

# R&S® ZV-Z5x Calibration Unit Specifications



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# Definitions

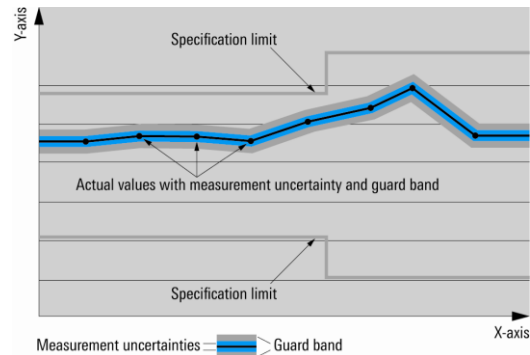
## General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

## Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as  $<$ ,  $\leq$ ,  $\geq$ ,  $>$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



**Specifications without limits**

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

**Typical data (typ.)**

Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

**Nominal values (nom.)**

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

**Measured values (meas.)**

Characterize expected product performance by means of measurement results gained from individual samples.

**Uncertainties**

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

Specifications apply under the following conditions:

Sufficient warm-up time (approx. 15 minutes) at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal calibrations and characterizations performed. Data designated "overrange" and data without tolerance limits is not binding.

## Measurement range

Impedance		50 $\Omega$ or 75 $\Omega$
Calibration port connector type	R&S®ZV-Z52	type N (50 $\Omega$ ), female or 3.5 mm, female
	R&S®ZV-Z53	type N (50 $\Omega$ or 75 $\Omega$ ), female or 3.5 mm, female
	R&S®ZV-Z54	2.92 mm, female
	R&S®ZV-Z55	2.4 mm, female
	R&S®ZV-Z58	type N (50 $\Omega$ ), female or 3.5 mm, female
	R&S®ZV-Z59	3.5 mm, female
Number of calibration ports	R&S®ZV-Z52	4
	R&S®ZV-Z53	2
	R&S®ZV-Z54	2
	R&S®ZV-Z55	2
	R&S®ZV-Z58	8
	R&S®ZV-Z59	6
	R&S®ZV-Z52	10 MHz to 24 GHz (model 30) or 100 kHz to 18 GHz (model 70)
	R&S®ZV-Z53	300 kHz to 3 GHz, 18 GHz or 24 GHz
	R&S®ZV-Z54	10 MHz to 40 GHz
	R&S®ZV-Z55	10 MHz to 50 GHz
	R&S®ZV-Z58	300 kHz to 8 GHz
	R&S®ZV-Z59	10 MHz to 20 GHz

Calibration time	4 ports, 201 points, and 1 kHz bandwidth	27 s
	401 points, and 1 kHz bandwidth	34 s
	201 points, and 100 Hz bandwidth	67 s
	8 ports, 201 points, and 1 kHz bandwidth	84 s
	401 points, and 1 kHz bandwidth	115 s
	201 points, and 100 Hz bandwidth	210 s
Nominal input level range		-45 dBm to +20 dBm
Damage level	R&S®ZV-Z52	+23 dBm
	R&S®ZV-Z53	+23 dBm
	R&S®ZV-Z54	+20 dBm
	R&S®ZV-Z55	+20 dBm
	R&S®ZV-Z58	+23 dBm
	R&S®ZV-Z59	+23 dBm
Damage DC voltage	R&S®ZV-Z52	12 V
	R&S®ZV-Z53	12 V
	R&S®ZV-Z54	0 V
	R&S®ZV-Z55	0 V
	R&S®ZV-Z58	12 V
	R&S®ZV-Z59	12 V

## Effective system data of the R&S®ZV-Z52 (model 30)

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 700 MHz	> 36 dB
	700 MHz to 8 GHz	> 40 dB
	8 GHz to 20 GHz	> 36 dB
	20 GHz to 24 GHz	> 32 dB
Source match	10 MHz to 700 MHz	> 30 dB
	700 MHz to 8 GHz	> 36 dB
	8 GHz to 18 GHz	> 30 dB
	18 GHz to 24 GHz	> 26 dB
Reflection tracking	10 MHz to 700 MHz	< 0.2 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 24 GHz	< 0.15 dB
Load match	10 MHz to 700 MHz	> 36 dB
	700 MHz to 8 GHz	> 40 dB
	8 GHz to 20 GHz	> 36 dB
	20 GHz to 24 GHz	> 32 dB
Transmission tracking	10 MHz to 700 MHz	< 0.2 dB
	700 MHz to 24 GHz	< 0.15 dB

## Effective system data of the R&S®ZV-Z52 (model 70)

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	100 kHz to 10 MHz	> 36 dB
	10 MHz to 8 GHz	> 40 dB
	8 GHz to 18 GHz	> 36 dB
Source match	100 kHz to 10 MHz	> 30 dB
	10 MHz to 8 GHz	> 36 dB
	8 GHz to 18 GHz	> 30 dB
Reflection tracking	100 kHz to 10 MHz	< 0.2 dB
	10 MHz to 8 GHz	< 0.1 dB
	8 GHz to 18 GHz	< 0.15 dB
Load match	100 kHz to 10 MHz	> 36 dB
	10 MHz to 8 GHz	> 40 dB
	8 GHz to 18 GHz	> 36 dB
Transmission tracking	100 kHz to 10 MHz	< 0.2 dB
	10 MHz to 8 GHz	< 0.1 dB
	8 GHz to 18 GHz	< 0.15 dB



## Effective system data of the R&S®ZV-Z53 (50 Ω)

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 10 MHz	> 40 dB
	10 MHz to 4 GHz	> 46 dB
	4 GHz to 8 GHz	> 40 dB
	8 GHz to 18 GHz	> 36 dB
	18 GHz to 20 GHz (3.5 mm only)	> 36 dB
	20 GHz to 24 GHz (3.5 mm only)	> 32 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
	8 GHz to 18 GHz	> 30 dB
	18 GHz to 24 GHz (3.5 mm only)	> 26 dB
Reflection tracking	300 kHz to 10 MHz	< 0.1 dB
	10 MHz to 4 GHz	< 0.04 dB
	4 GHz to 8 GHz	< 0.1 dB
	8 GHz to 18 GHz	< 0.3 dB
	18 GHz to 24 GHz (3.5 mm only)	< 0.3 dB
Load match	300 kHz to 10 MHz	> 40 dB
	10 MHz to 4 GHz	> 46 dB
	4 GHz to 8 GHz	> 40 dB
	8 GHz to 18 GHz	> 36 dB
	18 GHz to 20 GHz (3.5 mm only)	> 36 dB
	20 GHz to 24 GHz (3.5 mm only)	> 32 dB

Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 4 GHz	< 0.06 dB
	4 GHz to 8 GHz	< 0.1 dB
	8 GHz to 18 GHz	< 0.3 dB
	18 GHz to 24 GHz (3.5 mm only)	< 0.3 dB

## Effective system data of the R&S®ZV-Z53 (75 Ω)

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 10 MHz	> 36 dB
	10 MHz to 3 GHz	> 40 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 3 GHz	> 33 dB
Reflection tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 3 GHz	< 0.1 dB
Load match	300 kHz to 10 MHz	> 33 dB
	10 MHz to 3 GHz	> 36 dB
Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 3 GHz	< 0.1 dB

## Effective system data of the R&S®ZV-Z54

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
Source match	10 MHz to 700 MHz	> 30 dB
	700 MHz to 20 GHz	> 34 dB
	20 GHz to 40 GHz	> 30 dB
Reflection tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB
Load match	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
Transmission tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB

## Effective system data of the R&S®ZV-Z55

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
	40 GHz to 50 GHz	> 26 dB
Source match	10 MHz to 700 MHz	> 30 dB
	700 MHz to 20 GHz	> 34 dB
	20 GHz to 40 GHz	> 30 dB
	40 GHz to 50 GHz	> 26 dB
Reflection tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB
	40 GHz to 50 GHz	< 0.2 dB
Load match	10 MHz to 20 GHz	> 36 dB
	20 GHz to 40 GHz	> 30 dB
	40 GHz to 50 GHz	> 26 dB
Transmission tracking	10 MHz to 700 MHz	< 0.15 dB
	700 MHz to 8 GHz	< 0.1 dB
	8 GHz to 40 GHz	< 0.15 dB
	40 GHz to 50 GHz	< 0.2 dB

## Effective system data of the R&S®ZV-Z58

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	300 kHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
Source match	300 kHz to 10 MHz	> 23 dB
	10 MHz to 4 GHz	> 36 dB
	4 GHz to 8 GHz	> 32 dB
Reflection tracking	300 kHz to 4 GHz	< 0.1 dB
	4 GHz to 8 GHz	< 0.2 dB
Load match	300 kHz to 4 GHz	> 40 dB
	4 GHz to 8 GHz	> 36 dB
Transmission tracking	300 kHz to 10 MHz	< 0.2 dB
	10 MHz to 4 GHz	< 0.15 dB
	4 GHz to 8 GHz	< 0.3 dB

## Effective system data of the R&S®ZV-Z59

This data is valid between +18 °C and +28 °C, at a measurement bandwidth of 10 Hz, and a nominal power of –10 dBm at the calibration ports.

Directivity	10 MHz to 700 MHz for the R&S®ZVT8	> 34 dB
	10 MHz to 700 MHz for the R&S®ZVT20	> 34 dB
	700 MHz to 8 GHz	> 38 dB
	8 GHz to 20 GHz	> 32 dB
Source match	10 MHz to 700 MHz for the R&S®ZVT8	> 28 dB
	10 MHz to 700 MHz for the R&S®ZVT20	> 28 dB
	700 MHz to 8 GHz	> 34 dB
	8 GHz to 20 GHz	> 28 dB
Reflection tracking	10 MHz to 700 MHz for the R&S®ZVT8	< 0.3 dB
	10 MHz to 700 MHz for the R&S®ZVT20	< 0.3 dB
	700 MHz to 8 GHz	< 0.2 dB
	8 GHz to 20 GHz	< 0.3 dB
Load match	10 MHz to 700 MHz	> 34 dB
	700 MHz to 8 GHz	> 38 dB
	8 GHz to 20 GHz	> 34 dB
Transmission tracking	10 MHz to 700 MHz	< 0.3 dB
	700 MHz to 8 GHz	< 0.2 dB
	8 GHz to 20 GHz	< 0.3 dB

## USB connector

USB	universal serial bus connector (type B) for connecting the calibration unit with a vector network analyzer of the R&S®ZVA/B family, e.g. the R&S®ZVB8
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## General data

Temperature loading	operating temperature range	+5 °C to +40 °C
	permissible temperature range	0 °C to +50 °C
	storage temperature range	−40 °C to +70 °C
Damp heat		in line with IEC 60068-2-1 and IEC 60068-2-2
Mechanical resistance	vibration test, sinusoidal	+40 °C at 85 % rel. humidity 5 Hz to 150 Hz, in line with IEC 60068-2-6
	vibration test, random	10 Hz to 300 Hz, in line with IEC 60068-2-64
	shock test	40 g shock spectrum, in line with IEC 60068-2-27, MIL-STD-810
Calibration interval		1 year
EMC, RF emission	In line with EN 61000-6-4, operation in residential, commercial, and business areas or in small-size companies is not covered. Thus, the instrument may not be operated in residential, commercial, and business areas or in small-size companies unless additional measures are taken to ensure that EN 61000-6-3 is complied with.	in line with CISPR 11/EN 55011 group 1 class A (for a shielded test setup) The instrument complies with the emission requirements stipulated by EN 55011 class A. This means that the instrument is suitable for use in industrial environments.
EMC, other emissions and immunity		in line with IEC/EN 61326; emission: class B; immunity: industrial environment (excluding operating frequency)
Safety		in line with IEC 61010-1, EN 61010-1, and UL 61010B-1, CSA C22.2 No. 61010.1



Power supply	R&S®ZV-Z52, R&S®ZV-Z53, R&S®ZV-Z54, R&S®ZV-Z55	5 V, 500 mA via universal serial bus (USB)
	R&S®ZV-Z58 and R&S®ZV-Z59	100 V to 240 V (AC) with tolerance $\pm 10\%$ , 50 Hz to 60 Hz with tolerance $\pm 5\%$ , safety class I in line with VDE 411
Power consumption	R&S®ZV-Z52, R&S®ZV-Z53, R&S®ZV-Z54, R&S®ZV-Z55	2.5 W
	R&S®ZV-Z58 and R&S®ZV-Z59	125 W, typ. 20 W
Dimensions (W x H x D)	R&S®ZV-Z52, R&S®ZV-Z53, R&S®ZV-Z54, R&S®ZV-Z55	121.0 mm x 56.0 mm x 155.0 mm (4.8 in x 2.2 in x 6.1 in)
	R&S®ZV-Z58 and R&S®ZV-Z59	465.1 mm x 108.4 mm x 350.0 mm (18.3 in x 4.3 in x 13.8 in)
Weight	R&S®ZV-Z52, R&S®ZV-Z53, R&S®ZV-Z54, R&S®ZV-Z55	750 g (1.7 lb)
	R&S®ZV-Z58 and R&S®ZV-Z59	5 kg (11 lb)
Shipping weight	R&S®ZV-Z52, R&S®ZV-Z53, R&S®ZV-Z54, R&S®ZV-Z55	3 kg (6.6 lb)
	R&S®ZV-Z58 and R&S®ZV-Z59	13 kg (29 lb)

## Ordering information

Designation	Type	Order No.
Calibration Unit, 10 MHz to 24 GHz, 4 ports, 3.5 mm (f)	R&S®ZV-Z52	1164.0521.30
Calibration Unit, 100 kHz to 18 GHz, 4 ports, type N (f)	R&S®ZV-Z52	1164.0521.70
Calibration Unit, 300 kHz to 3 GHz, 2 ports, type N (f), 75 Ω	R&S®ZV-Z53	1164.0473.75
Calibration Unit, 300 kHz to 18 GHz, 2 ports, type N (f)	R&S®ZV-Z53	1164.0473.72
Calibration Unit, 300 kHz to 24 GHz, 2 ports, 3.5 mm (f)	R&S®ZV-Z53	1164.0473.32
Calibration Unit, 10 MHz to 40 GHz, 2 ports, 2.92 mm (f)	R&S®ZV-Z54	1164.0467.92
Calibration Unit, 10 MHz to 50 GHz, 2 ports, 2.4 mm (f)	R&S®ZV-Z55	1164.0480.42
Calibration Unit, 300 kHz to 8 GHz, 8 ports, type N (f)	R&S®ZV-Z58	1164.0638.78
Calibration Unit, 300 kHz to 8 GHz, 8 ports, 3.5 mm (f)	R&S®ZV-Z58	1164.0638.38
Calibration Unit, 10 MHz to 20 GHz, 6 ports, 3.5 mm (f)	R&S®ZV-Z59	1164.0450.36

<b>Service options</b>		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

#### **Extended warranty with a term of one to four years (WE1 to WE4)**

Repairs carried out during the contract term are free of charge <sup>1</sup>. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

#### **Extended warranty with calibration (CW1 to CW4)**

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs <sup>1</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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<sup>1</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.