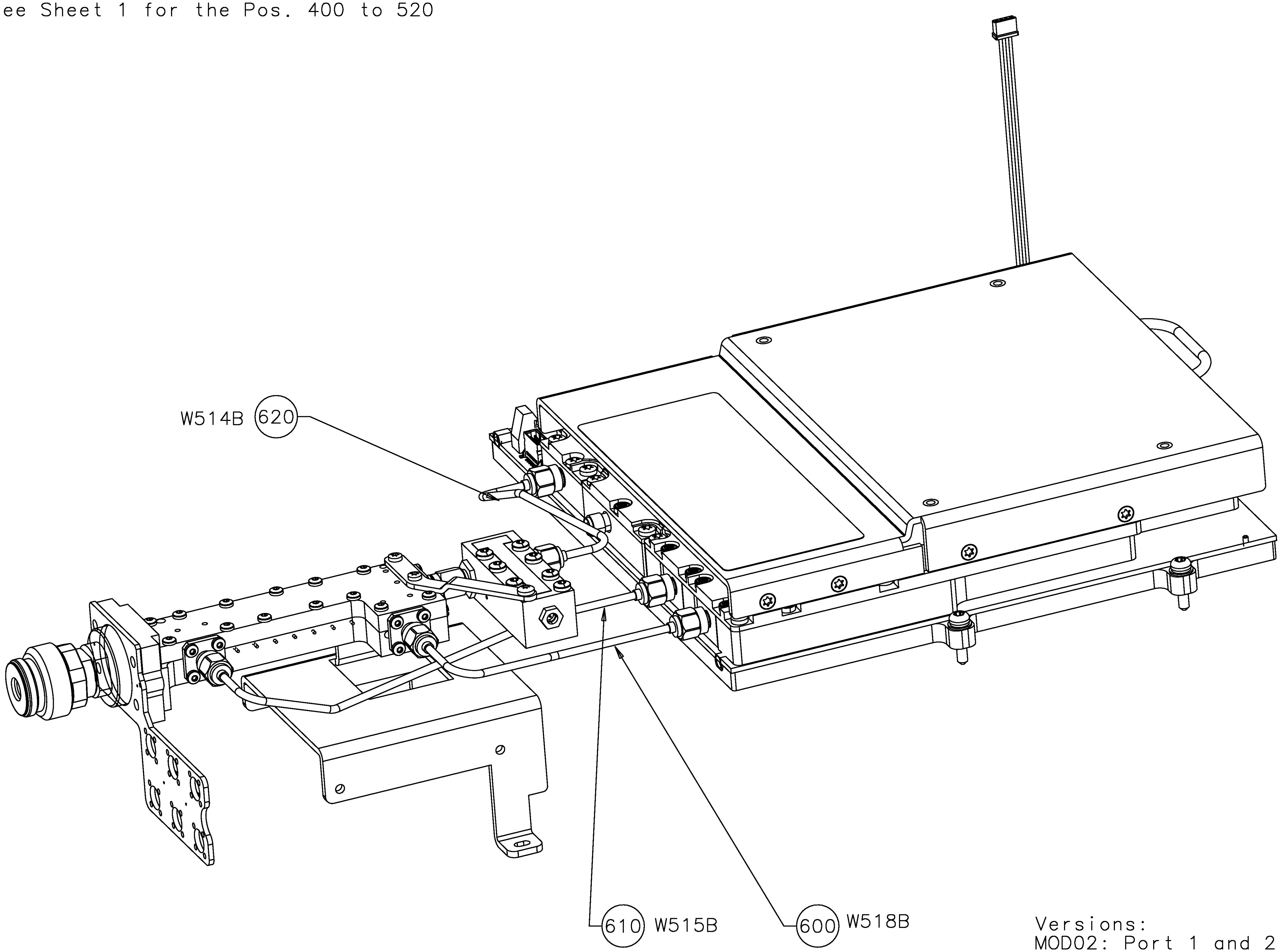
Versions:
MOD02: Port 1 and 2 (Sheet 1)
MOD03: Port 3 and 4 (Sheet 2)

Pos 445, 485(W541) ist nicht dargestellt.
Pos 445, 485(W541) not shown.

Projektionsmethode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: RM UNIT ZVA 50 GHz / RM UNIT ZVA 50 GHZ		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 1
ZVA50	Datum / *Date*: 2007-03-28	Abteilung / *Dept.*: 1ESK	Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1305.3407.01	D

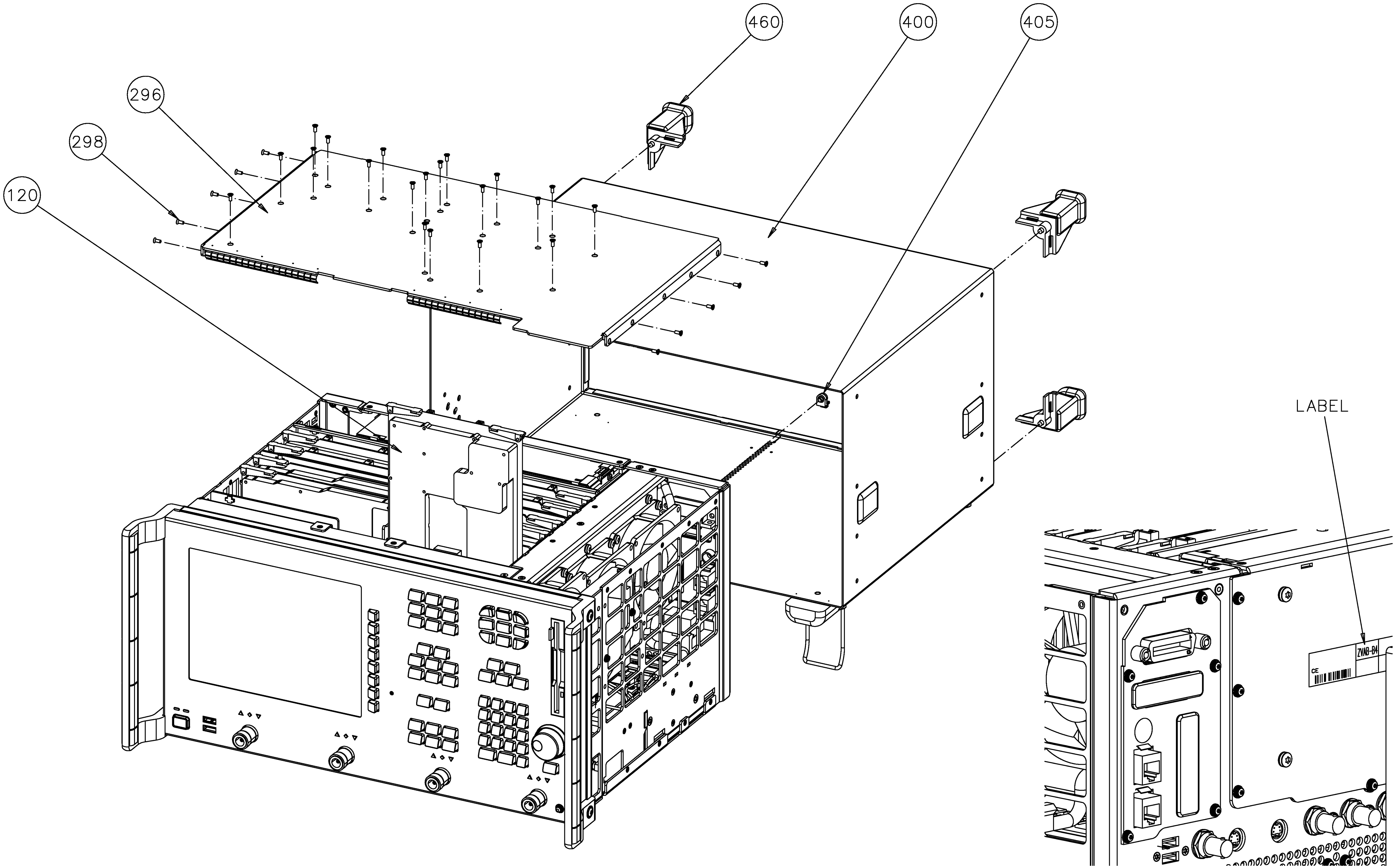
Please see Sheet 1 for the Pos. 400 to 520



Versions:
MOD02: Port 1 and 2 (Sheet 1)
MOD03: Port 3 and 4 (sheet 2)

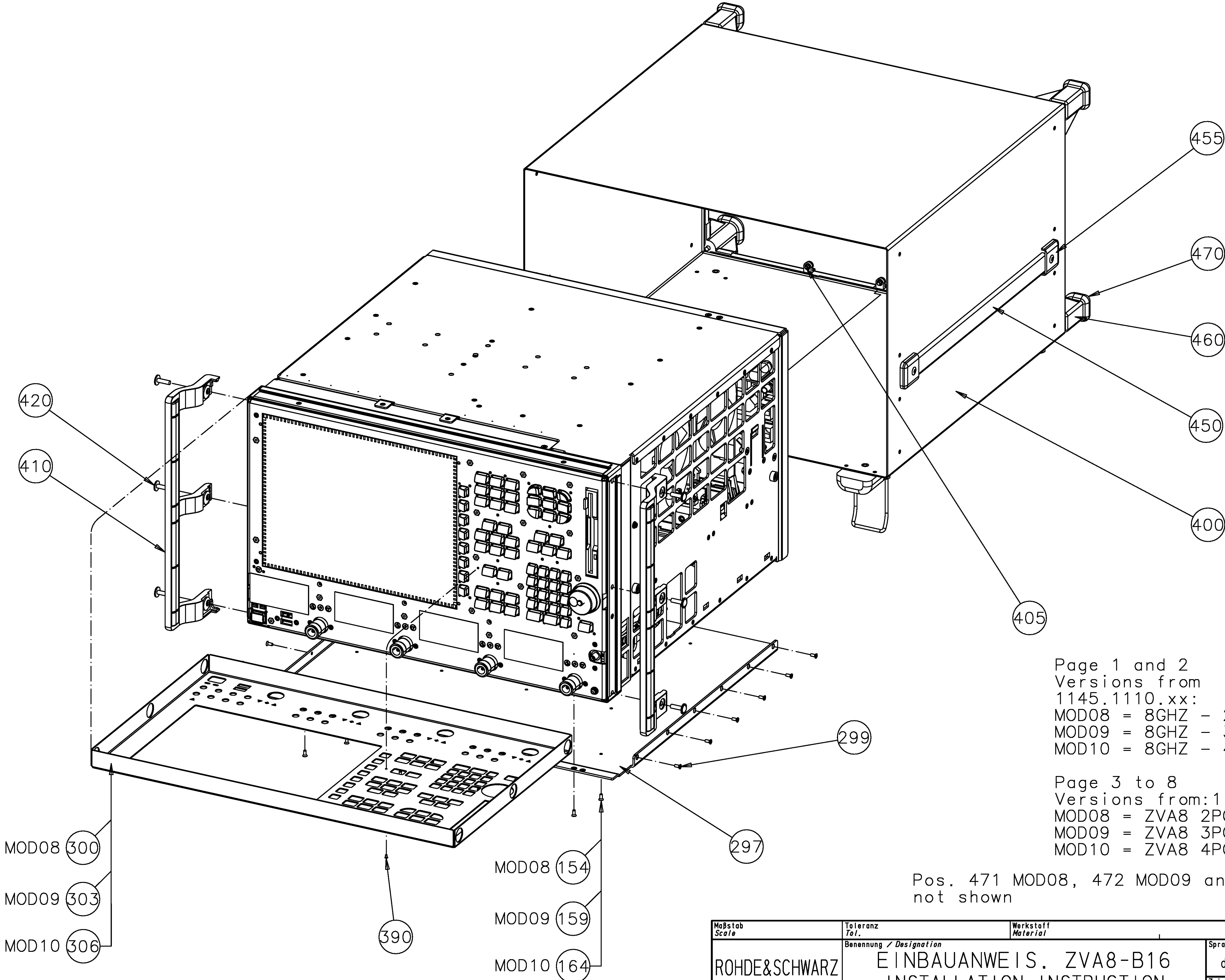
Projektionsmethode
Projection Method

Maßstab Scale	Toleranz Tol.		Werkstoff Material					
ROHDE&SCHWARZ	Benennung / Designation RM UNIT ZVA 50 GHz RM UNIT ZVA 50 GHZ					Sprache / Lang. de en	Aei. / C.I. 02.00	Blatt / Sh. 2
ZVA50	Datum Date 2007-03-28	Abteilung Dept. 1ESK		Name Name LA		Zeichn.Nr. / Drawing No. 1305.3407.01		D



Projektionsmethode / Projection Method

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



Page 1 and 2
Versions from
1145.1110.xx:
MOD08 = 8GHZ - 2PORT
MOD09 = 8GHZ - 3PORT
MOD10 = 8GHZ - 4PORT

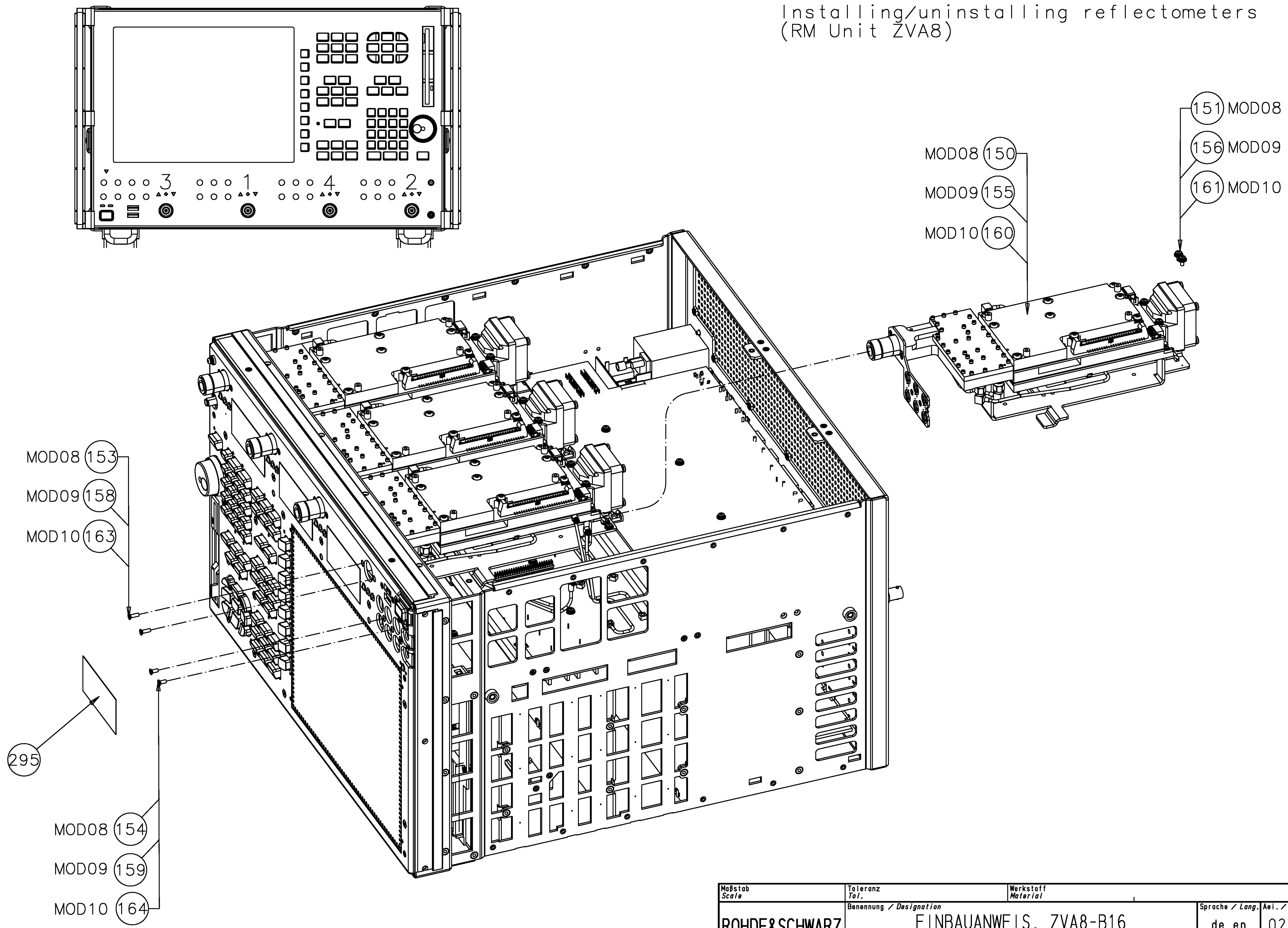
Page 3 to 8
Versions from:1164.0209.xx:
MOD08 = ZVA8 2PORT
MOD09 = ZVA8 3PORT
MOD10 = ZVA8 4PORT

Pos. 471 MOD08, 472 MOD09 and 473 MOD10
not shown

Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION	Sprache / Lang.: de en; Aei. / C.I.: 02.00; Blatt / Sh.: 1	Zeichn.Nr. / Drawing No.: 1164.0250.00 D
ZVA	Datum / Date: 2006-07-14	Abteilung / Dept.: 1ESK	Name: Wn

Installing/uninstalling reflectometers (RM Unit ZVA8)

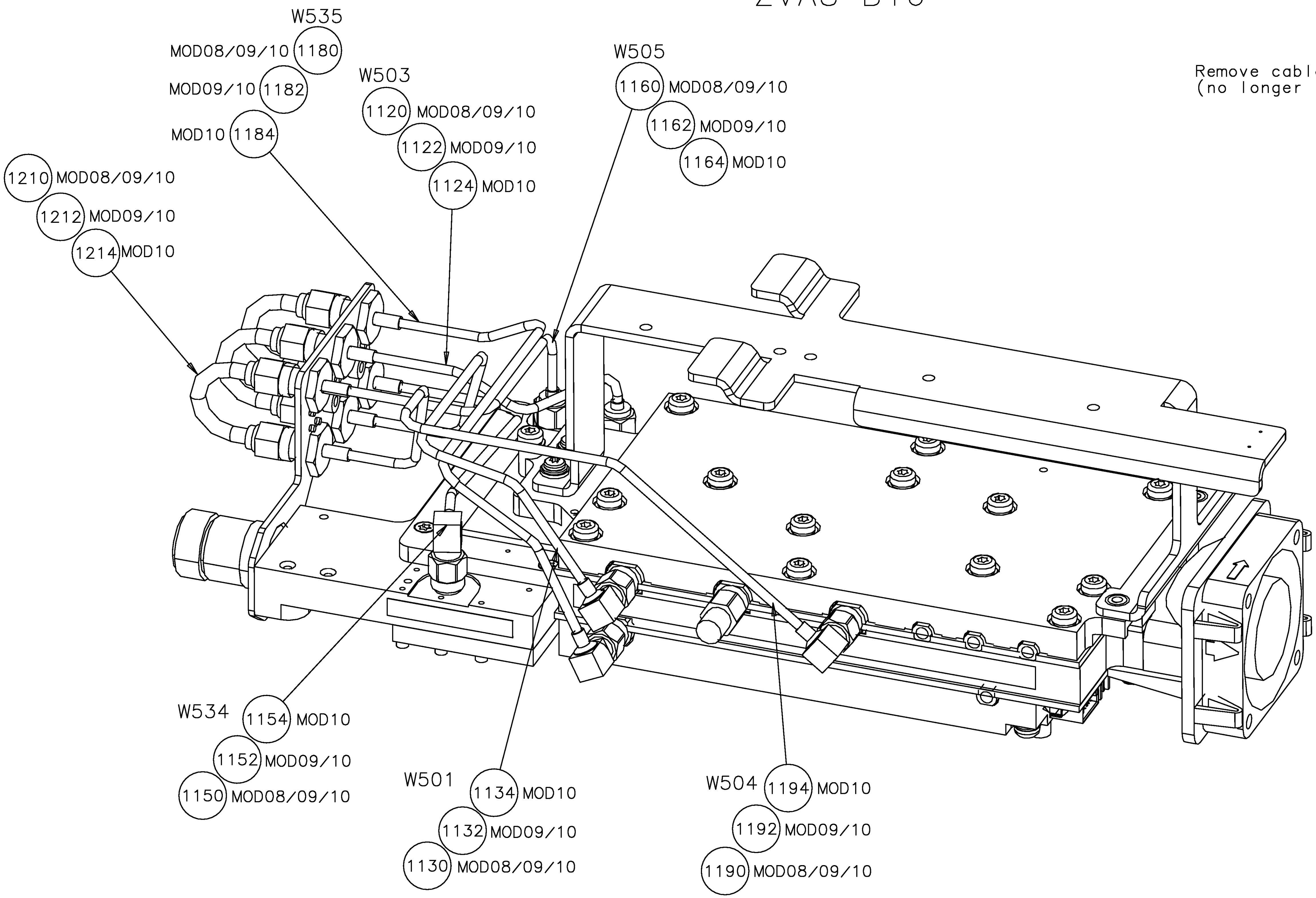


Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION		Sprache / Lang.: de en	Aei. / C.I.: 02.00
			Blatt / Sh.: 2	Zeichn.Nr. / Drawing No.: 1164.0250.00 D
ZVA	Datum / Date: 2006-09-18	Abteilung / Dept.: 1ESK	Name / Name: Wn	

ZVA8-B16

Remove cables W514, W515 and W518
(no longer required)



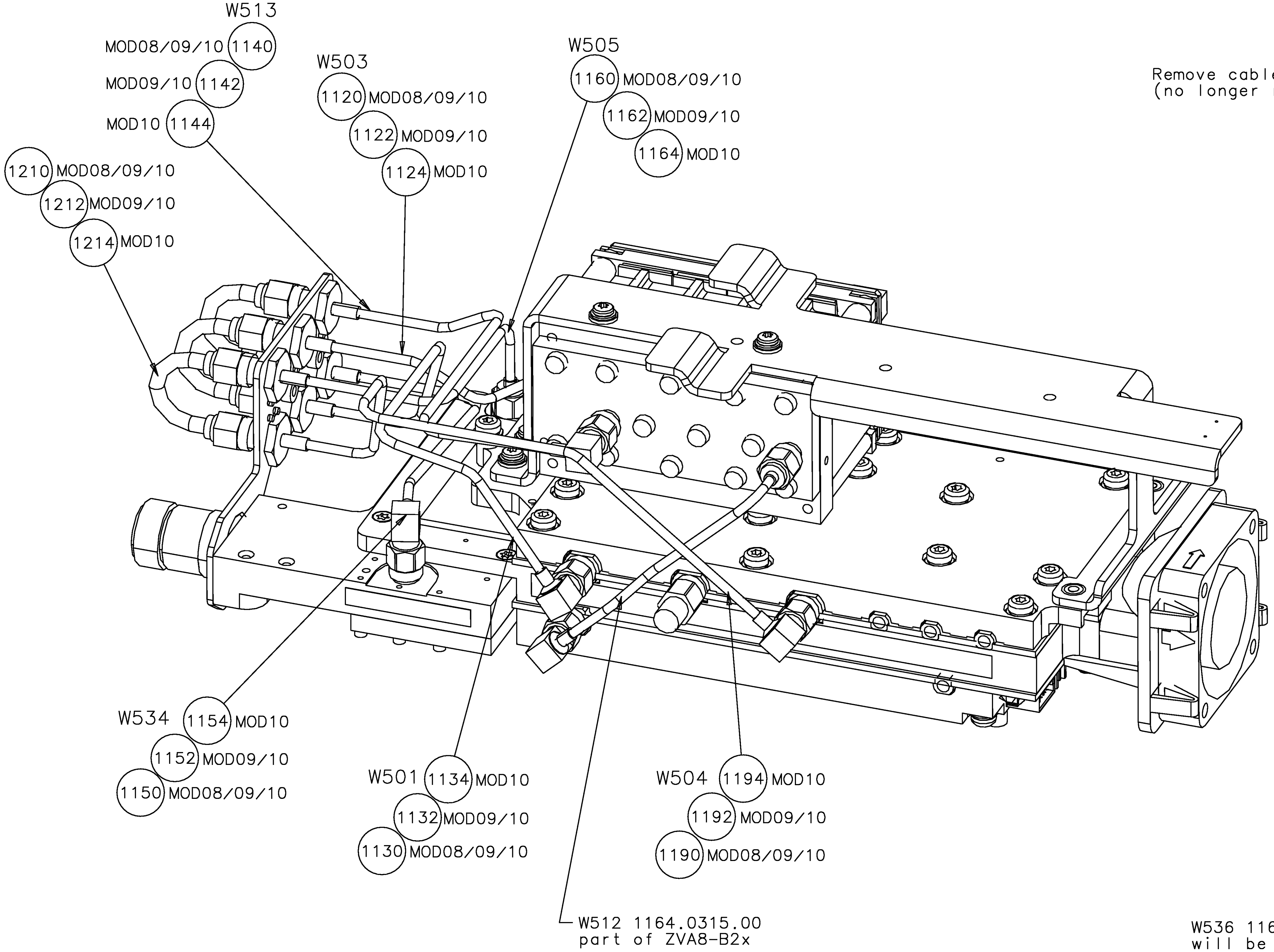
Pos. 1140, 1142, 1144, 1170, 1172, 1174, 1200, 1202 and 1204 will be not required

Projektions-methode / Projection Method

Maßstab / Scale 1:1	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION		Sprache / Lang. de en	Aei. / C.I. 02.00	Blatt / Sh. 3
ZVA	Datum / Date 2006-07-12	Abteilung / Dept. 1ESK	Name / Name HG	Zeichn.Nr. / Drawing No. 1164.0250.00 D	

ZVA8-B16 with ZVA8-B2x MOD02

Remove cables W514, W515 and W518
(no longer required)



W536 1164.0309.00 part of ZVA8-B2x
will be not required

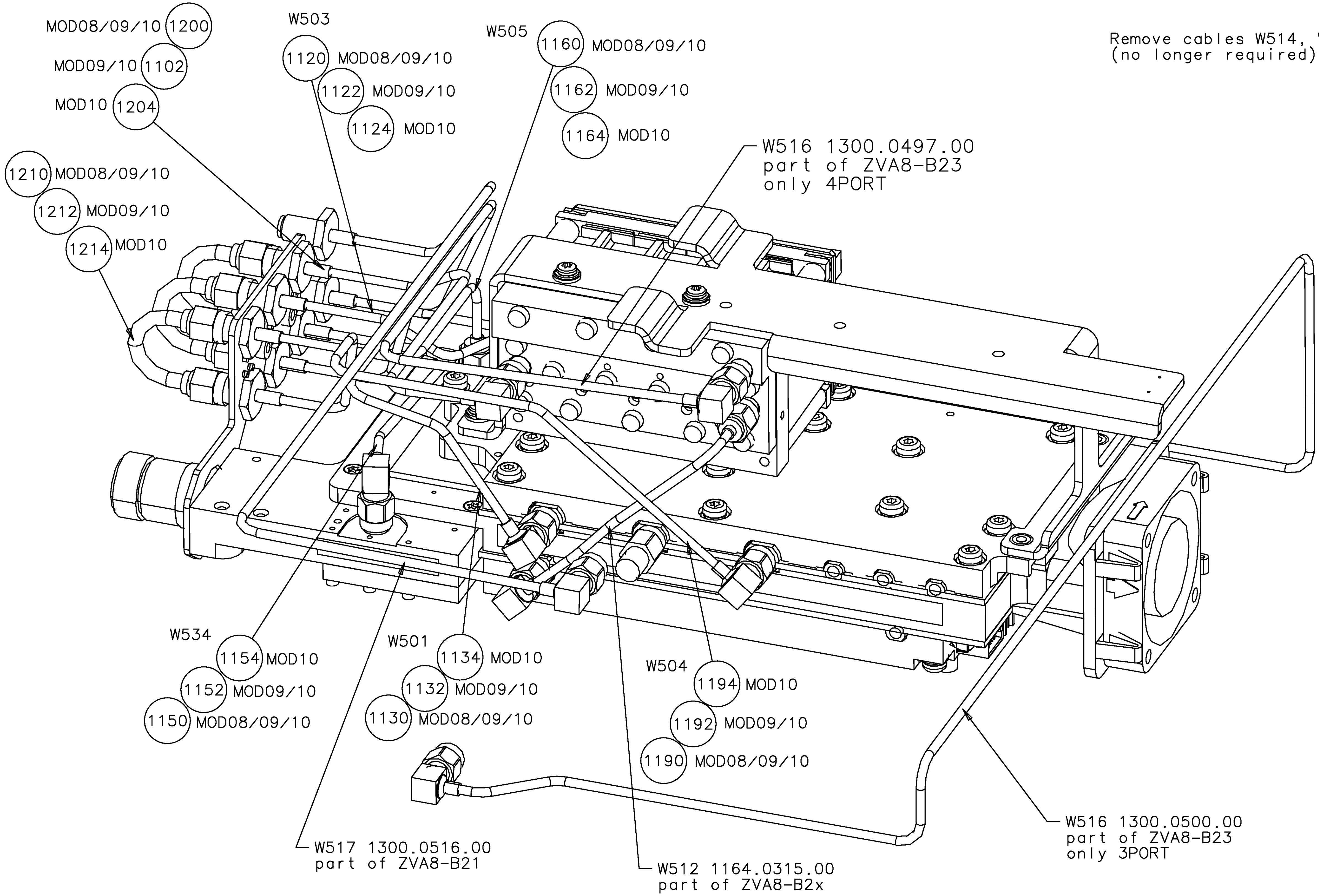
Pos. 1170, 1172, 1174, 1180, 1182, 1184, 1200, 1202 and 1204 will be not required

Projektions-methode / *Projection Method*

Maßstab / *Scale* 1:1	Toleranz / *Tol.*		Werkstoff / *Material*				
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION				Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 4
ZVA	Datum / *Date* 2006-07-12	Abteilung / *Dept.* 1ESK	Name / *Name* HG		Zeichn.Nr. / *Drawing No.* 1164.0250.00 D		

ZVA8-B16 with ZVA8-B2x MOD03

Remove cables W514, W515 and W518
(no longer required)



W536 1164.0367.00 part of ZVA8-B21 and
ZVA8-B23 will be not required

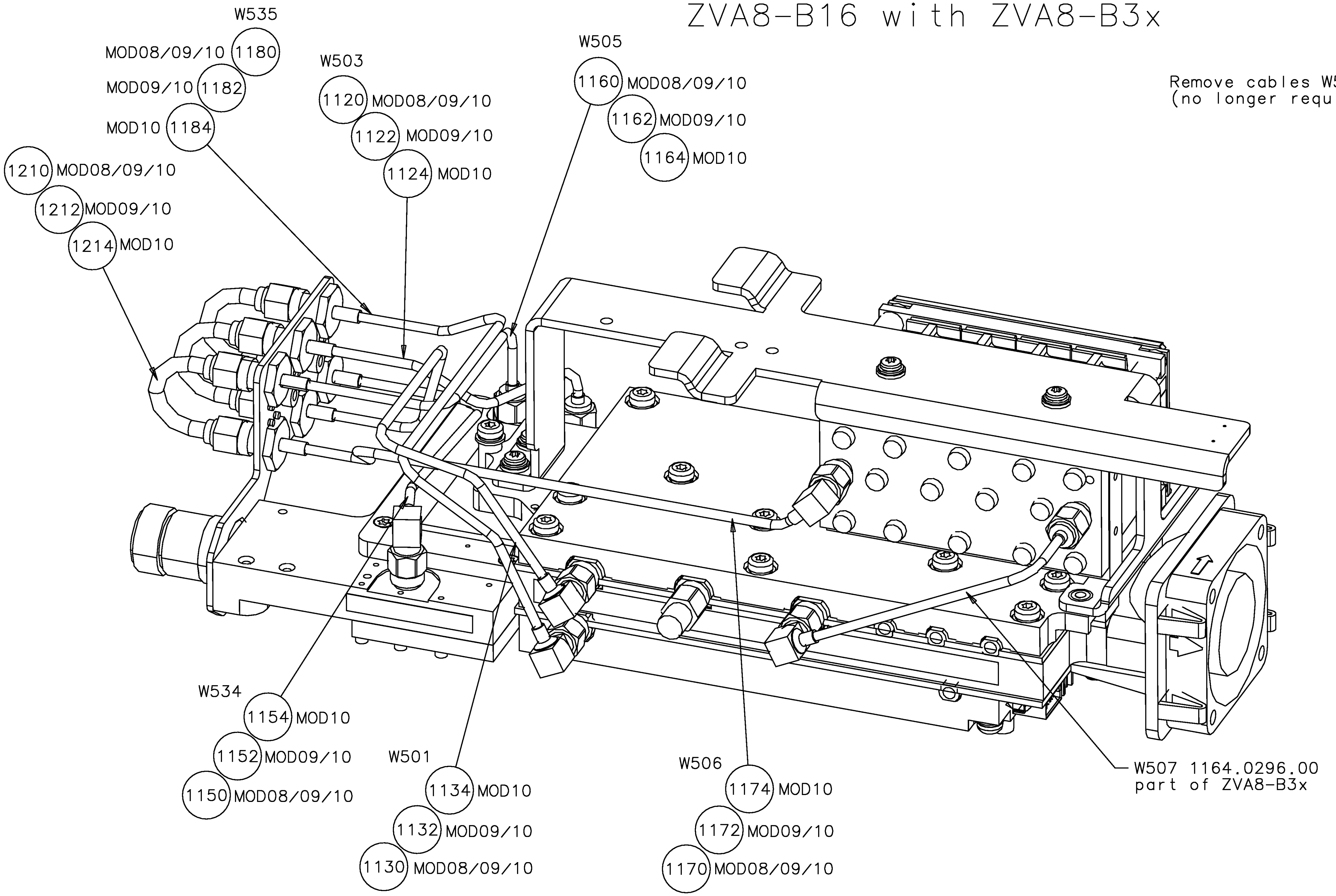
Pos. 1140, 1142, 1144, 1170, 1172, 1174, 1180, 1182 und 1184 will be not required

Projektionsmethode / *Projection Method*

Maßstab / *Scale* 1:1	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION		Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 5
ZVA	Datum / *Date* 2006-07-12	Abteilung / *Dept.* 1ESK	Name / *Name* Mi	Zeichn.Nr. / *Drawing No.* 1164.0250.00	D

ZVA8-B16 with ZVA8-B3x

Remove cables W514, W515 and W518
(no longer required)



W508 1164.0273.00 part of ZVA8-B3x will be not required

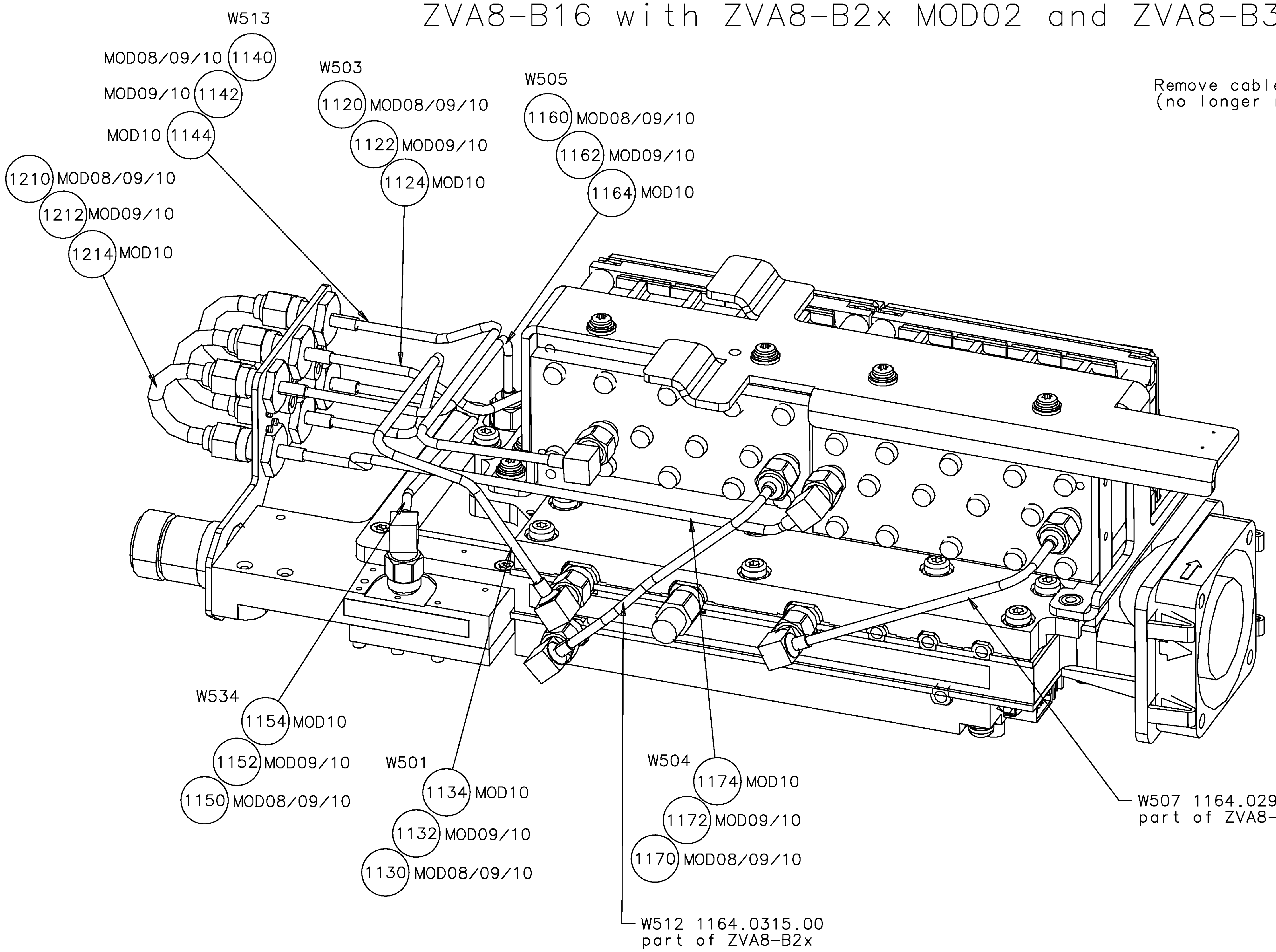
Pos. 1140, 1142, 1144, 1190, 1192, 1194, 1200, 1202 and 1204 will be not required

Maßstab / Scale: 1:1	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION	Sprache / Lang.: de en	Aei. / C.I.: 02.00
		Blatt / Sh.: 6	Zeichn.Nr. / Drawing No.: 1164.0250.00 D
ZVA	Datum / Date: 2006-07-13	Abteilung / Dept.: 1ESK	Name: Mi

Projektions-methode / Projection Method

ZVA8-B16 with ZVA8-B2x MOD02 and ZVA8-B3x

Remove cables W514, W515 and W518
(no longer required)



W536 1164.0309.00 part of ZVA8-B2x and
W508 1164.0273.00 part of ZVA8-B3x
will be not required

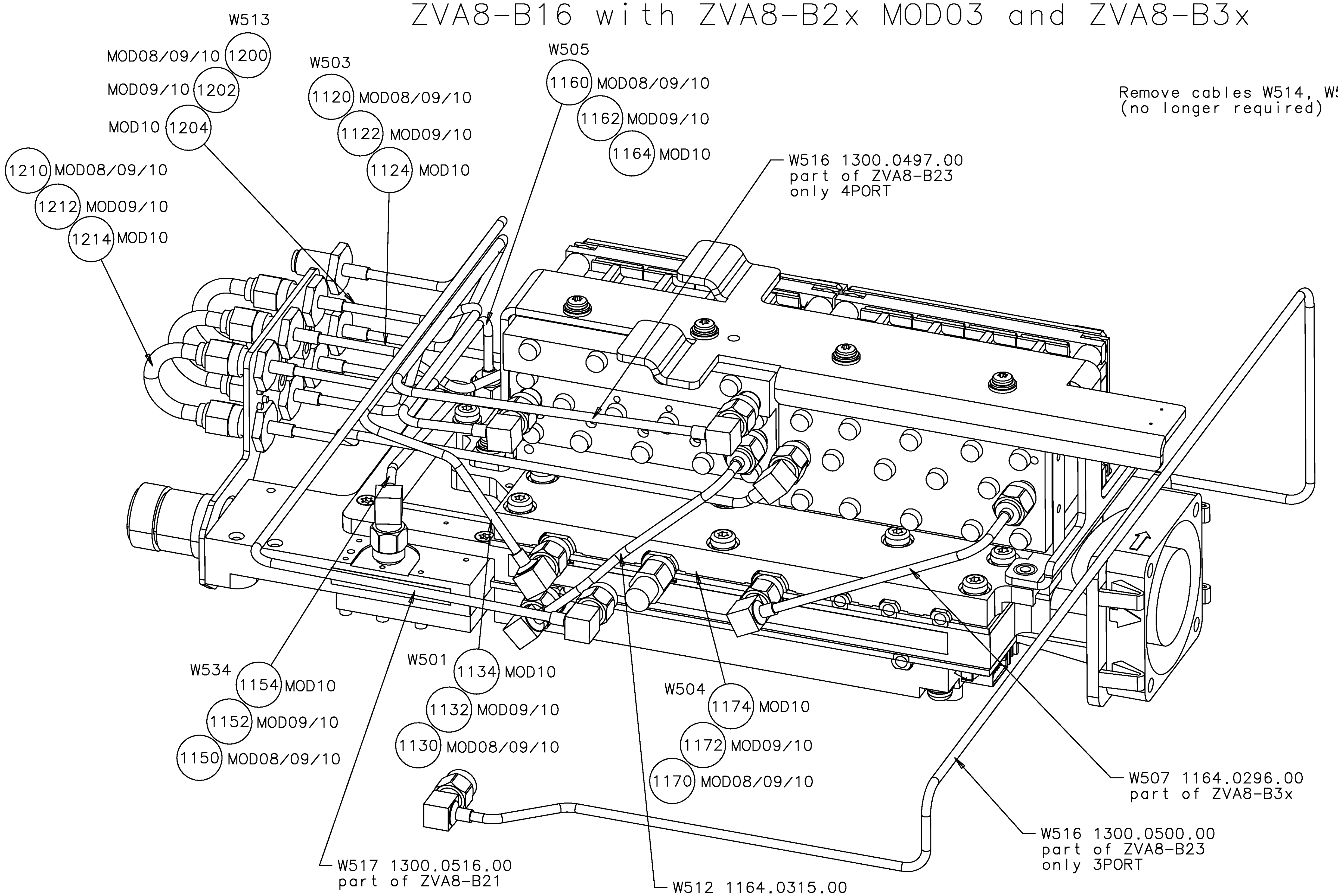
Pos. 1180, 1182, 1184, 1190, 1192, 1194, 1200, 1202 and 1204 will be not required

Projektionsmethode / *Projection Method*

Maßstab / *Scale* 1:1	Toleranz / *Tol.*	Werkstoff / *Material*	
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION	Sprache / *Lang.* de en; Aei. / *C.I.* 02.00; Blatt / *Sh.* 7	Zeichn.Nr. / *Drawing No.* 1164.0250.00 D
ZVA	Datum / *Date* 2006-07-13	Abteilung / *Dept.* 1ESK	Name / *Name* Mi

ZVA8-B16 with ZVA8-B2x MOD03 and ZVA8-B3x

Remove cables W514, W515 and W518
(no longer required)

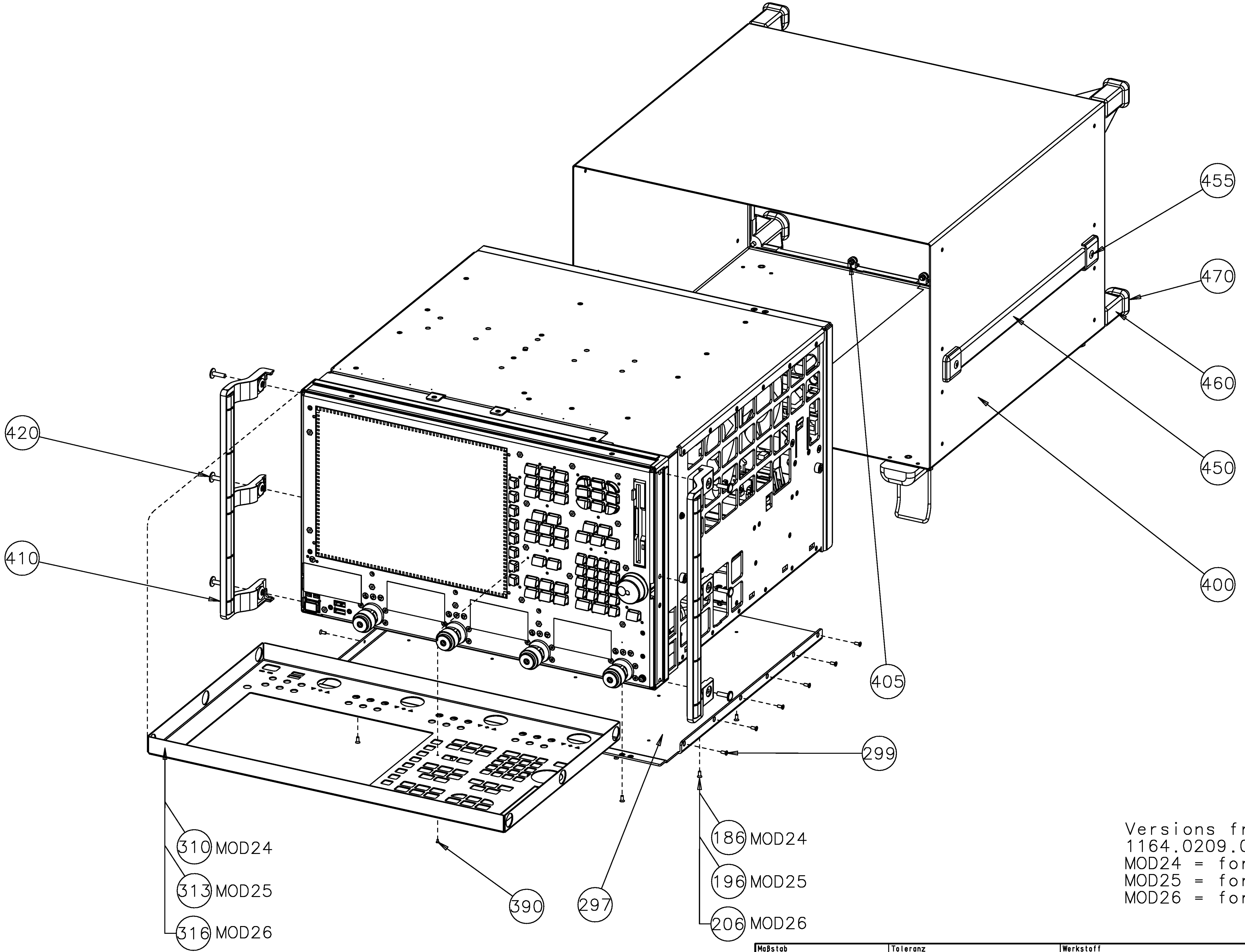


W536 1164.0367.00 part of ZVA8-B21 and
ZVA8-B23 will not be shown
W508 1164.0273.00 part of ZVA8-B3x
will will be not required

Pos. 1140, 1142, 1144, 1180, 1182, 1184, 1190, 1192 and 1194 will be not required

Projektions-methode
Projection Method

Maßstab Scale	Toleranz Tol. 1:1	Werkstoff Material		
ROHDE&SCHWARZ	Benennung / Designation EINBAUANWEIS. ZVA8-B16 INSTALLATION INSTRUCTION	Sprache / Lang. de en	Aei. / C.I. 02.00	Blatt / Sh. 8
ZVA	Datum Date 2006-07-13	Abteilung Dept. 1ESK	Name Mi	Zeichn.Nr. / Drawing No. 1164.0250.00 D

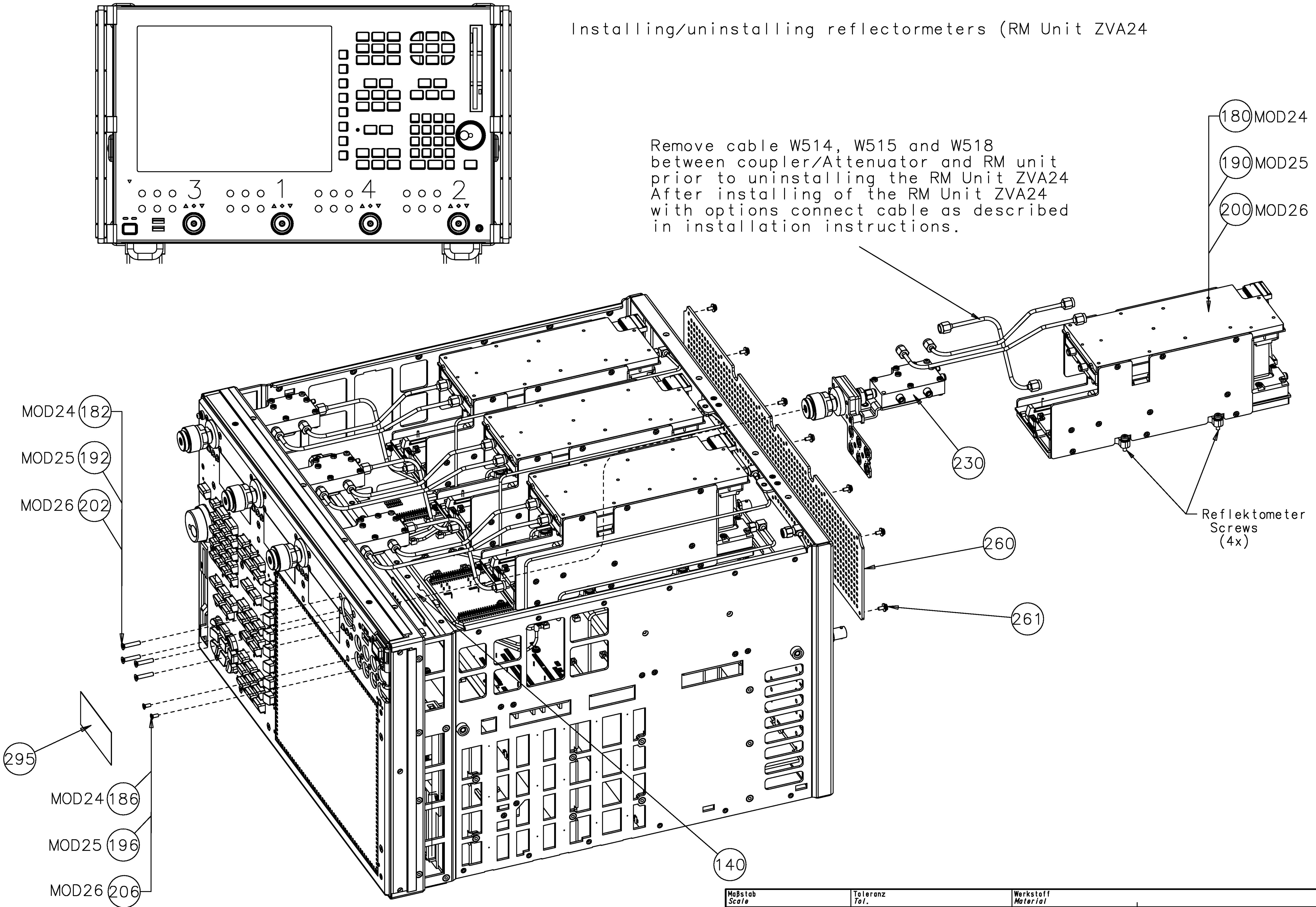


Versions from
1164.0209.01
MOD24 = for 2PORT
MOD25 = for 3PORT
MOD26 = for 4PORT

Projektionsmethode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: EINBAUANWEISUNG ZVA24-B16 INSTALLATION INSTRUCTION ZVA24-B16		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 1
ZVA	Datum / *Date*: 2006-06-23	Abteilung / *Dept.*: 1ESK	Name / *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1164.0267.00 D	

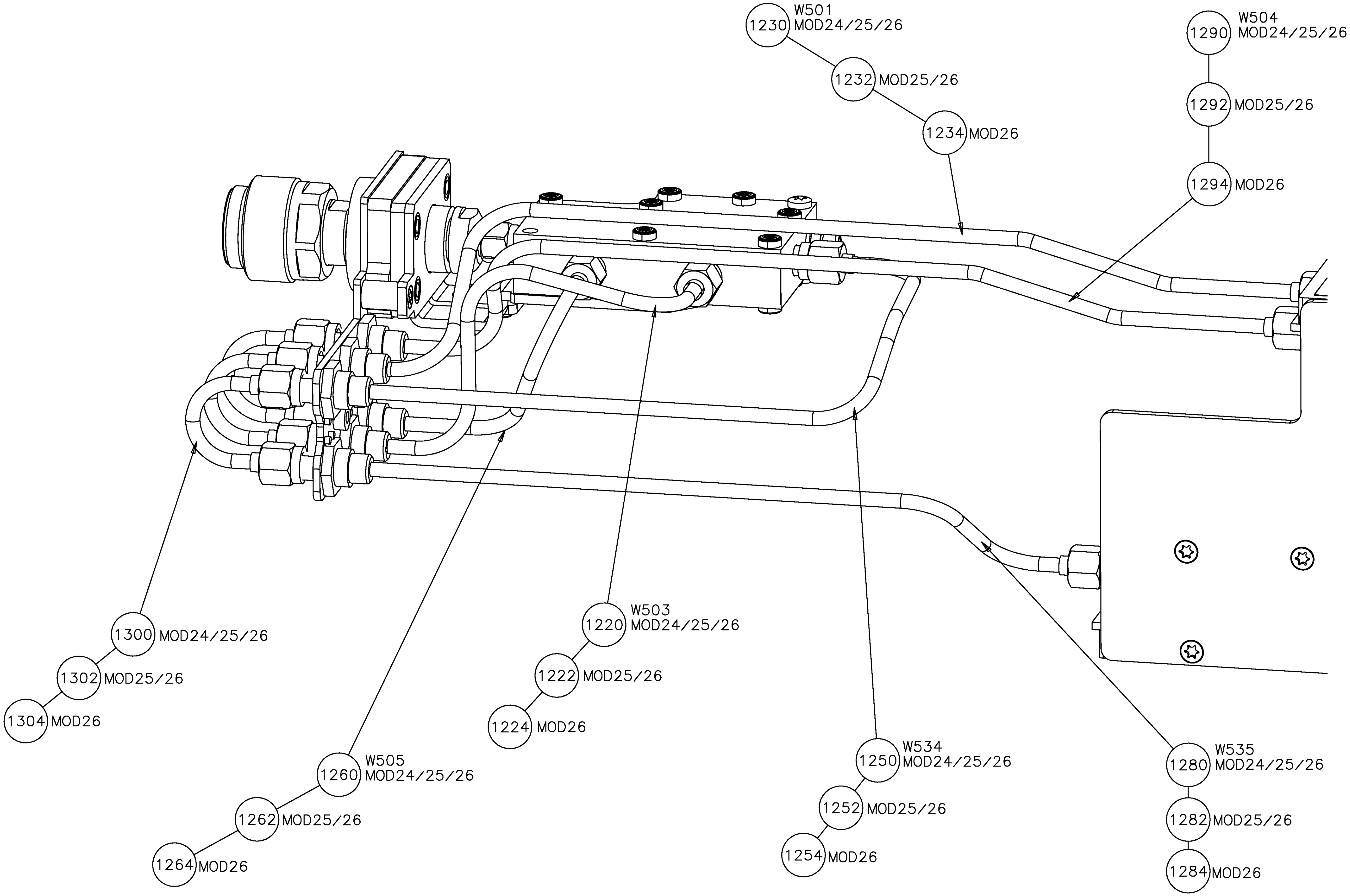
Installing/uninstalling reflectormeters (RM Unit ZVA24



Projektions-methode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEISUNG ZVA24-B16 INSTALLATION INSTRUCTION ZVA24-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00 · Blatt / Sh.: 2
ZVA	Datum / Date: 2006-06-23	Abteilung / Dept.: 1ESK · Name: Wn	Zeichn.Nr. / Drawing No.: 1164.0267.00 D	

ZVA24-B16

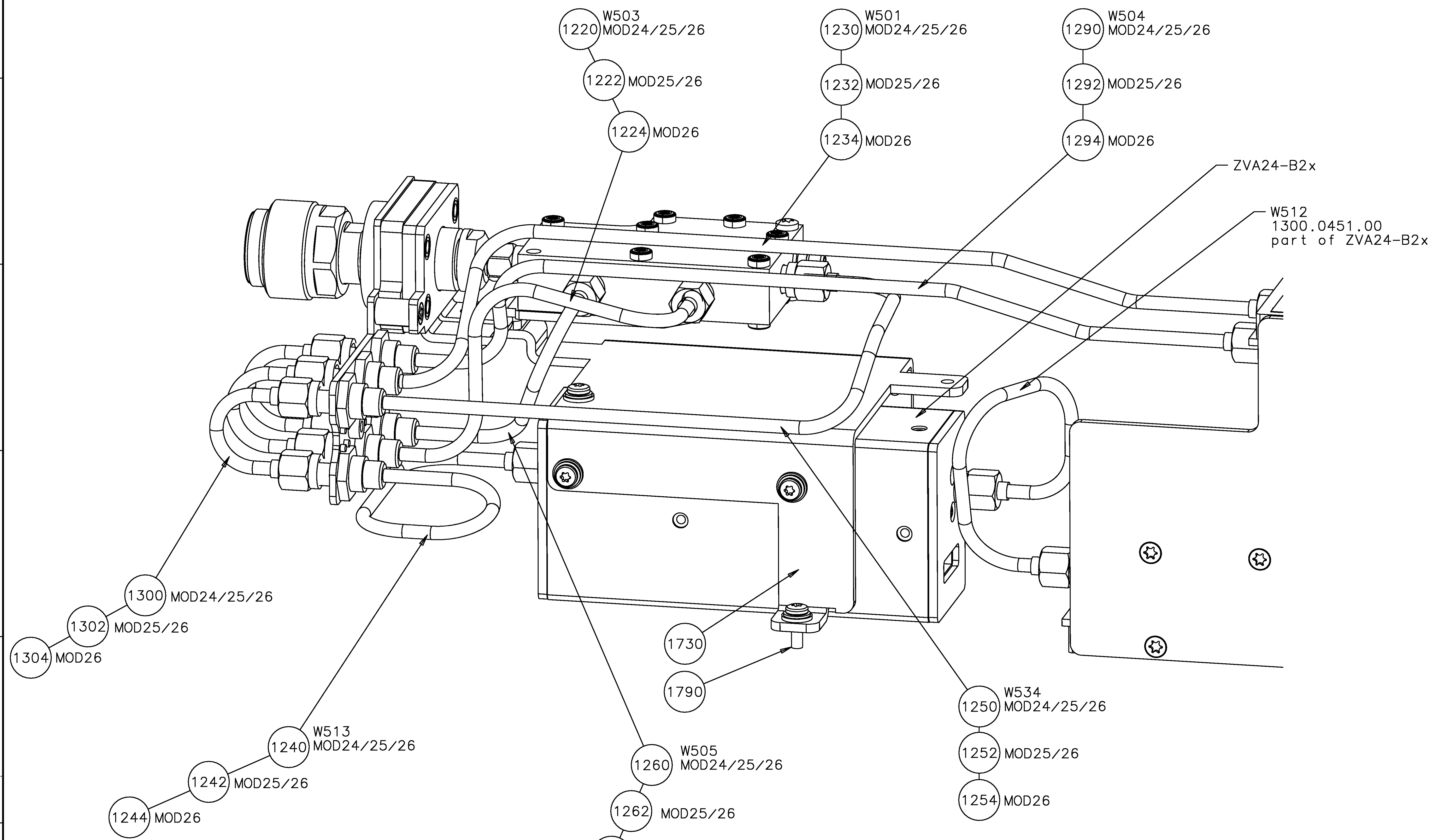


Pos. 1240, 1242, 1244, 1270, 1272 and 1274 will be not required

Projektionsmethode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: EINBAUANWEISUNG ZVA24-B16 / INSTALLATION INSTRUCTION ZVA24-B16		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 3
ZVA	Datum / *Date*: 2006-06-22	Abteilung / *Dept.*: 1ESK; Name / *Name*: HG	Zeichn.Nr. / *Drawing No.*: 1164.0267.00 D		

ZVA24-B16 with ZVA24-B2x (Attenuator)



W536 1164.0380.00 part of ZVA24-B2x will be not required

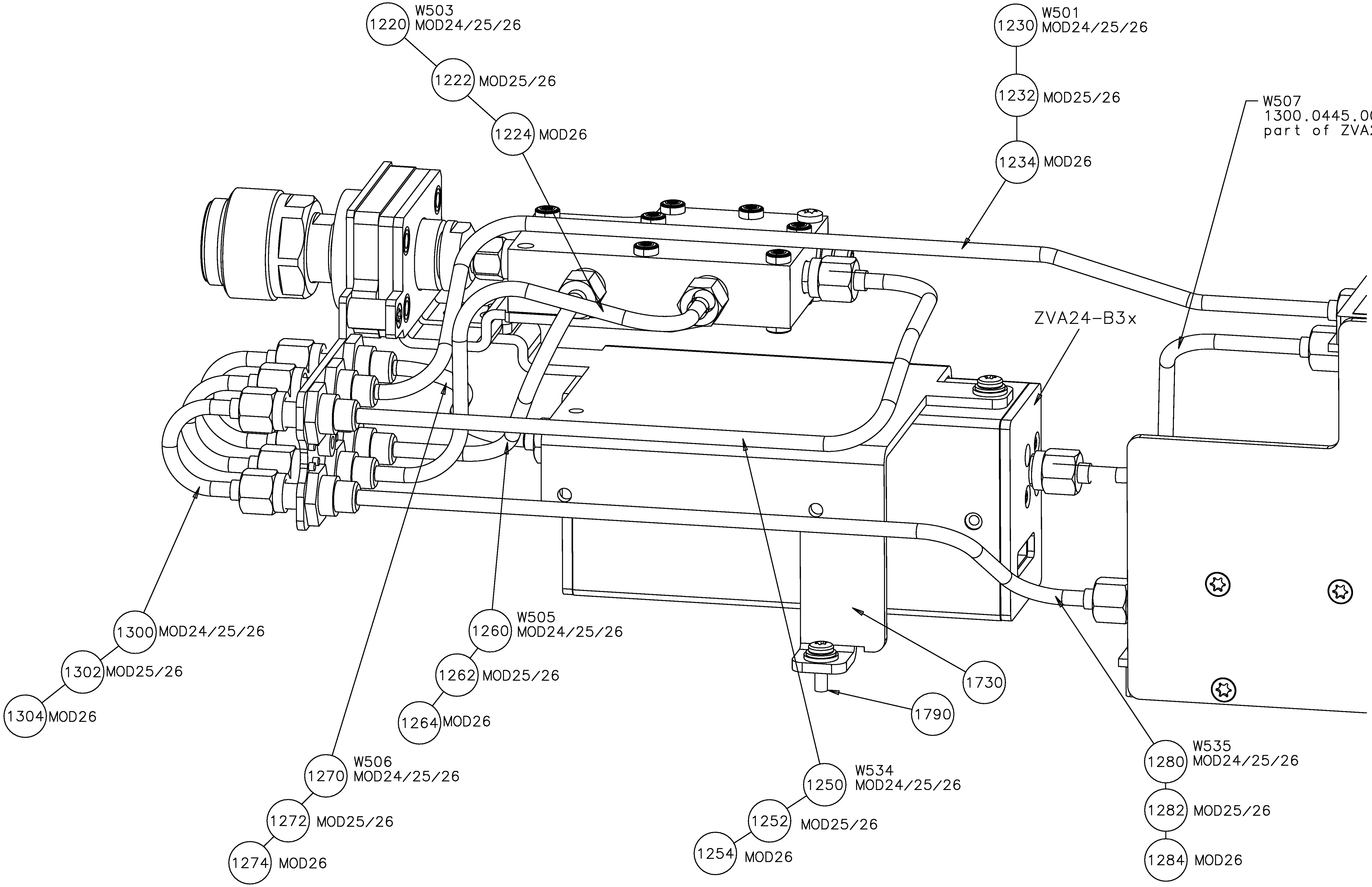
Pos. 1270, 1272, 1274,1280,1282 and 1284 will be not required

Projektionsmethode / *Projection Method*

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEISUNG ZVA24-B16 / INSTALLATION INSTRUCTION ZVA24-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00
ZVA	Datum / Date: 2006-06-22	Abteilung / Dept.: 1ESK	Name / Name: HG	Zeichn.Nr. / Drawing No.: 1164.0267.00 D

Blatt / Sh.: 4

ZVA24-B16 with ZVA24-B3x (Attenuator)



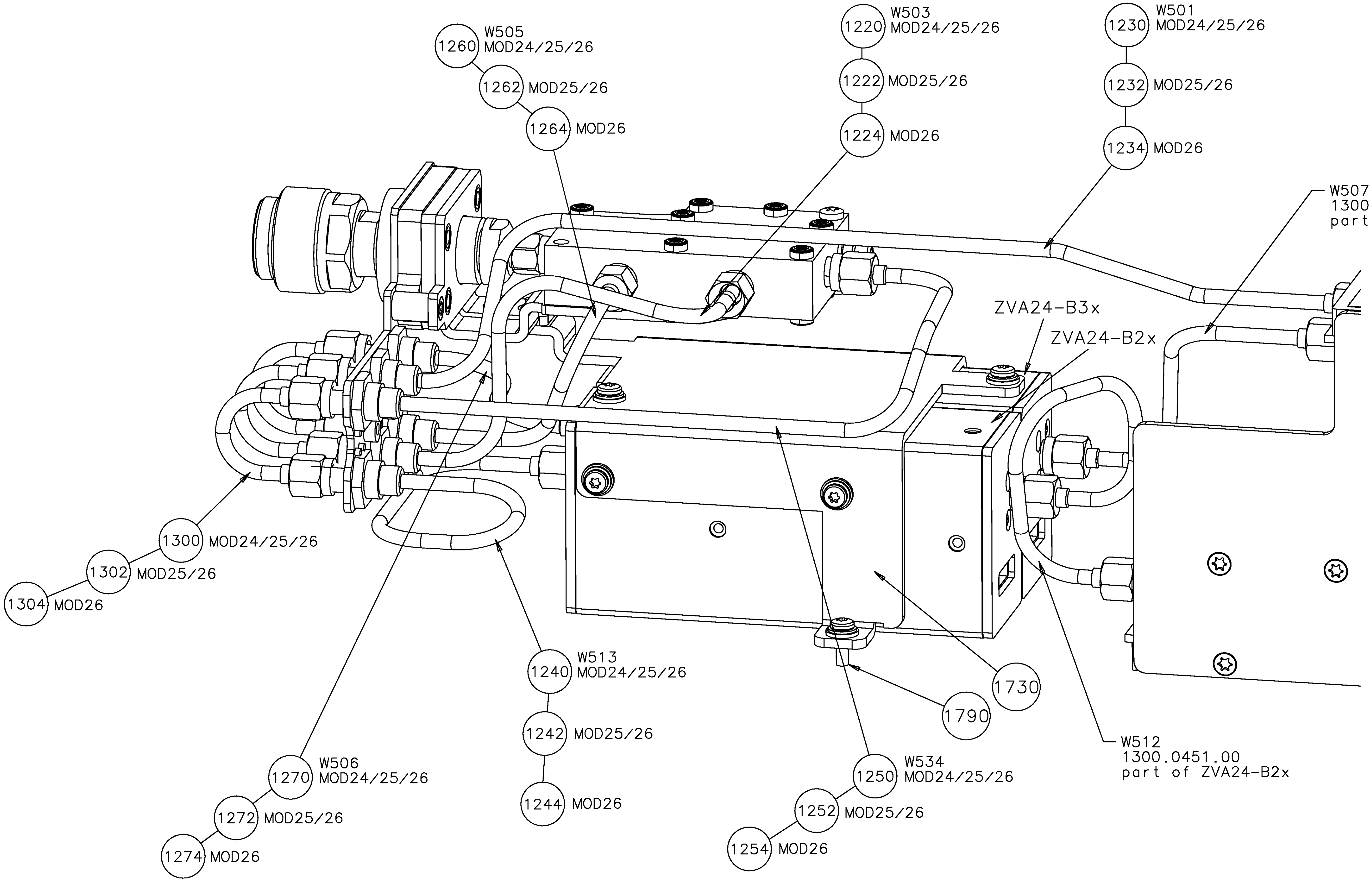
W508 1164.0373.00 part of ZVA24-B3x will be not required

Pos. 1240, 1242, 1244,1290,1292 and 1294 will be not required

Projektions-methode / *Projection Method*

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEISUNG ZVA24-B16 INSTALLATION INSTRUCTION ZVA24-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 5
ZVA	Datum / Date: 2006-06-22	Abteilung / Dept.: 1ESK	Name: Mi	Zeichn.Nr. / Drawing No.: 1164.0267.00	D

ZVA24-B16 with ZVA24-B2x and ZVA24-B3x (Attenuator)

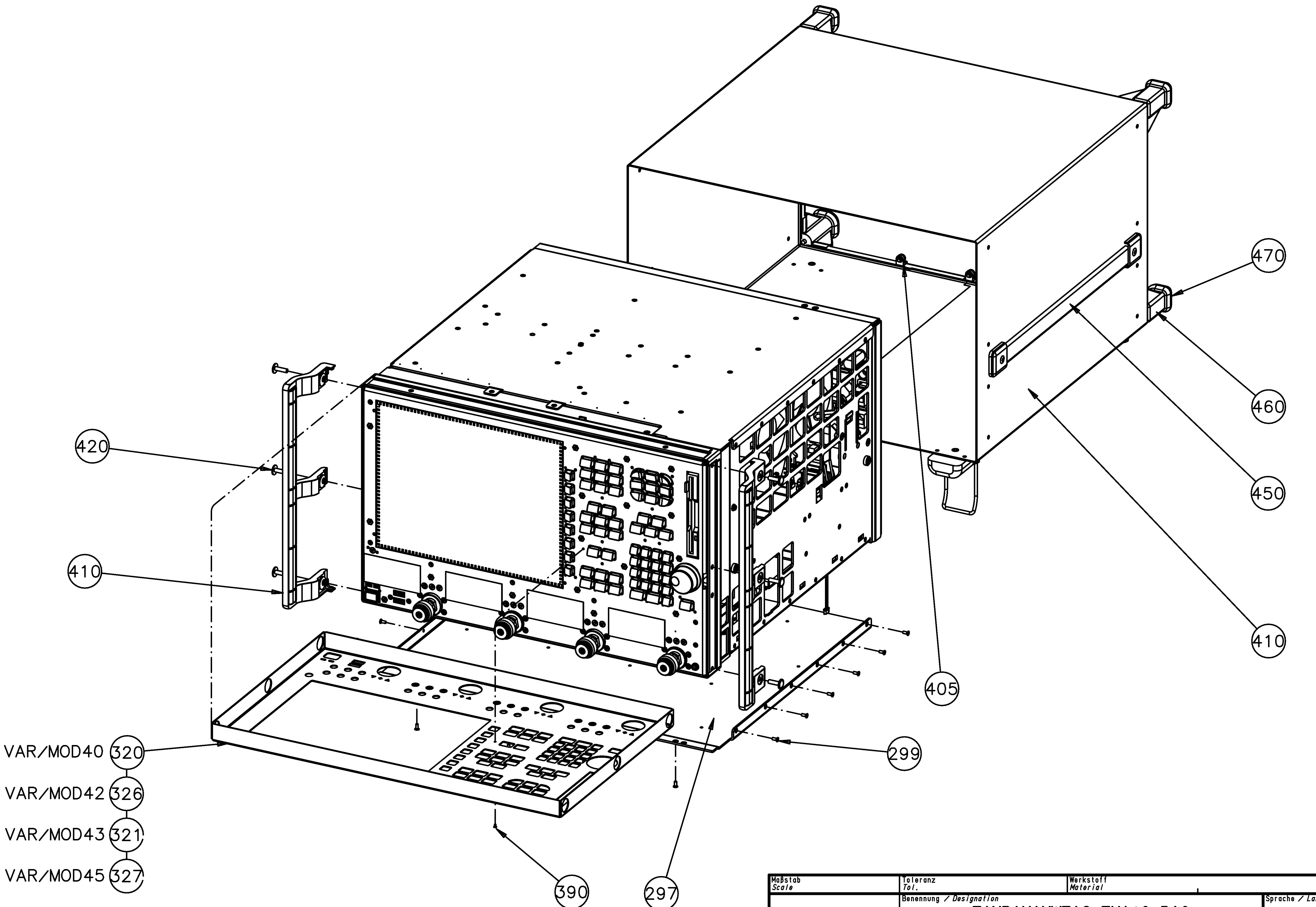


W536 1164.0380.00 part of ZVA24-B2x and
W508 1164.0373.00 part of ZVA24-B3x will be not required

Pos. 1280, 1282, 1284,1290,1292 and 1294 will be not required

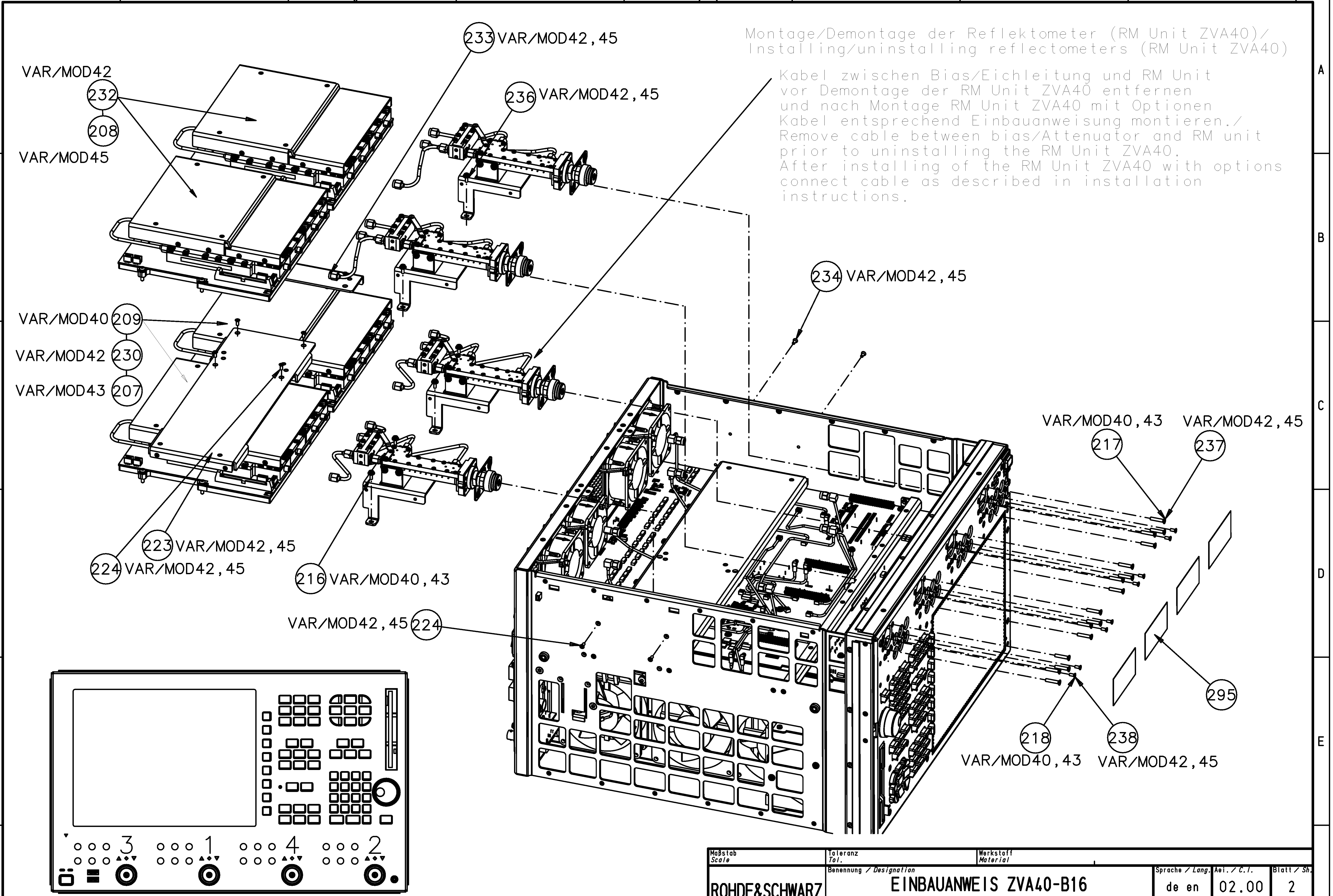
Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEISUNG ZVA24-B16 / INSTALLATION INSTRUCTION ZVA24-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00 — Blatt / Sh.: 6
ZVA	Datum / Date: 2006-06-22	Abteilung / Dept.: 1ESK — Name: Mi	Zeichn.Nr. / Drawing No.: 1164.0267.00 D	



Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 / INSTALLATION MANUAL ZVA40-B16	Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 1
ZVA40	Datum / Date: 2007-08-30; Abteilung / Dept.: 1ESK; Name / Name: LA	Zeichn.Nr. / Drawing No.: 1164.0238.00 D		



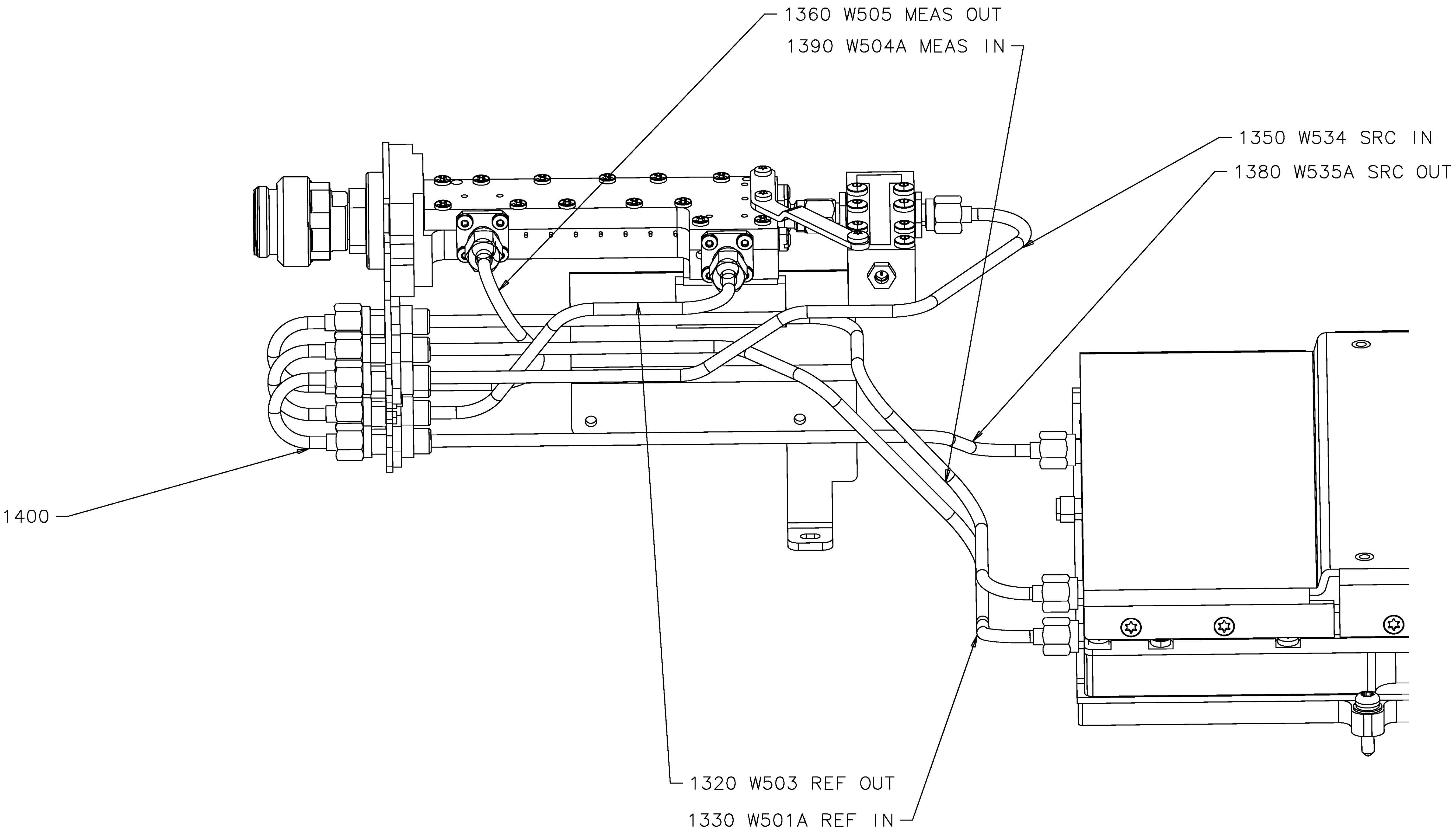
Für dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 / INSTALLATION MANUAL ZVA40-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00
ZVA40	Datum / Date: 2007-08-30	Abteilung / Dept.: 1ESK	Name: LA	Zeichn.Nr. / Drawing No.: 1164.0238.00 D

Blatt / Sh.: 2

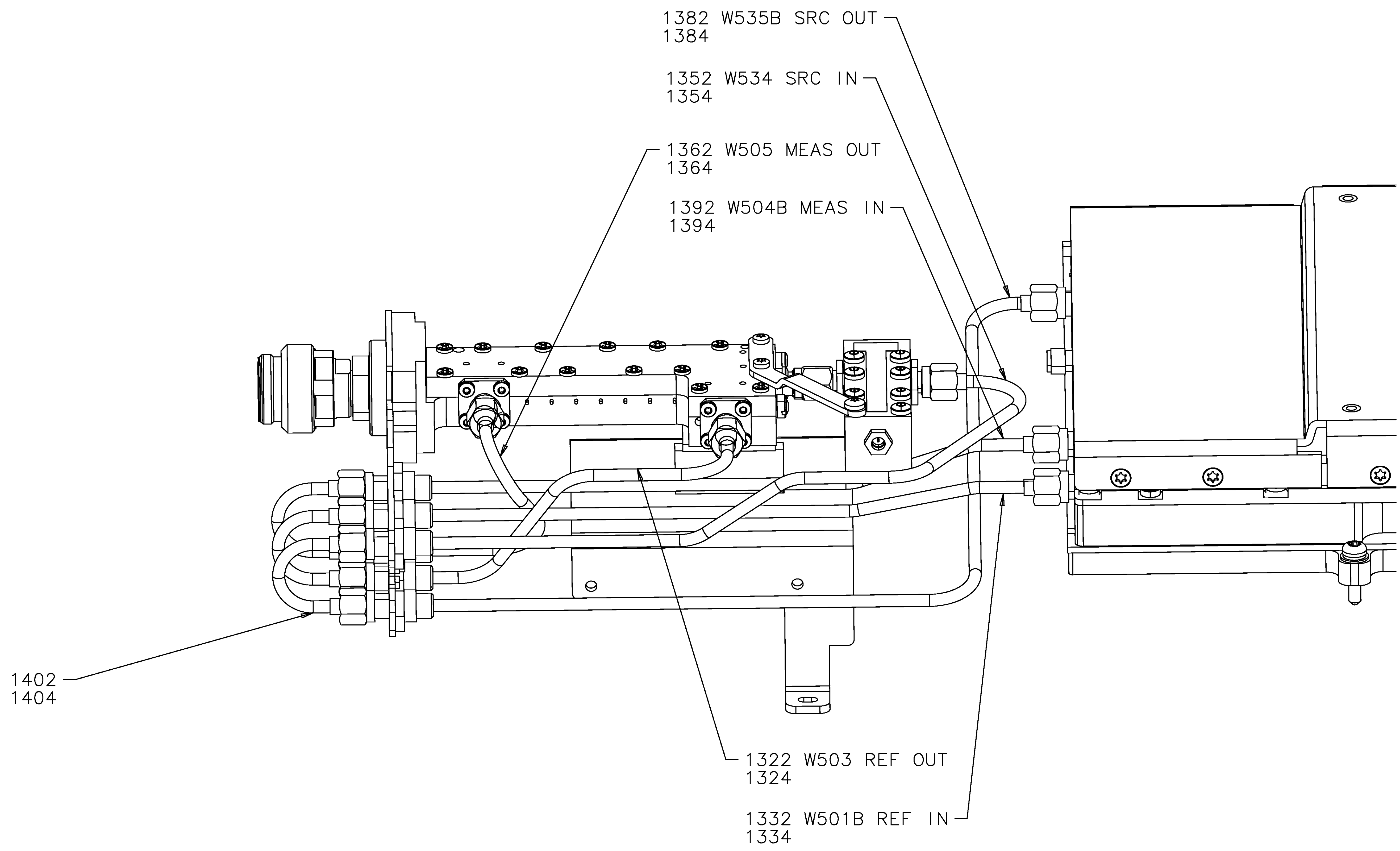
ZVA40-B16 (Tor/Port 1/2)



Projektionsmethode
Projection Method

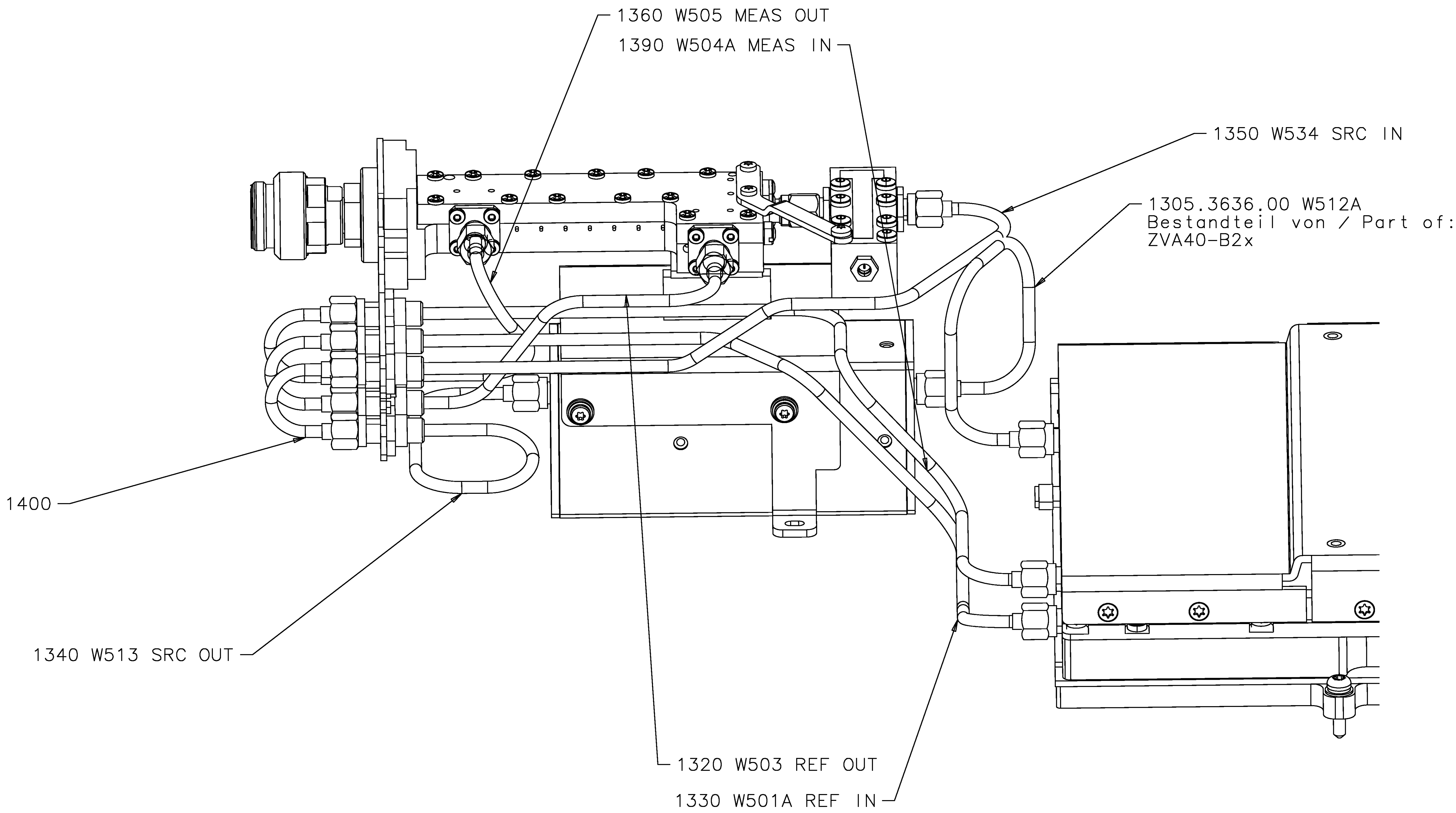
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 INSTALLATION MANUAL ZVA40-B16	Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 3
ZVA40	Datum / Date: 2007-03-29	Abteilung / Dept.: 1ESK	Name: La	Zeichn.Nr. / Drawing No.: 1164.0238.00 D

ZVA40-B16 (Tor/Port 3/4)



Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 INSTALLATION MANUAL ZVA40-B16		Sprache / Lang.: de en; Aei. / C.I.: 02.00	Blatt / Sh.: 4
ZVA40	Datum / Date: 2007-03-29	Abteilung / Dept.: 1ESK; Name / Name: LA	Zeichn.Nr. / Drawing No.: 1164.0238.00	D

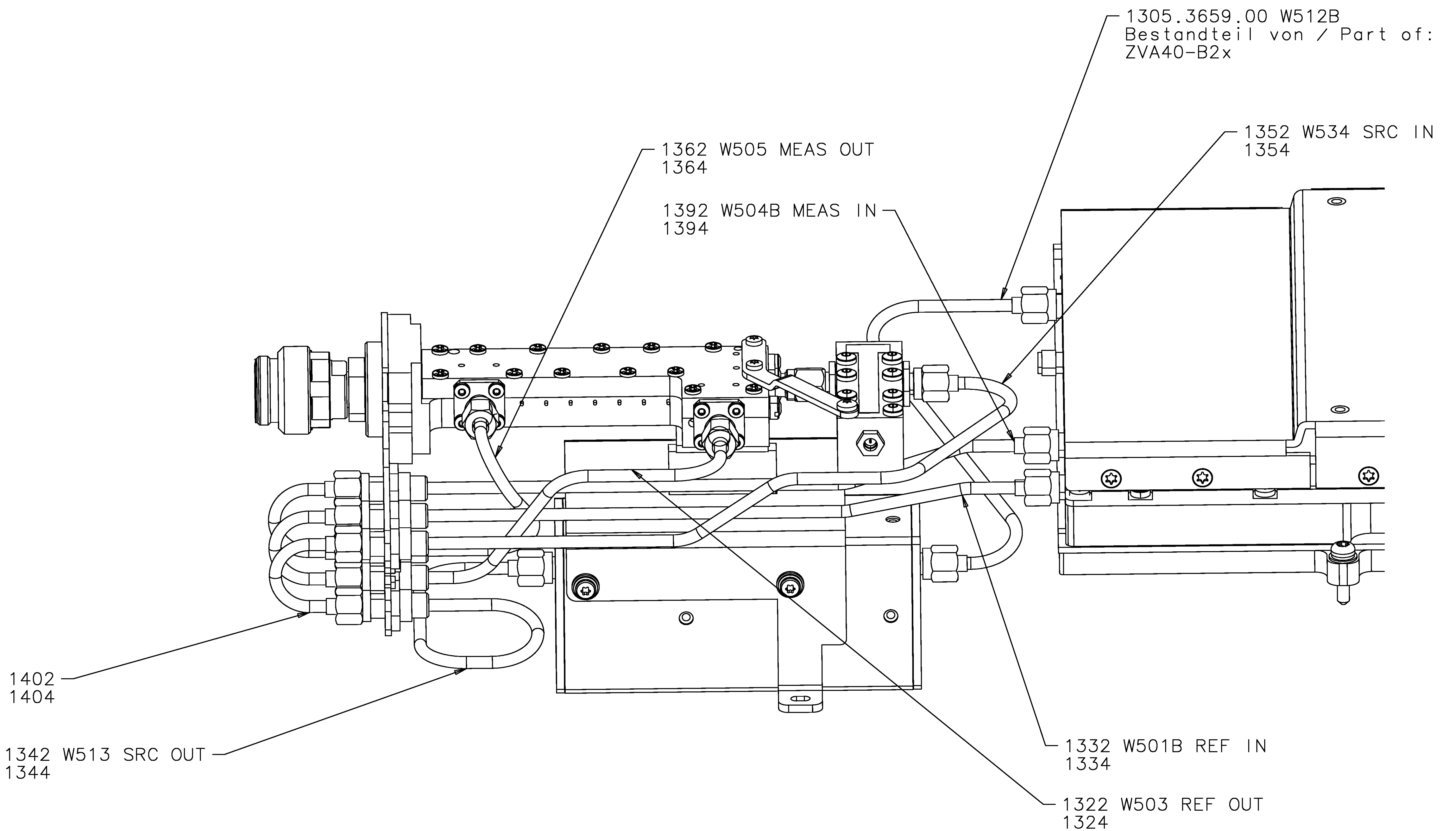
ZVA40-B16 (Tor/Port 1/2) mit/with ZVA40-B2x



Projektions-methode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 / INSTALLATION MANUAL ZVA40-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00 · Blatt / Sh.: 5
ZVA40	Datum / Date: 2007-03-29	Abteilung / Dept.: 1ESK · Name: LA	Zeichn.Nr. / Drawing No.: 1164.0238.00 D	

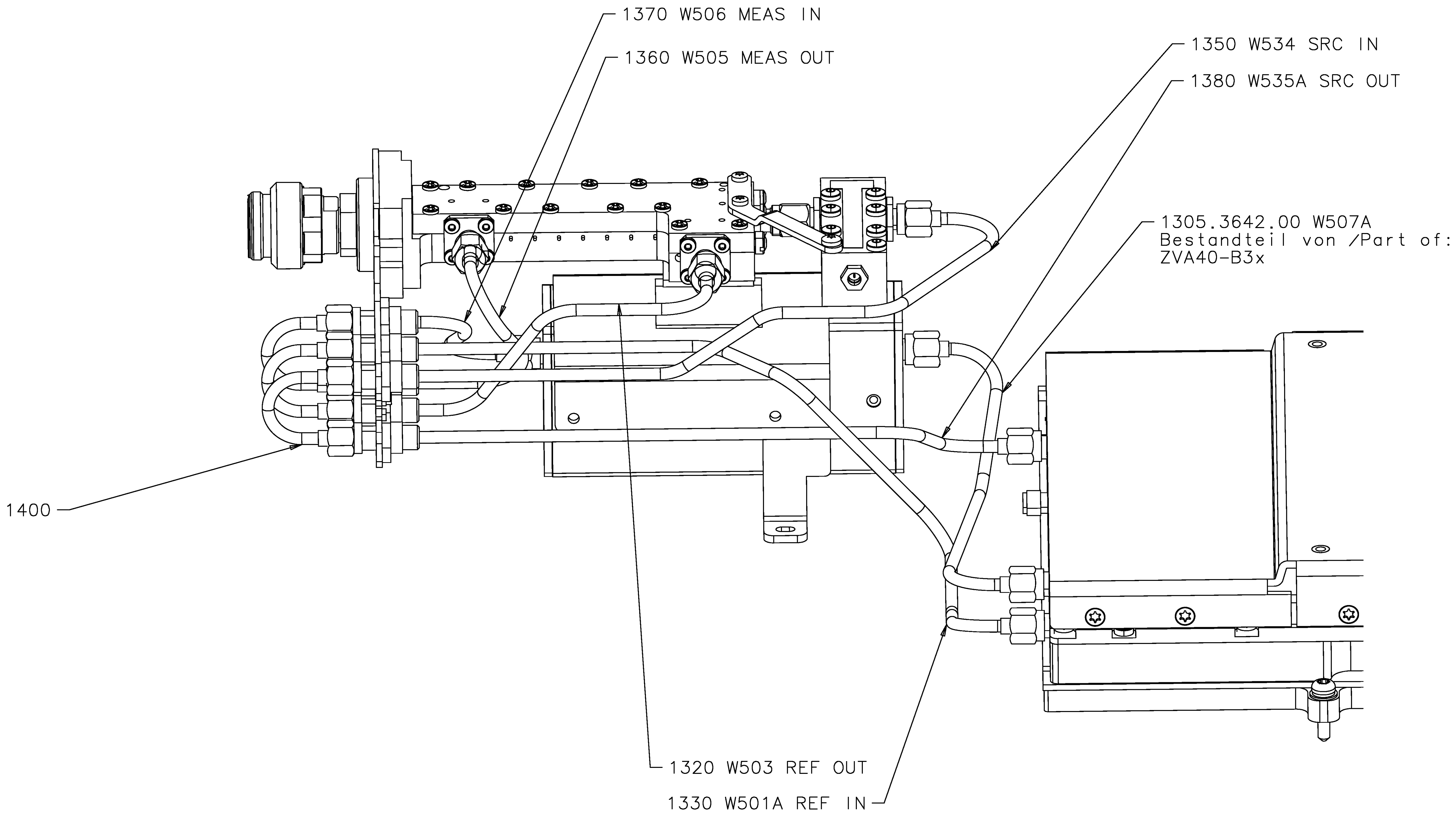
ZVA40-B16 (Tor/Port 3/4) mit/with ZVA40-B2x



Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 INSTALLATION MANUAL ZVA40-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00
			Blatt / Sh.: 6	Zeichn.Nr. / Drawing No.: 1164.0238.00 D
ZVA40	Datum / Date: 2007-03-29	Abteilung / Dept.: 1ESK	Name: LA	

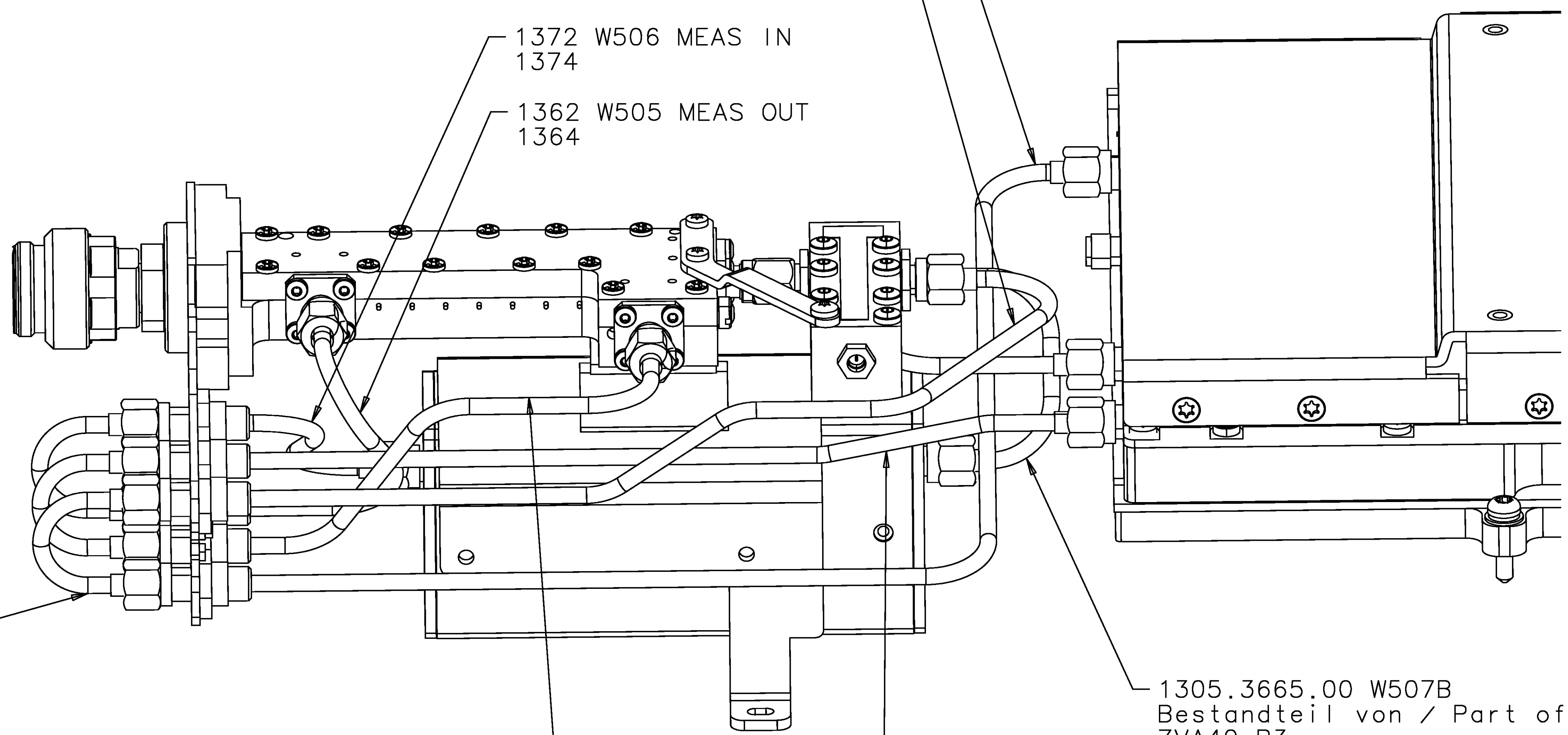
ZVA40-B16 (Tor/Port 1/2) mit/with ZVA40-B3x



Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 / INSTALLATION MANUAL ZVA40-B16	Sprache / Lang.: de en	Aei. / C.I.: 02.00 — Blatt / Sh.: 7
ZVA40	Datum / Date: 2007-03-29 — Abteilung / Dept.: 1ESK — Name: LA	Zeichn.Nr. / Drawing No.: 1164.0238.00 D	

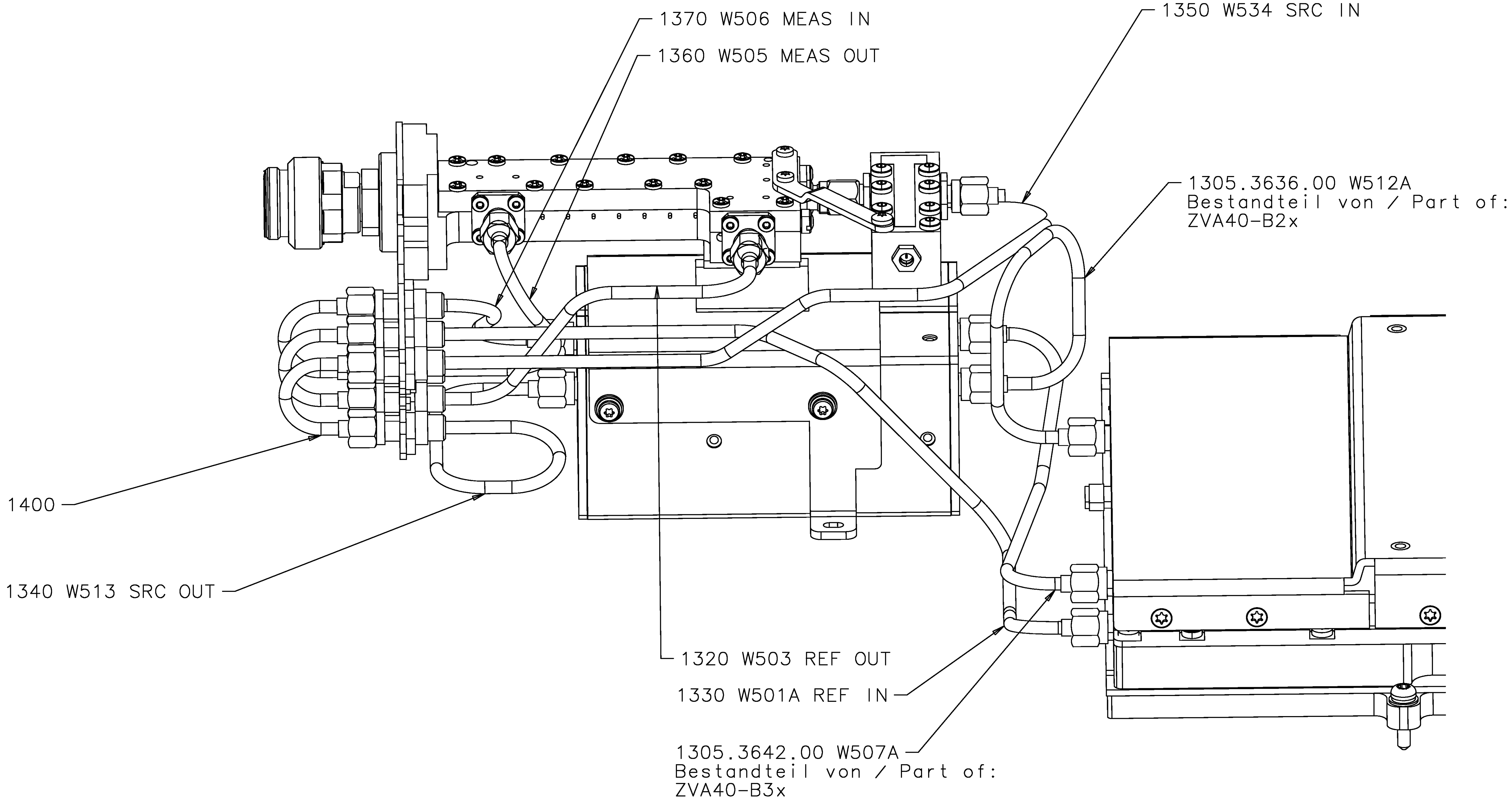
ZVA40-B16 (Tor/Port 3/4) mit/with ZVA40-B3x



Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEIS ZVA40-B16 / INSTALLATION MANUAL ZVA40-B16		Sprache / Lang.: de en	Aei. / C.I.: 02.00 / Blatt / Sh.: 8
ZVA40	Datum / Date: 2007-03-29	Abteilung / Dept.: 1ESK / Name: LA	Zeichn.Nr. / Drawing No.: 1164.0238.00 D	

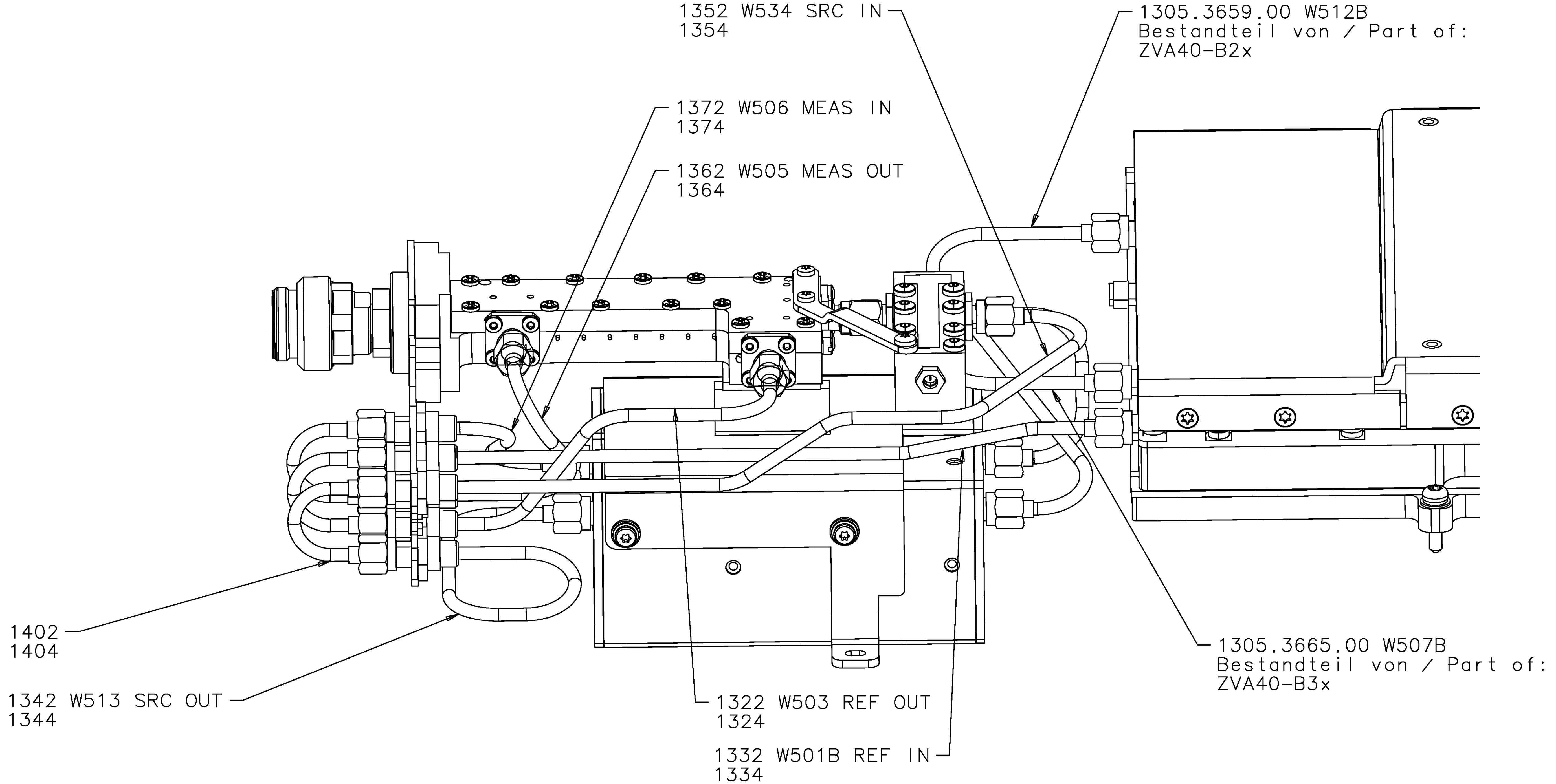
ZVA40-B16 (Tor/Port 1/2) mit/with ZVA40-B2x und/and ZVA40-B3x



Projektions-methode
Projection Method

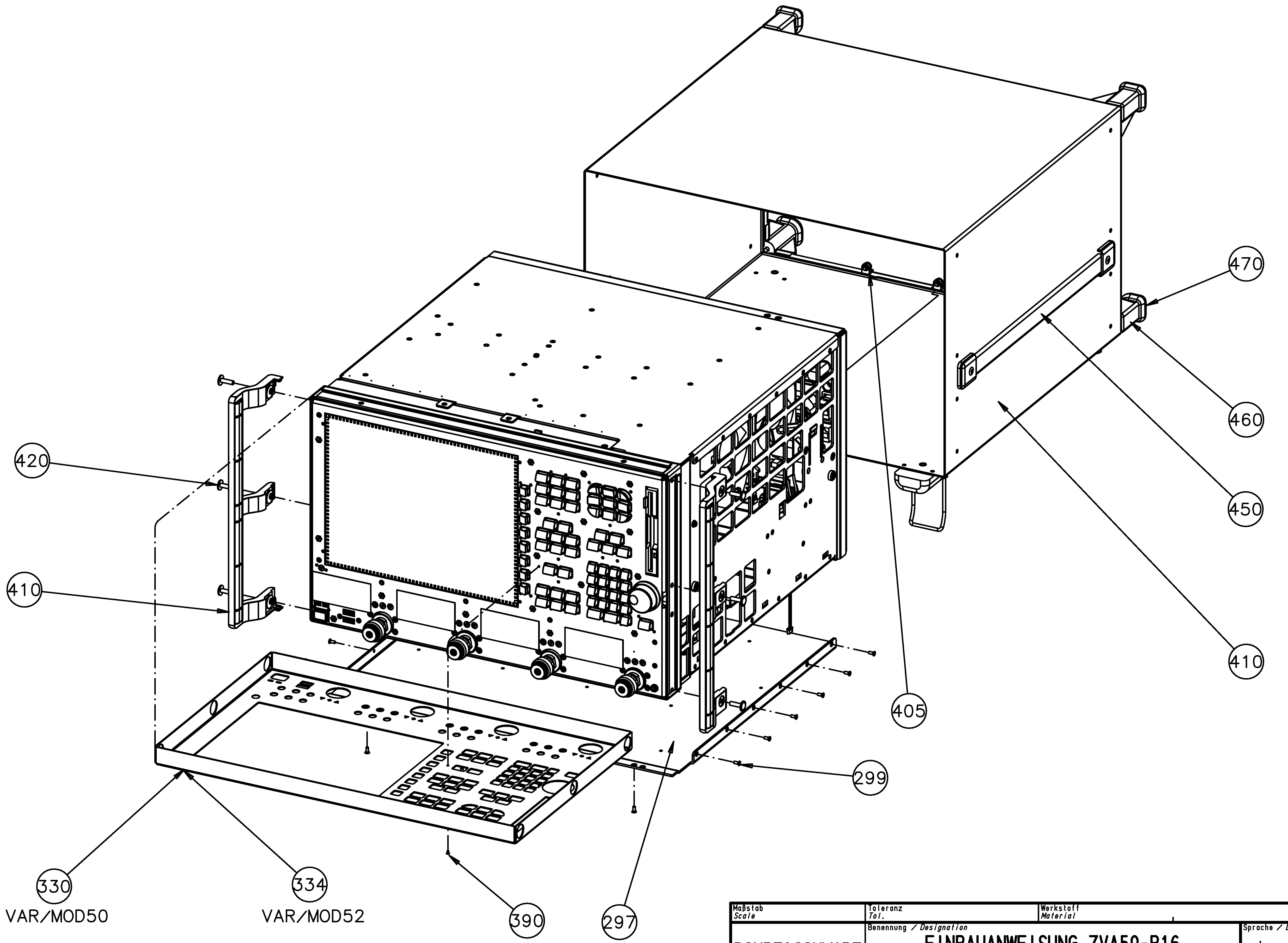
Maßstab *Scale*	Toleranz *Tol.*		Werkstoff *Material*		
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEIS ZVA40-B16 INSTALLATION MANUAL ZVA40-B16			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00 — Blatt / *Sh.* 9
ZVA40	Datum *Date* 2007-03-29	Abteilung *Dept.* 1ESK	Name *Name* LA	Zeichn.Nr. / *Drawing No.* 1164.0238.00 D	

ZVA40-B16 (Tor/Port 3/4) mit/with ZVA40-B2x und/and ZVA40-B3x



Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: EINBAUANWEIS ZVA40-B16 / INSTALLATION MANUAL ZVA40-B16	Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 10
ZVA40	Datum / *Date*: 2007-03-29; Abteilung / *Dept.*: 1ESK; Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1164.0238.00 D		



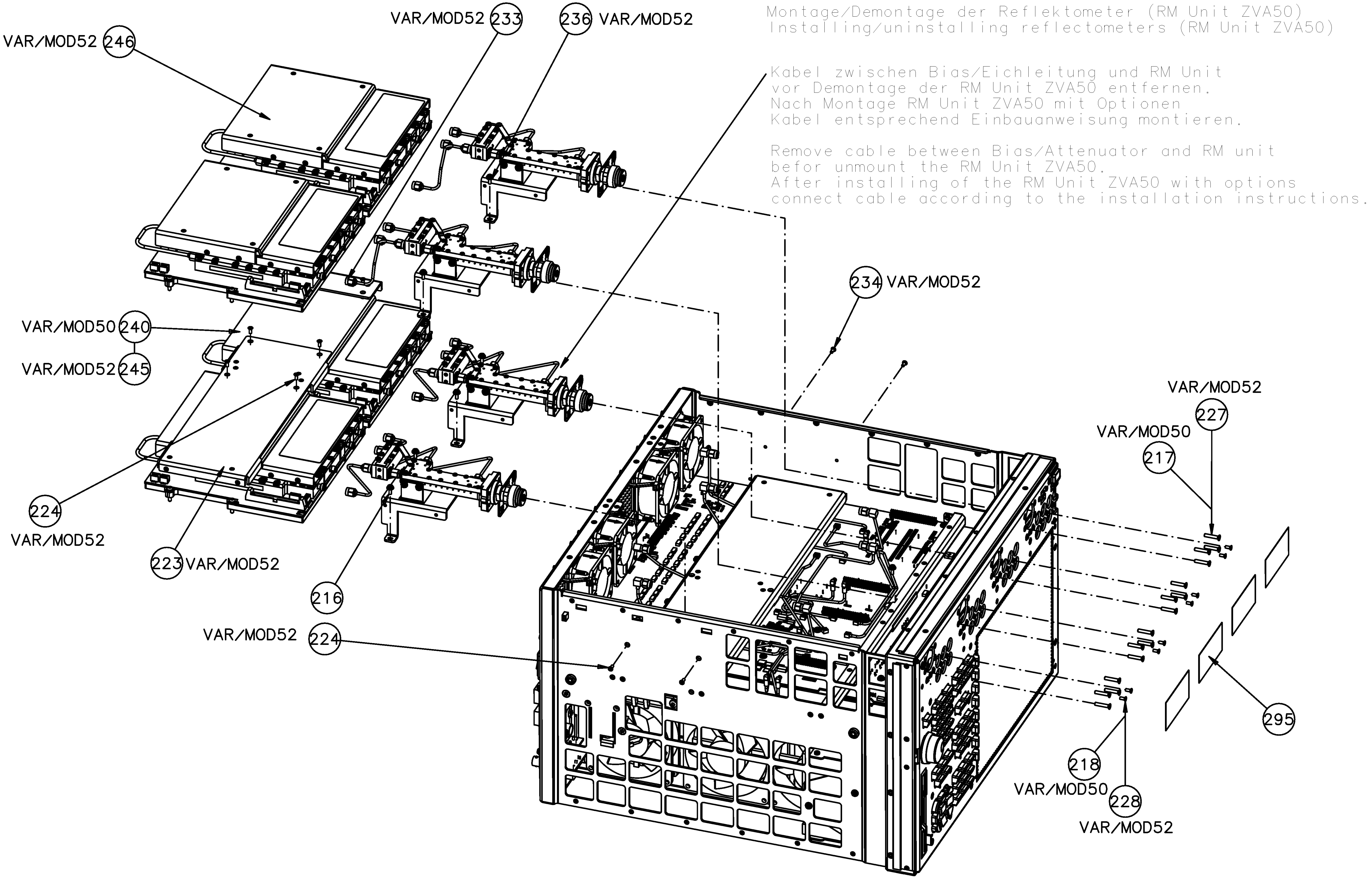
Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANWEISUNG ZVA50-B16 INSTALLATION INSTRUCTION ZVA50-B16	Sprache / *Lang.* de en	Aei. / *C.I.* 01.00 — Blatt / *Sh.* 1
ZVA50	Datum *Date* 2007-08-28 — Abteilung *Dept.* 1ESK — Name *Name* La	Zeichn.Nr. / *Drawing No.* 1305.5322.00 D	

Montage/Demontage der Reflektometer (RM Unit ZVA50)
Installing/uninstalling reflectometers (RM Unit ZVA50)

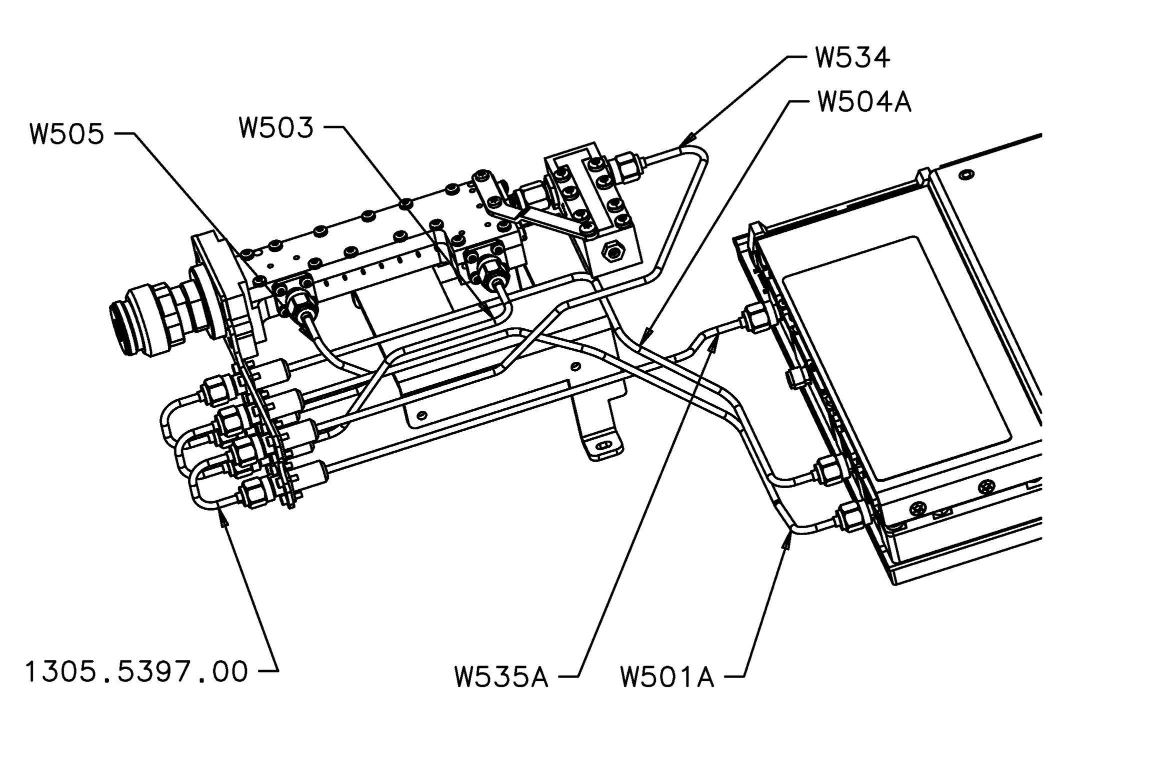
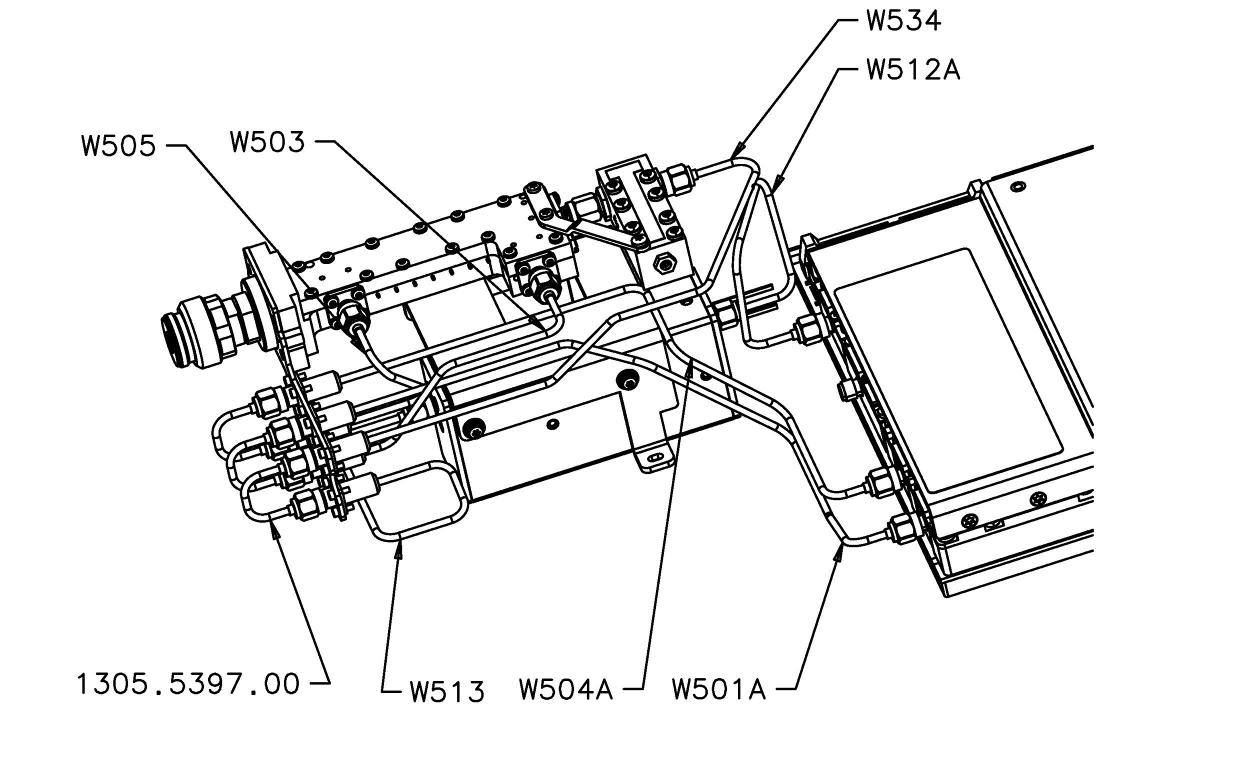
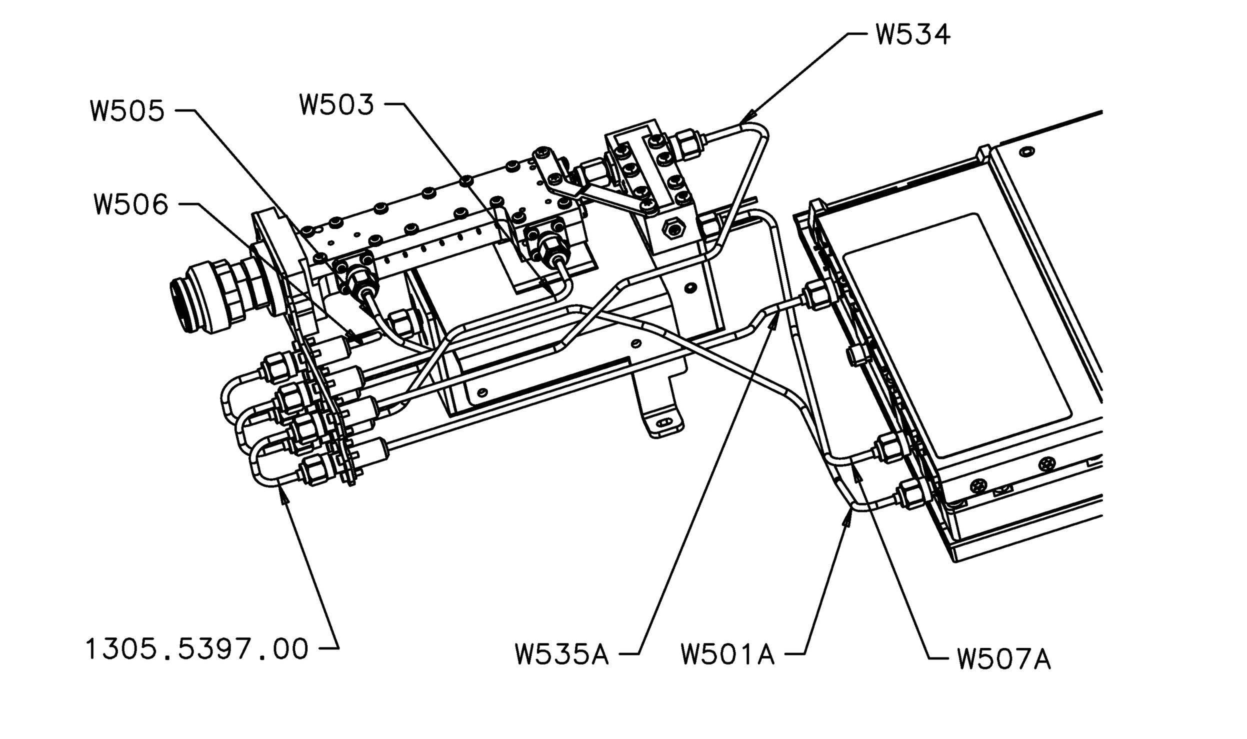
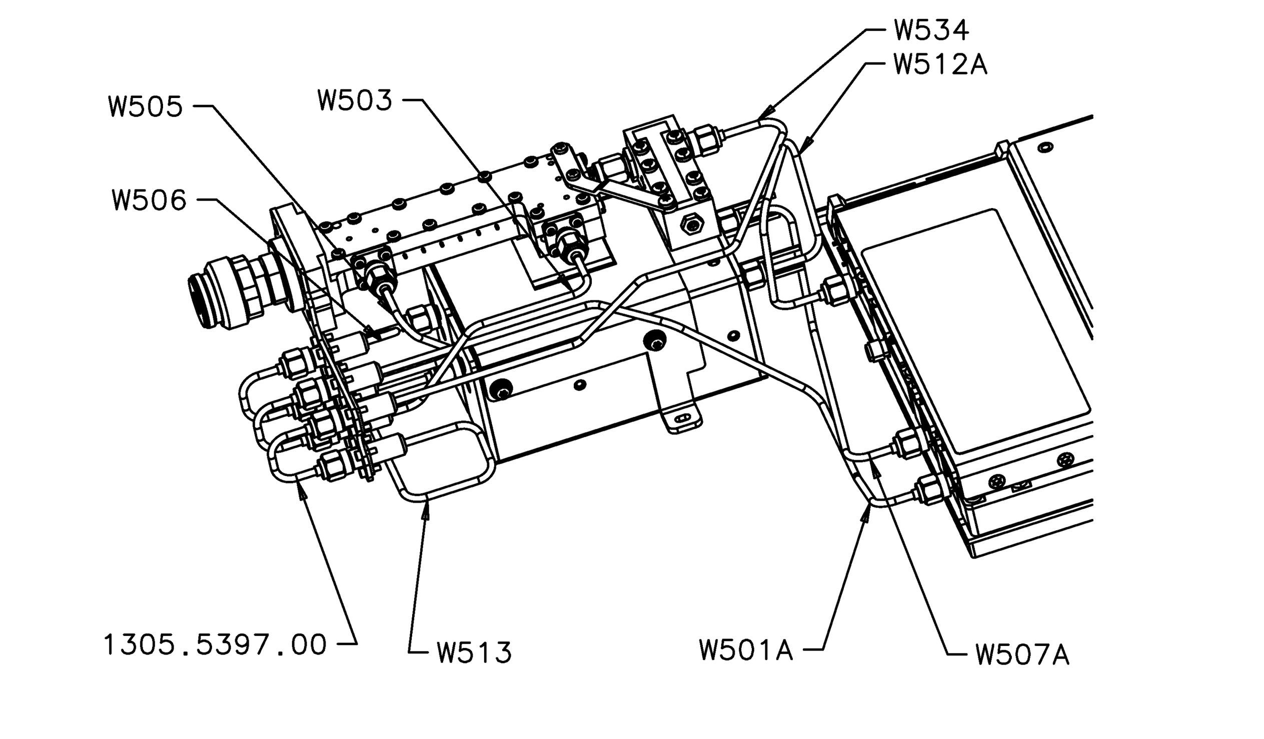
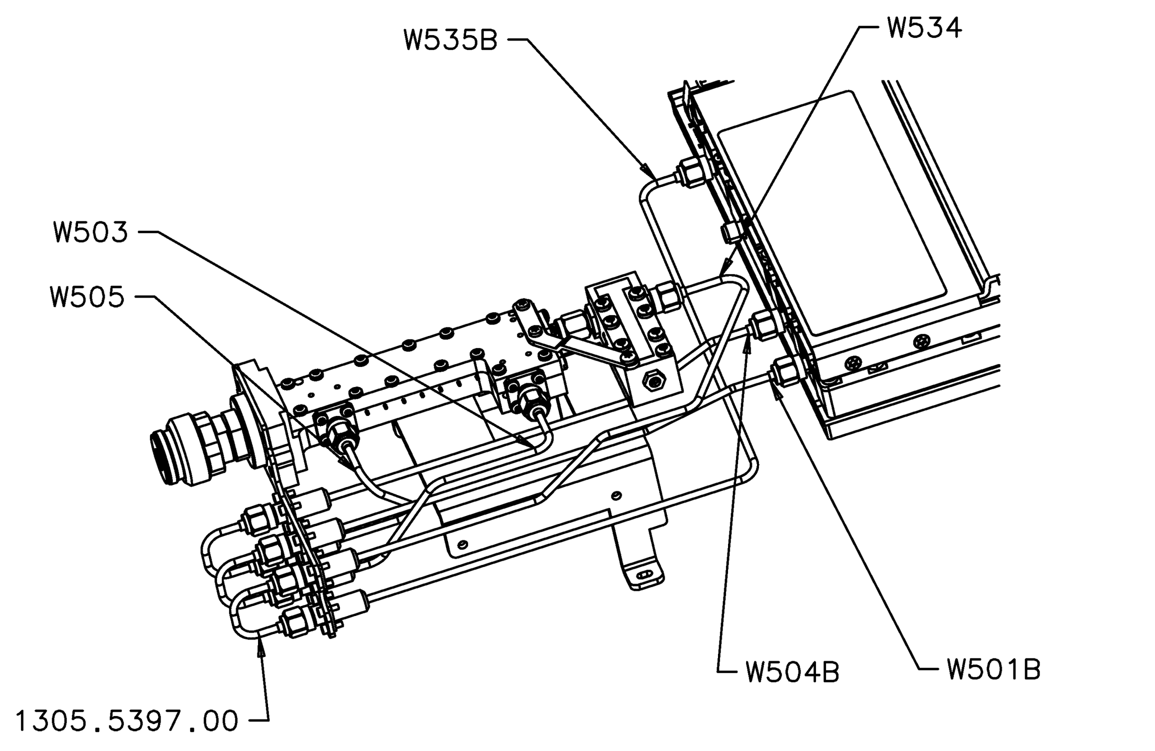
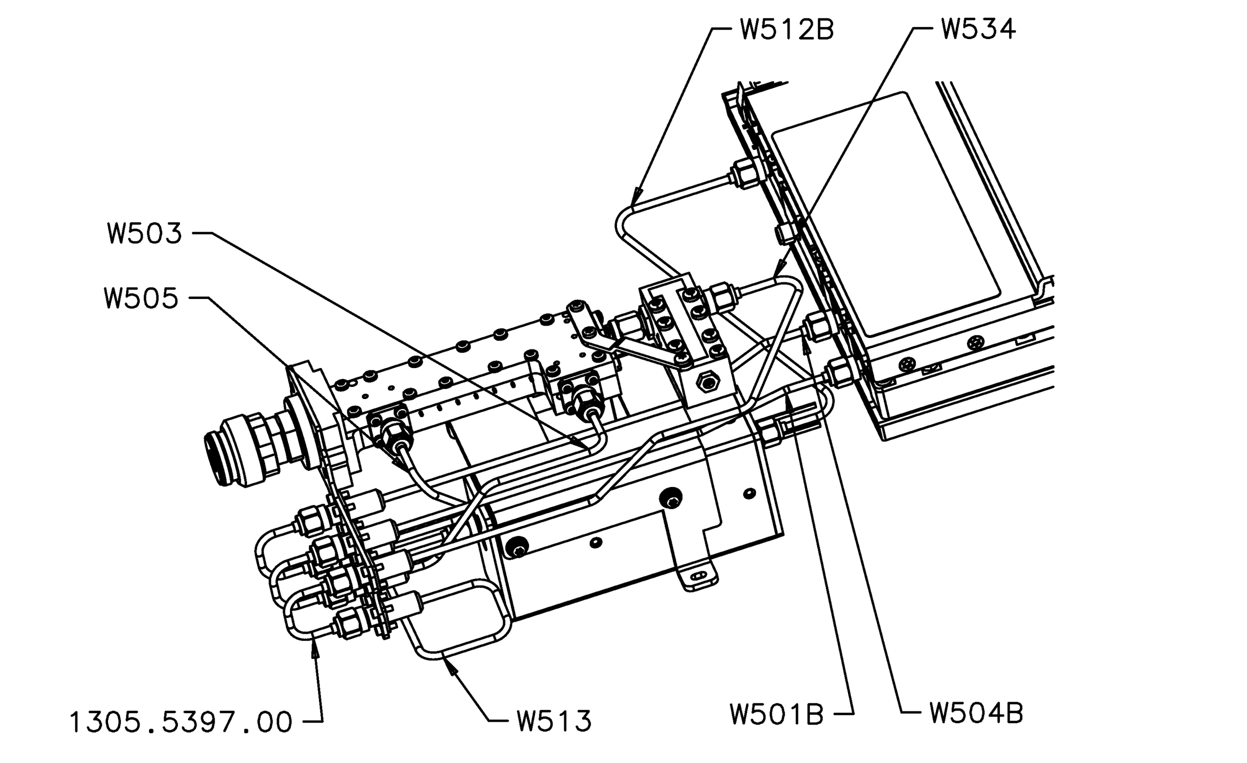
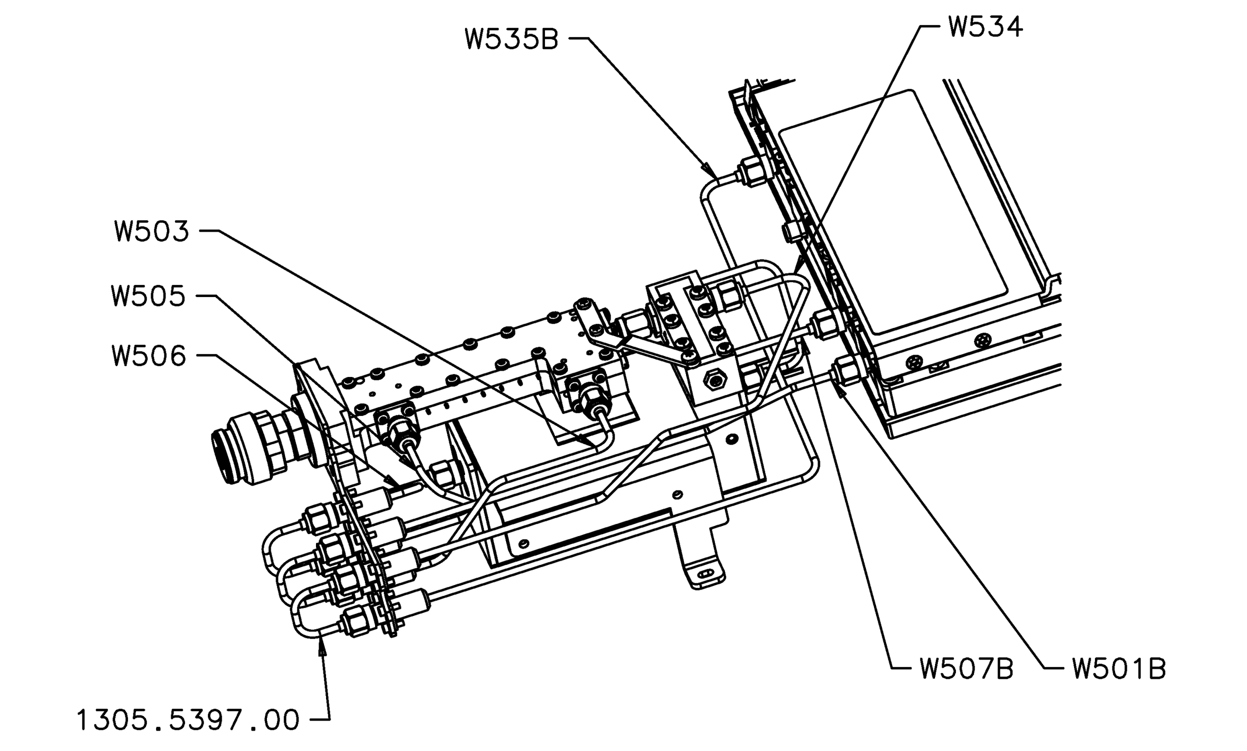
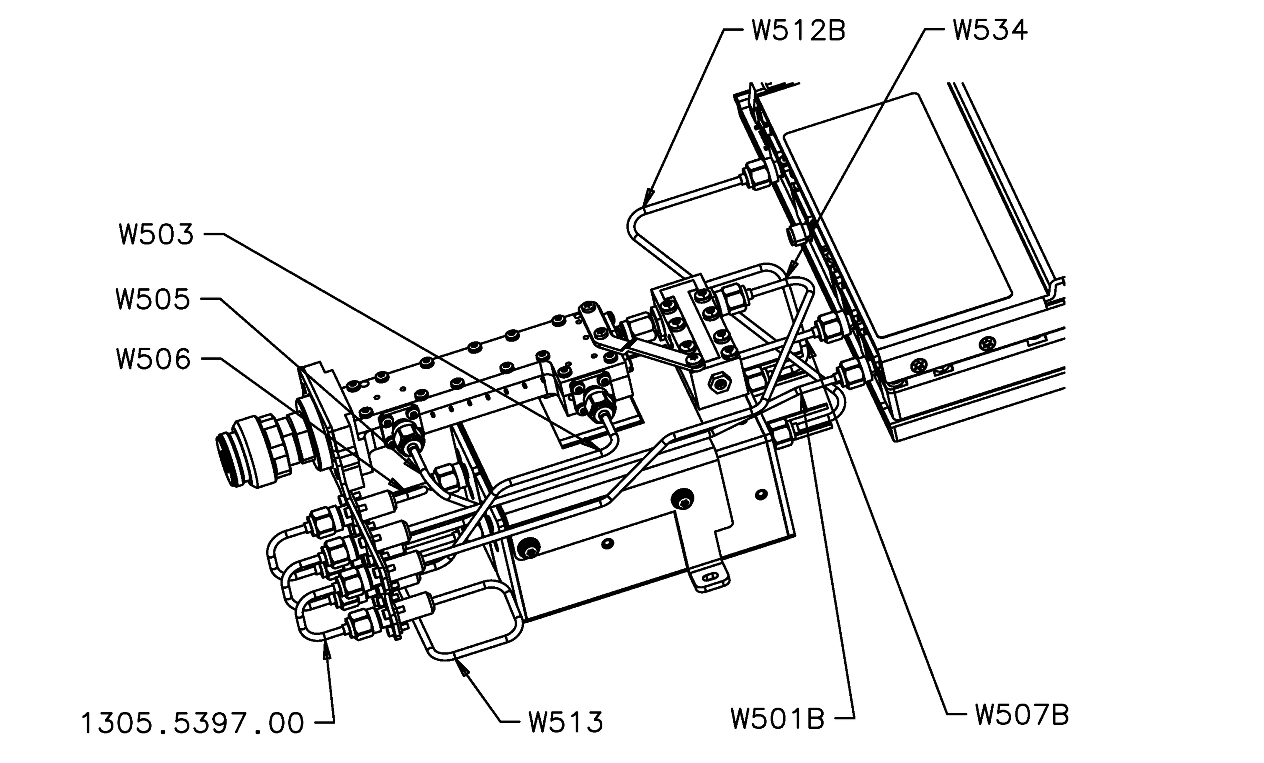
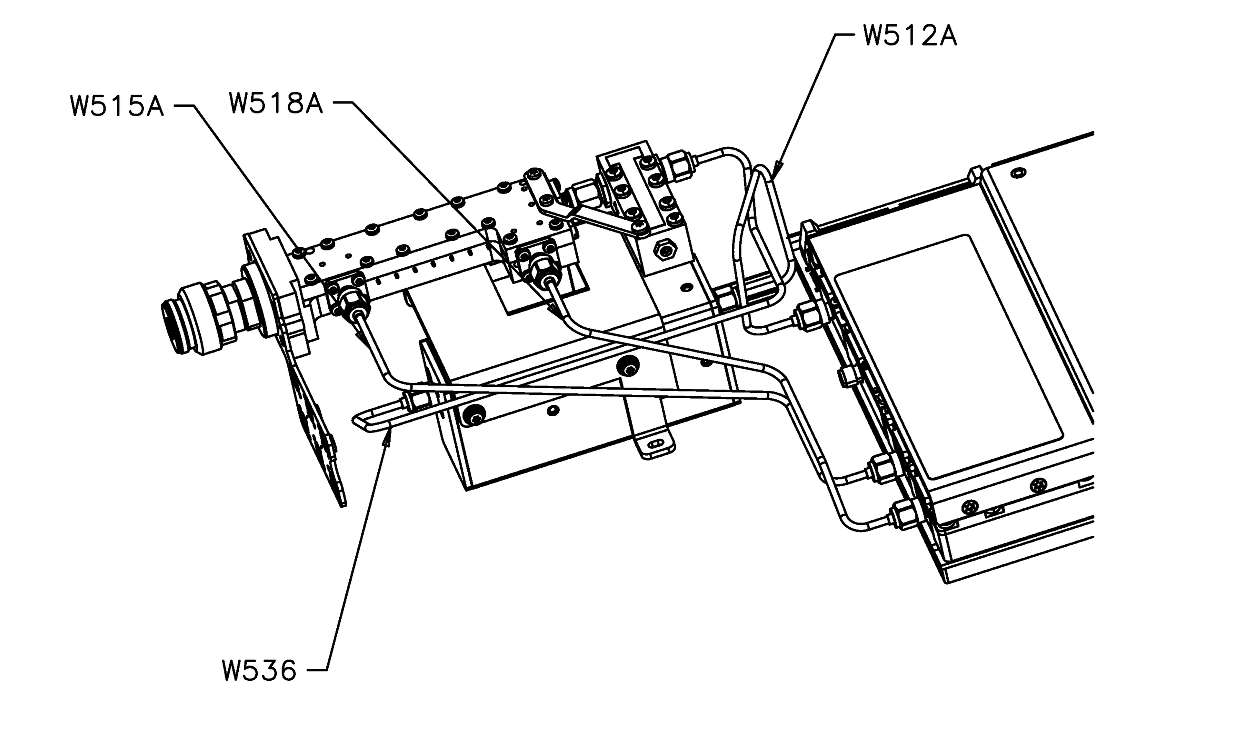
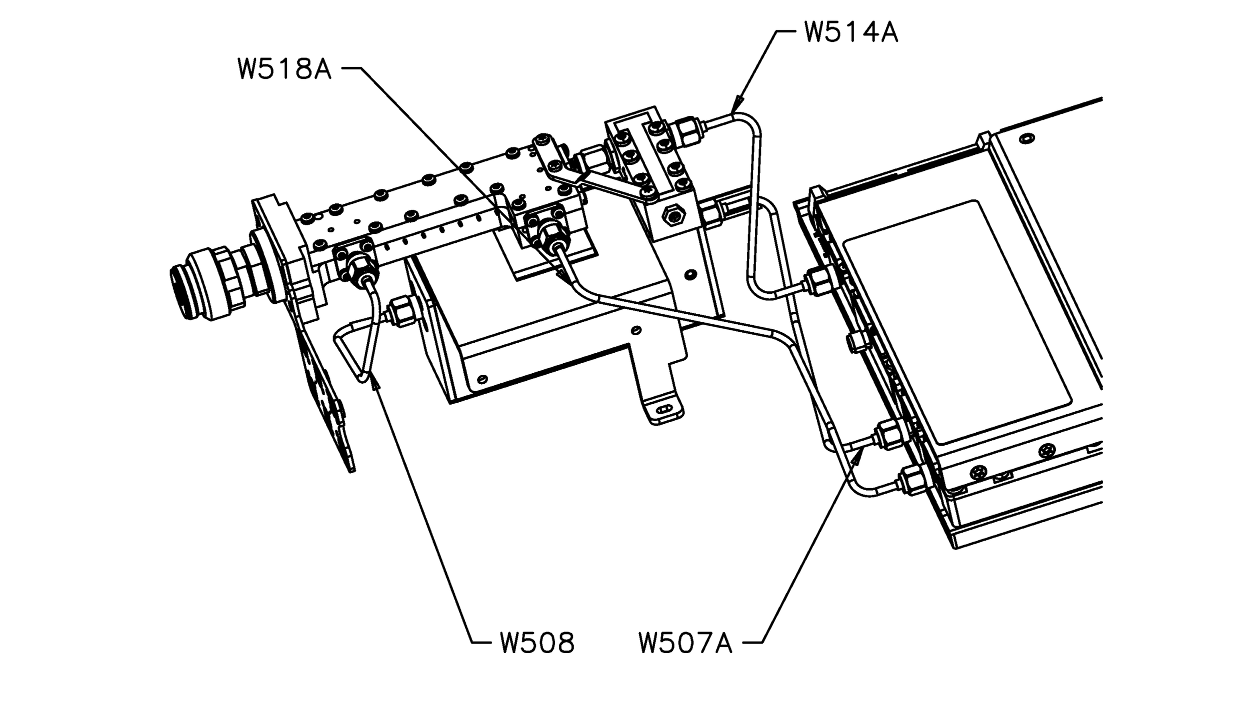
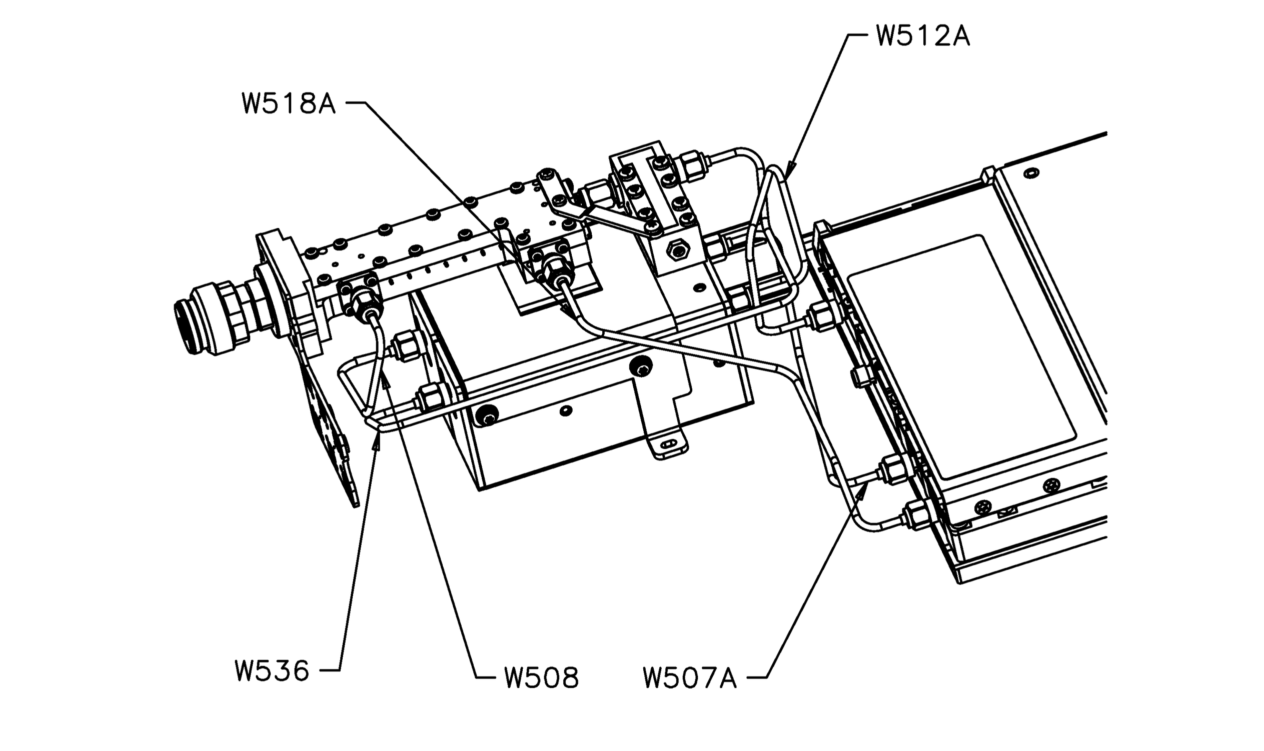
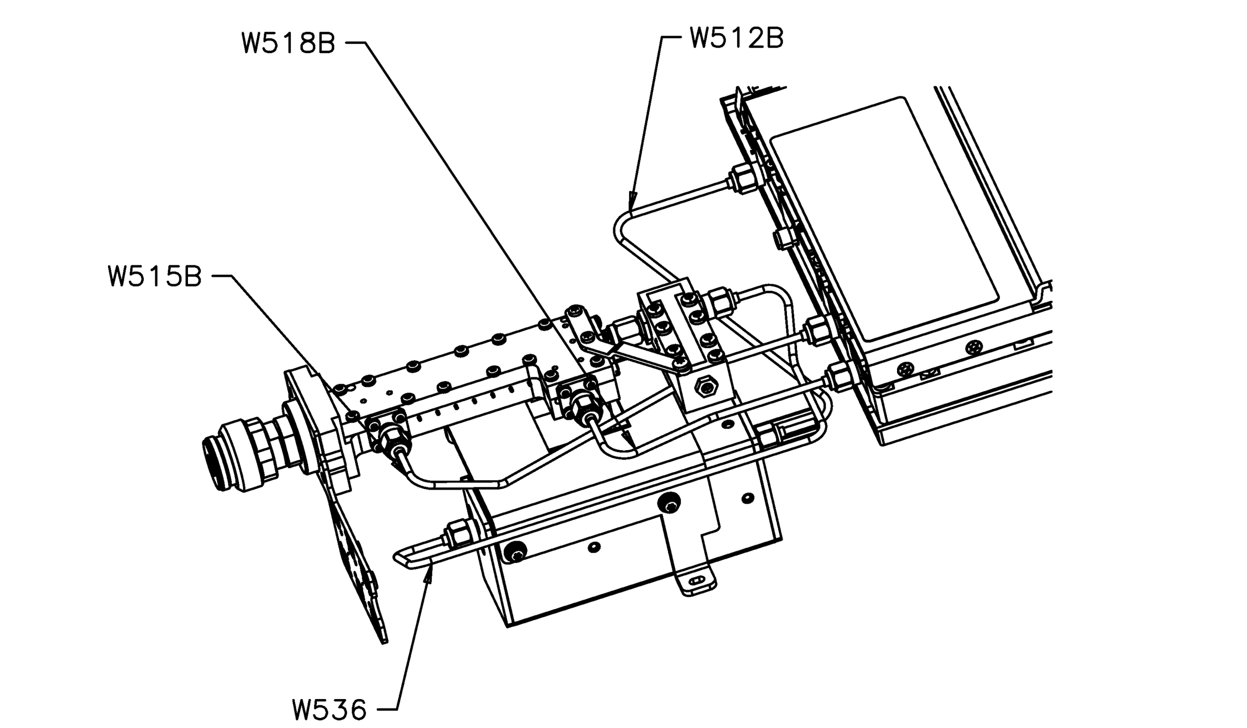
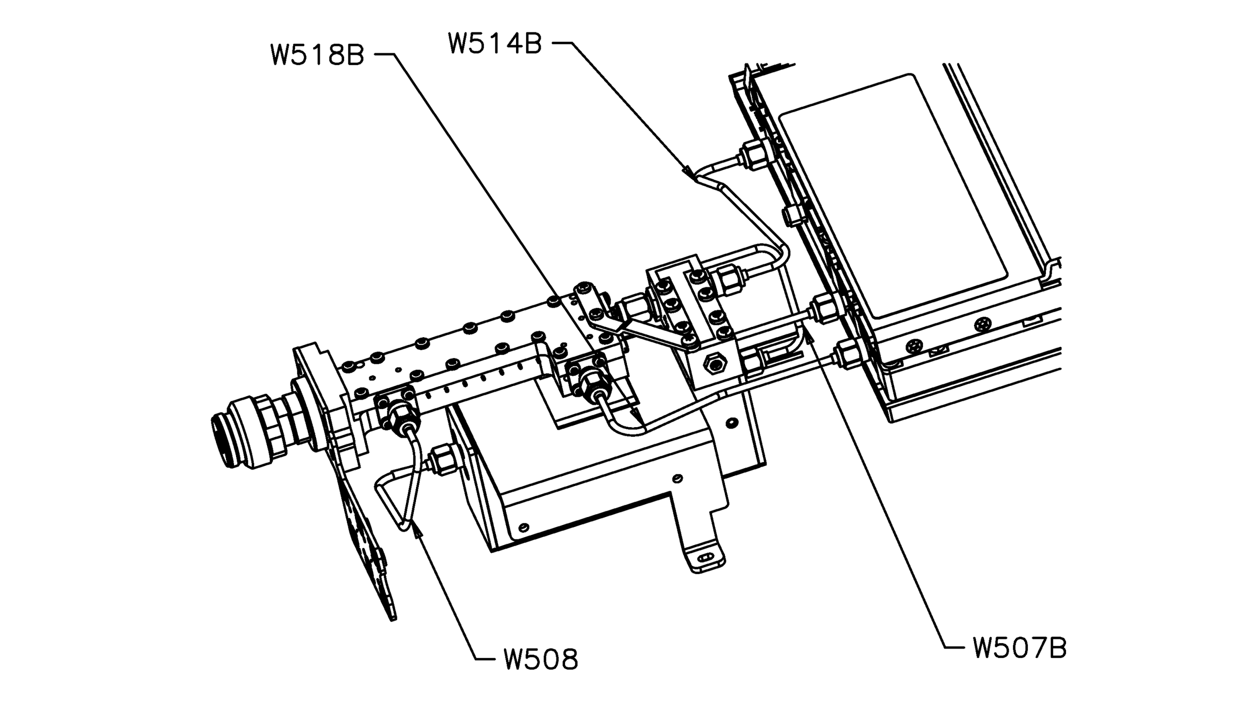
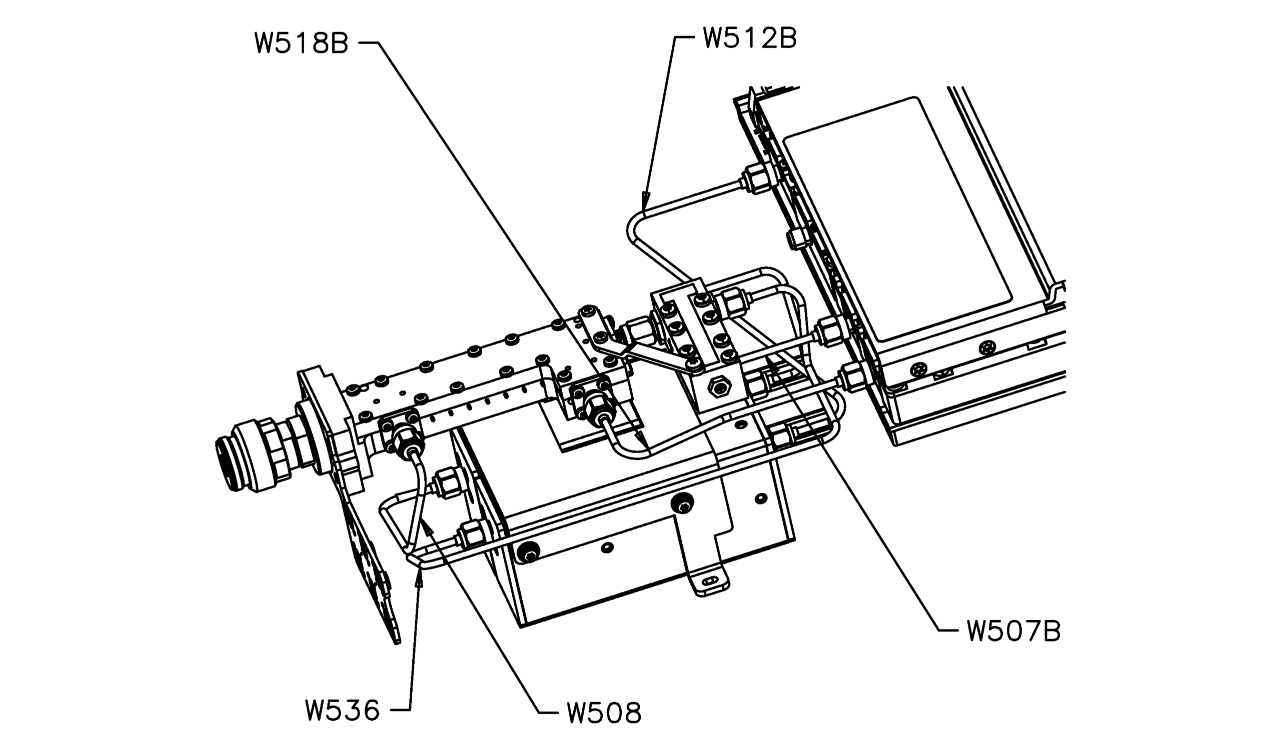
Kabel zwischen Bias/Eichleitung und RM Unit vor Demontage der RM Unit ZVA50 entfernen. Nach Montage RM Unit ZVA50 mit Optionen Kabel entsprechend Einbauanweisung montieren.

Remove cable between Bias/Attenuator and RM unit befor unmount the RM Unit ZVA50. After installing of the RM Unit ZVA50 with options connect cable according to the installation instructions.



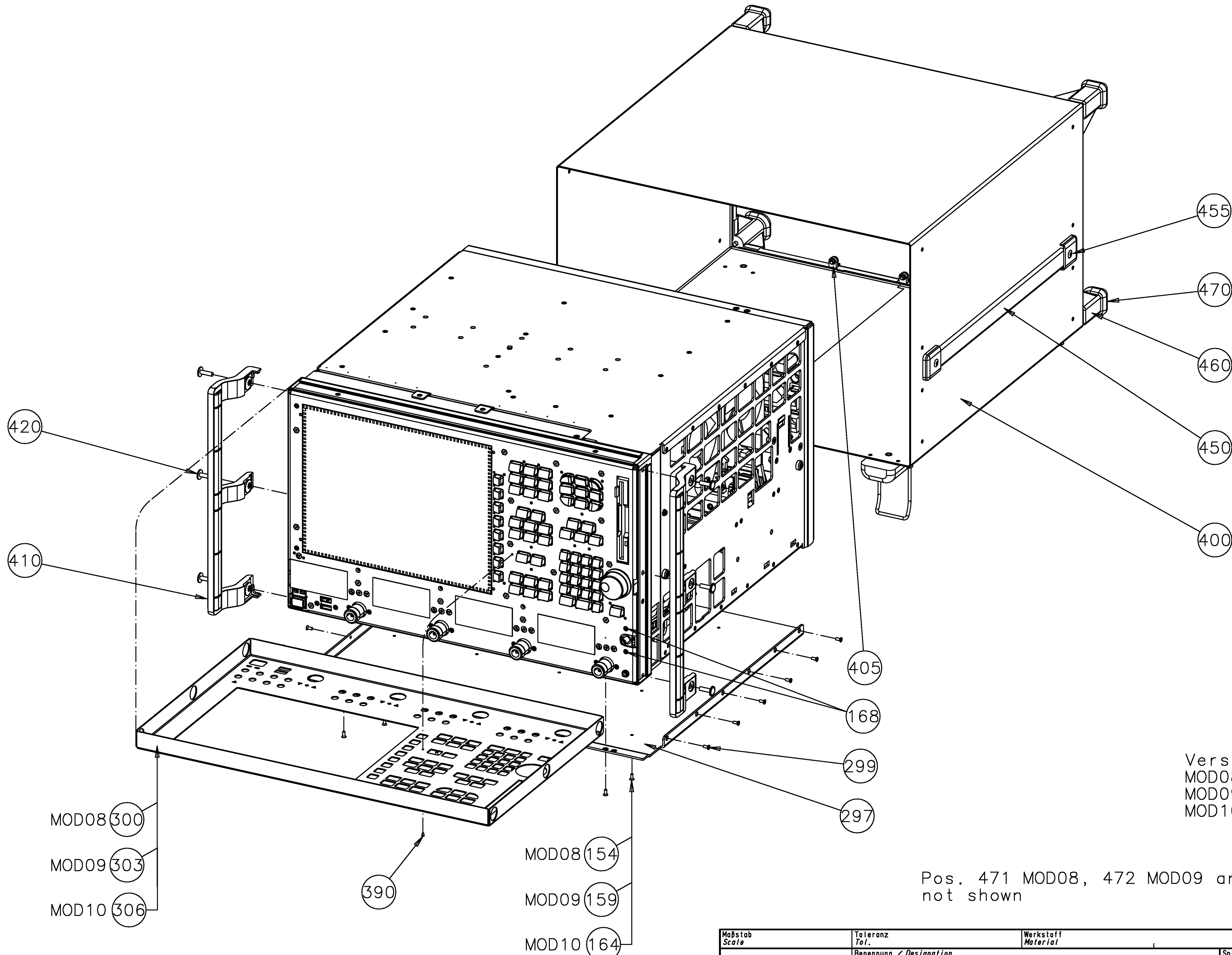
Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: EINBAUANWEISUNG ZVA50-B16 / INSTALLATION INSTRUCTION ZVA50-B16		Sprache / Lang.: de en	Aei. / C.I.: 01.00	Blatt / Sh.: 2
ZVA50	Datum / Date: 2007-08-28	Abteilung / Dept.: 1ESK	Name / Name: La	Zeichn.Nr. / Drawing No.: 1305.5322.00	D

	Option B16	Option B2x (x= Port#)	Option B3x (x= Port#)	Option B2x and B3x
Port 1/2 with B16				
Port 3/4 with B16				
Port 1/2 without B16				
Port 3/4 without B16				

Maßstab / Scale	1:2	Toleranz / Tol.		Werkstoff / Material			
ROHDE&SCHWARZ		Benennung / Designation: EINBAUANWEISUNG ZVA50-B16 INSTALLATION INSTRUCTION ZVA50-B16			Sprache / Lang.: de en	Ausg. / C.I.: 01.00	Blatt / Sh.: 3
ZVA50		Datum / Date: 2007-08-28	Abteilung / Dept.: 1ESK	Name: la	Zeichn.Nr. / Drawing No.: 1305.5322.00		D

Projektionsmethode
Projection Method



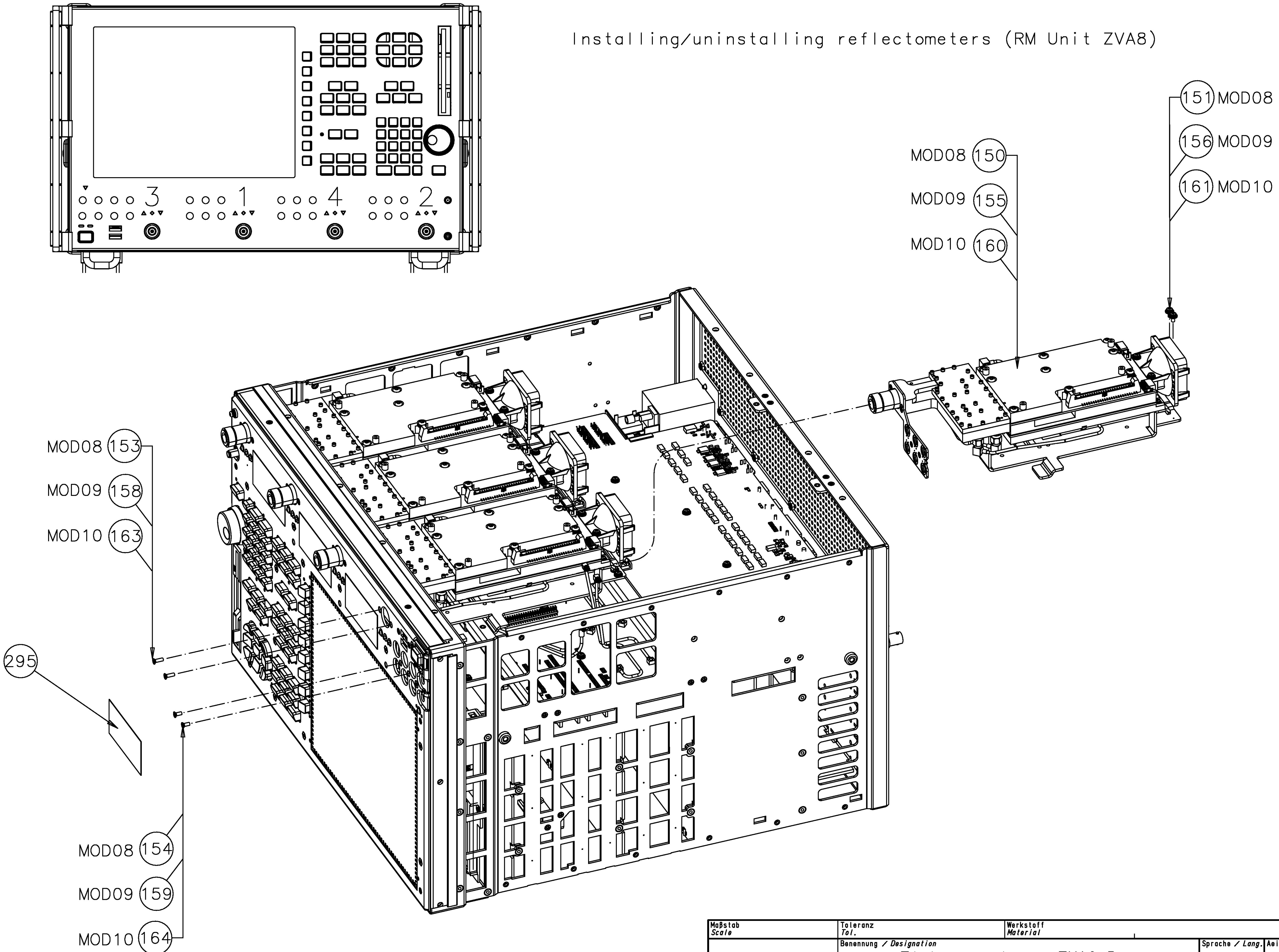
Versions:
MOD08 = 2PORT
MOD09 = 3PORT
MOD10 = 4PORT

Pos. 471 MOD08, 472 MOD09 and 473 MOD10
not shown

Projektionsmethode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*		Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA8-Bxx Installation Instruction			Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 1
ZVA-BXX	Datum / *Date*: 2006-09-18	Abteilung / *Dept.*: 1ESK	Name / *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1164.0215.00 D		

Installing/uninstalling reflectometers (RM Unit ZVA8)

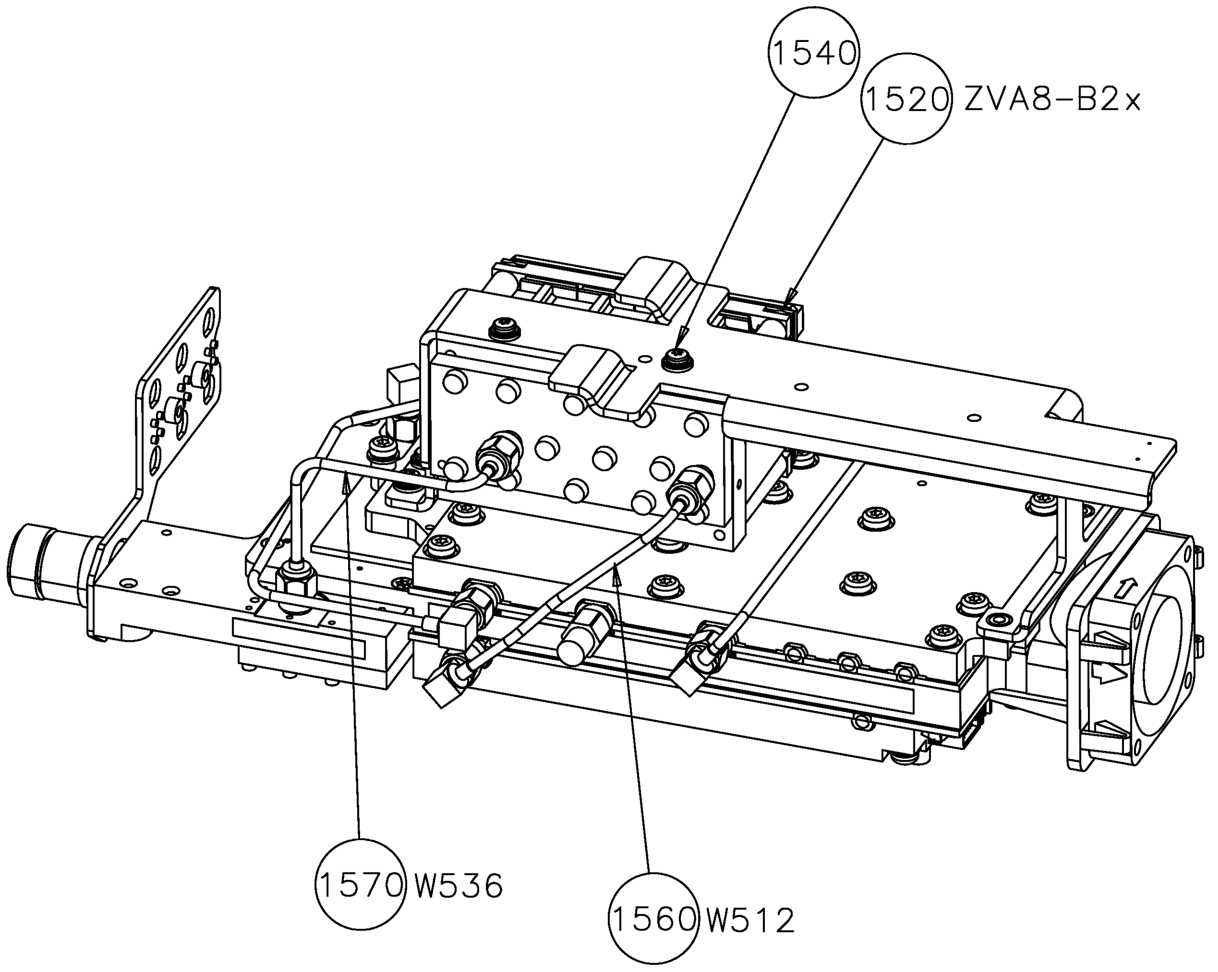


Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.		Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA8-Bxx Installation Instruction			Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 2
				Zeichn.Nr. / Drawing No.: 1164.0215.00 D		
ZVA-BXX	Datum / Date: 2006-07-18	Abteilung / Dept.: 1ESK	Name / Name: Wn			

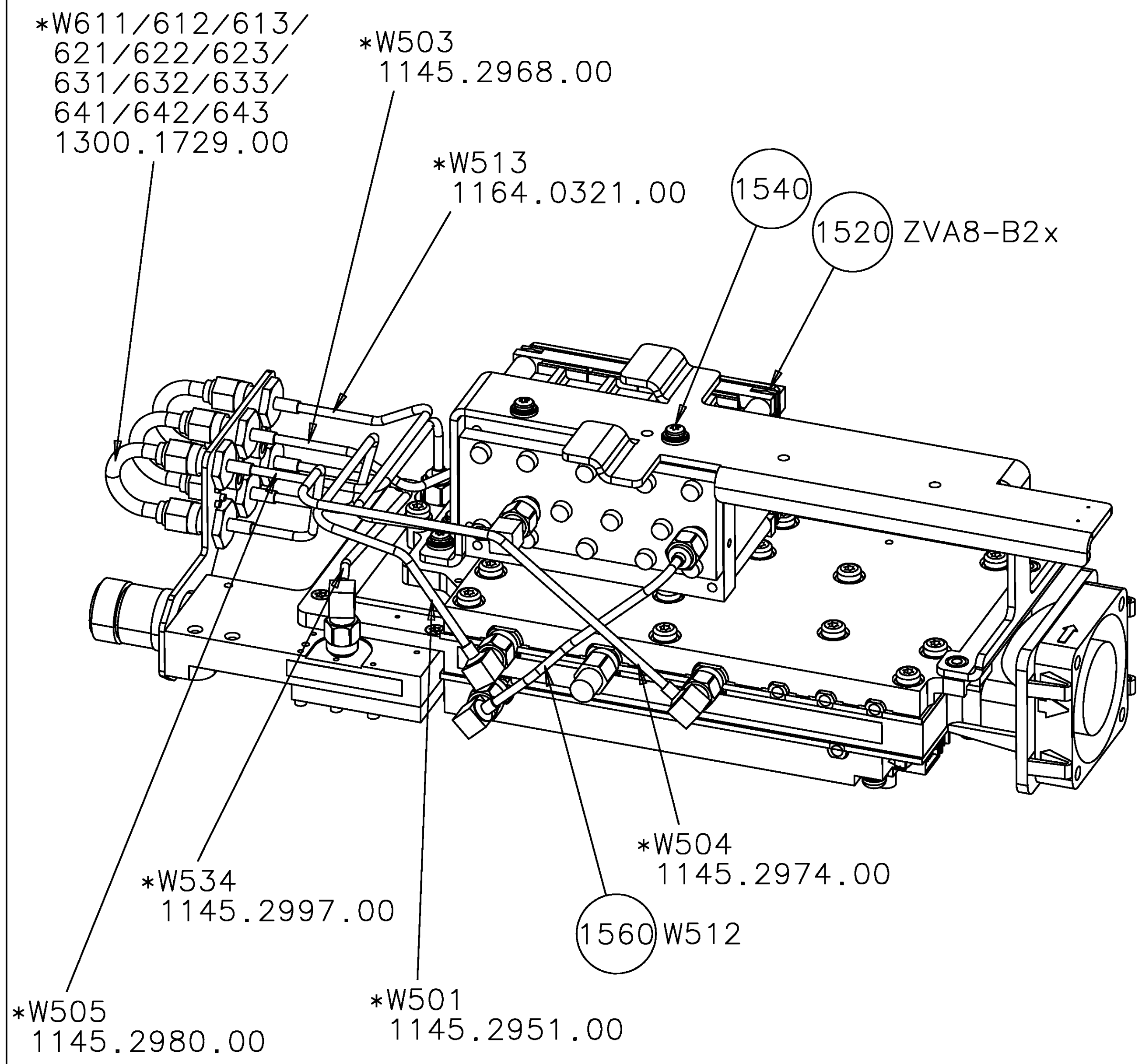
ZVA8-B21/22/23/24 MOD02

Prior installation remove cable W514



ZVA8-B21/22/23/24 MOD02 with ZVA8-B16

Prior installation remove cables W514, W515 and W518



*part of ZVA8-B16

Pos. 1550 (W550) not shown

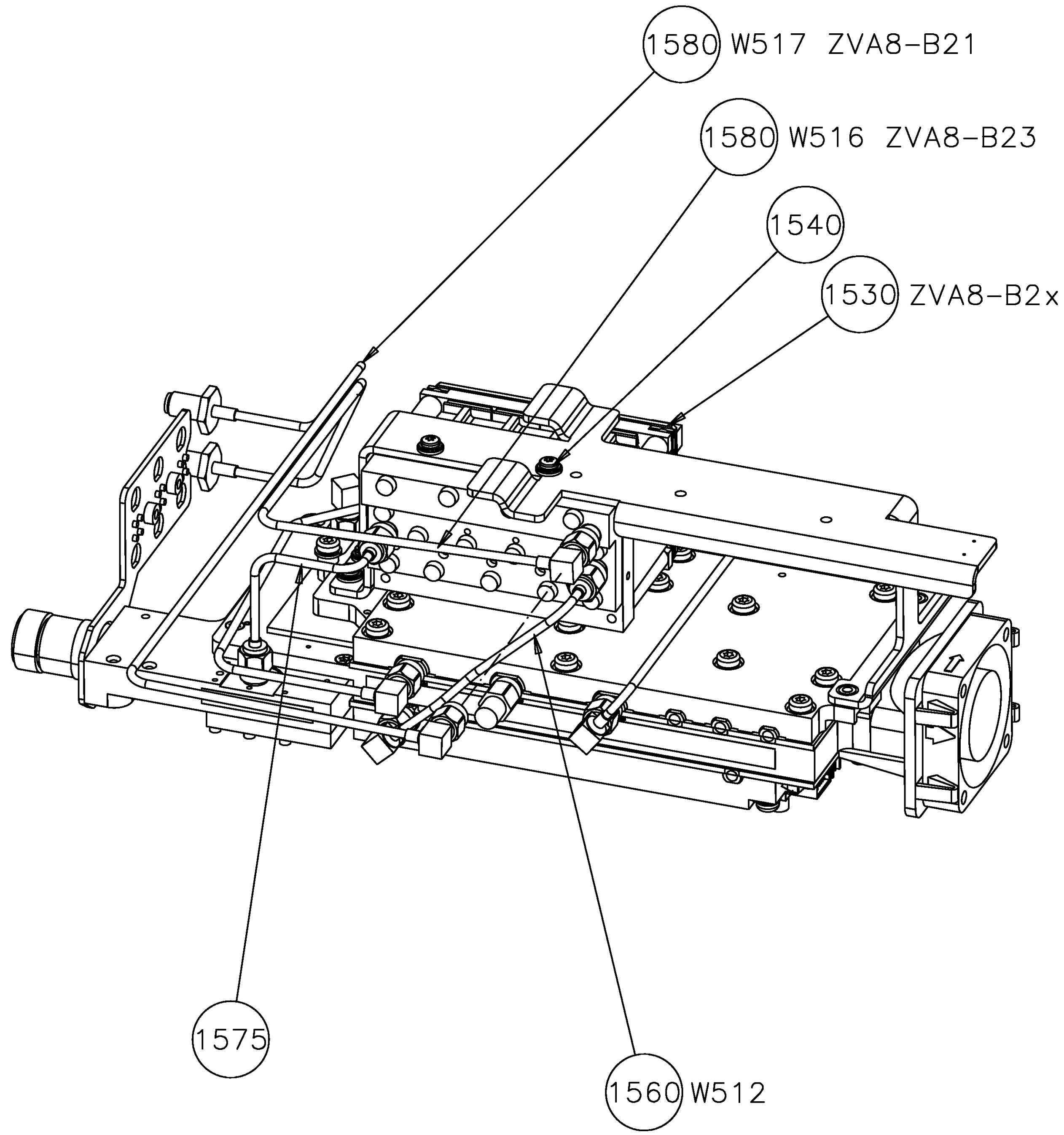
Pos. 1570 (W536) will be not required

Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA8-Bxx Installation Instruction		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00 — Blatt / *Sh.*: 3
ZVA-BXX	Datum / *Date*: 2006-07-18	Abteilung / *Dept.*: 1ESK — Name / *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1164.0215.00 D	

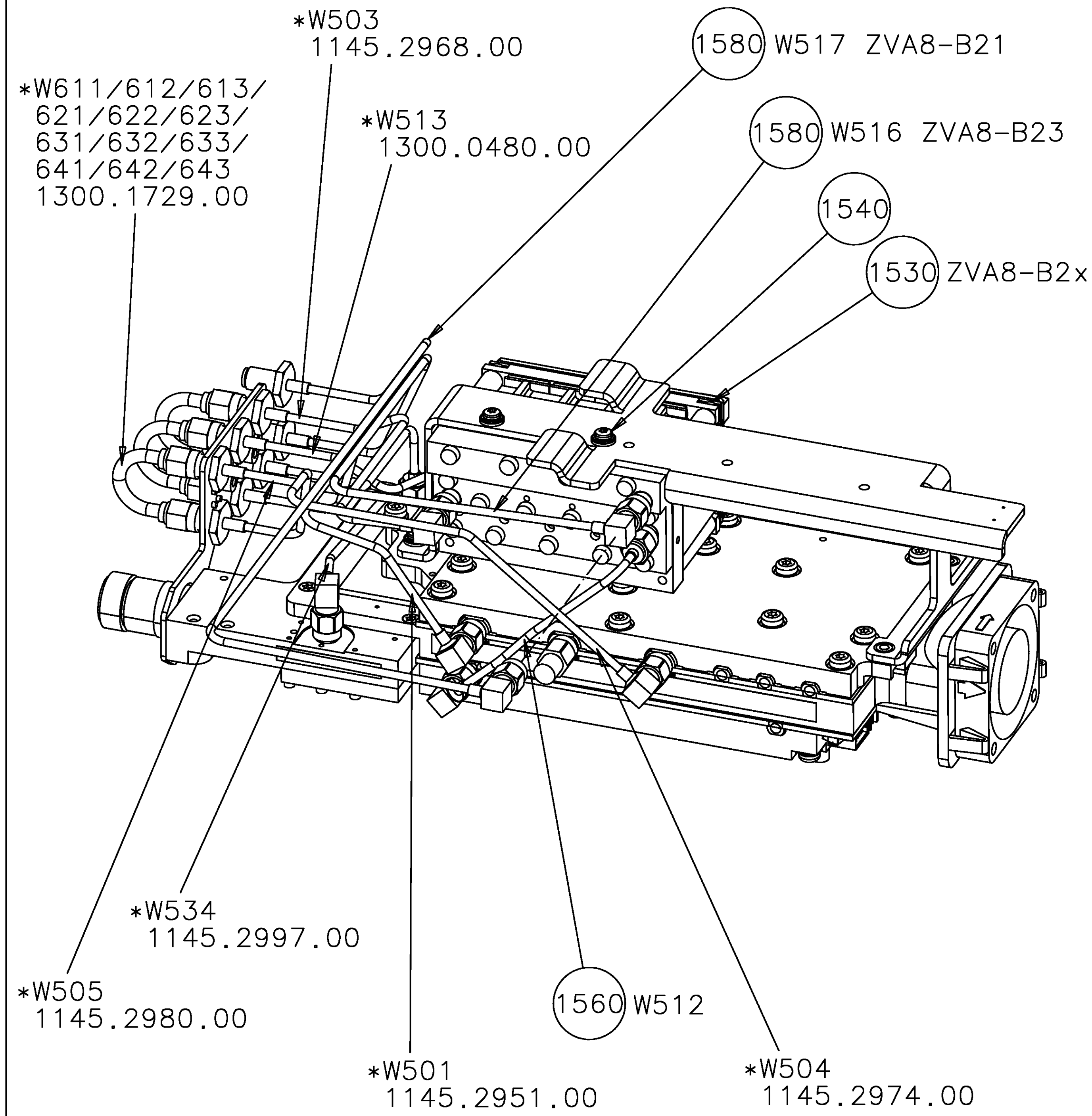
ZVA-B21/22/23/24 MOD03

Prior installation remove cable W514



ZVA-B21/22/23/24 MOD03 with ZVA8-B16

Prior installation remove cables W514, W515 and W518



*part of ZVA8-B16

Pos. 1550 (W550) not shown

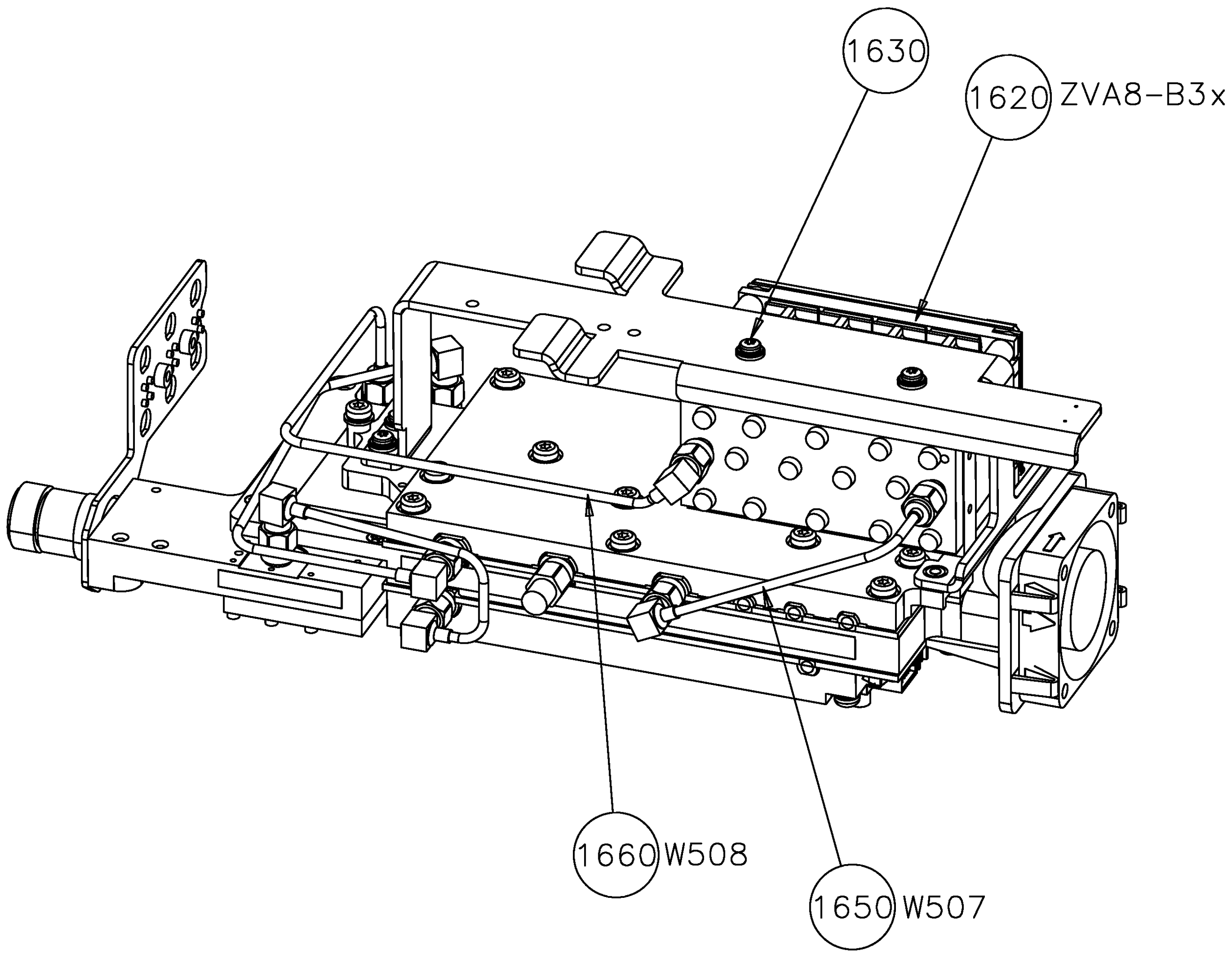
Pos. 1575 (W536) will be not required

Projektions-methode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA8-Bxx Installation Instruction		Sprache / Lang.: de en	Aei. / C.I.: 02.00
			Blatt / Sh.: 4	Zeichn.Nr. / Drawing No.: 1164.0215.00 D
ZVA-BXX	Datum / Date: 2006-07-18	Abteilung / Dept.: 1ESK	Name: Wn	

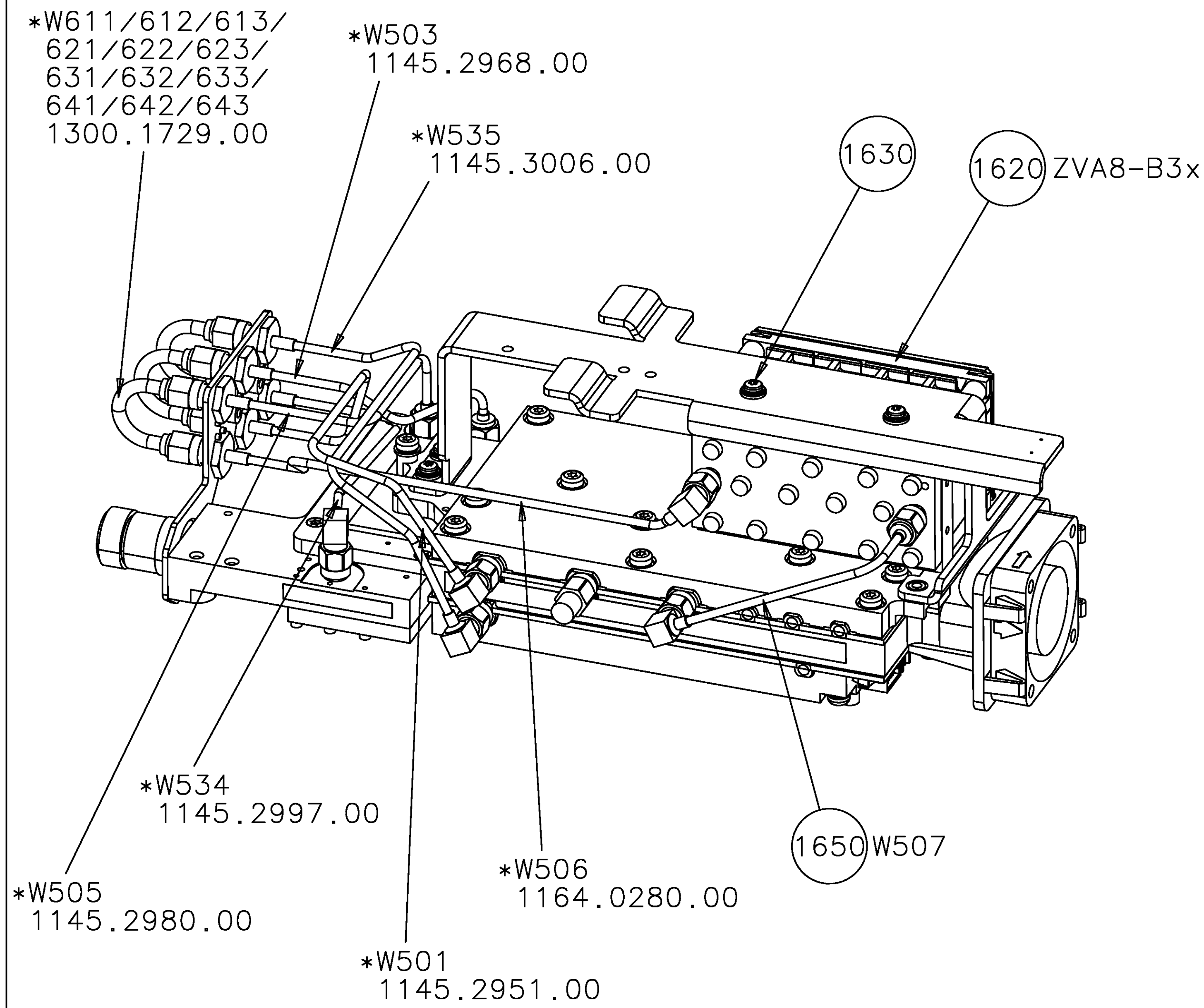
ZVA8-B31/32/33/34

Prior installation remove cable W515



ZVA8-B31/32/33/34 with ZVA8-B16

Prior installation remove cables W514, W515 and W518



Pos. 1640 (W550) not shown

*part of ZVA8-B16

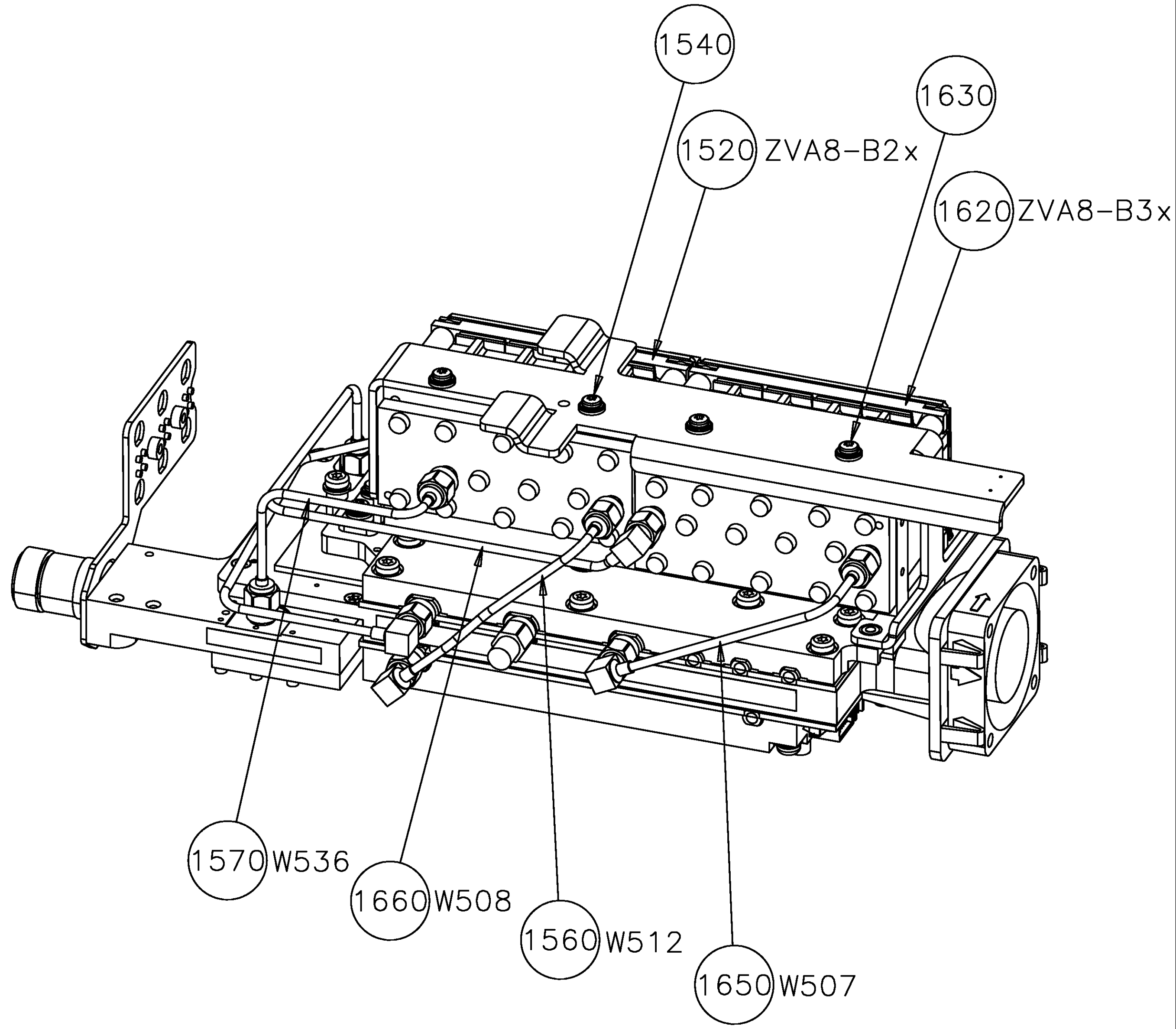
Pos. 1660 W508)will be not required

Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA8-Bxx Installation Instruction		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00 — Blatt / *Sh.*: 5
ZVA-BXX	Datum / *Date*: 2006-07-18	Abteilung / *Dept.*: 1ESK — Name / *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1164.0215.00 D	

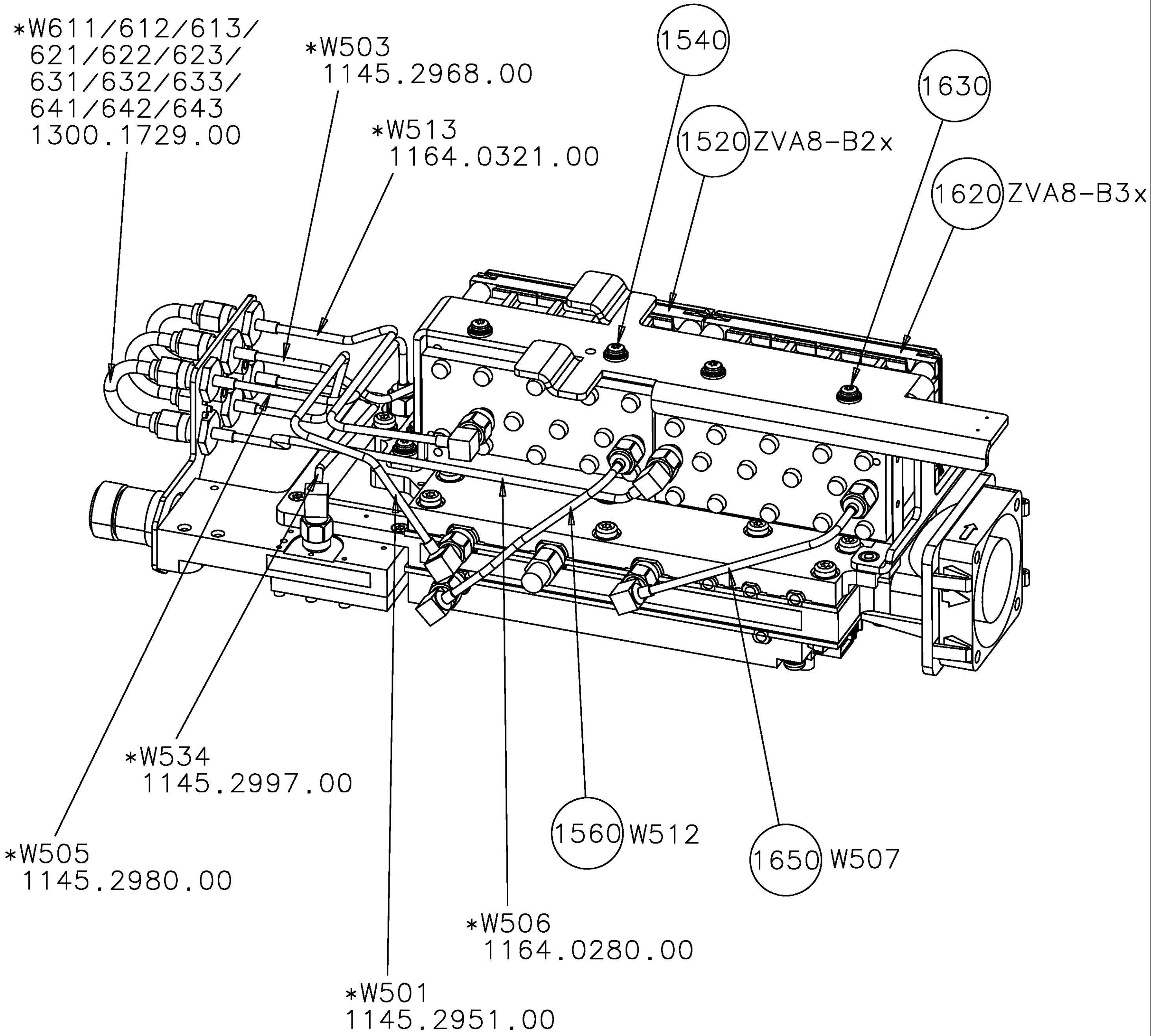
ZVA8-B21/22/23/24 MOD02
and ZVA8-B31/32/33/34

Prior installation remove cables W514 and W515



ZVA8-B21/22/23/24 MOD02 and
ZVA8-B31/32/33/34 with ZVA8-B16

Prior installation remove cables W514, W515 and W518



*part of ZVA8-B16

Pos. 1550 (W550) and 1640 (W550) not shown

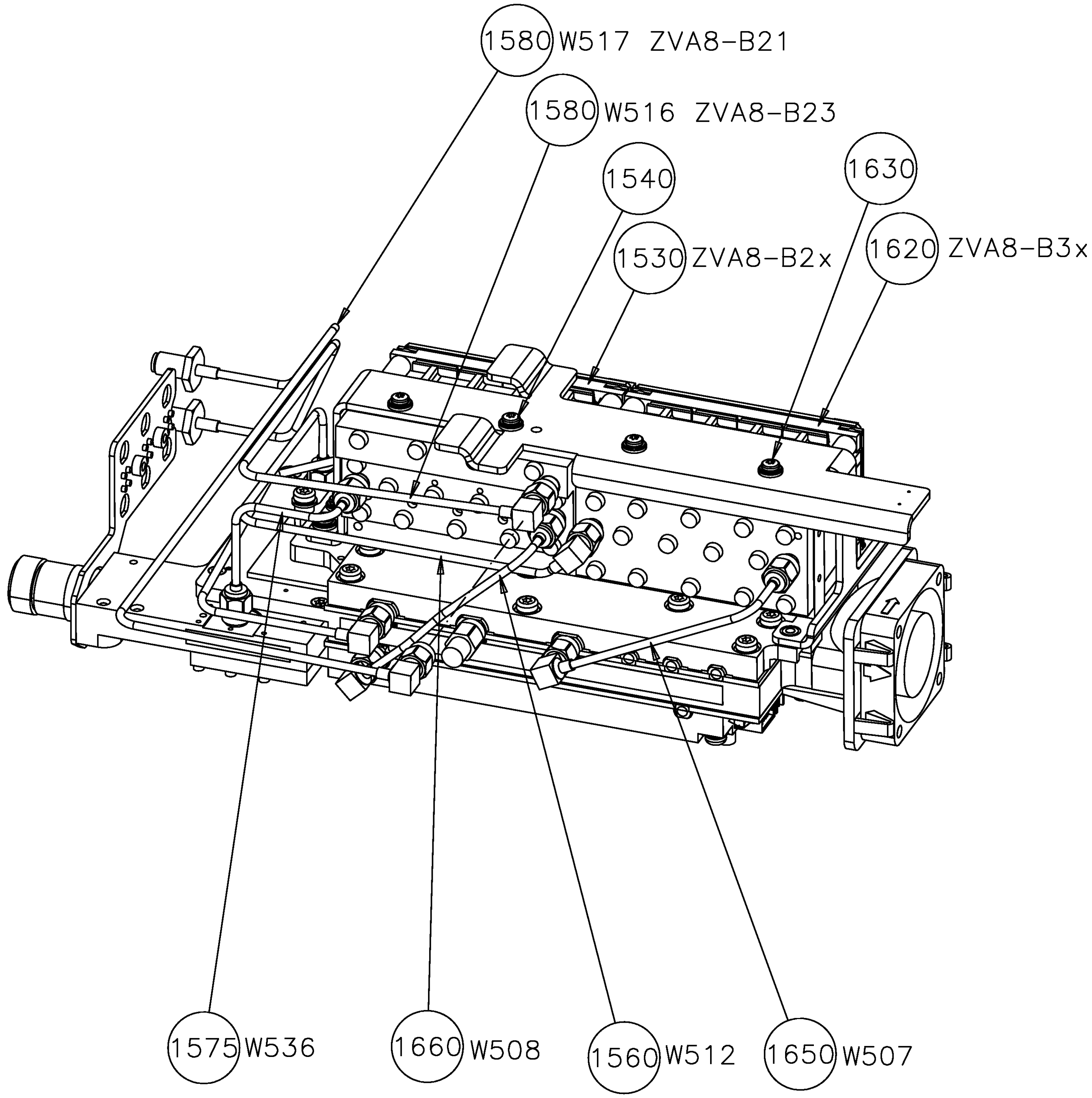
Pos. 1570 (W536) and 1660 (W508)
will be not required

Projektionsmethode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA8-Bxx Installation Instruction		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00 — Blatt / *Sh.*: 6
ZVA-BXX	Datum / *Date*: 2006-07-18	Abteilung / *Dept.*: 1ESK — Name / *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1164.0215.00 D	

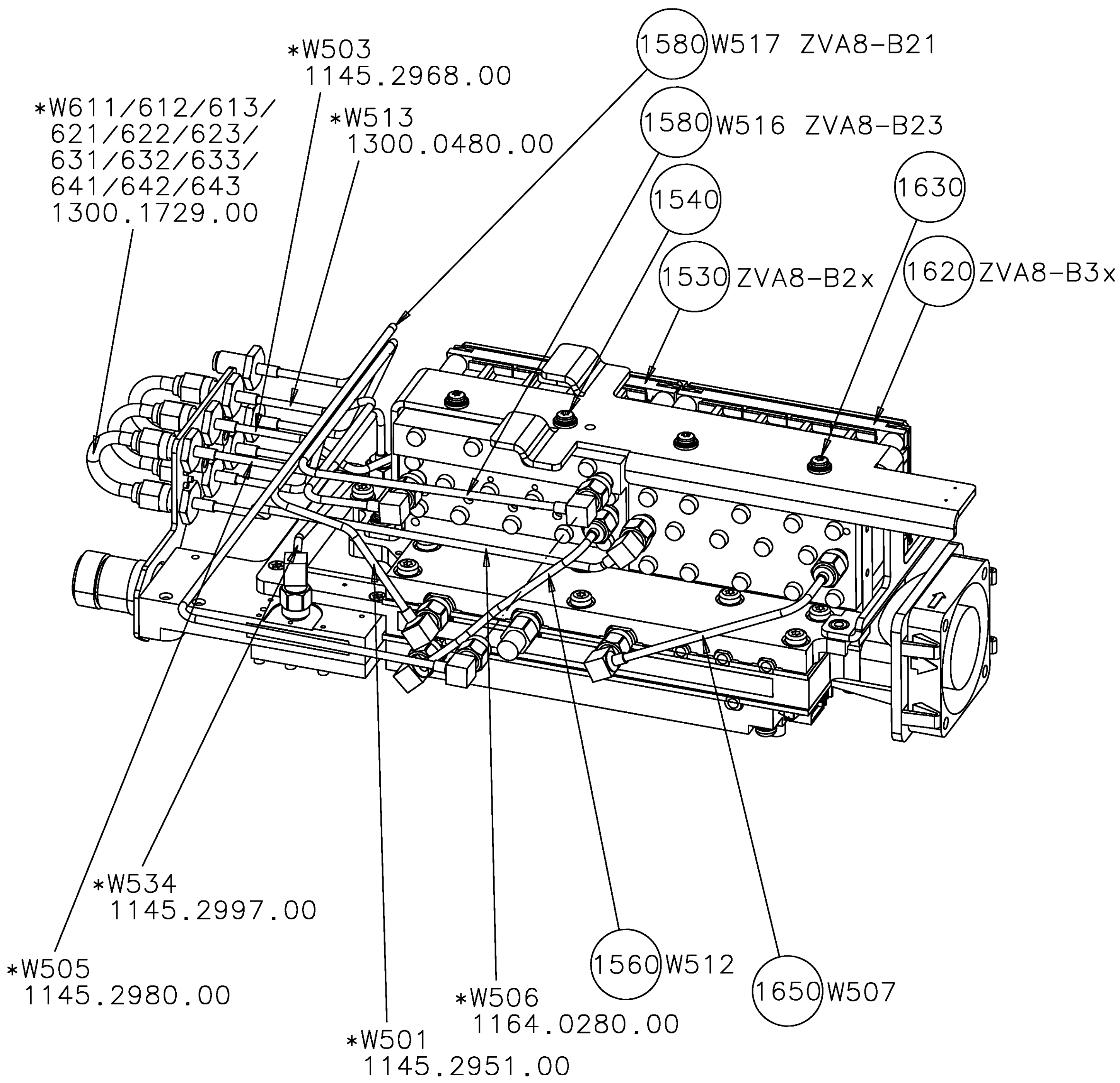
ZVA8-B21/22/23/24 MOD03 and ZVA8-B31/32/33/34

Prior installation removes cable W514 and W515



ZVA8-B21/22/23/24 MOD03 and ZVA8-B31/32/33/34 with ZVA8-B16

Prior installation remove cables W514, W515 and W518



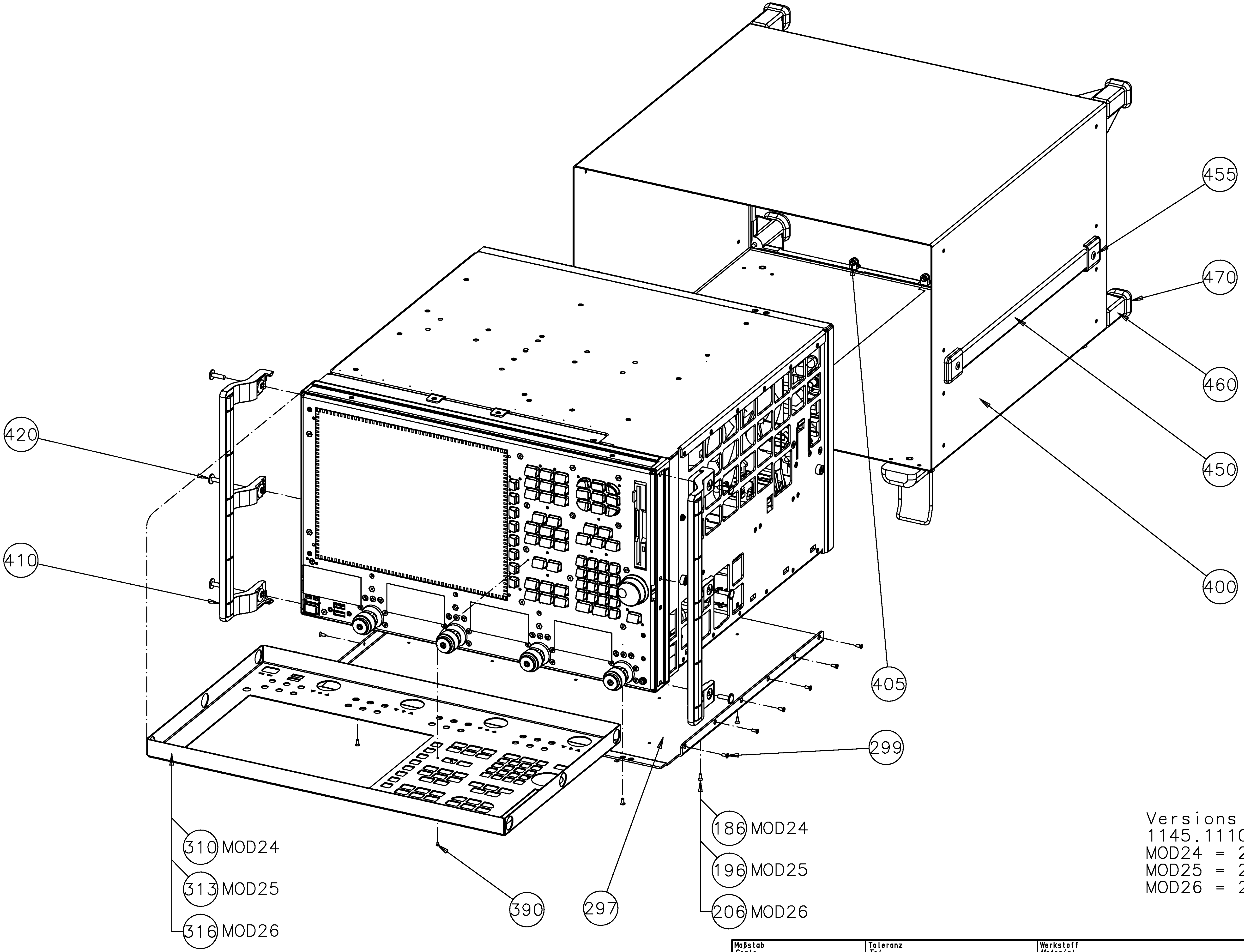
*part of ZVA8-B16

Pos. 1550 (W550) and 1640 (W550) not shown

Pos. 1575 (W536) and 1660 (W508) will be not required

Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA8-Bxx / Installation Instruction		Sprache / Lang.: de en	Aei. / C.I.: 02.00 · Blatt / Sh.: 7
ZVA-BXX	Datum / Date: 2006-07-18	Abteilung / Dept.: 1ESK · Name: Wn	Zeichn.Nr. / Drawing No.: 1164.0215.00 D	



Versions from
1145.1110.xx:
MOD24 = 24GHZ - 2PORT
MOD25 = 24GHZ - 3PORT
MOD26 = 24GHZ - 4PORT

Projektions-methode
Projection Method

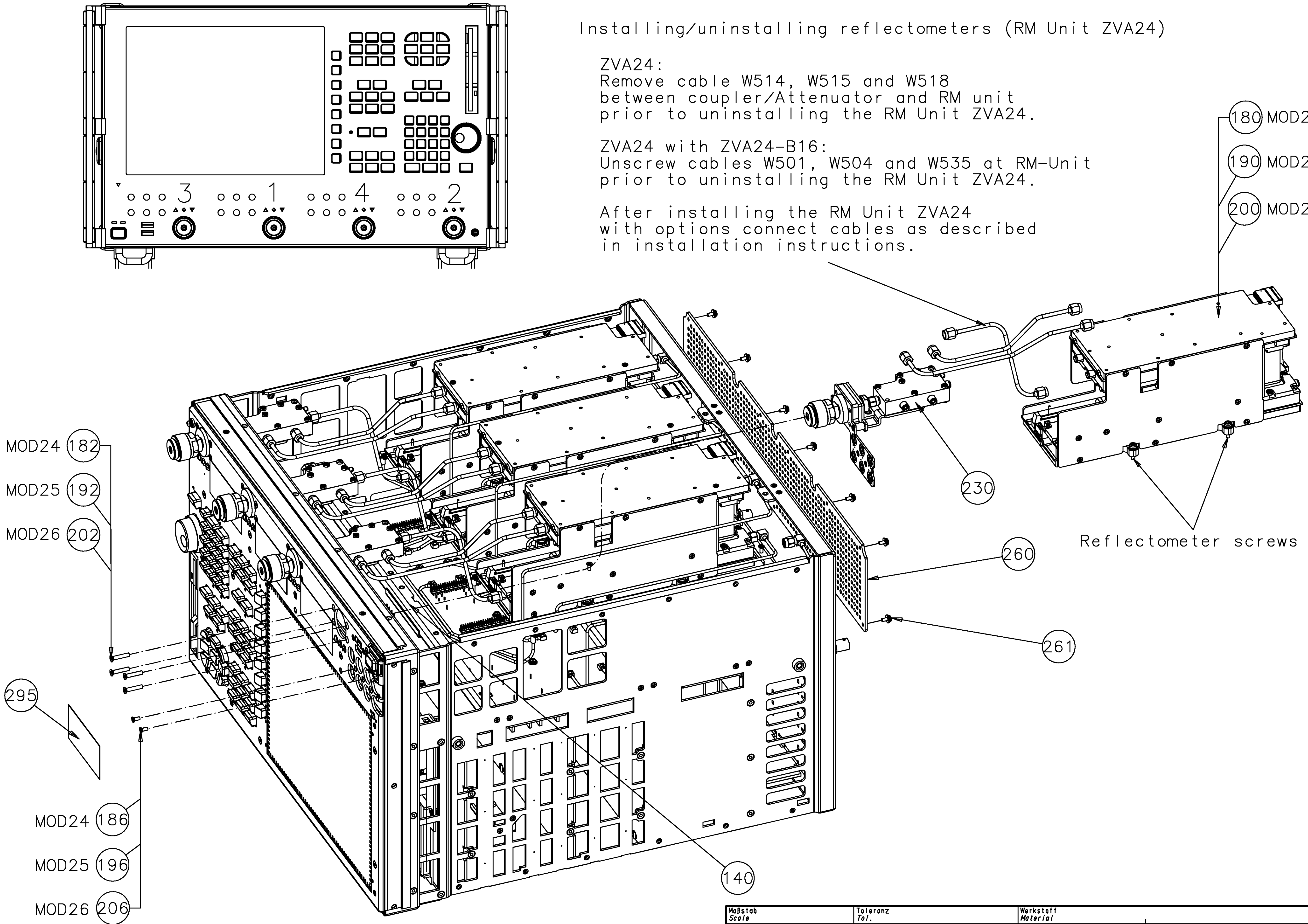
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*		
ROHDE&SCHWARZ	Benennung / *Designation* Einbauanweisung ZVA24-Bxx Installation Instruction		Sprache / *Lang.* de en	Aei. / *C.I.* 02.00 · Blatt / *Sh.* 1
ZVA24-BXX	Datum *Date* 2006-09-27	Abteilung *Dept.* 1ESK · Name *Name* Wn	Zeichn.Nr. / *Drawing No.* 1164.0221.00 D	

Installing/uninstalling reflectometers (RM Unit ZVA24)

ZVA24:
Remove cable W514, W515 and W518
between coupler/Attenuator and RM unit
prior to uninstalling the RM Unit ZVA24.

ZVA24 with ZVA24-B16:
Unscrew cables W501, W504 and W535 at RM-Unit
prior to uninstalling the RM Unit ZVA24.

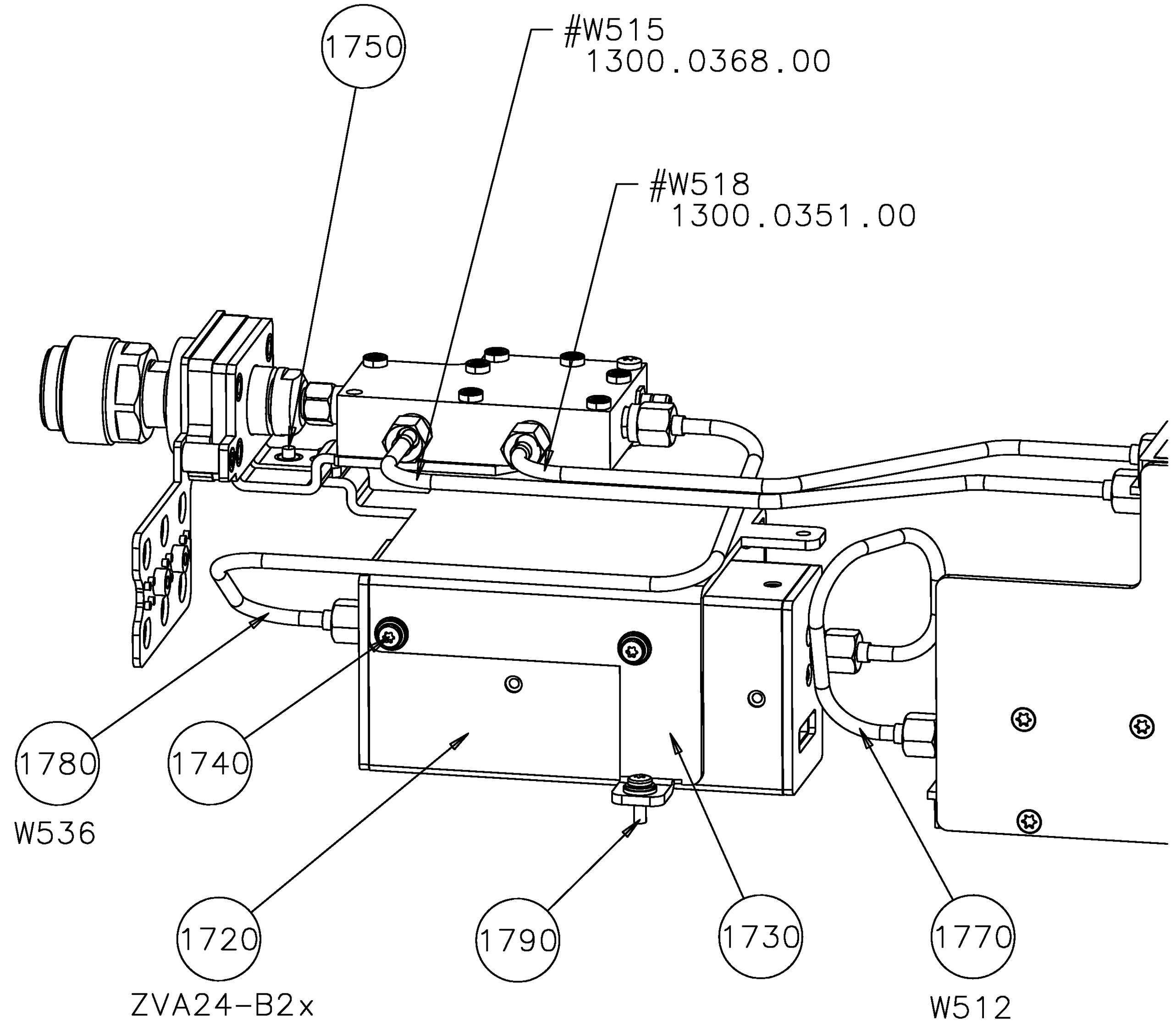
After installing the RM Unit ZVA24
with options connect cables as described
in installation instructions.



Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA24-Bxx Installation Instruction		Sprache / Lang.: de en	Aei. / C.I.: 02.00
			Blatt / Sh.: 2	Zeichn.Nr. / Drawing No.: 1164.0221.00 D
ZVA24-BXX	Datum / Date: 2006-09-29	Abteilung / Dept.: 1ESK	Name: Wn	

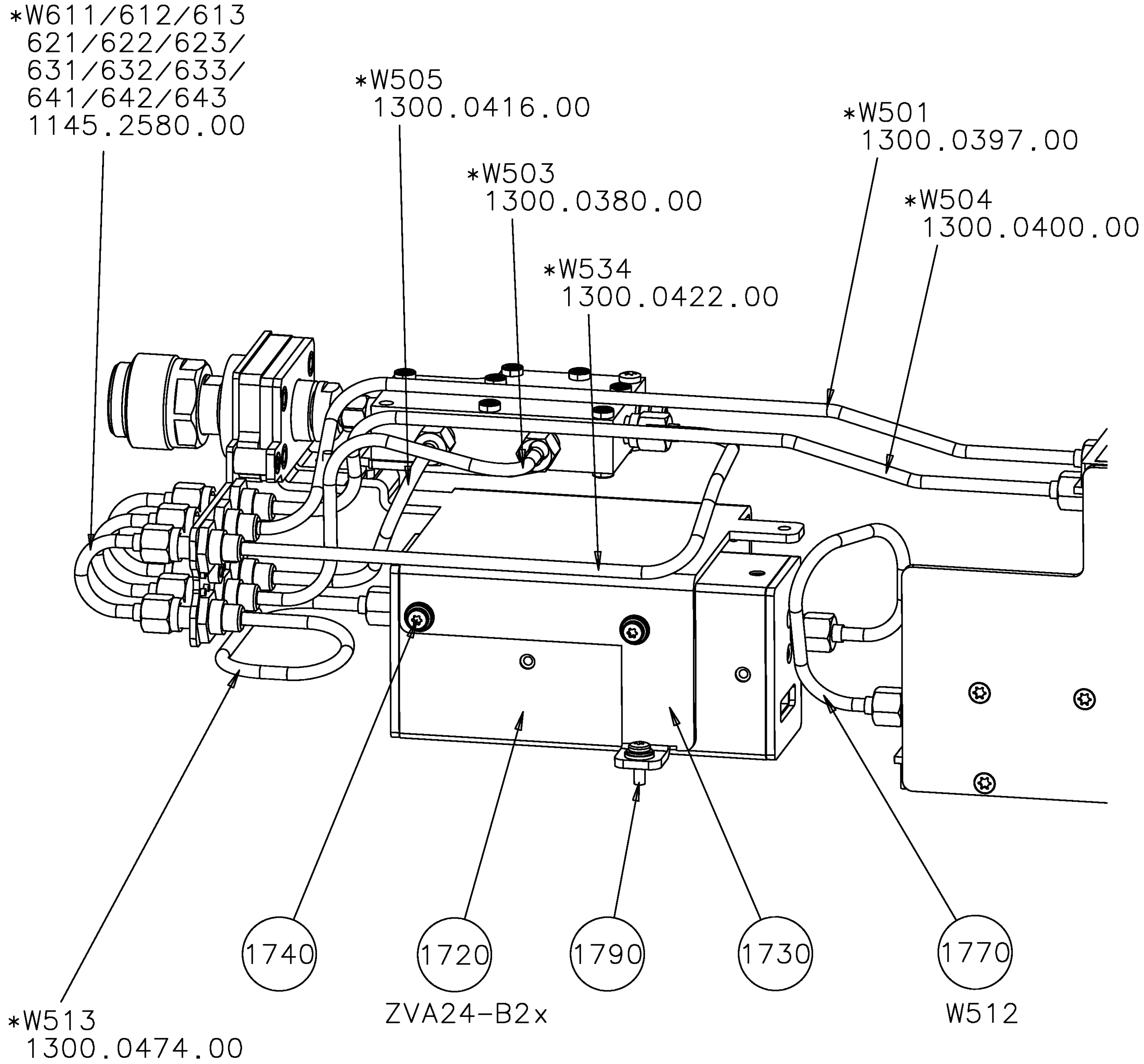
Projektions-methode / Projection Method

ZVA24-B21/22/23/24



part of RM Unit ZVA24

ZVA24-B21/22/23/24 with ZVA24-B16



* part of ZVA24-B16

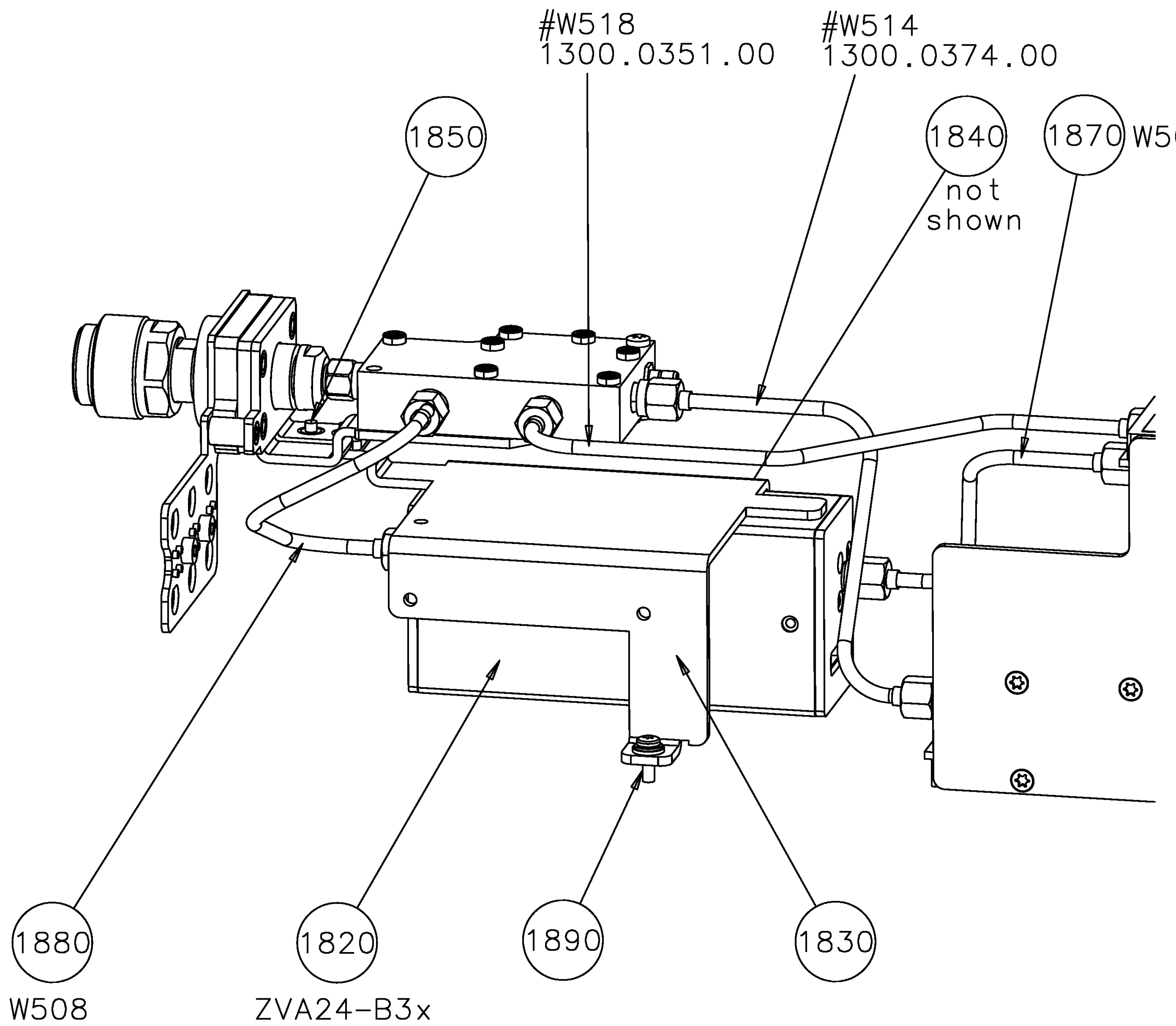
Pos.1760 (W550)not shown

Pos.1780 (W536) will be not required

Projektions-methode
Projection Method

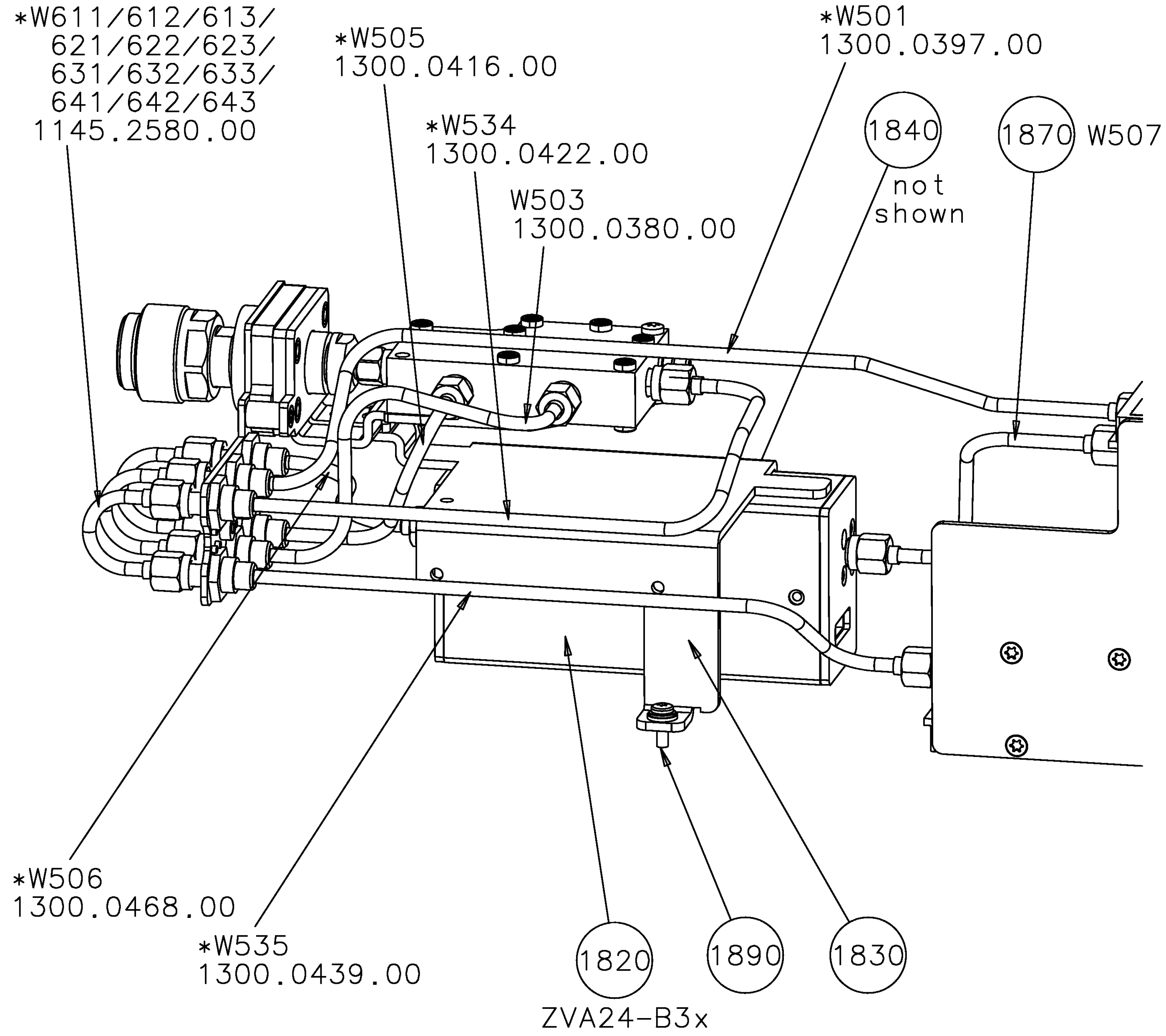
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA24-Bxx / Installation Instruction		Sprache / Lang.: de en; Aei. / C.I.: 02.00; Blatt / Sh.: 3
ZVA24-BXX	Datum / Date: 2006-09-27	Abteilung / Dept.: 1ESK; Name / Name: Wn	Zeichn.Nr. / Drawing No.: 1164.0221.00 D

ZVA24-B31/32/33/34



part of RM unit ZVA24

ZVA24-B31/32/33/34 with ZVA24-B16



* part of ZVA24-B16

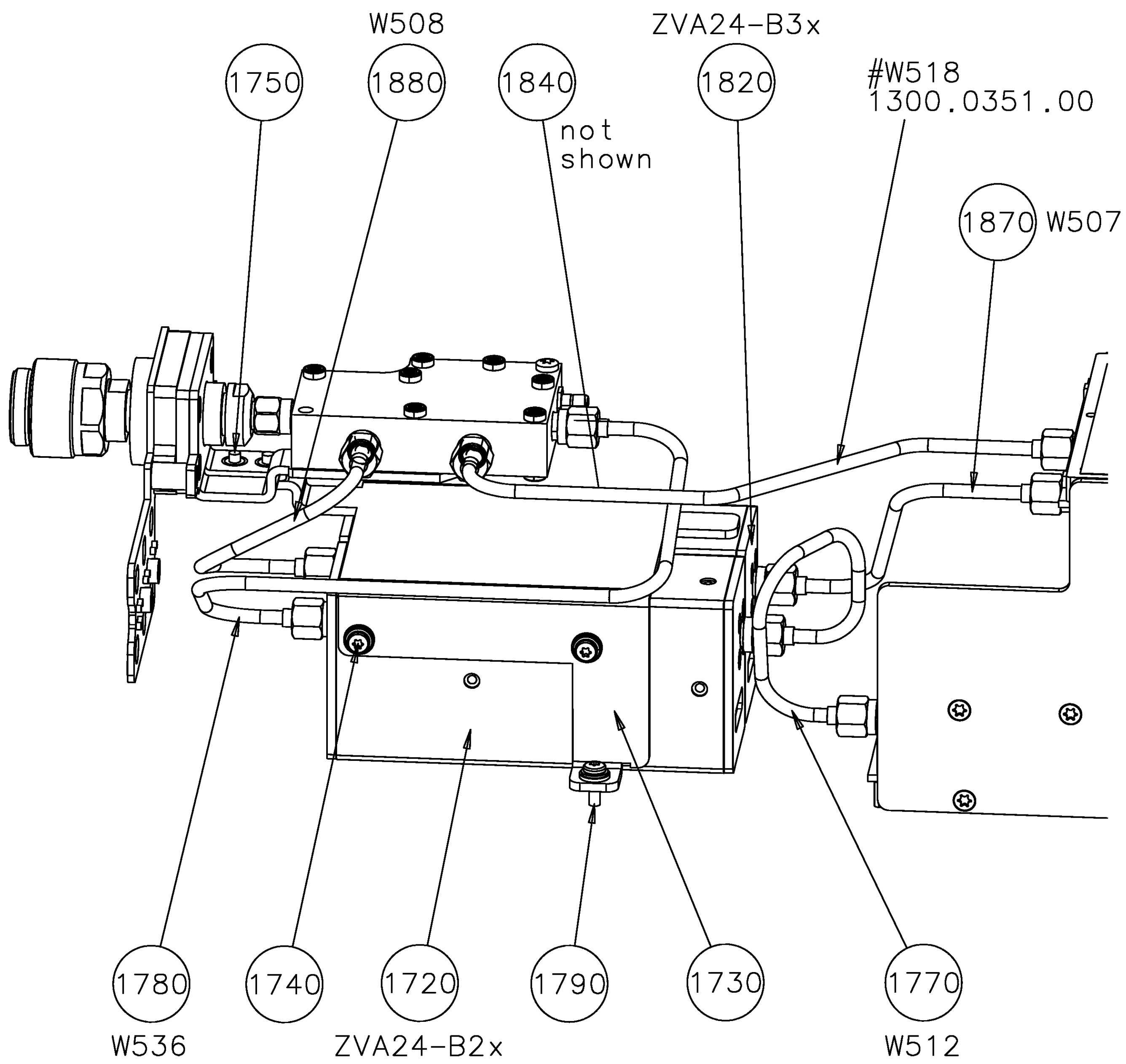
Pos. 1860 (W550) not shown

Pos. 1880 (W508) will be not required

Projektions-methode / Projection Method

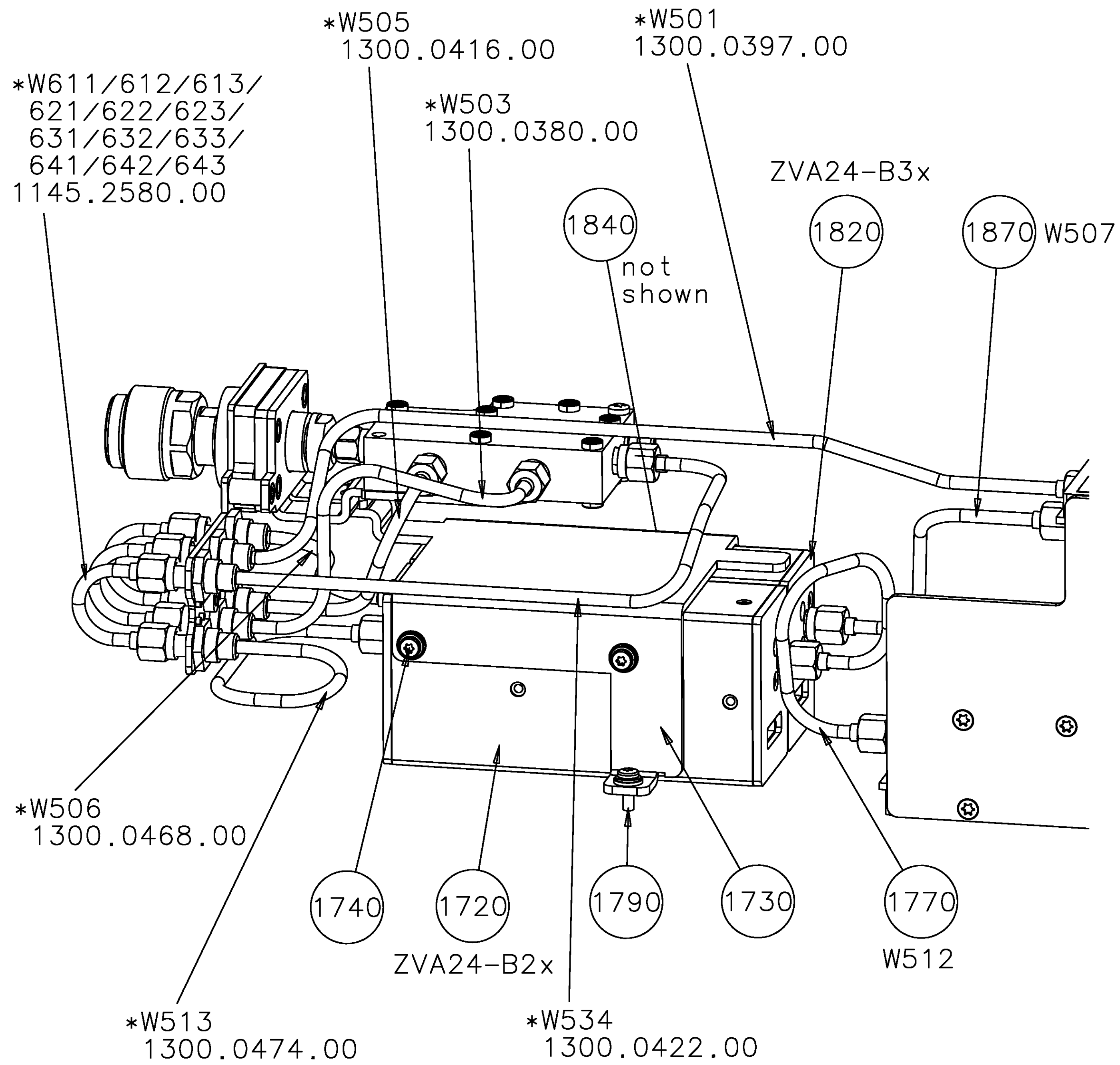
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA24-Bxx Installation Instruction	Sprache / Lang.: de en	Aei. / C.I.: 02.00 — Blatt / Sh.: 4
ZVA24-BXX	Datum / Date: 2006-09-27 — Abteilung / Dept.: 1ESK — Name: Wn	Zeichn.Nr. / Drawing No.: 1164.0221.00	D

ZVA24-B21/22/23/24 and ZVA24-B31/32/33/34



part of RM unit ZVA24

ZVA24-B21/22/23/24 and ZVA24-B31/32/33/34
with ZVA24-B16



* part of ZVA24-B16

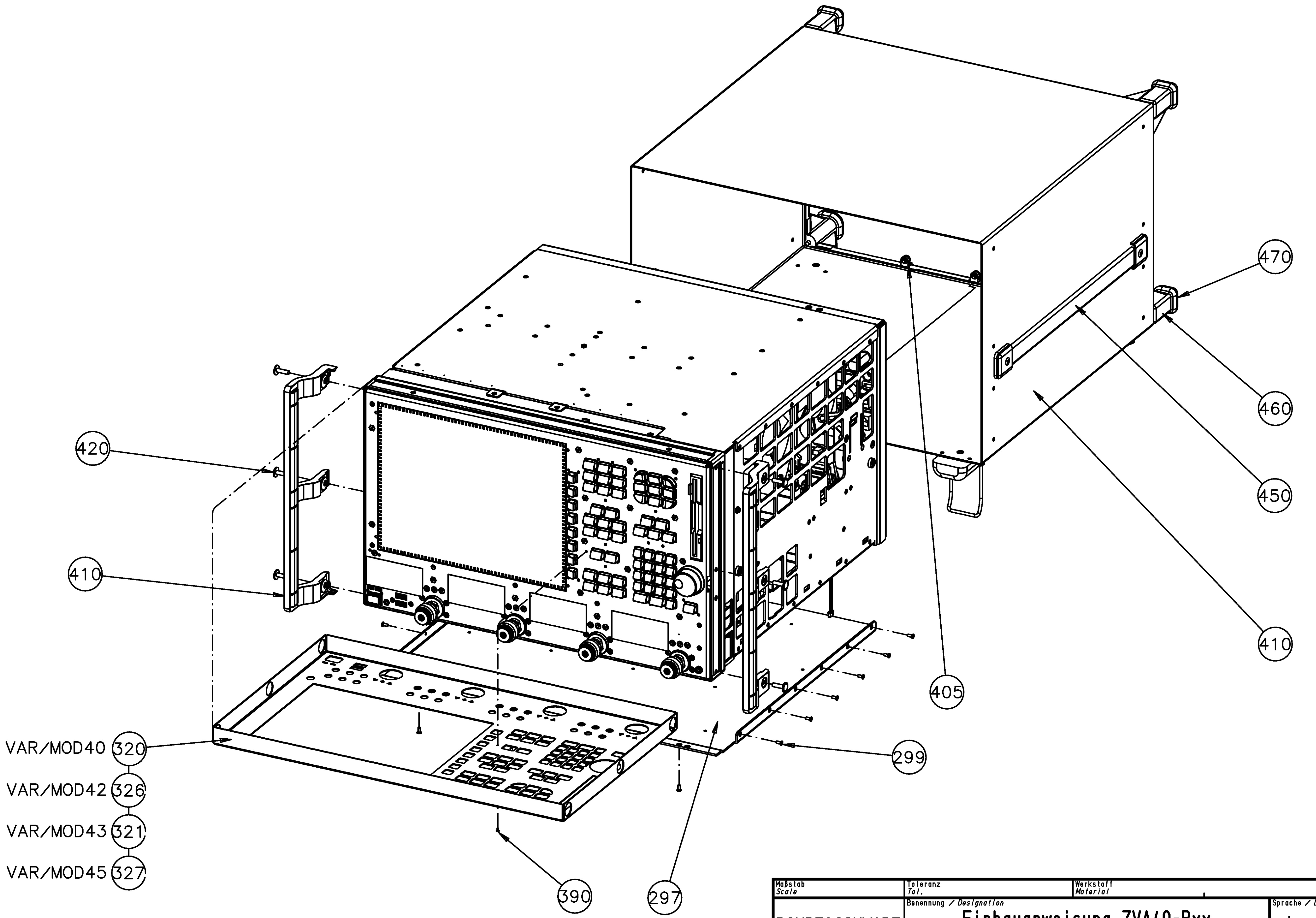
Pos.1760 (W550) and 1860 (W550) not shown

Pos. 1830,1850 und 1890 will be not required

Pos. 1780 (W536),1830,1850,1880 (W508) and 1890
will be not required

Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA24-Bxx Installation Instruction		Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 5
ZVA24-BXX	Datum / Date: 2006-09-27	Abteilung / Dept.: 1ESK; Name: Wn	Zeichn.Nr. / Drawing No.: 1164.0221.00 D		

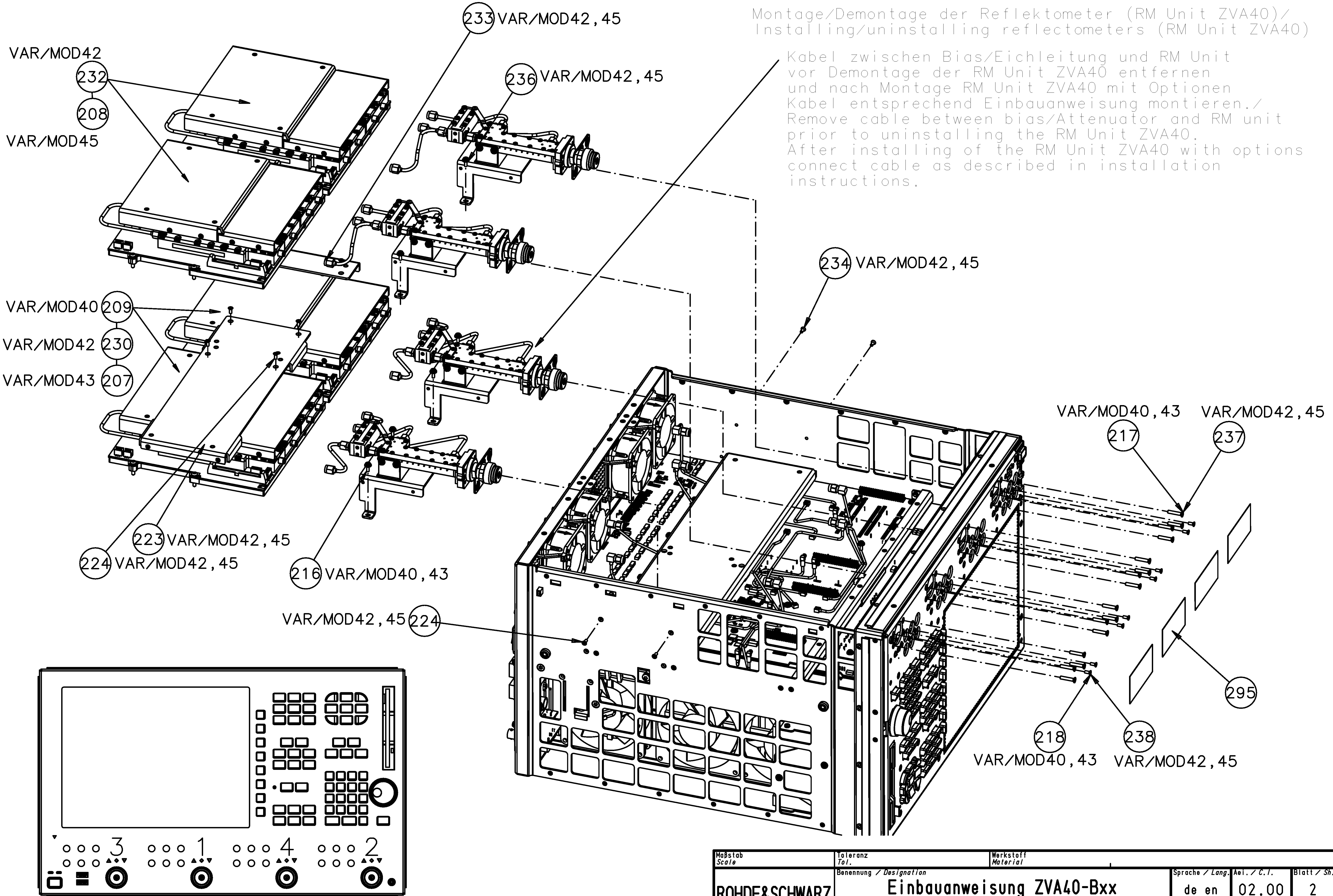


Projektionsmethode / Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material	
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA40-Bxx Assembly Instruction ZVA40-Bxx	Sprache / Lang.: de en; Aei. / C.I.: 02.00; Blatt / Sh.: 1	Zeichn.Nr. / Drawing No.: 1164.0409.00 D
ZVA40-BXX	Datum / Date: 2006-03-02	Abteilung / Dept.: 1ESK	Name / Name: Wn

Montage/Demontage der Reflektometer (RM Unit ZVA40)/
Installing/uninstalling reflectometers (RM Unit ZVA40)

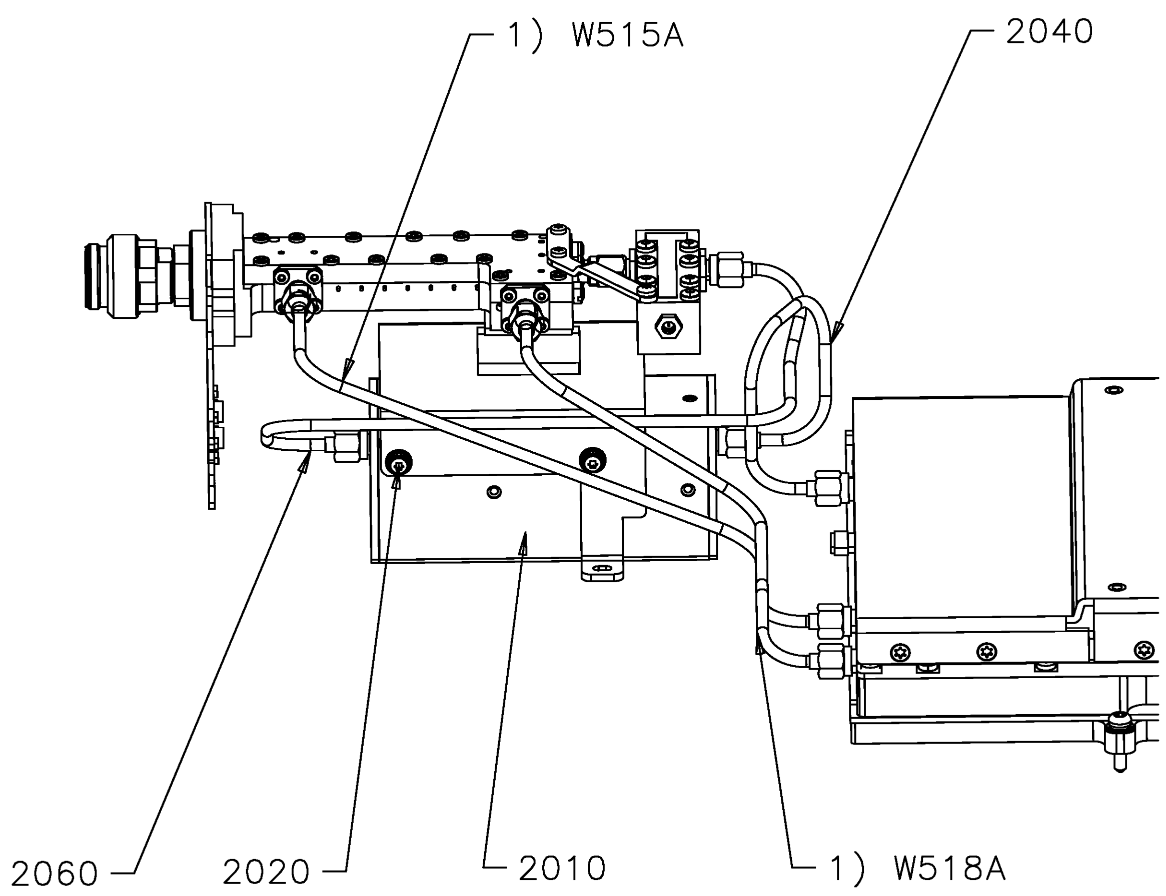
Kabel zwischen Bias/Eichleitung und RM Unit vor Demontage der RM Unit ZVA40 entfernen und nach Montage RM Unit ZVA40 mit Optionen Kabel entsprechend Einbauanweisung montieren./
Remove cable between bias/Attenuator and RM unit prior to uninstalling the RM Unit ZVA40.
After installing of the RM Unit ZVA40 with options connect cable as described in installation instructions.



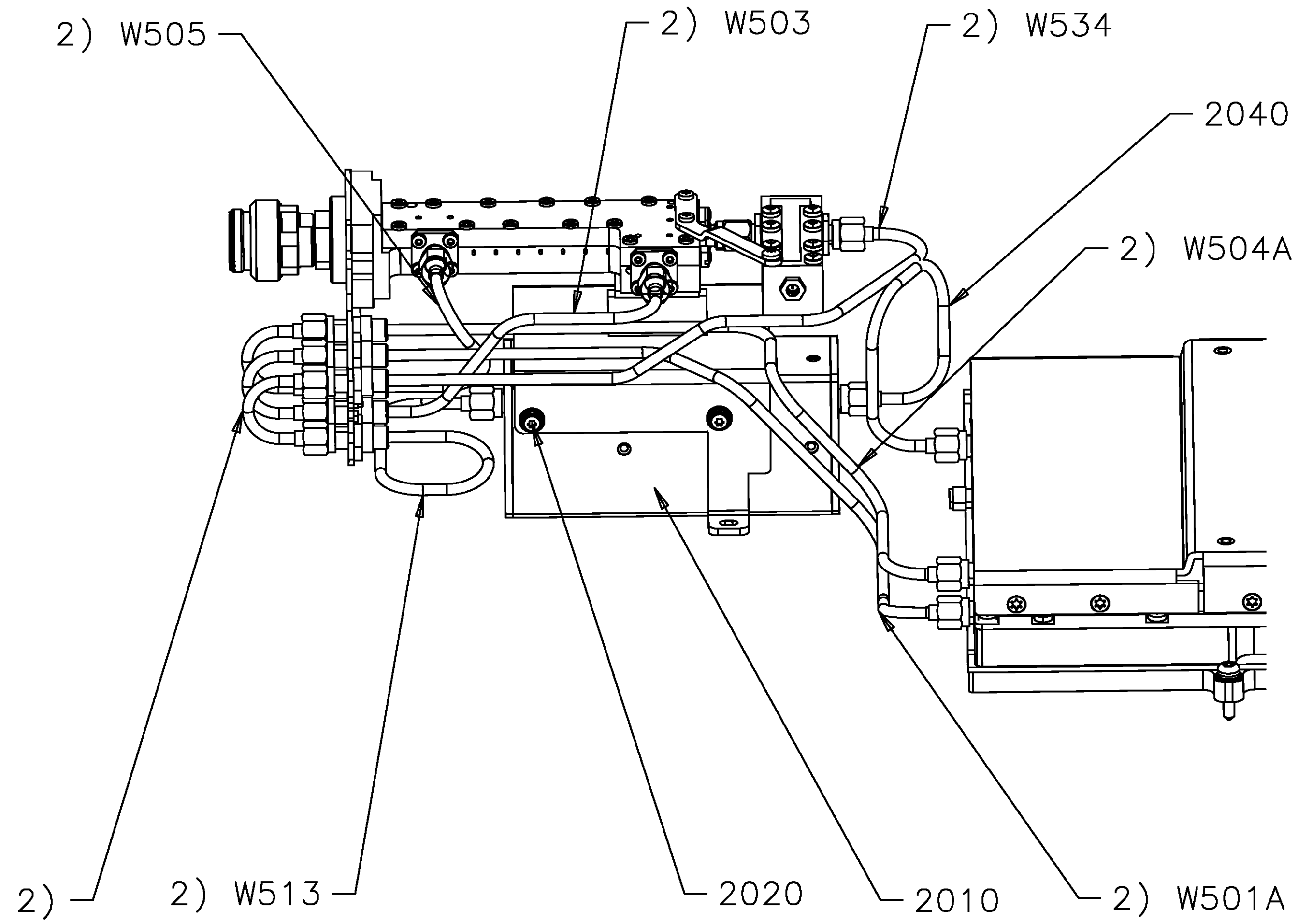
Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA40-Bxx Assembly Instruction ZVA40-Bxx	Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 2
ZVA40-BXX	Datum / Date: 2006-03-02	Abteilung / Dept.: 1ESK	Name: Wn	Zeichn.Nr. / Drawing No.: 1164.0409.00 D

ZVA4-B21/22



ZVA4-B21/22 mit/with ZVA40B16



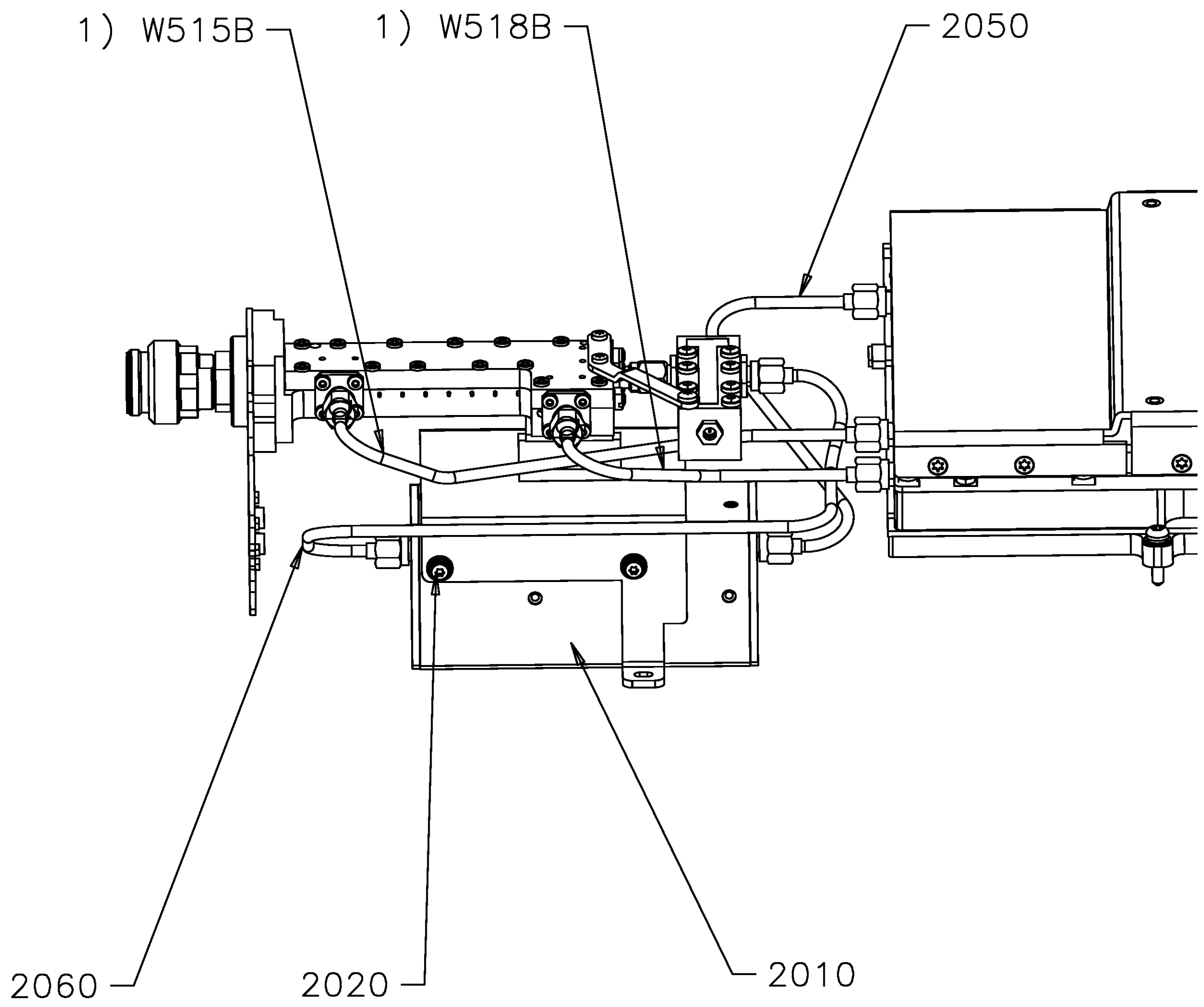
Pos. 2030 nicht dargestellt/
Pos. 2030 not shown

1) Bestandteil von / Part of:
1305.3420.01 RM Unit 2 ZVA40
2) Bestandteil von / Part of:
1164.0209.01 ZVA40-B16

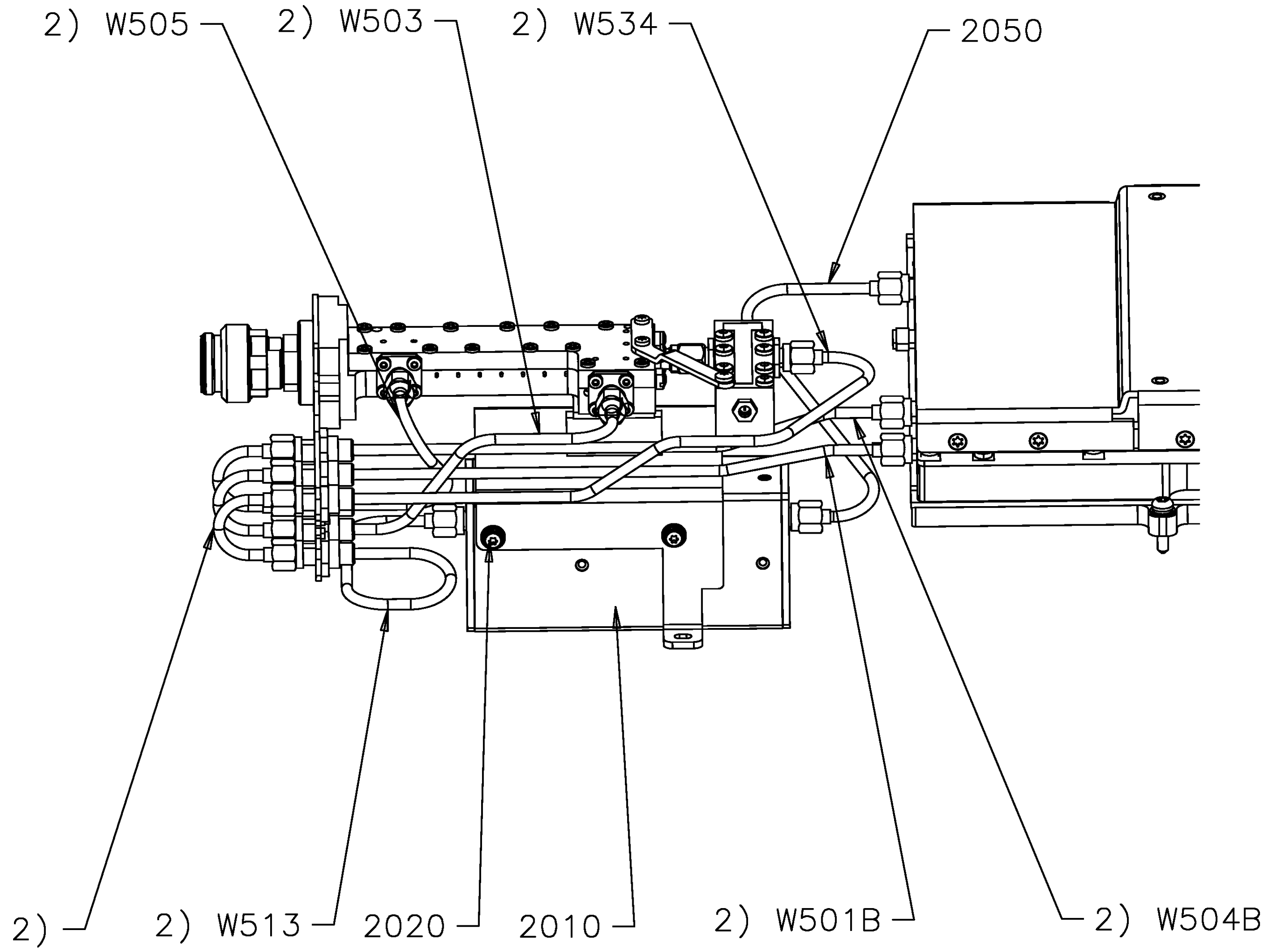
Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA40-Bxx Assembly Instruction ZVA40-Bxx		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00 ; Blatt / *Sh.*: 3
ZVA40-BXX	Datum / *Date*: 2007-03-30	Abteilung / *Dept.*: 1ESK ; Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1164.0409.00	D

ZVA40-B23/24



ZVA40-B23/24 mit/with ZVA40-B16



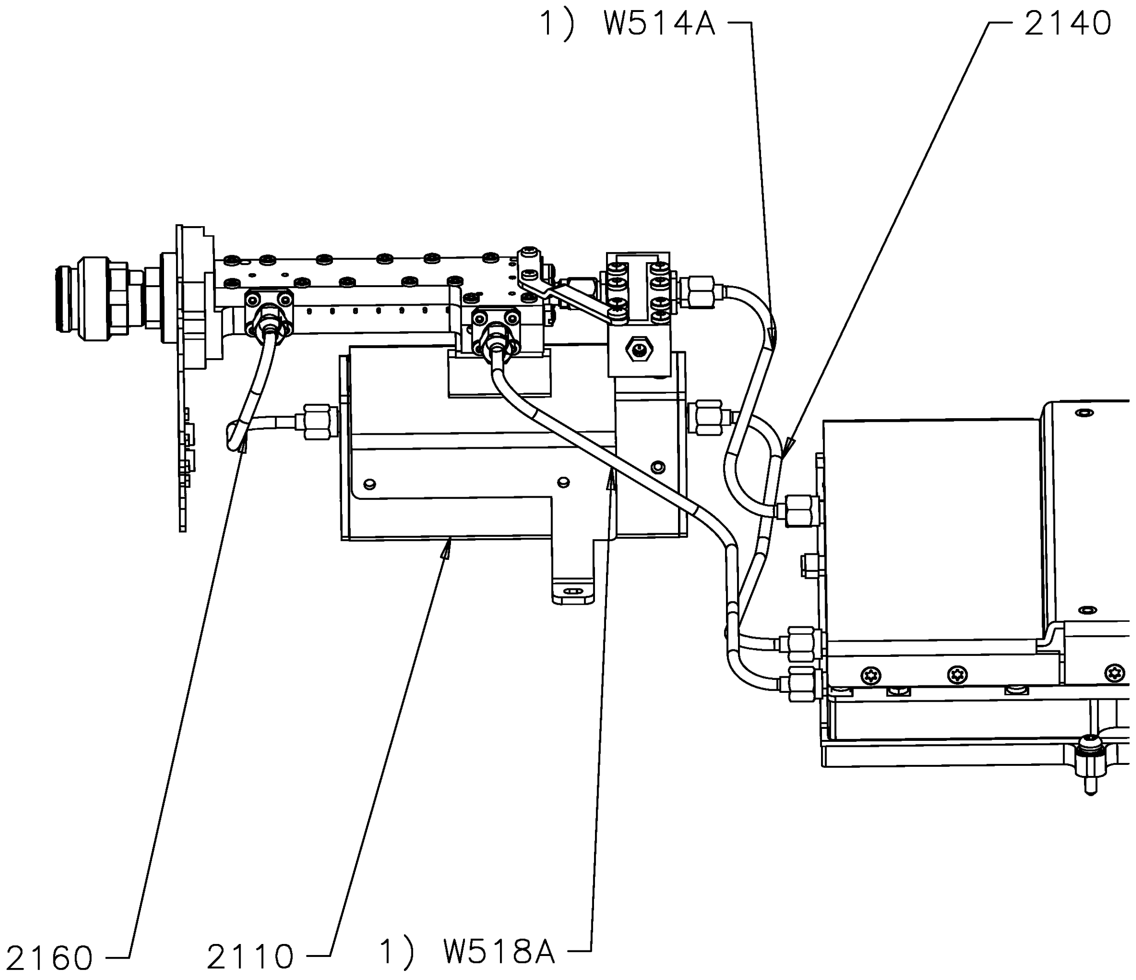
Pos. 2030 nicht dargestellt/
Pos. 2030 not shown

1) Bestandteil von / Part of:
1305.3420.01 RM Unit 2 ZVA40
2) Bestandteil von / Part of:
1164.0209.01 ZVA40-B16

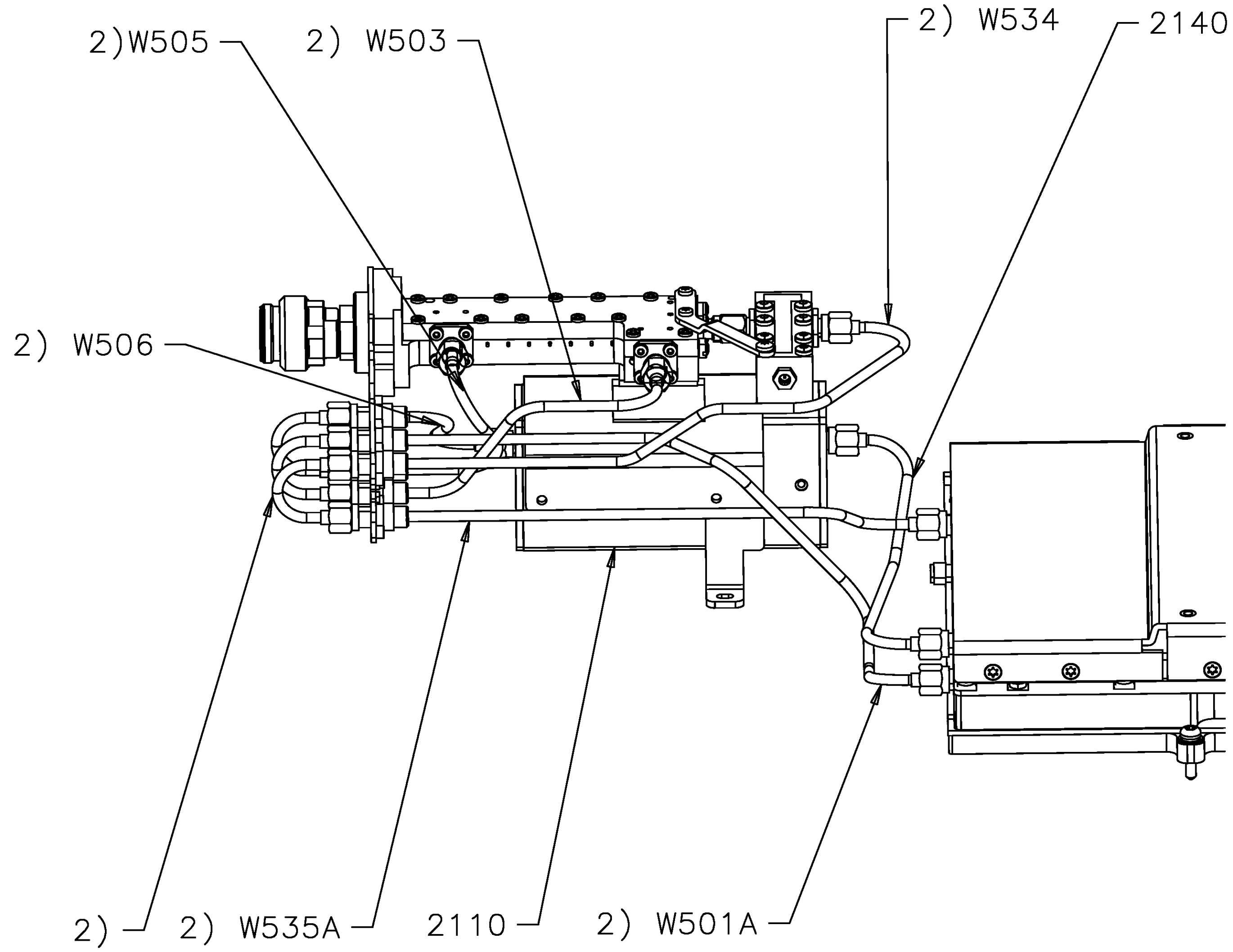
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA40-Bxx Assembly Instruction ZVA40-Bxx		Sprache / Lang.: de en Aei. / C.I.: 02.00	Blatt / Sh.: 4
ZVA40-BXX	Datum / Date: 2007-04-23	Abteilung / Dept.: 1ESK Name / Name: LA	Zeichn.Nr. / Drawing No.: 1164.0409.00	D

Projektions-methode
Projection Method

ZVA4-B31/B32



ZVA40-B31/B32 mit/with ZVA40-B16

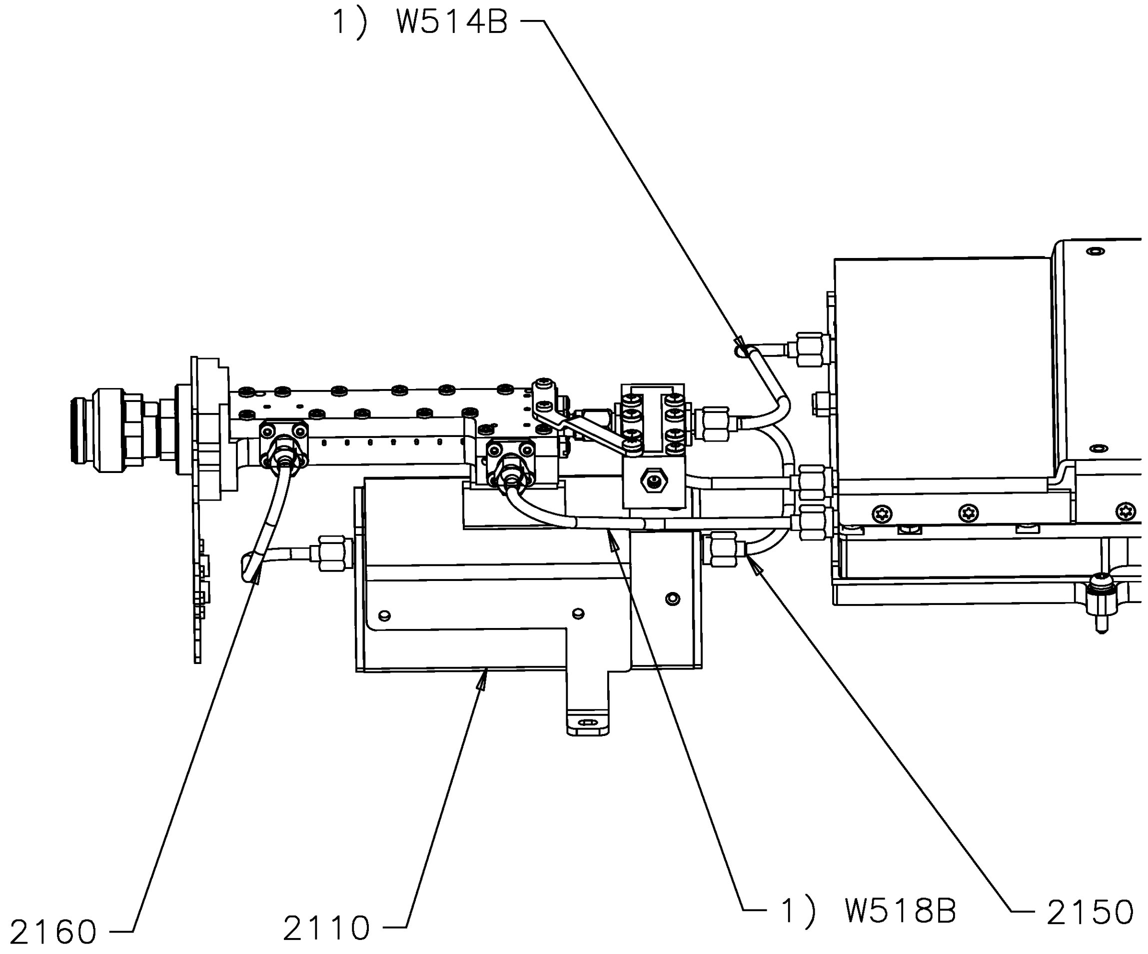


Pos. 2120, 2130 nicht dargestellt/
Pos. 2120, 2130 not shown

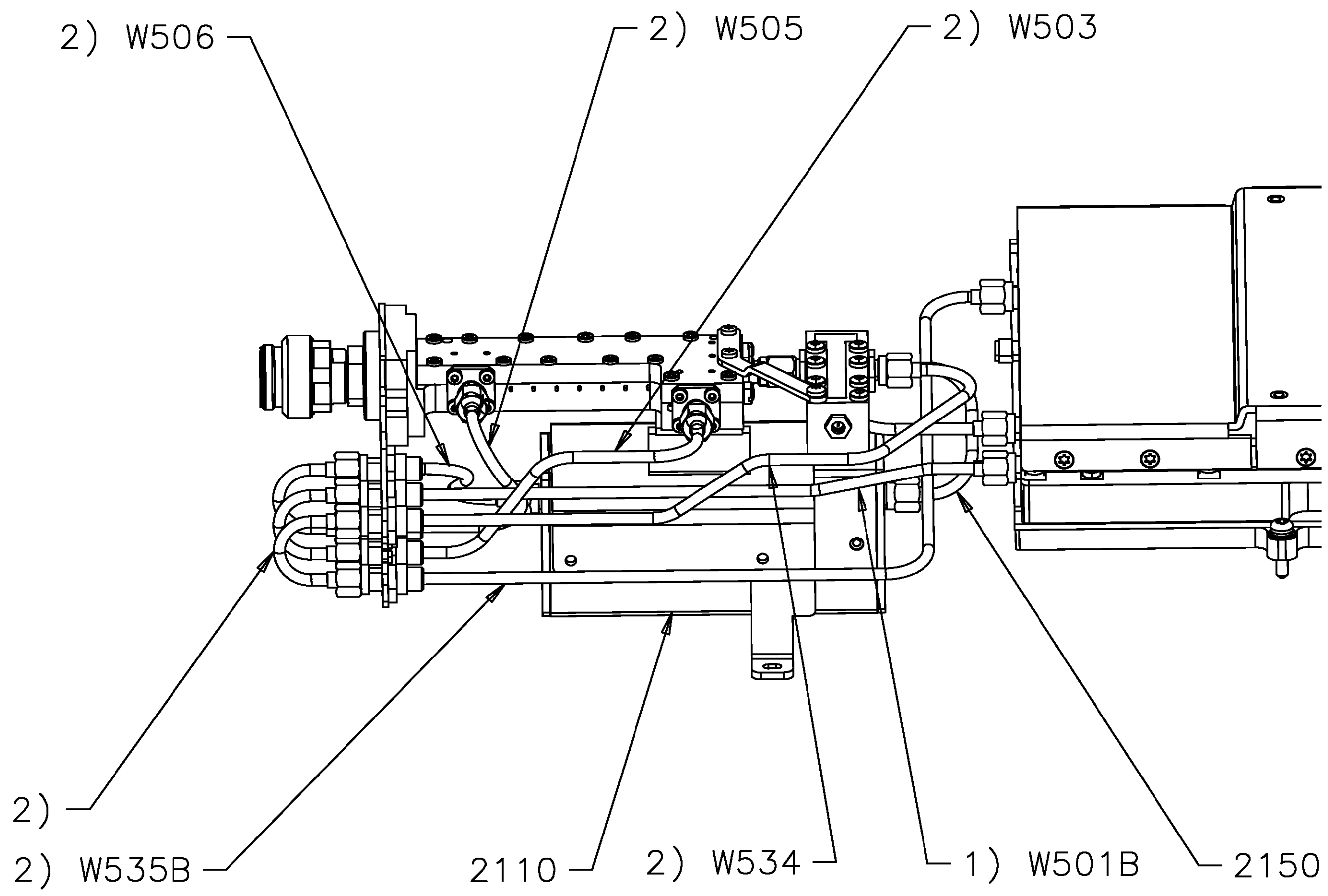
1) Bestandteil von / Part of:
   1305.3420.01 RM UNit 2 ZVA40
2) Bestandteil von / Part of:
   1164.0209.01 ZVA40-B16

Maßstab / Scale		Toleranz / Tol.		Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA40-Bxx / Assembly Instruction ZVA40-Bxx				Sprache / Lang.: de en	Aei. / C.I.: 02.00	Blatt / Sh.: 5
ZVA40-BXX	Datum / Date: 2007-04-23	Abteilung / Dept.: 1ESK	Name: LA		Zeichn.Nr. / Drawing No.: 1164.0409.00 D		

ZVA40-B33/34



ZVA40-B33/34 mit with ZVA40-B16



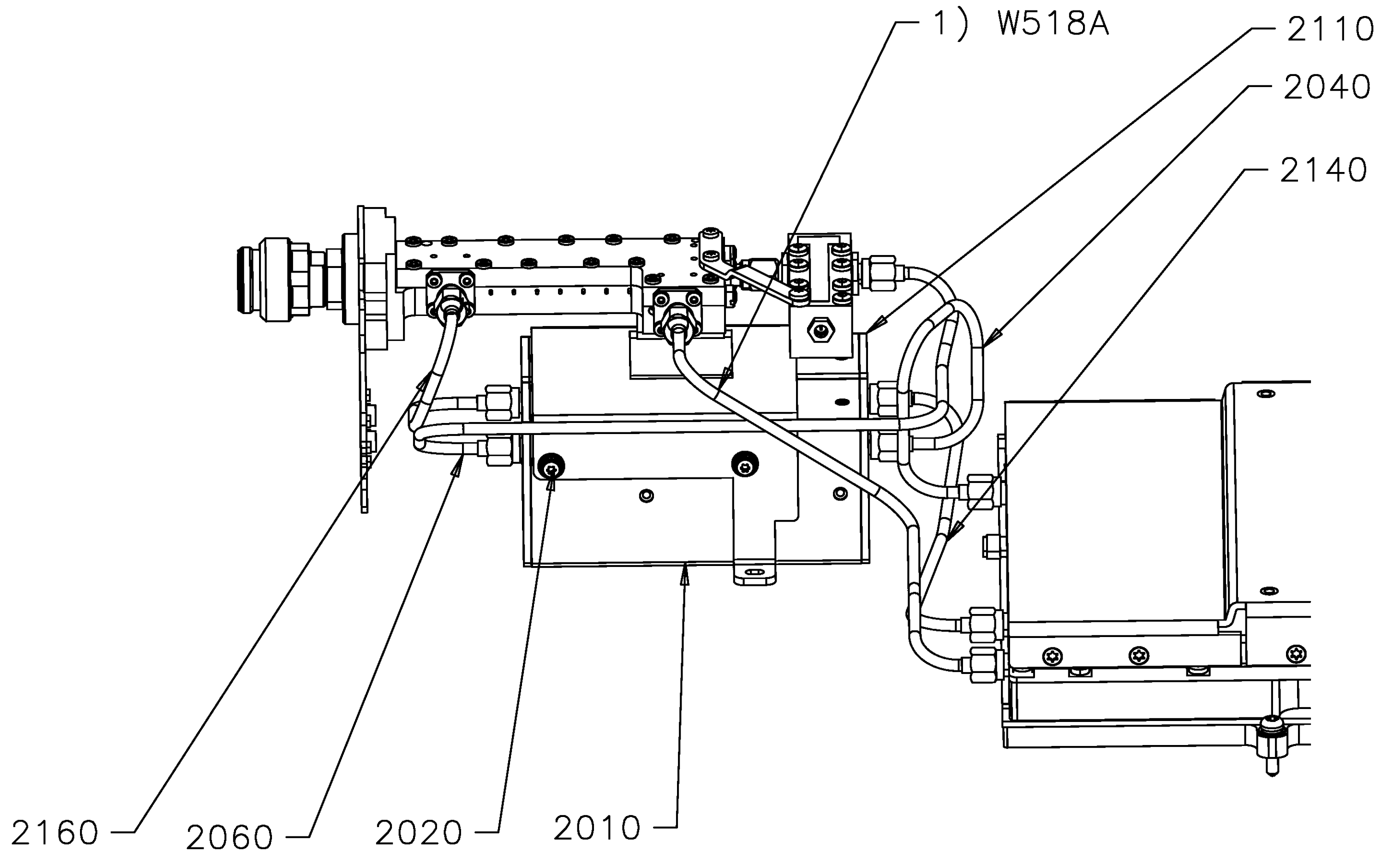
Projektions-methode
Projection Method

Pos. 2120, 2130 nicht dargestellt
Pos. 2120, 2130 not shown

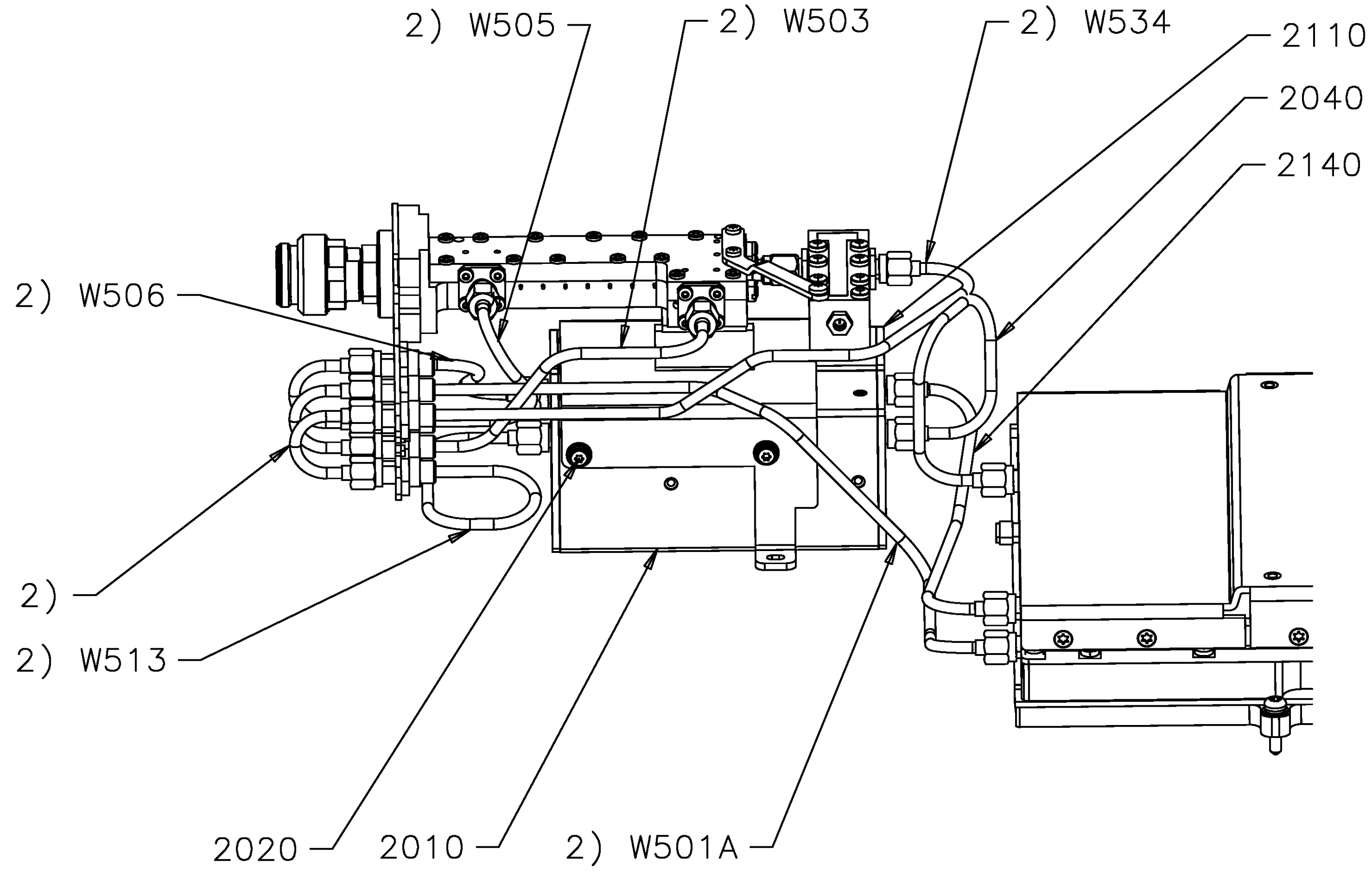
1) Bestandteil von / Part of:
1305.3420.01 RM Unit ZVA40
2) Bestandteil von / Part of:
1164.0209.01 ZVA40-B16

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA40-Bxx / Assembly Instruction ZVA40-Bxx		Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 6
ZVA40-BXX	Datum / *Date*: 2006-04-24	Abteilung / *Dept.*: 1ESK	Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1164.0409.00	D

ZVA40-B21/22 und/and ZVA40-B31/32



ZVA40-B21/22 und/and ZVA40-B31/32 mit/with ZVA40-B16



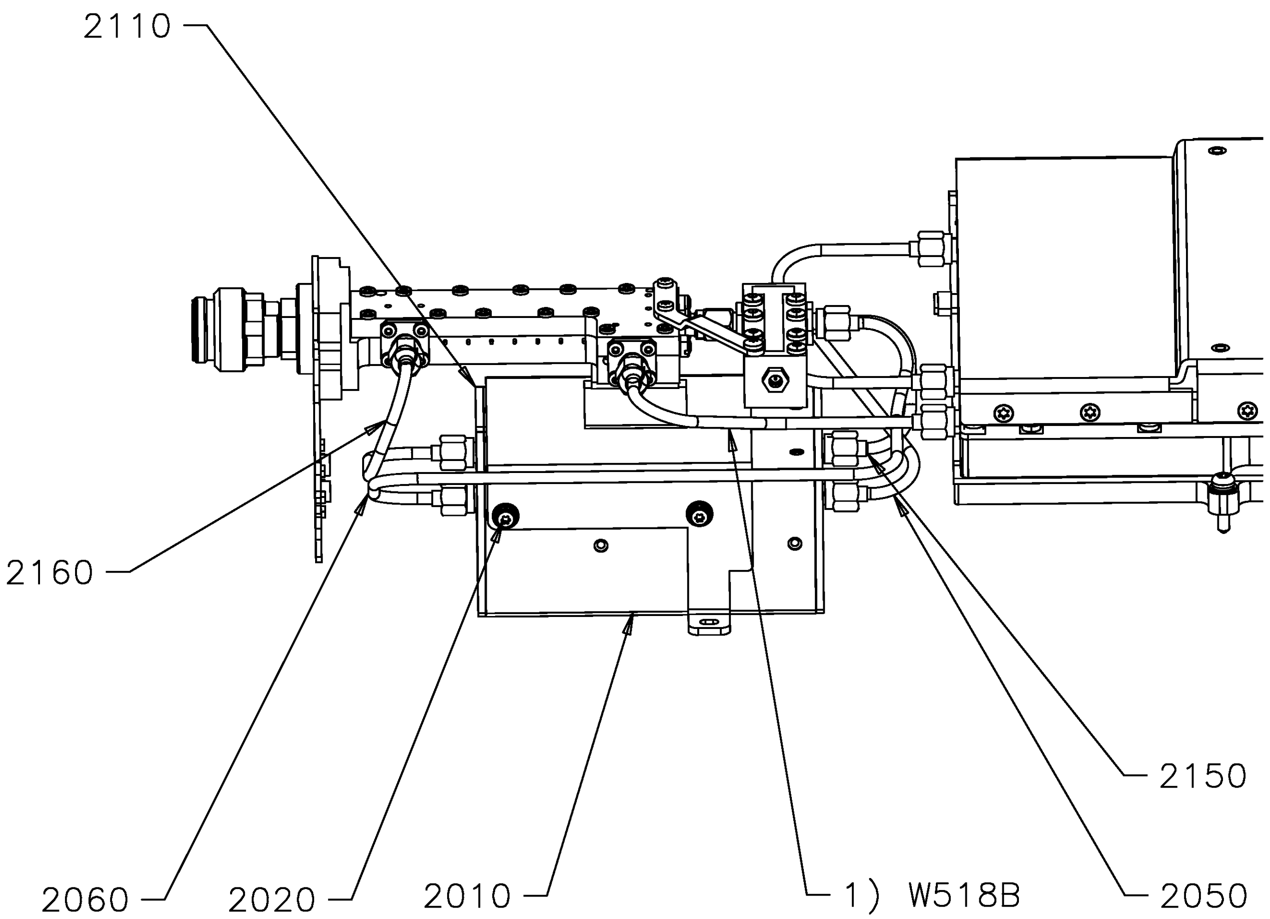
Pos. 2030, 2120, 2130 nicht dargestellt
Pos. 2030, 2120, 2130 not shown

1) Bestandteil von / Part of:
1305.3420.01 RM Unit 2 ZVA40
2) Bestandteil von / Part of:
1164.0209.01 ZVA40-B16

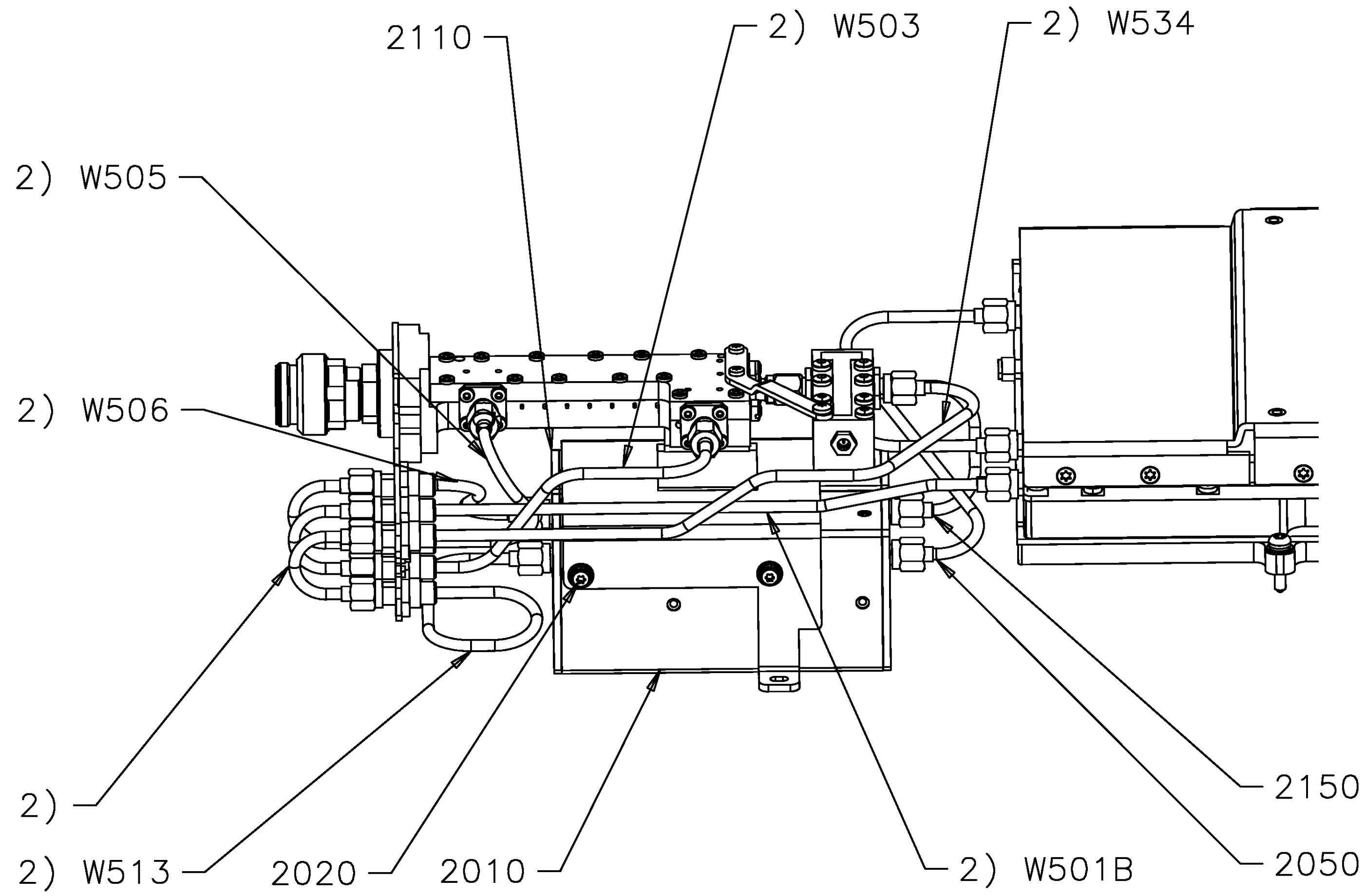
Projektions-methode / *Projection Method*

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*		
ROHDE&SCHWARZ	Benennung / *Designation*: Einbauanweisung ZVA40-Bxx / Assembly Instruction ZVA40-Bxx	Sprache / *Lang.*: de en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 7
ZVA40-BXX	Datum / *Date*: 2007-04-24 · Abteilung / *Dept.*: 1ESK · Name / *Name*: LA	Zeichn.Nr. / *Drawing No.*: 1164.0409.00 D		

ZVA40-B23/24 und/and ZVA40-B33/34



ZVA40-B23/24 und/and ZVA40-B33/34
mit/with ZVA40-B16



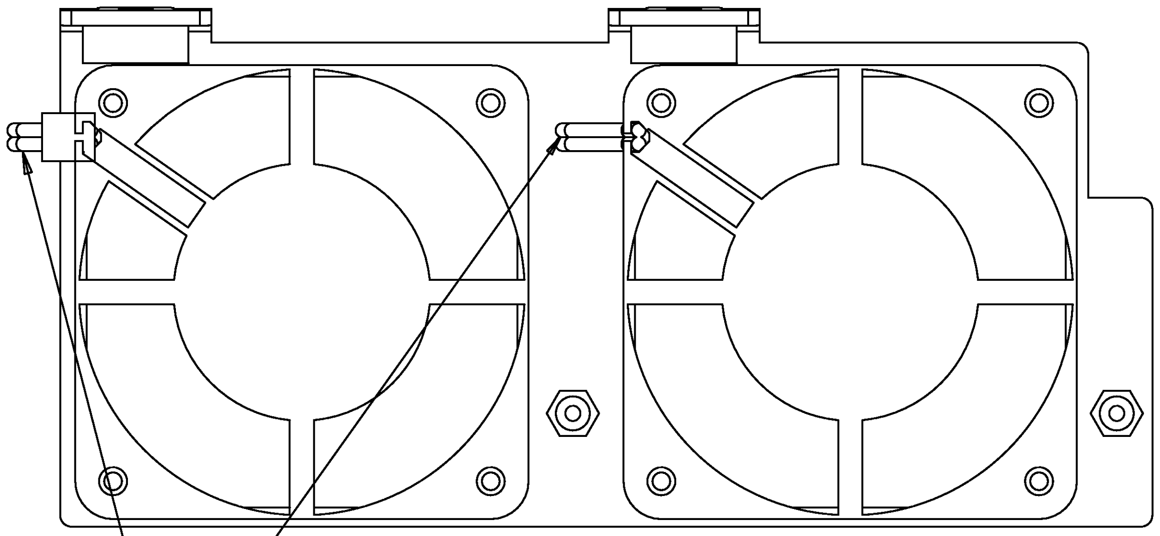
Projektions-methode
Projection Method

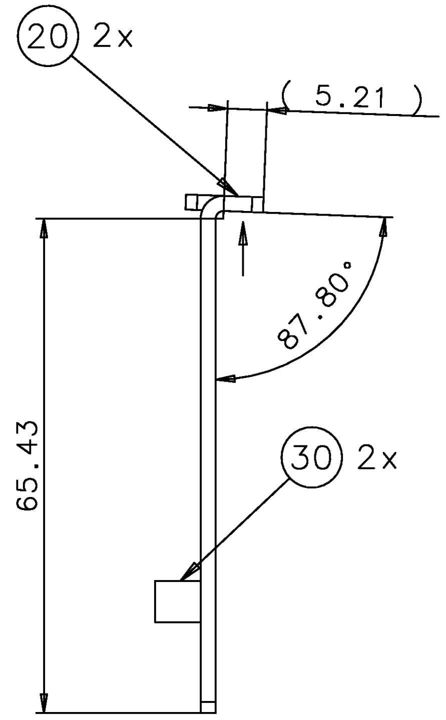
Pos. 2030, 2120, 2130 nicht dargestellt
Pos. 2030, 2120, 2130 not shown

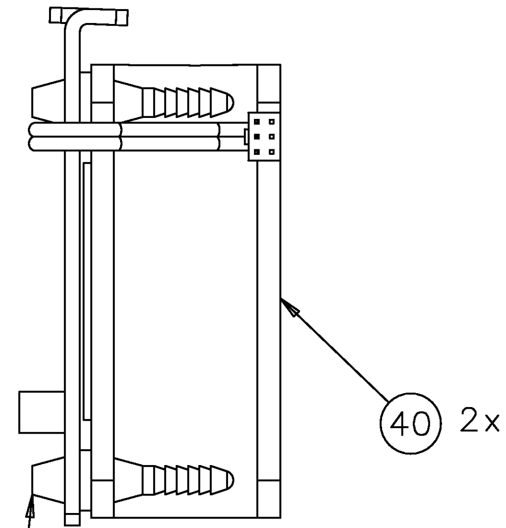
1) Bestandteil von / Part of:
13053420.01 RM Unit 2 ZVA40
2) Bestandteil von / Part of:
1164.0209.01 ZVA40-B16

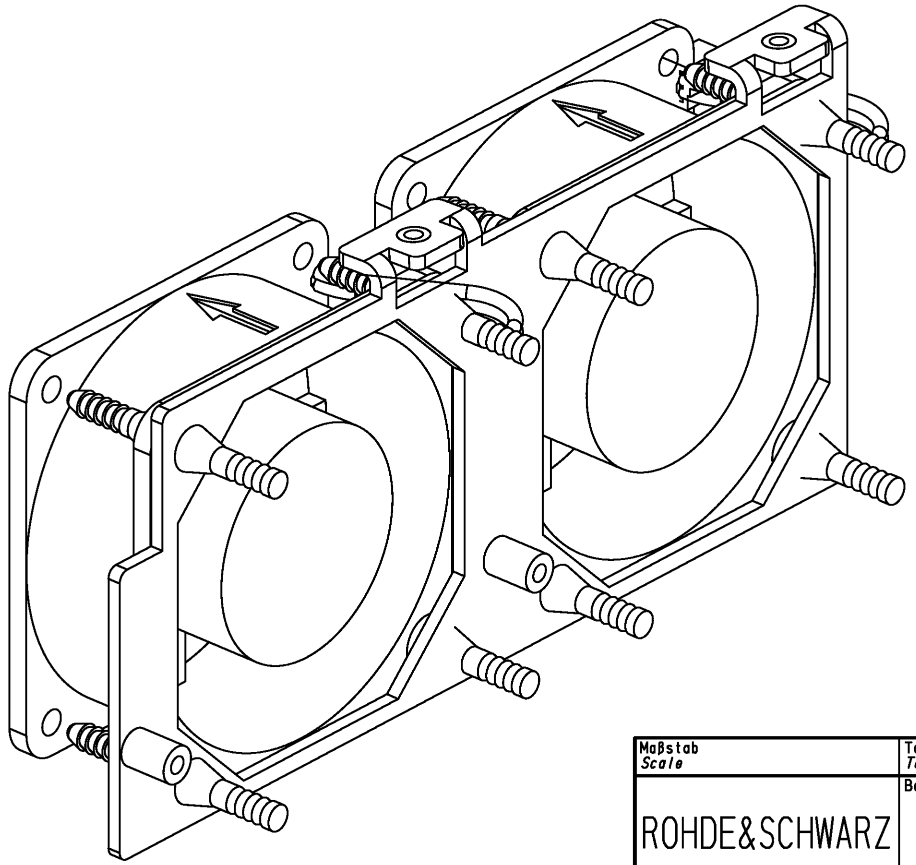
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: Einbauanweisung ZVA40-Bxx / Assembly Instruction ZVA40-Bxx		Sprache / Lang.: de en	Aei. / C.I.: 02.00 · Blatt / Sh.: 8
ZVA40-BXX	Datum / Date: 2007-04-24	Abteilung / Dept.: 1ESK · Name / Name: LA	Zeichn.Nr. / Drawing No.: 1164.0409.00	D

I









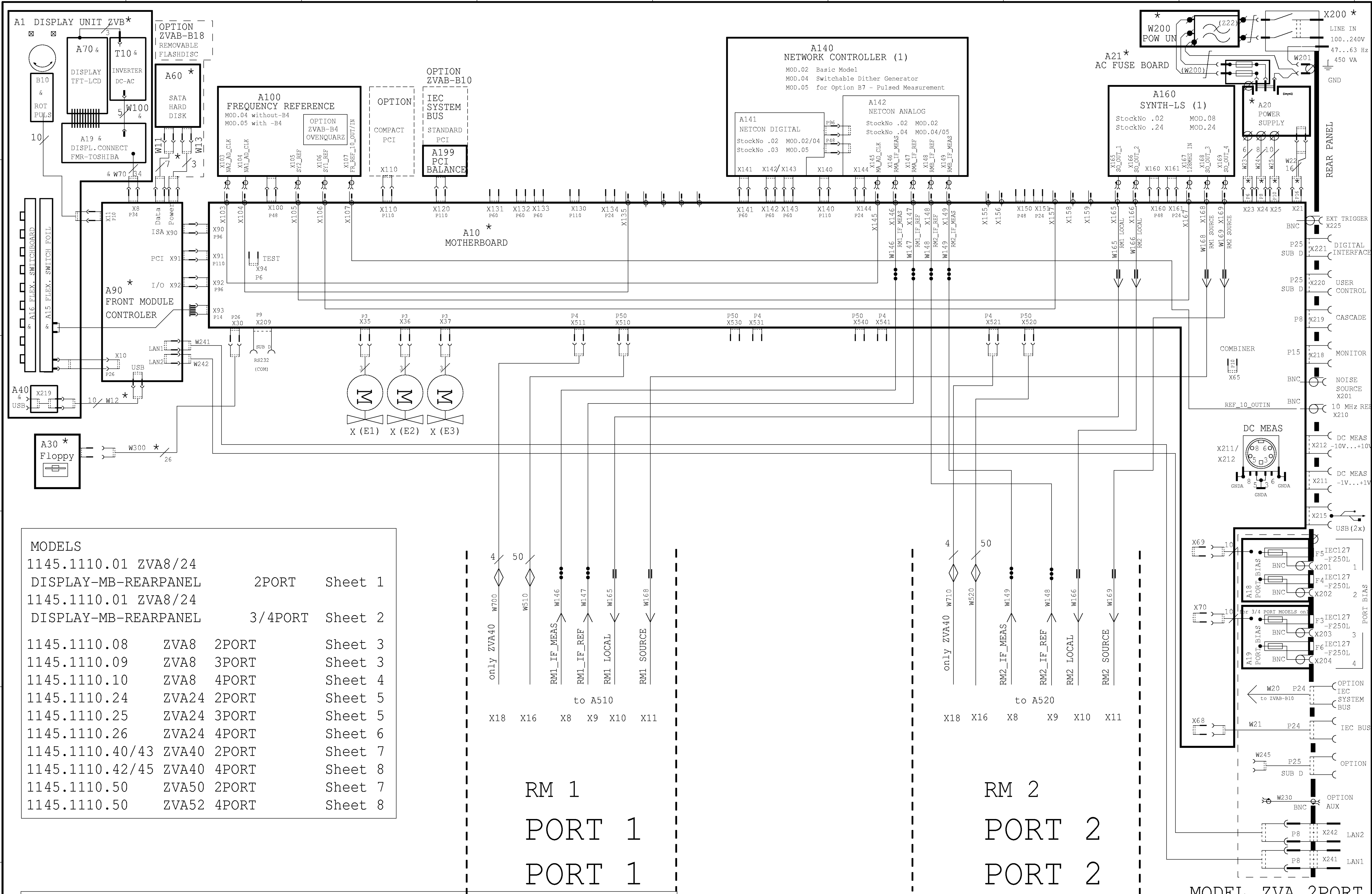
↑ Einpressrichtung
press-in direction

Projektionsmethode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*: 0001.1569.00, BL 2 DIN1783ALMG3 W19	
ROHDE&SCHWARZ	Benennung / *Designation*: RM44 LUEFTERBEFESTIGUNG RM44 BLOWER ATTACHEMENT	Sprache / *Lang.*: de en; Aei. / *C.I.*: 03.00	Blatt / *Sh.*: 1
ZVA44	Datum / *Date*: 2006-10-26; Abteilung / *Dept.*: 1ESK; Name / *Name*: Mi	Zeichn.Nr. / *Drawing No.*: 1302.5621.00, D	

ROHDE&SCHWARZ

Circuit Diagram



MODELS

1145.1110.01 ZVA8/24
DISPLAY-MB-REARPANEL 2PORT Sheet 1
1145.1110.01 ZVA8/24
DISPLAY-MB-REARPANEL 3/4PORT Sheet 2

1145.1110.08	ZVA8	2PORT	Sheet 3
1145.1110.09	ZVA8	3PORT	Sheet 3
1145.1110.10	ZVA8	4PORT	Sheet 4
1145.1110.24	ZVA24	2PORT	Sheet 5
1145.1110.25	ZVA24	3PORT	Sheet 5
1145.1110.26	ZVA24	4PORT	Sheet 6
1145.1110.40/43	ZVA40	2PORT	Sheet 7
1145.1110.42/45	ZVA40	4PORT	Sheet 8
1145.1110.50	ZVA50	2PORT	Sheet 7
1145.1110.50	ZVA52	4PORT	Sheet 8

E

Legende / legend

Cables to RM n
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVB
1302.5050.01

RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

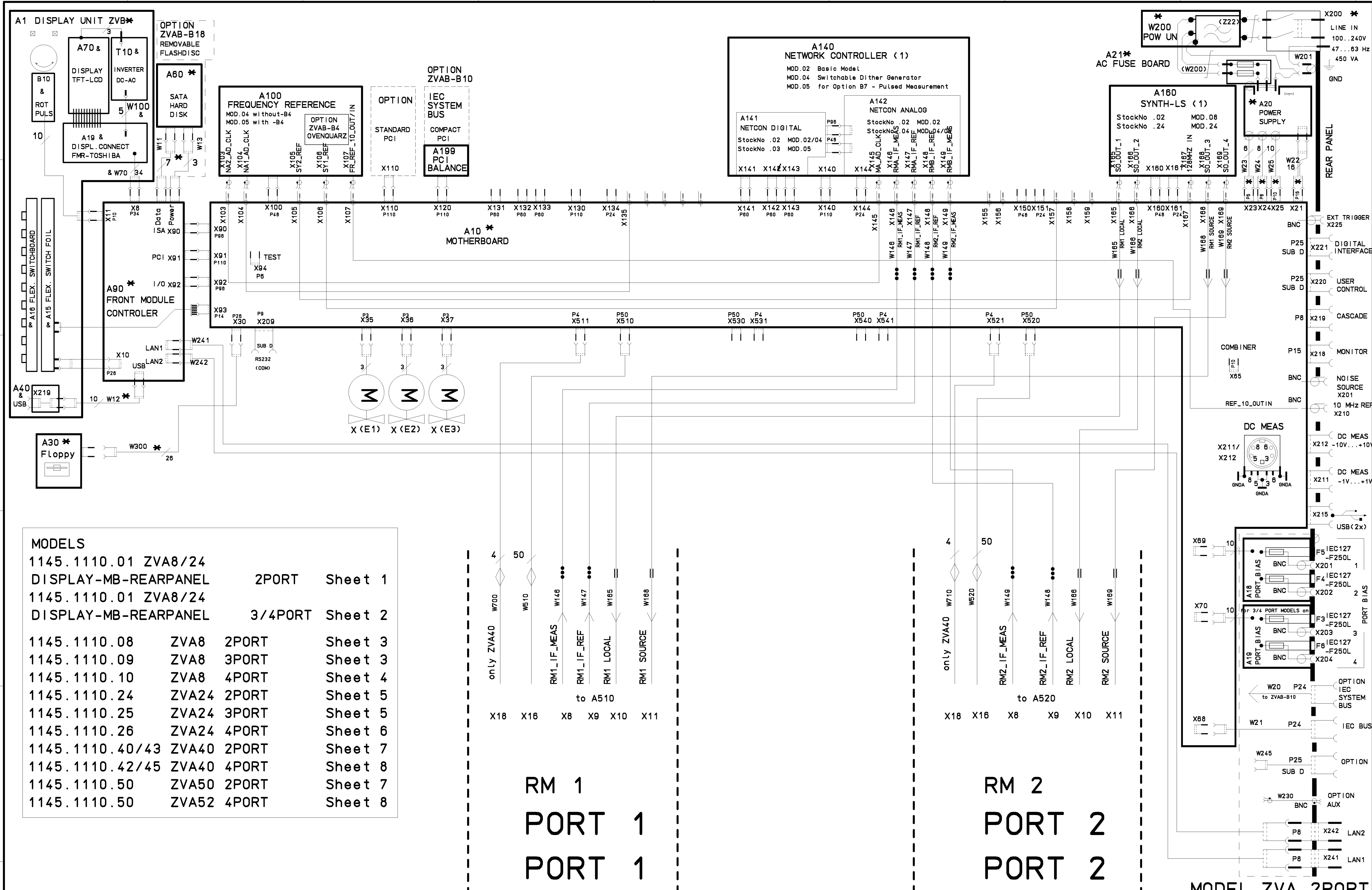
*
enthalten in / contained in
GRUNDEINHEIT ZVA /
FUNDAMENTAL UNIT
1145.1310.01

&
enthalten in / contained in
DISPLAYEINHEIT ZVB
DISPLAY UNIT ZVB
1145.1384.01

X = E1, E2, E3
enthalten in / contained in
GERAETERAHMEN/
DEVICE FRAME
1145.1355.00

MODEL ZVA_2PORT

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 13.00	Blatt:/Sh.: 1 +
ZVA	Datum: Date: 07-11-09	Abteilung: Dept.: 1ESK	Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S



MODELS

1145.1110.01 ZVA8/24			
DISPLAY-MB-REARPANEL		2PORT	Sheet 1
1145.1110.01 ZVA8/24			
DISPLAY-MB-REARPANEL		3/4PORT	Sheet 2
1145.1110.08	ZVA8	2PORT	Sheet 3
1145.1110.09	ZVA8	3PORT	Sheet 3
1145.1110.10	ZVA8	4PORT	Sheet 4
1145.1110.24	ZVA24	2PORT	Sheet 5
1145.1110.25	ZVA24	3PORT	Sheet 5
1145.1110.26	ZVA24	4PORT	Sheet 6
1145.1110.40/43	ZVA40	2PORT	Sheet 7
1145.1110.42/45	ZVA40	4PORT	Sheet 8
1145.1110.50	ZVA50	2PORT	Sheet 7
1145.1110.50	ZVA52	4PORT	Sheet 8

Legende / legend

Cables to RM n
enthalten in / contained in KABELSATZ ZVA/ SET OF CABLE ZVB 1302.5050.01

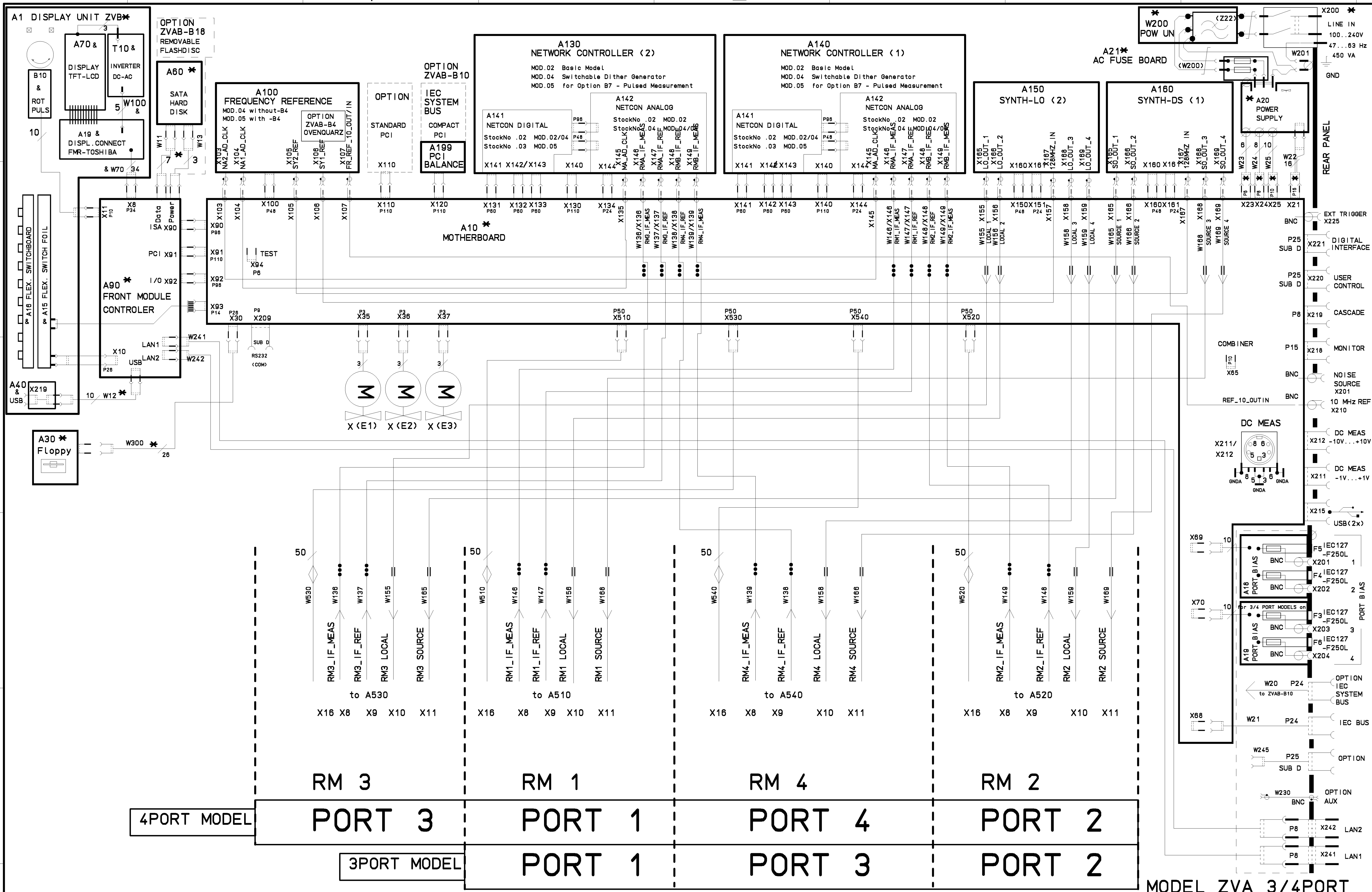
RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

* enthalten in / contained in GRUNDEINHEIT ZVA / FUNDAMENTAL UNIT 1145.1310.01

& enthalten in / contained in DISPLAYEINHEIT ZVB DISPLAY UNIT ZVB 1145.1384.01

X = E1, E2, E3 enthalten in / contained in GERAETERAHMEN/ DEVICE FRAME 1145.1355.00

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 14.00
		Blatt:/Sh.: 1+	
ZVA	Datum:/Date: 08-09-16 · Abteilung:/Dept.: 1ESK · Name:/Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S	



Legende / legend

Cables to RM n
enthalten in / contained in KABELSATZ ZVA/ SET OF CABLE ZVB 1302.5050.01

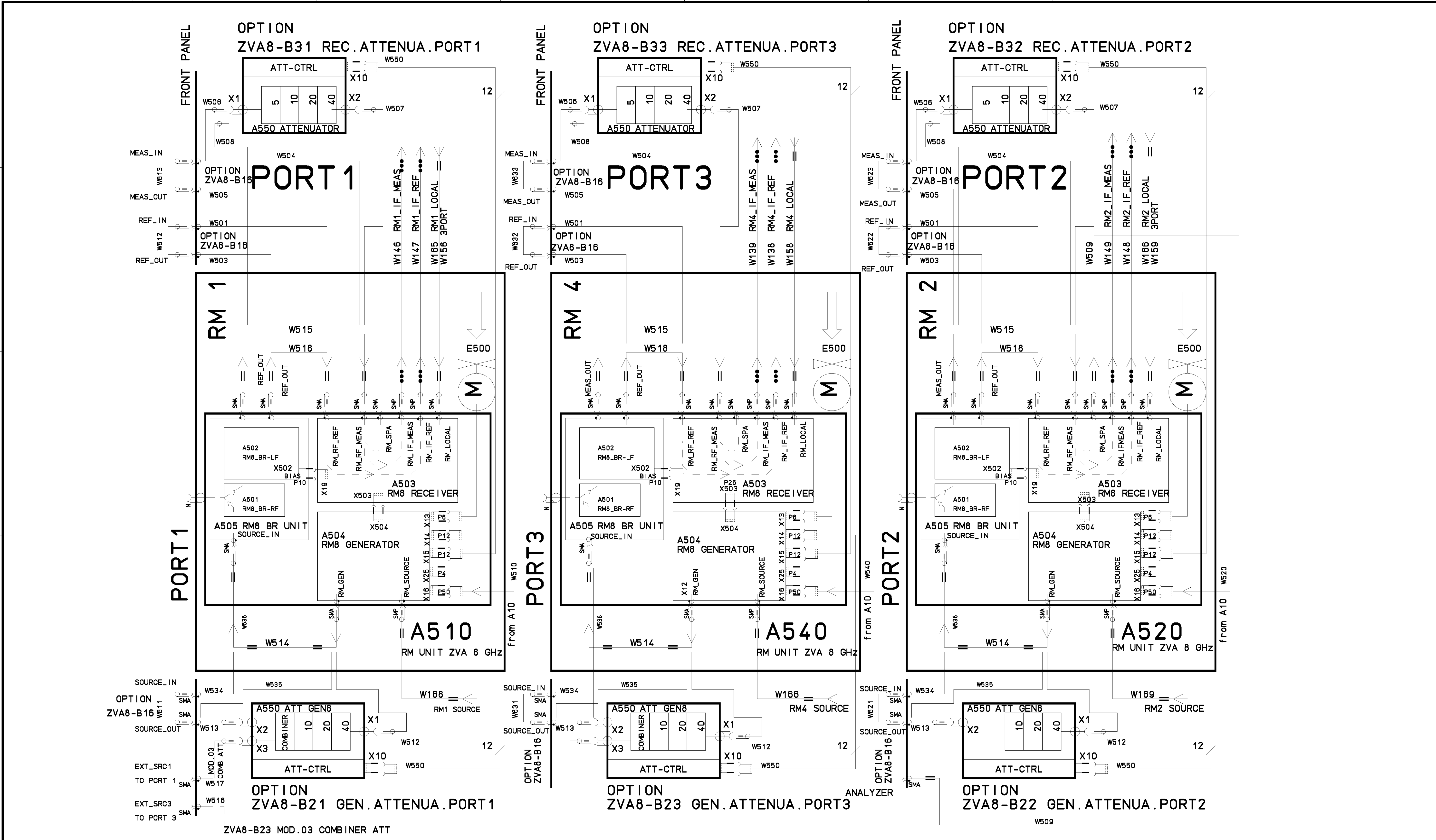
RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

* enthalten in / contained in GRUNDEINHEIT ZVA / FUNDAMENTAL UNIT 1145.1310.01

& enthalten in / contained in DISPLAYEINHEIT ZVB DISPLAY UNIT ZVB 1145.1384.01

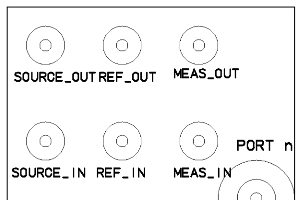
X = E1, E2, E3 enthalten in / contained in GERAETERAHMEN/ DEVICE FRAME 1145.1355.00

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Ae:/C.I.: 14.00
ZVA	Datum: Date: 08-09-16	Abteilung: Dept.: 1ESK	Name: schoettl
	Blatt:/Sh.: 2 +	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S	



MODELS
1145.1110.08 ZVA8 2PORT
1145.1110.09 ZVA8 3PORT

Ext Cables to A510, A520, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01

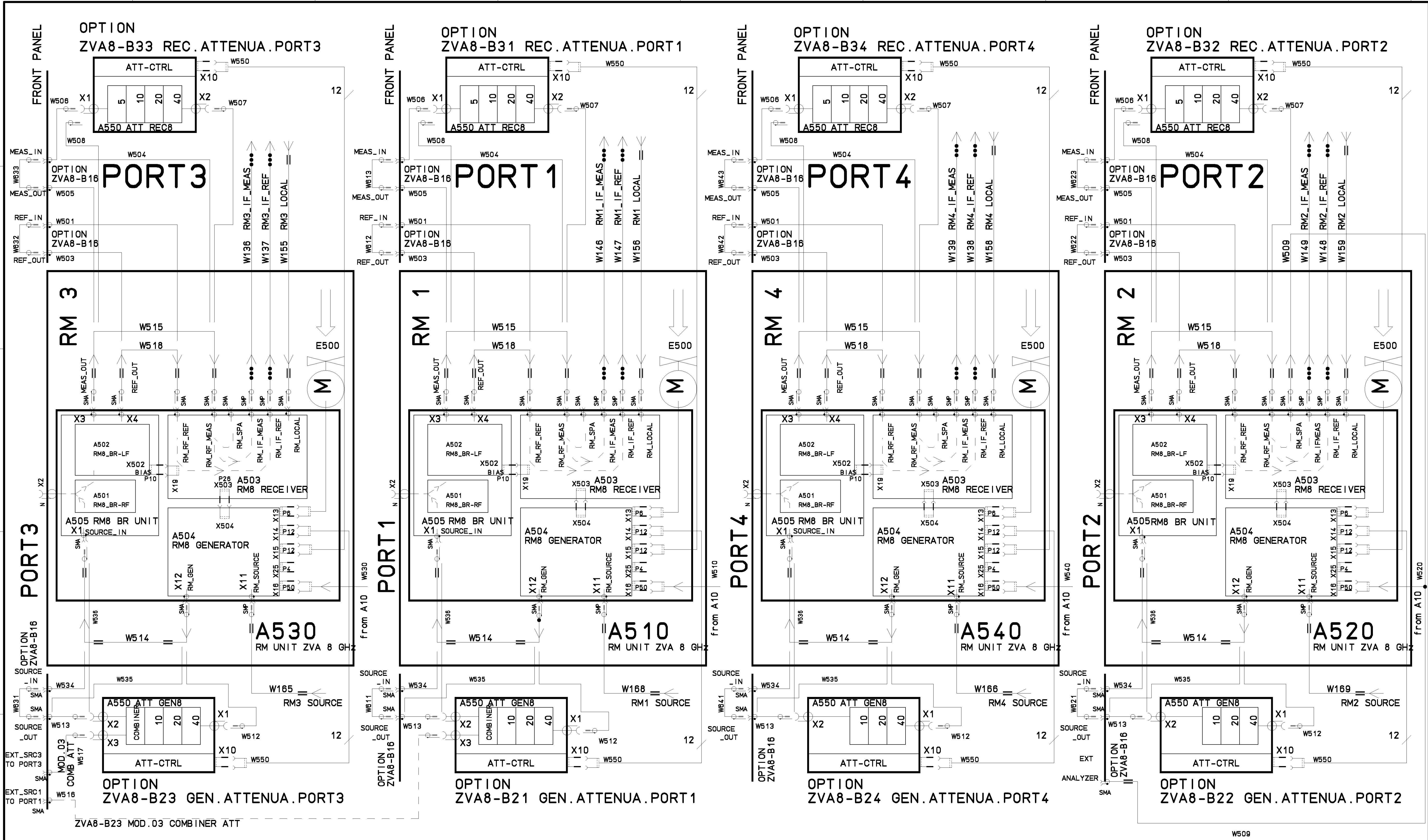


FRONT PANEL
TOP VIEW

Legende / legend

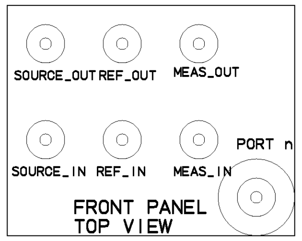
RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 14.00	Blatt:/Sh.: 3 +
ZVA	Datum: Date: 08-09-16	Abteilung: Dept.: 1ESK	Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S



MODEL
1145.1110.10 ZVA8 4PORT

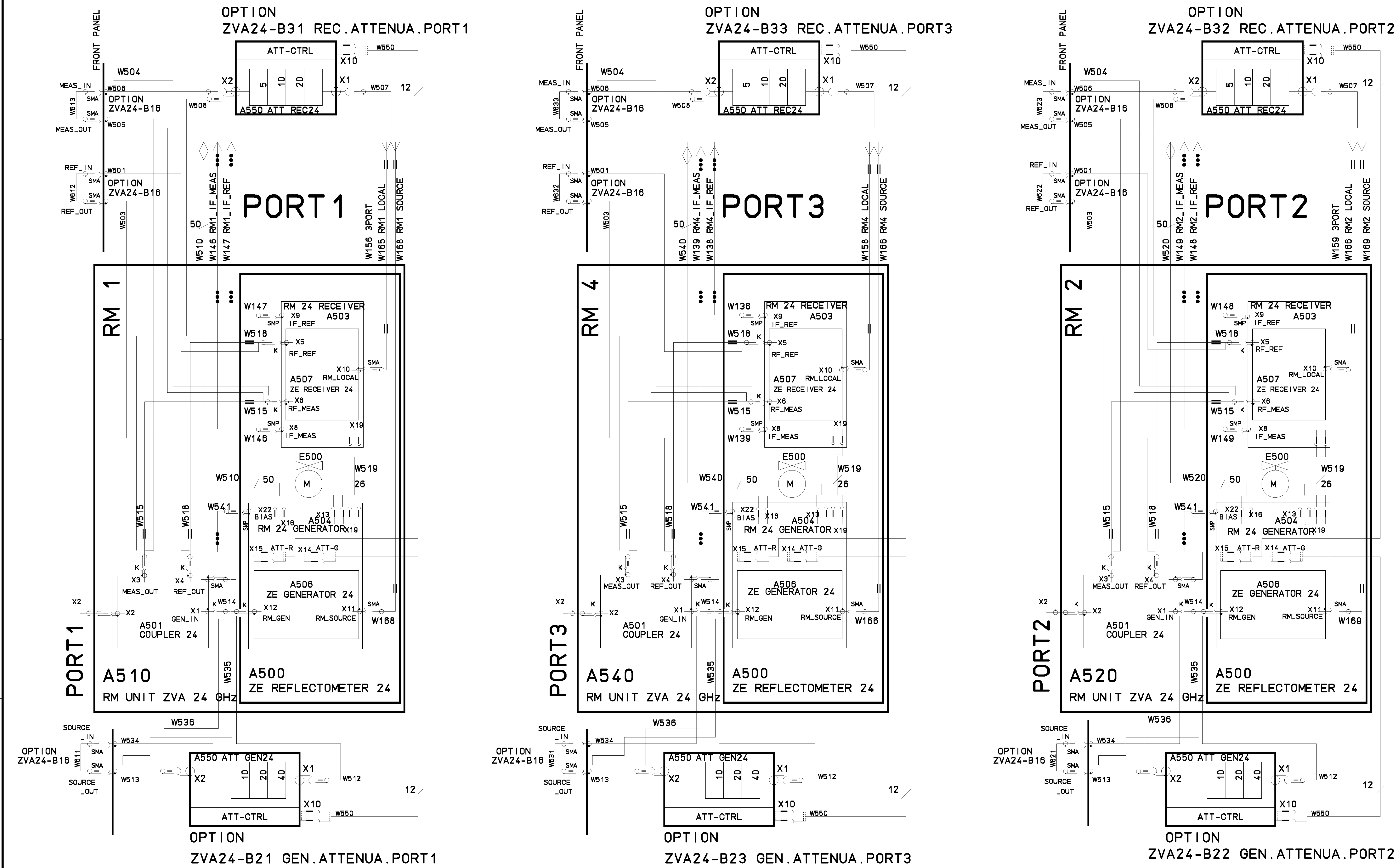
Ext Cables to A510, A520, A530, 540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01



Legende / legend

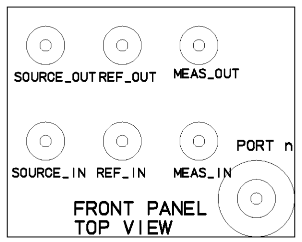
RM n = REFLECTOMETER n
= semi rigid cable
••• flex koax cable

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 14.00	Blatt:/Sh.: 4 +
ZVA	Datum: Date: 08-09-16	Abteilung: Dept.: 1ESK	Name: Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S		



MODELS 1145.1110.24 ZVA24 2PORT
1145.1110.25 ZVA24 3PORT

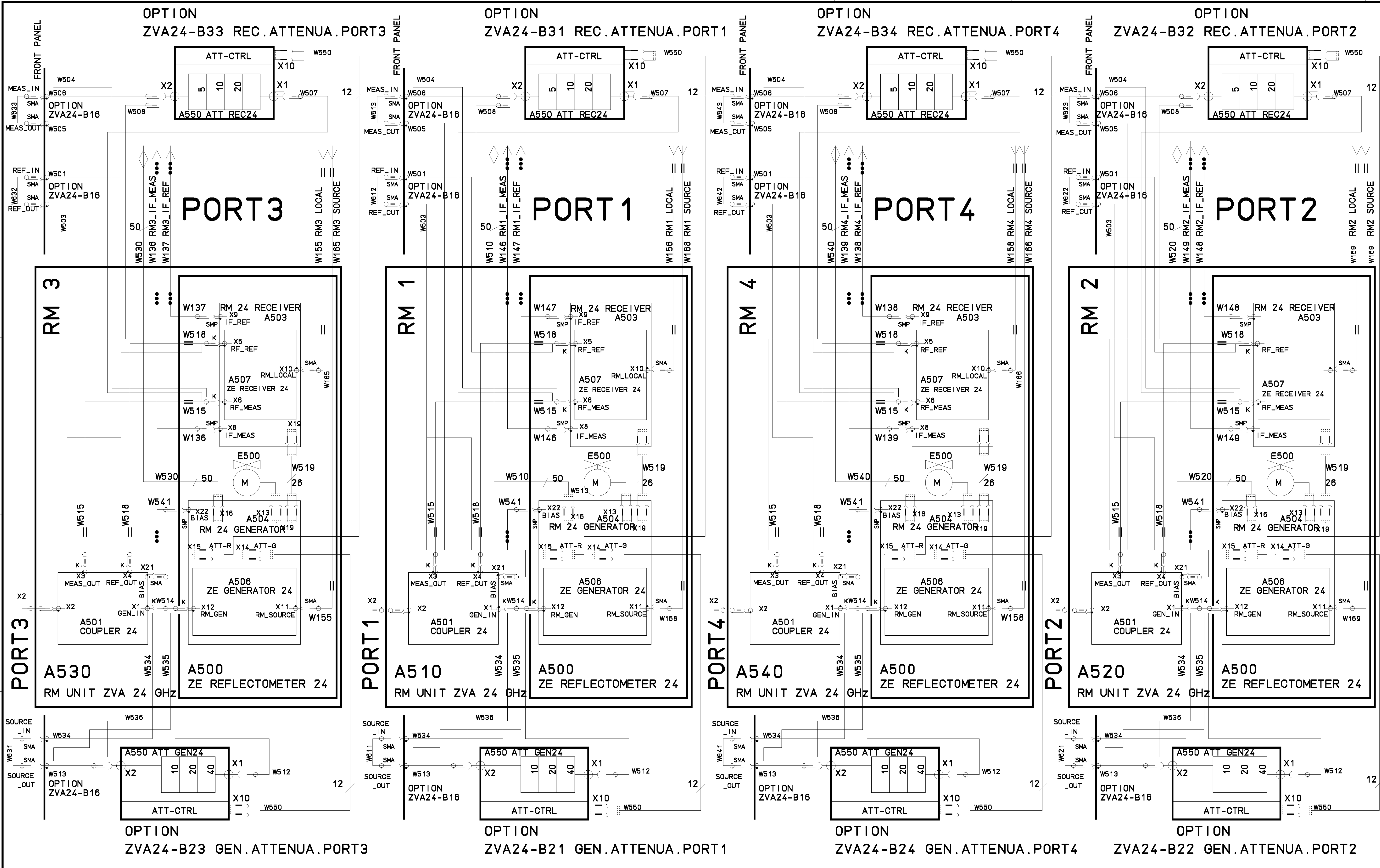
Ext Cables to A510, A520, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01



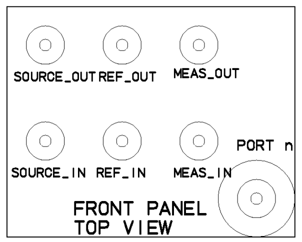
Legende / legend

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

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Ae!:/C.I.: 14.00	Blatt:/Sh.: 5 +
ZVA	Datum:/Date: 08-09-16	Abteilung:/Dept.: 1ESK	Name:/Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S



Ext Cables to A510, A520, A530, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01

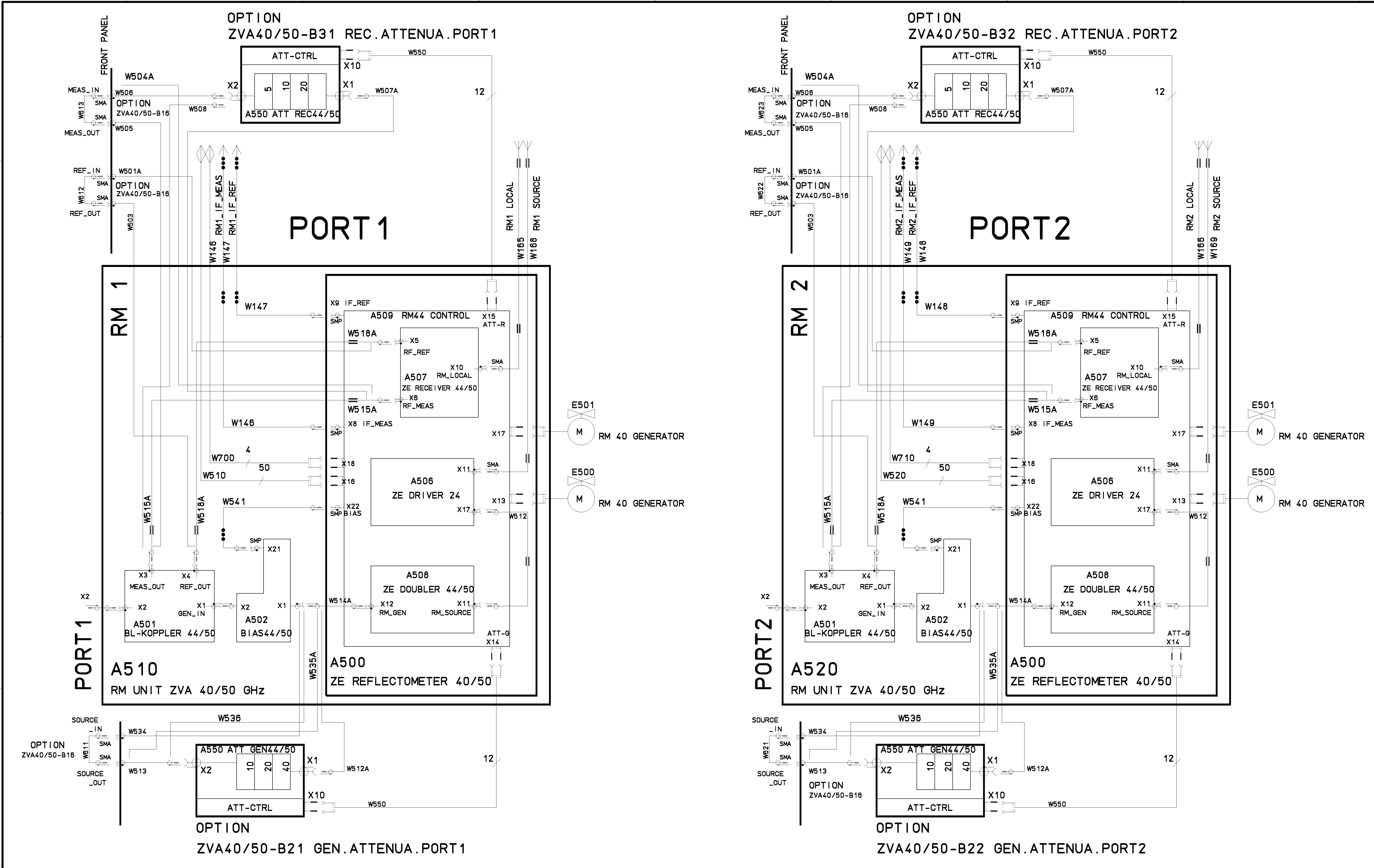


Legende / legend

RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

MODEL 1145.1110.26 ZVA24 4PORT

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Ael:/C.I.: 14.00	Blatt:/Sh.: 6 +
ZVA	Datum: / Date: 08-09-16 · Abteilung: / Dept.: 1ESK · Name: / Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S		



Ext Cables to A510, A520, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01

FRONT PANEL
TOP VIEW

SOURCE_OUT REF_OUT MEAS_OUT
SOURCE_IN REF_IN MEAS_IN
PORT n

Legende / legend

RM n = REFLECTOMETER n

semi rigid cable

flex koax cable

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 14.00	Blatt:/Sh.: 7 +
ZVA	Datum: / Date: 08-09-16	Abteilung: / Dept.: 1ESK	Name: / Name: schoettl	Zeichn.Nr.:/Drawing No.: 1145.1110.01 S

Ext Cables to A510, A520, A530, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01

SOURCE_OUT REF_OUT MEAS_OUT
SOURCE_IN REF_IN MEAS_IN PORT n
FRONT PANEL
TOP VIEW

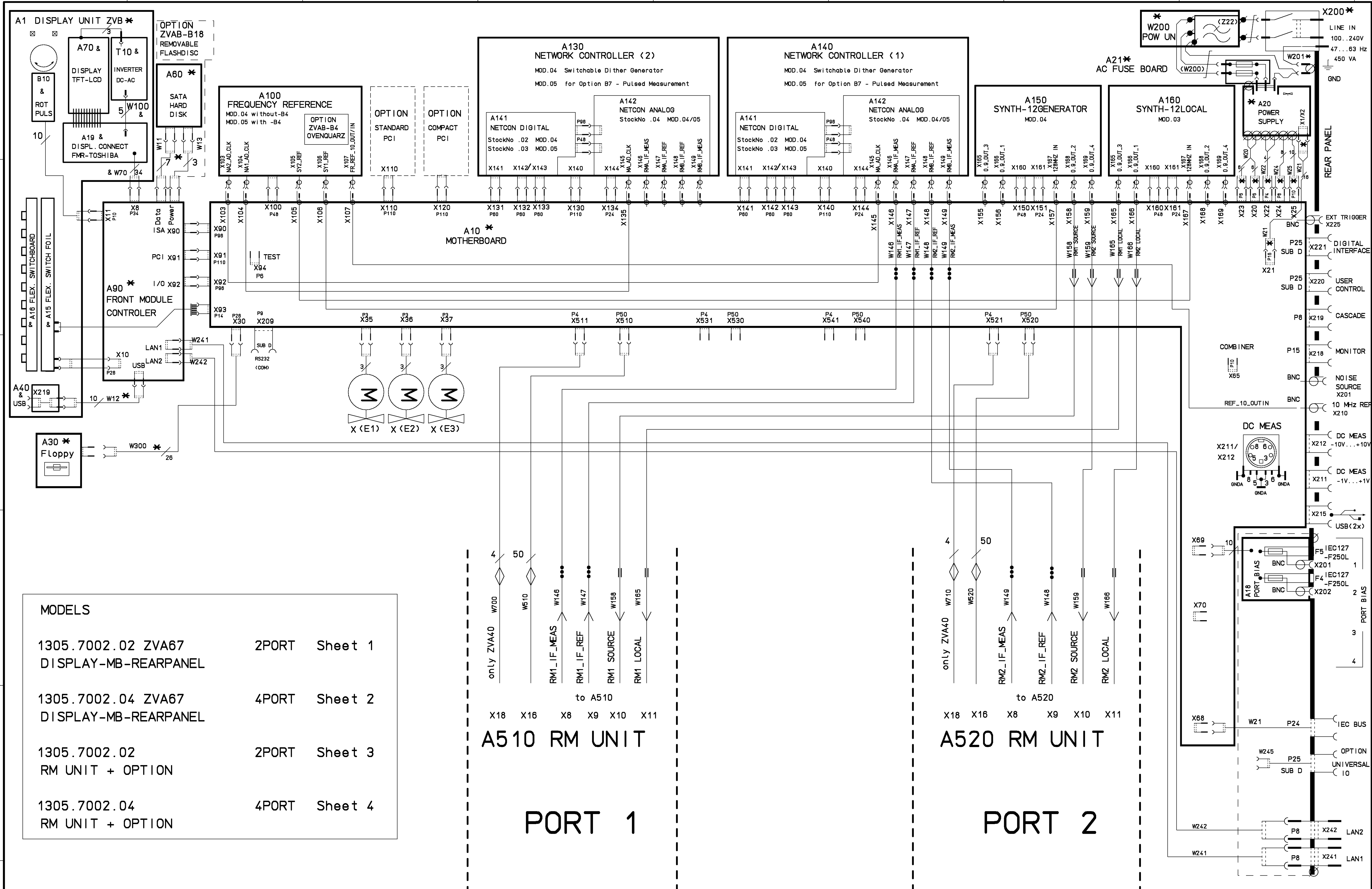
Legende / legend

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

Bindende Angaben ueber Varianten, Trimmwerte, Bauteile und nicht bestueckte Bauteile siehe ST.
For binding information on models, trimming and components values and nonfitted components see parts list.

ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: ZVA NETWORK ANALYZER	Spr./Lang.: de	Ae./C.I.: 14.00	Blatt/Sh.: 8 -
ZVA	Datum/Date: 08-09-16	Abteilung/Dept.: 1ESK	Name: schoettl	Zeichn.Nr./Drawing No.: 1145.1110.01 S



MODELS

1305.7002.02 ZVA67 DISPLAY-MB-REARPANEL	2PORT	Sheet 1
1305.7002.04 ZVA67 DISPLAY-MB-REARPANEL	4PORT	Sheet 2
1305.7002.02 RM UNIT + OPTION	2PORT	Sheet 3
1305.7002.04 RM UNIT + OPTION	4PORT	Sheet 4

Legende / legend

Cables to RM n
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVB
1302.5050.01

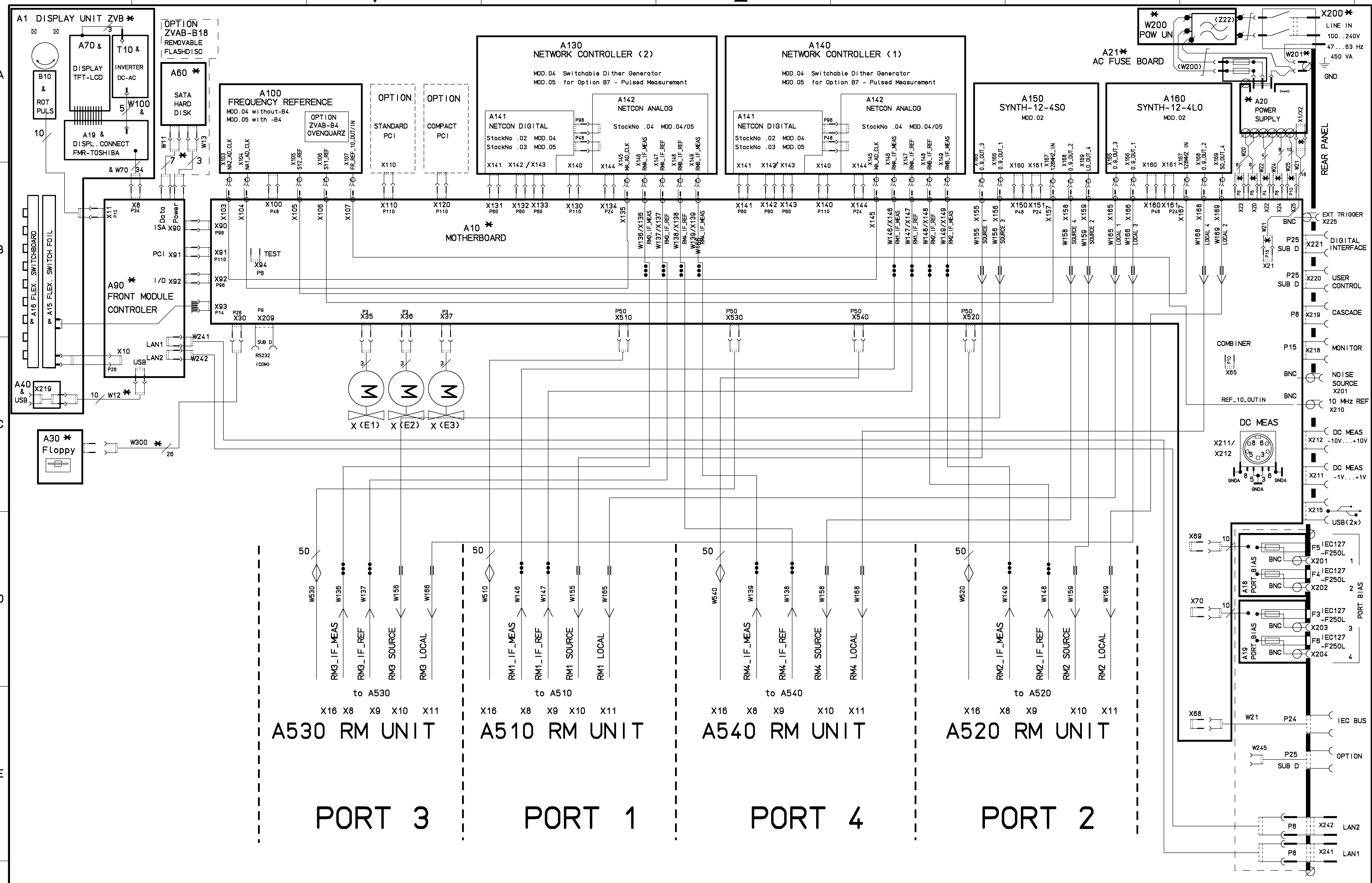
RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

* enthalten in / contained in GRUNDEINHEIT ZVA / FUNDAMENTAL UNIT 1145.1310.01

& enthalten in / contained in DISPLAYEINHEIT ZVB DISPLAY UNIT ZVB 1145.1390.01

X = E1, E2, E3 enthalten in / contained in GERAETERAHMEN/ DEVICE FRAME 1145.1355.00

ROHDE&SCHWARZ	Benennung / Designat.: ZVA67 NETWORK ANALYZER ZVA67 NETWORK ANALYZER	Spr.:/Lang.: de; Aei:/C.I.: 04.00; Blatt:/Sh.: 1 +
ZVA	Datum: 2009-07-13; Abteilung: 1ESK; Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1305.7002.01 S



Legende / legend

Cables to RM n
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVB
1302.5050.01

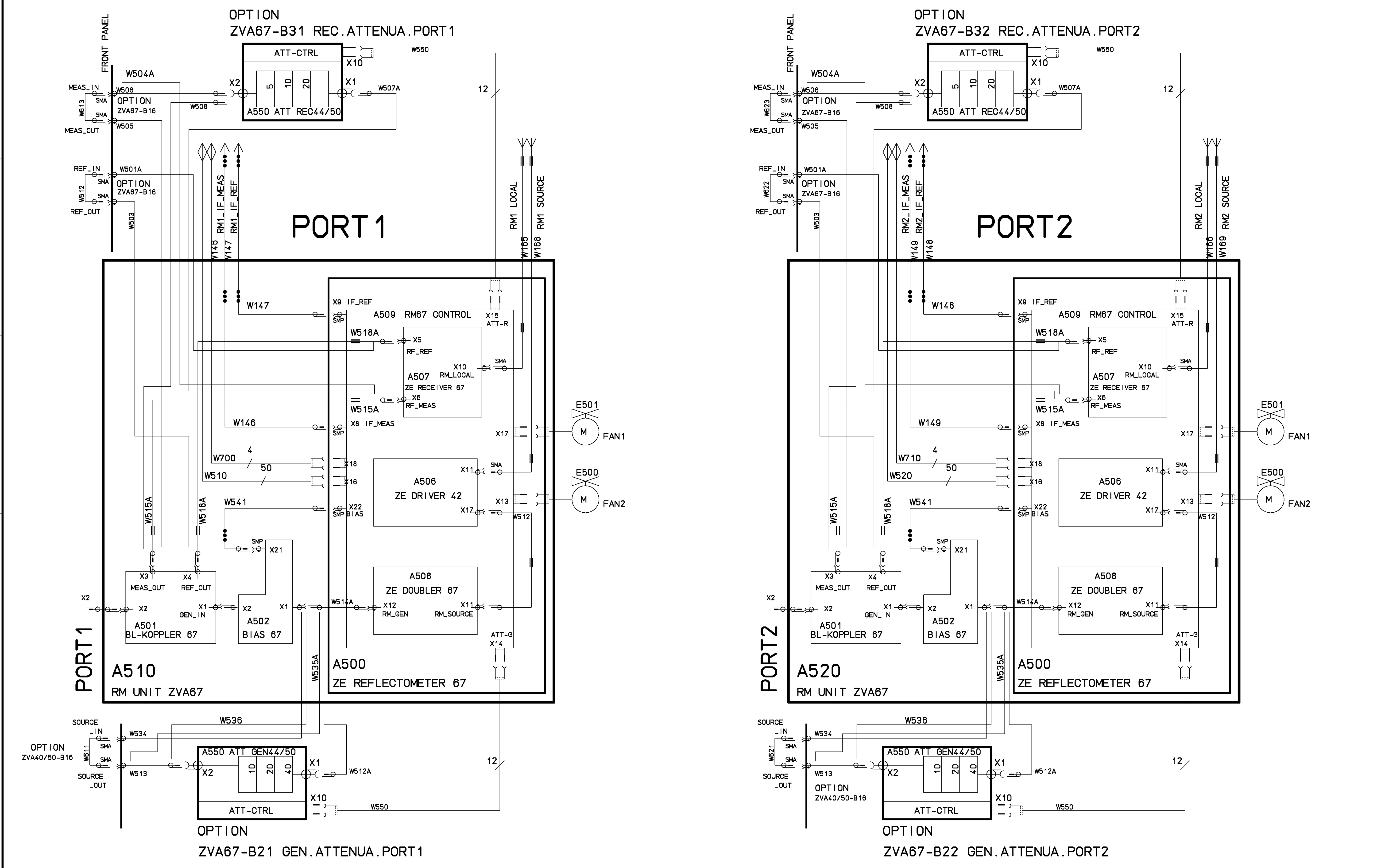
RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

*
enthalten in / contained in
GRUNDEINHEIT ZVA /
FUNDAMENTAL UNIT
1145.1310.01

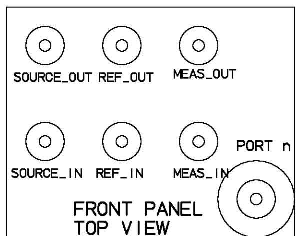
&
enthalten in / contained in
DISPLAYEINHEIT ZVB
DISPLAY UNIT ZVB
1145.1384.01

X = E1, E2, E3
enthalten in / contained in
GERAETERAHMEN/
DEVICE FRAME
1145.1355.00

ROHDE&SCHWARZ	Benennung / Designat.: ZVA67 NETWORK ANALYZER / ZVA67 NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 04.00
ZVA	Datum: / Date: 2009-07-13 ; Abteilung: / Dept.: 1ESK ; Name: / Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1305.7002.01 S	Blatt:/Sh.: 2 +



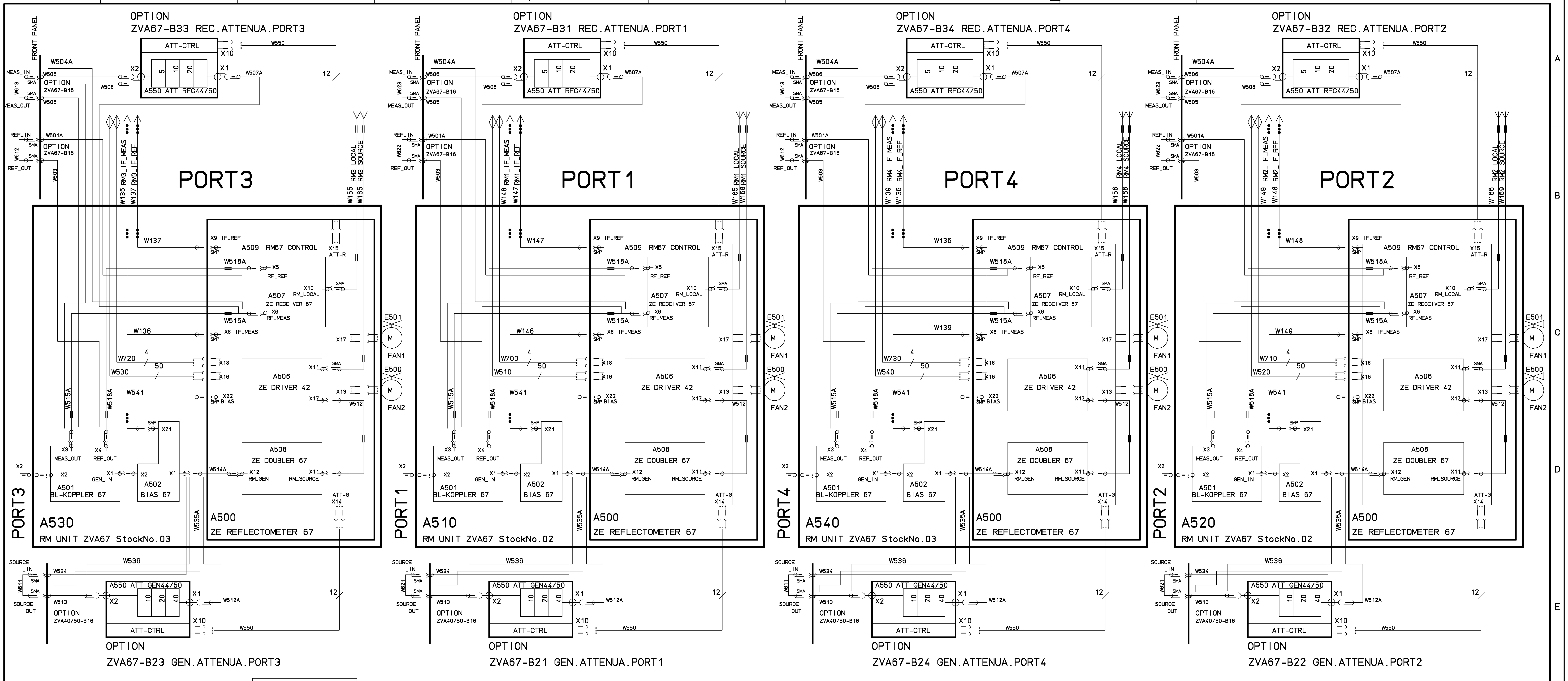
Ext Cables to A510, A520, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01



Legende / legend

RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

ROHDE&SCHWARZ	Benennung / Designat.: ZVA67 NETWORK ANALYZER ZVA67 NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 3 +
				Zeichn.Nr.:/Drawing No.: 1305.7002.01 S		
ZVA	Datum:/Date: 2009-07-13	Abteilung:/Dept.: 1ESK	Name:/Name: smolinsk			



Legende / legend

RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

Ext Cables to A510, A520, A530, A540
enthalten in / contained in
KABELSATZ ZVA/
SET OF CABLE ZVA
1302.5050.01

ROHDE&SCHWARZ	Benennung / Designat.: ZVA67 NETWORK ANALYZER ZVA67 NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 04.00 · Blatt:/Sh.: 4 -
ZVA	Datum: / Date: 2009-07-13 · Abteilung: / Dept.: 1ESK · Name: / Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1305.7002.01 S	