

### List of accredited calibrations

- All accredited calibrations are performed in accordance with the accredited norms/standards or Schwarzbeck's internal calibration procedures.
- Measurement results are traceable to national and international standards.
- The accreditation applies only to services explicitly listed in the laboratory's scope of accreditation.
- Calibration certificates are issued in accordance with the requirements of ISO/IEC 17025.
- Small repairs up to 20% of the designated calibration price will be performed at no additional cost without prior notice, unless otherwise instructed by the customer.
- If an item cannot be calibrated, no charges (except shipping costs) will apply.
- In case a device requires adjustment/repair to fulfil the specifications, we will document as-found data, then we will adjust/repair and finally record as-left data. If the adjustment cost is less than 20% of the designated calibration price, we do not bill anything for this adjustment/repair. Recording additional as-left data will be billed with an additional 50% of the designated calibration price.

#### Accredited calibration of antenna related measurements

Ref. number	Description	Examples
AC BIC 1ST SETUP	Accredited calibration of a biconical antenna. Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). First test distance: 1 m, reference point: center of the bicone antenna.	VHA 9103 B w. BBA 9106, UBAA 9114 w. BBUK 9139, VUBA 9117, SBA 9119, HK116, POD16, POD618, EMCO 9104C, 3109, VBA 6106A, SAS-540
AC LOG 1ST SETUP	Accredited calibration of a log.-per. Antenna (LPDA). Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). First test distance: 1 m, reference point: tip of the log.-per. antenna.	VULP 9118 A, USLP 9143, VUSLP 9111, HL223, HL040, EMCO 3148 B, 3144, 3147, UPA 6108, 6109, SAS-512
AC STLP 1ST SETUP	Accredited calibration of a stacked log.-per. antenna. Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). First test distance: 1 m, reference point: tip of the stacked log.-per. antenna.	STLP 9128 C, STLP 9128 D, STLP 9128 E, R&S@HL046E, STLP 9129
AC HYBR 1ST SETUP	Accredited calibration of a hybrid or Biconi-log or Logbicon antenna. Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). First test distance: 3 m, reference point: center of the hybrid antenna.	VULB 9168, VULB 9163, CBL 6111, 6112, 6141, R&S HL562, EMCO 3142, SAS-521
AC HORN 1ST SETUP	Accredited calibration of a horn antenna. Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). First test distance: 1 m, reference point: front plane of the horn antenna.	BBHA 9120 D, BBHA 9120 E, EMCO 3106, 3115, 3116, 3117, R&S HF907,

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AC ANT ADD SETUP	Additional setup for an accredited antenna calibration. Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). Further test distance: Commonly used distances are 1 m, 3 m, 5 m, 10 m. Common reference points are: tip or front plane or center of the antenna.	Any antenna as long as a 1st setup has been ordered
AC ROD	Accredited calibration of the antenna factor of an active rod antenna with the equivalent capacitance method (ECSM). (Distance not applicable for this method, rod and ground-plane not necessary for calibration!)	VAMP 9240, VAMP 9243, EMCO 3301, R&S HFH2-Z1, HFH2-Z6
AC LOG SPIR 1ST	Accredited calibration of a conical log.-spiral antenna. Quasi free space antenna factor and gain (gain only for information purposes, not under accreditation). First test distance: 1 m, reference point: tip of the log.-spiral antenna.	HLX 0810, CLSA 0110, EMCO 3101, 3102, 3103
AC 9125 D	Accredited calibration of gain (gain only for information purposes, not under accreditation) and antenna factor of a half wave dipole UHA 9125 D with 6 sets of fixed length elements. Settings for total element length LE and short: LE: 140 mm Short: Removed. LE: 114 mm, Short: Removed. LE: 90 mm Short: 45 mm. LE: 72 mm Short: 36 mm. LE: 60 mm Short: 30 mm. LE: 48 mm Short: 24 mm.	UHA 9125 D
AC DIPOLE	Accredited calibration of gain (gain only for information purposes, not under accreditation) and antenna factor of a half wave dipole with tuneable element length at 8 different frequencies, elements tuned and reported accordingly.	VHA 9103, VDA 6116A
AC VHAP/UHAP	Accredited calibration of gain (gain only for information purposes, not under accreditation) and antenna factor for a pair of 2 antennas measured in a calibration adapter, frequency range: 30-300 MHz or, 300-1000 MHz.	VHAP, UHAP, R&S HZ-12, HZ-13
AC EFS-HFS	Accredited calibration of the electric or magnetic antenna factor of a one dimensional electric or magnetic field probe in a Crawford cell.	EFS 9218, EFS 9221 Narda 3531, 3551, HFS 1546
AC 3DFS	Accredited calibration of the electric or magnetic antenna factor of a 3-dimensional electric or magnetic field probe in a Crawford cell.	FSH3D, Narda 3581
AC MAG LOOP RX	Accredited calibration of the magnetic antenna factor and the fictitious electric field antenna factor of an Rx loop.	FMZB 1516, HFH2-Z2, HLA 6120, EMCO 6502, FMZB 1519-60 D, FMZB 1513

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AC FESP RX	Accredited calibration of a monitor loop: The conversion factor from magnetic field strength to voltage across 50 Ohm is determined.	FESP 5133, FESP 5132, FESP 5134-40, FESP 5133-7/41, FESP 5133-F, F-304, F-305, 7605, 7606, HS 5136
AC FESP TX	Accredited calibration of a radiating loop: The conversion factor from current to magnetic field strength in a certain distance is determined.	FESP 5133, FESP 5132
AC HHS	Calculation of the conversion factor from current to magnetic field (coil factor) in the center of a square or circular pair of Helmholtz coils if the geometry is known. Additionally accredited measurement of the coil factor at DC.	HHS 5204-36, HHS 5204-12, HHS 5215, HHS 5218, 6402, 6404
AC RSAL RSAH	Accredited calibration of the rolling stock antenna RSAL 5340 (9 kHz - 2 MHz) or RSAH 5324 (9 kHz - 5 MHz).	RSAL 5340, RSAH 5324
AC HFCD HXYZ	Accredited calibration of the conversion factor in dBOhm of the transmission between a calibration dipole and a large 3 dimensional van Veen loop antenna in accordance with EN 55016-1-4 positions each for 3 perpendicular loops.	HXYZ 9170, HFCD 9171, HM020, HM020Z3, RF-300
AC DAF BIC	Accredited calibration of the dual antenna factor of a pair of biconical antennas in accordance with the 2-antenna-method. The sum of the antenna factors of the pair is determined and divided by 2. Test distance: 3 m between the centers of the biconical antennas. Quasi free space conditions.	A pair of VHBB 9124 with BBA 9106, a pair of HK116
AC DAF LOG	Accredited calibration of the dual antenna factor of a pair of log.-per.-antennas in accordance with the 2-antenna-method. The sum of the antenna factors of the pair is determined and divided by 2. Test distance: 3 m between the centers of the log.-per.-antennas. Quasi free space conditions.	A pair of VULP 9118 A, a pair of VUSLP 9111 B
AC SITE REF	Accredited calibration of the site reference based on the antenna combination of a small biconical antenna as Tx and a hybrid antenna as Rx antenna 30-1000 MHz in a distance of 3 m from the center of the hybrid antenna for validation of a fully anechoic chamber in accordance with CISPR 16-1-4.	UBAA 9114 or UBAA 9115 w. elements BBUK 9139 with VULB 9168 or VULB 9163 or CBL 6111 or EMCO 3142 or HL562
AC 420 NJ	Accredited Calibration of the SWR at the antenna connector of SBA 9113 with 420 NJ elements in accordance with Ford test method RI115.	SBA 9113 with 420 NJ
AC 422 NJ	Accredited Calibration of the SWR at the antenna connector of SBA 9119 with 422 NJ elements.	SBA 9119 with 422 NJ
AC BALANCE	Accredited calibration of the inversion	VHA 9103 B with BBA 9106, Frankonia BTA-

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	symmetry of an antenna also referred to as “Balun Imbalance” in accordance with CISPR 16-1-6.	H, VULB 9168, R&S®HK116E
AC CROSS POLAR	Accredited calibration of the cross polarisation response of a linear polarised antenna 30 MHz – 18 GHz.	VULB 9168, VUSLP 9111 B, BBHA 9120 D
AC PATTERN 9112	Accredited calibration of the directional pattern of the SBA 9112 in H-plane and in E-plane in 1 degree steps every 1 GHz from 3 to 18 GHz (16 frequencies). Data presentation as described in CISPR 16-1-4.	SBA 9112, POD 618
AC PATTERN 9119	Accredited calibration of the directional pattern of the SBA 9119 in H-plane and in E-plane in 5 degree steps every 1 GHz from 1 to 6 GHz (6 frequencies). Data presentation as described in CISPR 16-1-4.	SBA 9119, POD 16
AC PATTERN	Accredited calibration of the directional pattern of an antenna in E-plane and H-plane at a sufficient number of frequencies. Frequency list will be appointed with customer in advance.	
AC VSWR	Accredited calibration of the VSWR at the antenna connector.	All antennas and many other devices

#### Accredited calibration of LISN, ISN, CDN, CDNE, voltage probes, impedance converters

Ref. number	Description	Examples
AC LISN CISPR 16-1-2	Accredited calibration of the magnitude and phase of the impedance at EUT terminals (coaxial output terminated with 50 Ohm) and calibration of the transmission from the EUT terminals to coaxial output and of the isolation between mains terminals and EUT terminals or coaxial output respectively in accordance with EN 55016-1-2.	NSLK 8117, NSLK 8127, NNLK 8121, NNLK 8140, R&S® ENV216, R&S®ENV4200, Narda PMM L2-16B
AC LISN ARTHAND	Accredited calibration of the values of R and C of an artificial hand of a LISN	NSLK 8126
AC LISN CISPR 25	Accredited calibration of the magnitude of the impedance at EUT terminals (coaxial output terminated with 50 Ohm) and the transmission from the EUT terminals to coaxial output in accordance with EN 55016-1-2.	NNBM 8125, NNBM 8124-BNC, NNBM 8124-N
AC LISN MIL461	Accredited calibration of the magnitude of the impedance at EUT terminals (coaxial output terminated with 50 Ohm) and the transmission from the EUT terminals to coaxial output in accordance with MIL-STD-461H.	NNBL 8226, LI-3P-416
AC LISN DO-160	Accredited calibration of the magnitude of the impedance in accordance with DO-160 (output terminated in 50 Ohm and 10 µF across mains terminals) Frequency range 10 kHz – 400 MHz	NNBM 8124, NNBM DO160-1500, LI-3100
AC TEMPEST LISN	Accredited calibration of the impedance at EUT N jack (output terminated with 50	TEMP 8400

Ref. number	Description	Examples
	Ohm) and VSWR at EUT N jack and of the decoupling between EUT and generator terminals AE (50-Ohm system) and the transmission EUT N jack to Output N jack.	
AC ECSS LISN	Accredited calibration of the magnitude of the impedance between terminals or from terminal to ground.	ECSS LISN 2
AC PVDC	Accredited calibration of magnitude and phase of the common mode impedance and the differential mode impedance at EUT terminals (BNC terminated with 50 Ohm), voltage division factor in mode A/B, CM, DM with a short or open applied respectively at the AE side, decoupling between EUT and AE in a 50-Ohm system (CM) or a 150-Ohm system (DM) respectively. Decoupling between EUT and generator terminals AE (50-Ohm system for CM and 150-Ohm system for DM)	PVDC 8301
AC VHFL	Accredited calibration of the magnitude and phase of the impedance at EUT terminals and of the decoupling between any mains input and any output.	VHFB 8801, VHFU 8802
AC 8158	Accredited calibration of an ISN: Voltage division factor EUT – BNC, magnitude of the impedance at EUT-terminals, phase of the impedance at EUT-terminals, decoupling AE-EUT, LCL at EUT-terminals	NTFM 8158, CAT5 8158, CAT3 8158, NTFM 8131 A
AC ISN S	Accredited calibration of an ISN with shielded connector: Voltage division factor, impedance (magnitude and phase in accordance with IEC 61000-4-6 and CISPR 16-1-2), transmission bandwidth.	ISN S8, ISN S1, CDN ISN S8 RJ45, CDN S9
AC PILOT	Accredited calibration of a Pilot ISN: impedance (magnitude in accordance with IEC 61851-21-1)	Pilot ISN
AC CDN	Accredited calibration of a CDN: Voltage division factor, magnitude of common mode impedance with AE shorted and open in accordance with IEC 61000-4-6.	CDN M2/M3PE 16A, Lüthi, Com-Power, Teseq or EM-Test CDNs
AC CDNE	Accredited calibration of a CDNE for emission measurement: Voltage division factor, magnitude and phase of common mode impedance with AE shorted and open in accordance with EN 55016-1-2.	CDNE M2 CDNE M3
AC TK	Accredited calibration of the voltage division factor of a voltage probe for conducted disturbance voltage measurements. If a divider is additionally supplied the VDF for the divider will also be recorded. Standard: CISPR 16-1-2.	TK 9420, SHC, ESH2-Z3
AC CVP	Accredited calibration of a capacitive voltage probe. Measurands: Voltage division factor for 8mm-conductor, VSWR at output,	CVP 9222, CVP 2200

Ref. number	Description	Examples
	shielding voltage division factor in accordance with CISPR 16-1-2.	
AC VHIC	Accredited calibration of an antenna impedance converter in accordance with CISPR 25 using a dummy antenna. Measurands: Transmission $S_{21}$ with artificial antenna and transmission with forced impedance matching at input.	VHIC 9260, R&S EZ-12

#### Accredited calibration of ferrite devices, current clamps, absorbing clamps

Ref. number	Description	Examples
AC SW	Accredited calibration of the transfer impedance $Z_T$ in dBOhm.	SW 9602, SW 9605, F-33-2, EZ-17, SW 9601 A2, SW 9600 B2, 91550
AC CMAD	Accredited calibration of common mode absorbing device: Measurement of $S_{11}$ in accordance with CISPR 16-1-4 Section 8.5 ("TRL Method") and $S_{21}$ in accordance with CISPR 16-1-4 Section 8.6 ("Degradation method").	CMAD 1614, Teseq CMAD20A, CMAD 20B
AC MDS JIG	Accredited calibration of the insertion loss in accordance with CISPR 16-1-3 Ed. 2.0 in large jig with secondary absorbing device and calculation of the Clamp Factor $C_{orig}$ , which is finally needed for correction purposes during disturbance power measurements. Please send the MDS 21, the coaxial cable and the 6 dB attenuator. The attenuation of cable and attenuator will then be taken into account.	MDS 21, MDS 21 B, MDS 21 C
AC MDS ORIG	Accredited calibration of $A_{orig}$ and decoupling DF and DR of the clamp in a calibration site in accordance with DIN EN 55016-1-3 (VDE 0876-16-1-3), EN 55016-1-3. Furthermore the clamp factor $C_{orig}$ finally required for correction is computed: $C_{orig} = A_{orig} - 17$ dB. Please send the MDS 21, the coaxial cable and the 6 dB attenuator. The attenuation of cable and attenuator will then be taken into account.	MDS 21, MDS 21 B, MDS 21 C, Kyoritsu KT-10, AMZ 41A
AC EM 101	Accredited calibration of an injection clamp in accordance with IEC/EN 61000-4-6: Measurand: Coupling factor in 150 $\Omega$ system according A.2.2.3 from injection port to EUT port	EMCL 6146, EM 101, F-2031, KEMZ 801
AC FTC 101	Accredited calibration of a decoupling clamp for IEC/EN 61000-4-6: Decoupling factor in the 50-Ohm system.	FTC-101, FTC 101 C

**Accredited calibration of Impedance Z, Resistance R, Inductance L and Capacitance C**

Ref. number	Description	Examples
AC SHUNT	Accredited calibration of the impedance of a shunt resistor.	SHUNT 9571, NFCN 9734
AC RLC 1ST SETUP	Calibration of the Resistance or Inductance or capacitance of a circuitry at first frequency.	SCA-10nF, Genrad 1482 series
AC RLC ADD SETUP	Any additional setup of RLC-measurement e.g. for different frequency or equivalent circuit diagram.	SCA-10nF, Genrad 1482 series

**Accredited calibration of cables, attenuators, pulse limiters, preamplifiers, spectrum generators, directional couplers.**

Ref. number	Description	Examples
AC ATT	Accredited calibration of the attenuation of a coaxial cable, attenuator, pulse limiter or similar.	AK 9513, AK 9515 G, Sucoflex 104, RG223, DGA 9552 N, DGA 9553 BNC, VTSD 9561 F, PL-01, ESH3-Z2
AC DIRCOUP	Accredited calibration of a directional coupler, coupling factor, directivity, loss, VSWR.	RFDC1M06G10, C20-0R518
AC BBV	Accredited calibration of a broadband preamplifier: Measurands: gain and VSWR at input and output.	BBV 9742, BBV 9718, PAM-0118, TS-PR1, TS-PR3, TS-PR7