Schweizerische Eidgenossenschaft
Confédération suisse
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Federal Department of Economic Affairs,
Education and Research EAER

State Secretariat for Economic Affairs SECO
Swiss Accreditation Service SAS

SCS-Directory

Accreditation number: SCS 0058

International standard: ISO/IEC 17025:2017

Swiss standard: SN EN ISO/IEC 17025:2018

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Initial accreditation: 06.12.1995

Current accreditation: 14.03.2021 to 13.03.2026

Scope of accreditation see: www.sas.admin.ch
(Accredited bodies)

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Scope of accreditation as of 19.12.2024

Calibration laboratory for electrical quantities, fiber optics, pressure, temperature, magnetic and electric fields

Calibration and Measurement Capability (CMC)

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
DC Voltage				
Calibration of voltage measurement instruments	0 mV ... < 220 mV		$7{,}2 \cdot 10^{-6}\ U + 0{,}6\ \mu V$	Also possible in the branches and on site [2]
	220 mV ... < 2,2 V		$3{,}5 \cdot 10^{-6}\ U + 1{,}6\ \mu V$	U = Measurement value
	2,2 V ... < 22 V		$2{,}6 \cdot 10^{-6}\ U + 7\ \mu V$	
	22 V ... < 220 V		$3{,}5 \cdot 10^{-6}\ U + 120\ \mu V$	
	220 V ... 1100 V		$4 \cdot 10^{-6}\ U + 700\ \mu V$	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
Calibration of voltage calibrators	0 mV … < 120 mV		$6.6 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	Also possible in the branches and on site [2]
	120 mV ... < 1,2 V		$2 \cdot 10^{-6}\ U + 0{,}2\ \mu V$	
	1,2 V ... < 12 V		$2 \cdot 10^{-6}\ U + 1\ \mu V$	
	12 V ... < 120 V		$2 \cdot 10^{-6}\ U + 14\ \mu V$	
	120 V ... 1050 V		$3 \cdot 10^{-6}\ U + 200\ \mu V$	
Fixed voltages	100 mV		$6{,}5 \cdot 10^{-6}\ U$	
	1 V; 10 V; 100 V; 1000V		$2 \cdot 10^{-6}\ U$	
High voltage				
Calibration of high voltage generators	1 kV ... ≤ 10 kV	$R_L \geq 110\ M\Omega$	0,05 % + 0,11 V	Also possible in Fehraltdorf and on site [3]
	> 10 kV … 20 kV	$R_L \geq 200\ M\Omega$	0,06 % + 1,3 V	
	> 20 kV … 35 kV	$R_L \geq 200\ M\Omega$	0,12 % + 3,0 V	
	> 35 kV … 50 kV	$R_L \geq 760\ M\Omega$	1,2 % + 6,5 V	
Calibration of voltage measurement instruments	1 kV ... ≤ 10 kV		0,05 % + 0,13 V	Also possible in Fehraltdorf and on site [4]
	> 10 kV …20 kV		0,06 % + 1,4 V	
	> 20 kV …35 kV		0,12 % + 3,1 V	
	> 35 kV …50 kV		1,2 % + 6,6 V	
DC Current				
Calibration of ammeters	0 µA ... 12 µA		$16 \cdot 10^{-6}\ I + 0{,}2\ nA$	Also possible in the branches and on site [2] I = Measurement value
	> 12 µA ... 120 µA		$16 \cdot 10^{-6}\ I + 0{,}5\ nA$	
	> 120 µA ... 1,2 mA		$16 \cdot 10^{-6}\ I + 4{,}5\ nA$	
	> 1,2 mA ... 12 mA		$16 \cdot 10^{-6}\ I + 41\ nA$	
	> 12 mA ... 120 mA		$16 \cdot 10^{-6}\ I + 0{,}5\ \mu A$	
	> 120 mA ... 2 A		$17 \cdot 10^{-6}\ I + 4{,}5\ \mu A$	
	> 2 A ... 20 A		$68 \cdot 10^{-6}\ I + 43\ \mu A$	
	> 20 A ... 100 A		$73 \cdot 10^{-6}\ I + 130\ \mu A$	
Calibration of current clamps	> 100 A … 500 A	With current coil	$5{,}8 \cdot 10^{-3}\ I + 26\ mA$	
	> 500 A … 2500 A		$5{,}8 \cdot 10^{-3}\ I + 160\ mA$	
Calibration of current calibrators	0 µA ... 12 µA		$16 \cdot 10^{-6}\ I + 0{,}11\ nA$	Also possible in the branches and on site [2]
	> 12 µA ... 120 µA		$16 \cdot 10^{-6}\ I + 0{,}4\ nA$	
	> 120 µA ... 1,2 mA		$16 \cdot 10^{-6}\ I + 3{,}6\ nA$	
	> 1,2 mA ... 12 mA		$16 \cdot 10^{-6}\ I + 35\ nA$	

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	> 12 mA ... 120 mA		$16 \cdot 10^{-6}\ I + 350$ nA	
	> 120 mA ... 2 A		$17 \cdot 10^{-6}\ I + 3{,}7$ µA	
	> 2 A ... 20 A		$68 \cdot 10^{-6}\ I + 36$ µA	
	> 20 A ... 100 A		$73 \cdot 10^{-6}\ I + 40$ µA	
DC Resistance				
Calibration of resistance measurement instruments	100 µΩ		$70 \cdot 10^{-6}\ R$	The measurement uncertainties indicated apply to decadic values
	1 mΩ		$45 \cdot 10^{-6}\ R$	
	10 mΩ; 100 mΩ		$45 \cdot 10^{-6}\ R$	
With fixed resistors	1 Ω; 10 Ω		$10 \cdot 10^{-6}\ R$	Also possible in the branches and on site [2),5)]
	100 Ω; 1 kΩ		$8 \cdot 10^{-6}\ R$	
	10 kΩ		$5 \cdot 10^{-6}\ R$	
	19 kΩ; 100 kΩ		$8 \cdot 10^{-6}\ R$	
	1 MΩ		$10 \cdot 10^{-6}\ R$	
	10 MΩ		$12 \cdot 10^{-6}\ R$	
	100 MΩ		$40 \cdot 10^{-6}\ R$	
	1 GΩ		$250 \cdot 10^{-6}\ R$	
	10 GΩ		$520 \cdot 10^{-6}\ R$	
	100 GΩ		$750 \cdot 10^{-6}\ R$	
	1 TΩ		$5 \cdot 10^{-3}\ R$	
	10 TΩ		$8 \cdot 10^{-3}\ R$	
	100 TΩ		$16 \cdot 10^{-3}\ R$	
With precision resistance decades	10 mΩ ... 10 Ω		$47 \cdot 10^{-6}\ R$ + 0,82 mΩ	Also possible in the branches and on site [2) 5)]
	> 10 Ω ... 1 kΩ		$38 \cdot 10^{-6}\ R$ + 1,3 mΩ	
	> 1 kΩ ... 10 kΩ		$29 \cdot 10^{-6}\ R$ + 6 mΩ	
	> 10 kΩ ... 100 kΩ		$28 \cdot 10^{-6}\ R$ + 58 mΩ	
	> 100 kΩ ... 1 MΩ		$33 \cdot 10^{-6}\ R$ + 2,3 Ω	
	> 1 MΩ ... 10 MΩ		$150 \cdot 10^{-6}\ R$ + 116 Ω	
	> 10 MΩ ... 100 MΩ		$600 \cdot 10^{-6}\ R$ + 1,2 kΩ	
	> 100 MΩ ... 1 GΩ		$1{,}4 \cdot 10^{-3}\ R$	
	> 1 GΩ ... 10 GΩ		$2{,}6 \cdot 10^{-3}\ R$	

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
	> 10 GΩ ... 100 GΩ		$6 \cdot 10^{-3}\ R$	
	> 100 GΩ ... 1 TΩ		$9 \cdot 10^{-3}\ R$	
Calibration of resistances	100 µΩ ... < 500 µΩ		$100 \cdot 10^{-6}\ R$	Also possible in the branches and on site [5]
	500 µΩ ... < 5 mΩ		$75 \cdot 10^{-6}\ R$	
	5 mΩ ... < 50 mΩ		$72 \cdot 10^{-6}\ R$	
	50 mΩ ... < 500 mΩ		$44 \cdot 10^{-6}\ R$	
	500 mΩ ... < 5 Ω		$10 \cdot 10^{-6}\ R$	
	5 Ω ... < 50 Ω		$10 \cdot 10^{-6}\ R$	
	50 Ω ... < 500 Ω		$10 \cdot 10^{-6}\ R$	
	500 Ω ... < 5 kΩ		$10 \cdot 10^{-6}\ R$	
	5 kΩ ... < 50 kΩ		$5{,}5 \cdot 10^{-6}\ R$	
	50 kΩ ... < 500 kΩ		$7{,}5 \cdot 10^{-6}\ R$	
	500 kΩ ... < 5 MΩ		$15 \cdot 10^{-6}\ R$	
	5 MΩ ... < 50 MΩ		$60 \cdot 10^{-6}\ R$	
	50 MΩ ... < 500 MΩ		$480 \cdot 10^{-6}\ R$	
	500 MΩ ... < 5 GΩ		$600 \cdot 10^{-6}\ R$	
	5 GΩ ... < 50 GΩ		$850 \cdot 10^{-6}\ R$	
	50 GΩ ... < 500 GΩ		$1{,}65 \cdot 10^{-3}\ R$	
	500 GΩ ... < 5 TΩ		$6{,}8 \cdot 10^{-3}\ R$	
	5 TΩ ... < 50 TΩ		$9{,}2 \cdot 10^{-3}\ R$	
	50 TΩ ... 200 TΩ		$1{,}85 \cdot 10^{-2}\ R$	
DC Power		40 V … 480 V		
Calibration of power generators	2,4 W … 96 W	60 mA … < 200 mA	0,58 %	
	> 8 W … 240 W	200 mA … 500 mA	0,35 %	
	> 20 W … 960 W	> 500 mA … 2 A	0,11 %	
	> 80 W … 7,68 kW	> 2 A … 16 A	0,58 %	
		40 V … 300 V		
	> 640 W … 6 kW	> 16 A … 20 A	0,58 %	
	> 800 W … 30 kW	20 A … 100 A	0,11 %	
Calibration of power analyzers		0,1 V … 1000 V		Also possible in the branches and on site [2]
	330 µW … 200 W	3,3 mA … 200 mA	0,58 %	

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SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
	> 20 mW … 500 W	> 200 mA … 500 mA	0,35 %	
	> 50 mW … 2 kW	> 500 mA … 2 A	0,12 %	
	> 200 mW … 20 kW	> 2 A … 20 A	0,59 %	
		40 V … 300 V		
	> 800 W … 30 kW	> 20 A … 100 A	0,11 %	
Calibration of power meter clamps		0,1 V … 1000 V		With current coil
	330 µW … <33 mW	3,3 mA … 1000 A	0,91 %	
	33 mW … <110 mW		0,78 %	Also possible in the branches and on site [2)]
	110 mW … 100 kW		0,61 %	
	> 100 kW … 1 MW		0,83 %	
AV Voltage				
Calibration of voltage calibrators	10 mV ... < 22 mV	10 Hz	$954 \cdot 10^{-6}\ U + 0{,}2\ \mu V$	Also possible in the branches and on site [2)]
		20 Hz; 40 Hz	$895 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	U = Measurement value
		500 Hz; 1 kHz; 10 kHz;	$893 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	
		20 kHz; 50 kHz; 100 kHz	$470 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	
		200 kHz	$951 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	
		500 kHz	$1{,}3 \cdot 10^{-3}\ U + 0{,}1\ \mu V$	
		700 kHz	$1{,}5 \cdot 10^{-3}\ U + 0{,}2\ \mu V$	
		1 MHz	$1{,}5 \cdot 10^{-3}\ U + 0{,}2\ \mu V$	
	22 mV ... < 70 mV	10 Hz	$825 \cdot 10^{-6}\ U + 0{,}8\ \mu V$	
		20 Hz	$696 \cdot 10^{-6}\ U + 0{,}3\ \mu V$	
		40 Hz; 500 Hz; 1 kHz; 10 kHz	$680 \cdot 10^{-6}\ U + 0{,}2\ \mu V$	
		20 kHz; 50 kHz	$702 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	
		100 kHz	$754 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	
		300 kHz	$812 \cdot 10^{-6}\ U + 0{,}2\ \mu V$	
		500 kHz	$870 \cdot 10^{-6}\ U + 0{,}1\ \mu V$	
		700 kHz	$1{,}2 \cdot 10^{-3}\ U + 0{,}2\ \mu V$	
		1 MHz	$1{,}8 \cdot 10^{-3}\ U + 0{,}2\ \mu V$	
	70 mV ... < 220 mV	10 Hz	$150 \cdot 10^{-6}\ U + 2\ \mu V$	
		20 Hz	$150 \cdot 10^{-6}\ U + 1\ \mu V$	

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
		40 Hz	$100 \cdot 10^{-6}$ *U*+ 0,3 µV	
		500 Hz; 1 kHz; 10 kHz; 20 kHz	$80 \cdot 10^{-6}$ *U*+ 0,3 µV	
		50 kHz	$100 \cdot 10^{-6}$ *U*+ 0,2 µV	
		100 kHz	$155 \cdot 10^{-6}$ *U*+ 0,2 µV	
		200 kHz	$212 \cdot 10^{-6}$ *U*+ 0,1 µV	
		500 kHz; 700 kHz	$295 \cdot 10^{-6}$ *U*+ 0,2 µV	
		1 MHz	$443 \cdot 10^{-6}$ *U*+ 0,2 µV	
	220 mV ... < 700 mV	10 Hz	$147 \cdot 10^{-6}$ *U*+ 8 µV	
		20 Hz	$85 \cdot 10^{-6}$ *U*+ 3 µV	
		40 Hz	$63 \cdot 10^{-6}$ *U*+ 2 µV	
		500 Hz; 1 kHz; 10 kHz	$38 \cdot 10^{-6}$ *U*+ 2 µV	
		20 kHz;50 kHz; 100 kHz	$51 \cdot 10^{-6}$ *U*+ 1 µV	
		200 kHz	$66 \cdot 10^{-6}$ *U*+ 1 µV	
		500 kHz	$235 \cdot 10^{-6}$ *U*+ 1 µV	
		700 kHz	$442 \cdot 10^{-6}$ *U*+ 1 µV	
		1 MHz	$638 \cdot 10^{-6}$ *U*+ 1 µV	
	700 mV ... < 2,2 V	10 Hz	$94 \cdot 10^{-6}$ *U*+ 25 µV	
		20 Hz	$28 \cdot 10^{-6}$ *U* + 10 µV	
		40 Hz; 500 Hz; 1 kHz; 10 kHz; 20 kHz	$28 \cdot 10^{-6}$ *U*+ 3 µV	
		50 kHz	$30 \cdot 10^{-6}$ *U*+ 1 µV	
		100 kHz	$40 \cdot 10^{-6}$ *U* + 2 µV	
		200 kHz	$50 \cdot 10^{-6}$ *U* + 2 µV	
		500 kHz	$120 \cdot 10^{-6}$ *U* + 1 µV	
		700 kHz	$234 \cdot 10^{-6}$ *U* + 2 µV	
		1 MHz	$453 \cdot 10^{-6}$ *U* + 2 µV	
	2,2 V ... < 7 V	10 Hz	$163 \cdot 10^{-6}$ *U* + 42 µV	
		20 Hz	$49 \cdot 10^{-6}$ *U* + 28 µV	
		40 Hz	$28 \cdot 10^{-6}$ *U* + 13 µV	
		500 Hz; 1 kHz; 10 kHz	$22 \cdot 10^{-6}$ *U* + 14 µV	

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
		20 kHz	$27 \cdot 10^{-6}\ U + 10\ \mu V$	
		50 kHz; 100 kHz	$33 \cdot 10^{-6}\ U + 7\ \mu V$	
		200 kHz	$51 \cdot 10^{-6}\ U + 10\ \mu V$	
		500 kHz	$348 \cdot 10^{-6}\ U + 9\ \mu V$	
		700 kHz	$407 \cdot 10^{-6}\ U + 8\ \mu V$	
		1 MHz	$424 \cdot 10^{-6}\ U + 8\ \mu V$	
	7 V ... < 22 V	10 Hz	$153 \cdot 10^{-6}\ U + 291\ \mu V$	
		20 Hz	$62 \cdot 10^{-6}\ U + 73\ \mu V$	
		40 Hz	$40 \cdot 10^{-6}\ U + 21\ \mu V$	
		500 Hz	$28 \cdot 10^{-6}\ U + 29\ \mu V$	
		1 kHz; 10 kHz; 20 kHz	$28 \cdot 10^{-6}\ U + 15\ \mu V$	
		50 kHz	$33 \cdot 10^{-6}\ U + 17\ \mu V$	
		100 kHz	$47 \cdot 10^{-6}\ U + 12\ \mu V$	
		200 kHz	$68 \cdot 10^{-6}\ U + 10\ \mu V$	
		500 kHz	$178 \cdot 10^{-6}\ U + 12\ \mu V$	
		700 kHz	$345 \cdot 10^{-6}\ U + 41\ \mu V$	
		1 MHz	$461 \cdot 10^{-6}\ U + 41\ \mu V$	
	22 V ... < 70 V	10 Hz	$112 \cdot 10^{-6}\ U + 0{,}7\ mV$	
		20 Hz	$62 \cdot 10^{-6}\ U + 257\ \mu V$	
		40 Hz	$56 \cdot 10^{-6}\ U + 181\ \mu V$	
		500 Hz	$52 \cdot 10^{-6}\ U + 111\ \mu V$	
		1 kHz	$52 \cdot 10^{-6}\ U + 138\ \mu V$	
		10 kHz; 20 kHz	$52 \cdot 10^{-6}\ U + 82\ \mu V$	
		50 kHz	$52 \cdot 10^{-6}\ U + 71\ \mu V$	
		100 kHz	$66 \cdot 10^{-6}\ U + 166\ \mu V$	
	70 V ... < 220 V	10 Hz	$152 \cdot 10^{-6}\ U + 2{,}1\ mV$	
		20 Hz	$68 \cdot 10^{-6}\ U + 473\ \mu V$	
		40 Hz	$68 \cdot 10^{-6}\ U + 195\ \mu V$	
		500 Hz; 1 kHz	$53 \cdot 10^{-6}\ U + 222\ \mu V$	
		10 kHz;20 kHz;50 kHz	$53 \cdot 10^{-6}\ U + 176\ \mu V$	

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
	220 V ... < 700 V	100 kHz	$68 \cdot 10^{-6}\ U$ + 601 µV	
		10 Hz	$171 \cdot 10^{-6}\ U$ + 580 µV	
		20 Hz	$92 \cdot 10^{-6}\ U$ + 580 µV	
		40 Hz	$72 \cdot 10^{-6}\ U$ + 580 µV	
		500 Hz	$55 \cdot 10^{-6}\ U$ + 860 µV	
		1 kHz	$55 \cdot 10^{-6}\ U$ + 750 µV	
		10 kHz	$55 \cdot 10^{-6}\ U$ + 580 µV	
		20 kHz	$65 \cdot 10^{-6}\ U$ + 580 µV	
		50 kHz	$75 \cdot 10^{-6}\ U$ + 580 µV	
		100 kHz	$235 \cdot 10^{-6}\ U$ + 580 µV	
	700 V ... 1050 V	10 Hz	$172 \cdot 10^{-6}\ U$ + 580 µV	
		20 Hz	$93 \cdot 10^{-6}\ U$ + 580 µV	
		40 Hz	$72 \cdot 10^{-6}\ U$ + 580 µV	
		500 Hz; 1 kHz;	$56 \cdot 10^{-6}\ U$ + 900 µV	
		10 kHz	$56 \cdot 10^{-6}\ U$ + 580 µV	
		20 kHz; 50 kHz	$76 \cdot 10^{-6}\ U$ + 580 µV	
		100 kHz	$235 \cdot 10^{-6}\ U$ + 580 µV	
AC Voltage				
Calibration of voltage measurement instruments	10 mV ... < 22 mV	10 Hz; 20 Hz	$842 \cdot 10^{-6}\ U$ + 5,8 µV	Also possible in the branches and on site [2]
		40 Hz; 500 Hz; 1 kHz; 10 kHz; 20 kHz; 50 kHz	$840 \cdot 10^{-6}\ U$ + 2,4 µV	
		100 kHz	$893 \cdot 10^{-6}\ U$ + 3,5 µV	
		200 kHz	$895 \cdot 10^{-6}\ U$ + 5,8 µV	
		500 kHz	$895 \cdot 10^{-6}\ U$ + 12 µV	
		700 kHz	$900 \cdot 10^{-6}\ U$ + 18 µV	
		1 MHz	$956 \cdot 10^{-6}\ U$ + 18 µV	
	22 mV ... < 70 mV	10 Hz	$217 \cdot 10^{-6}\ U$ + 24 µV	
		20 Hz	$136 \cdot 10^{-6}\ U$ + 18 µV	
		40 Hz	$101 \cdot 10^{-6}\ U$ + 2,4 µV	
		500 Hz; 1 kHz; 10 kHz; 20 kHz	$93 \cdot 10^{-6}\ U$ + 2,4 µV	

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		50 kHz; 100 kHz	$107 \cdot 10^{-6}\ U + 2{,}4\ \mu V$	
		200 kHz	$116 \cdot 10^{-6}\ U + 4{,}7\ \mu V$	
		500 kHz	$172 \cdot 10^{-6}\ U + 12\ \mu V$	
		700 kHz	$280 \cdot 10^{-6}\ U + 24\ \mu V$	
		1 MHz	$290 \cdot 10^{-6}\ U + 24\ \mu V$	
	70 mV ... < 220 mV	10 Hz	$183 \cdot 10^{-6}\ U + 24\ \mu V$	
		20 Hz	$110 \cdot 10^{-6}\ U + 18\ \mu V$	
		40 Hz; 500 Hz; 1 kHz; 10 kHz; 20 kHz; 50 kHz; 100 kHz	$60 \cdot 10^{-6}\ U + 2{,}4\ \mu V$	
		200 kHz	$63 \cdot 10^{-6}\ U + 4{,}7\ \mu V$	
		500 kHz	$136 \cdot 10^{-6}\ U + 12\ \mu V$	
		700 kHz; 1 MHz	$250 \cdot 10^{-6}\ U + 25\ \mu V$	
	220 mV ... < 700 mV	10 Hz	$178 \cdot 10^{-6}\ U + 25\ \mu V$	
		20 Hz	$100 \cdot 10^{-6}\ U + 18\ \mu V$	
		40 Hz	$41 \cdot 10^{-6}\ U + 6\ \mu V$	
		500 Hz; 1 kHz; 10 kHz	$27 \cdot 10^{-6}\ U + 6\ \mu V$	
		20 kHz; 50 kHz	$33 \cdot 10^{-6}\ U + 6\ \mu V$	
		100 kHz	$36 \cdot 10^{-6}\ U + 6\ \mu V$	
		200 kHz	$58 \cdot 10^{-6}\ U + 12\ \mu V$	
		500 kHz	$100 \cdot 10^{-6}\ U + 24\ \mu V$	
		700 kHz; 1 MHz	$192 \cdot 10^{-6}\ U + 58\ \mu V$	
	700 mV ... < 2,2 V	10 Hz	$175 \cdot 10^{-6}\ U + 35\ \mu V$	
		20 Hz	$96 \cdot 10^{-6}\ U + 20\ \mu V$	
		40 Hz; 500 Hz; 1 kHz	$26 \cdot 10^{-6}\ U + 6\ \mu V$	
		10 kHz; 20 kHz	$27 \cdot 10^{-6}\ U + 6\ \mu V$	
		50 kHz; 100 kHz	$33 \cdot 10^{-6}\ U + 7\ \mu V$	
		200 kHz	$45 \cdot 10^{-6}\ U + 12\ \mu V$	
		500 kHz	$90 \cdot 10^{-6}\ U + 24\ \mu V$	
		700 kHz; 1 MHz	$187 \cdot 10^{-6}\ U + 58\ \mu V$	
	2,2 V ... < 7 V	10 Hz	$176 \cdot 10^{-6}\ U + 48\ \mu V$	

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
		20 Hz	$96 \cdot 10^{-6}\ U + 33\ \mu V$	
		40 Hz	$27 \cdot 10^{-6}\ U + 16\ \mu V$	
		500 Hz; 1 kHz; 10 kHz; 20 kHz	$23 \cdot 10^{-6}\ U + 17\ \mu V$	
		50 kHz	$26 \cdot 10^{-6}\ U + 14\ \mu V$	
		100 kHz	$29 \cdot 10^{-6}\ U + 14\ \mu V$	
		200 kHz	$47 \cdot 10^{-6}\ U + 20\ \mu V$	
		500 kHz	$93 \cdot 10^{-6}\ U + 120\ \mu V$	
		700 kHz	$186 \cdot 10^{-6}\ U + 120\ \mu V$	
		1 MHz	$258 \cdot 10^{-6}\ U + 120\ \mu V$	
	7 V ... < 22 V	10 Hz	$178 \cdot 10^{-6}\ U + 300\ \mu V$	
		20 Hz	$98 \cdot 10^{-6}\ U + 76\ \mu V$	
		40 Hz	$34 \cdot 10^{-6}\ U + 23\ \mu V$	
		500 Hz	$27 \cdot 10^{-6}\ U + 31\ \mu V$	
		1 kHz; 10 kHz; 20 kHz	$27 \cdot 10^{-6}\ U + 20\ \mu V$	
		50 kHz	$29 \cdot 10^{-6}\ U + 21\ \mu V$	
		100 kHz	$38 \cdot 10^{-6}\ U + 17\ \mu V$	
		200 kHz	$64 \cdot 10^{-6}\ U + 20\ \mu V$	
		500 kHz	$222 \cdot 10^{-6}\ U + 120\ \mu V$	
		700 kHz; 1 MHz	$455 \cdot 10^{-6}\ U + 125\ \mu V$	
	22 V ... < 70 V	10 Hz	$184 \cdot 10^{-6}\ U + 740\ \mu V$	
		20 Hz	$105 \cdot 10^{-6}\ U + 310\ \mu V$	
		40 Hz	$48 \cdot 10^{-6}\ U + 204\ \mu V$	
		500 Hz	$37 \cdot 10^{-6}\ U + 145\ \mu V$	
		1 kHz	$37 \cdot 10^{-6}\ U + 167\ \mu V$	
		10 kHz; 20 kHz	$37 \cdot 10^{-6}\ U + 124\ \mu V$	
		50 kHz	$38 \cdot 10^{-6}\ U + 136\ \mu V$	
		100 kHz	$49 \cdot 10^{-6}\ U + 203\ \mu V$	
	70 V ... < 220 V	10 Hz	$187 \cdot 10^{-6}\ U + 2{,}1\ mV$	
		20 Hz	$107 \cdot 10^{-6}\ U + 504\ \mu V$	
		40 Hz	$56 \cdot 10^{-6}\ U + 216\ \mu V$	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
		500 Hz	$41 \cdot 10^{-6}\ U + 241\ \mu V$	
		1 kHz; 10 kHz; 20 kHz	$41 \cdot 10^{-6}\ U + 220\ \mu V$	
		50 kHz	$42 \cdot 10^{-6}\ U + 200\ \mu V$	
		100 kHz	$57 \cdot 10^{-6}\ U + 612\ \mu V$	
	220 V ... < 700 V	50 Hz	$70 \cdot 10^{-6}\ U + 0{,}82\ mV$	
		500 Hz; 1 kHz	$50 \cdot 10^{-6}\ U + 1{,}1\ mV$	
	700 V ... < 1050 V	50 Hz	$70 \cdot 10^{-6}\ U + 0{,}82\ mV$	
		500 Hz; 1 kHz	$52 \cdot 10^{-6}\ U + 1{,}1\ mV$	
High voltage				
Calibration of high voltage sources	2 kV ... 20 kV	$R_L \geq 760\ M\Omega$; 16,7 Hz	1,2 % + 6,6 V	RMS; Û/√2
	> 20 kV ... 30 kV		1,2 % + 22 V	
	1 kV ... 10 kV	$R_L \geq 110\ M\Omega$; 50 Hz	0,15 % + 0,2 V	Also possible in Fehraltorf and on site [6]
	> 10 kV ... 20 kV	$R_L \geq 200\ M\Omega$	0,13 % + 0,7 V	
	> 20 kV ... 30 kV	$R_L \geq 200\ M\Omega$	0,15 % + 3,0 V	
	> 30 kV ... 50 kV	$R_L \geq 760\ M\Omega$	1,2 % + 22 V	
	> 50 kV ... 100 kV	$R_L \geq 760\ M\Omega$	1,2 % + 29 V	
Calibration of high voltage measurement instruments	1 kV ... ≤ 10 kV	50 Hz	0,15 % + 0,3 V	RMS; Û/√2
	> 10 kV ... 20 kV		0,13 % + 0,8 V	
	> 20 kV ... 30 kV		0,15 % + 3,1 V	Also possible in Fehraltorf and on site [7]
	> 30 kV ... 50 kV		1,2 % + 23 V	
	> 50 kV ... 100 kV		1,2 % + 30 V	
AC Current				
Calibration of current calibrators	0,1 mA ... < 0,77 mA	40 Hz ... 1 kHz	$350 \cdot 10^{-6}\ I$	Also possible in the branches and on site [2]
		> 1 kHz … 5 kHz	$450 \cdot 10^{-6}\ I$	I = Measurement value
	0,77 mA ... < 2 mA	40 Hz ... 1 kHz	$250 \cdot 10^{-6}\ I$	
		> 1 kHz … 5 kHz	$350 \cdot 10^{-6}\ I$	
	2 mA ... < 10 mA	20 Hz ... < 40 Hz	$135 \cdot 10^{-6}\ I + 0{,}5\ \mu A$	
		40 Hz ... 10 kHz	$105 \cdot 10^{-6}\ I + 0{,}5\ \mu A$	
	10 mA ... < 30 mA	20 Hz ... < 40 Hz	$140 \cdot 10^{-6}\ I + 4{,}2\ \mu A$	
		40 Hz ... 10 kHz	$115 \cdot 10^{-6}\ I + 4{,}2\ \mu A$	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
	30 mA ... < 100 mA	20 Hz ... < 40 Hz	$140 \cdot 10^{-6}$ / + 4,2 µA	
		40 Hz ... 10 kHz	$115 \cdot 10^{-6}$ / + 4,2 µA	
	100 mA ... < 300 mA	20 Hz ... < 40 Hz	$160 \cdot 10^{-6}$ / + 35 µA	
		40 Hz ... 10 kHz	$140 \cdot 10^{-6}$ / + 35 µA	
	300 mA ... < 2 A	20 Hz ... < 40 Hz	$165 \cdot 10^{-6}$ / + 36 µA	
		40 Hz ... < 5 kHz	$140 \cdot 10^{-6}$ / + 36 µA	
		5 kHz ... 10 kHz	$140 \cdot 10^{-6}$ / + 36 µA	
	2 A ... < 5 A	20 Hz ... < 40 Hz	$140 \cdot 10^{-6}$ / + 155 µA	
		40 Hz ... < 5 kHz	$115 \cdot 10^{-6}$ / + 155 µA	
		5 kHz ... 10 kHz	$115 \cdot 10^{-6}$ / + 155 µA	
	5 A ... < 10 A	20 Hz ... < 40 Hz	$140 \cdot 10^{-6}$ / + 155 µA	
		40 Hz ... < 5 kHz	$115 \cdot 10^{-6}$ / + 160 µA	
		5 kHz ... 10 kHz	$115 \cdot 10^{-6}$ / + 155 µA	
	10 A ... 20 A	20 Hz ... < 40 Hz	$145 \cdot 10^{-6}$ / + 170 µA	
		40 Hz ... 5 kHz	$115 \cdot 10^{-6}$ / + 180 µA	
	> 20 A … 120 A	45 Hz … 55 Hz	$210 \cdot 10^{-6}$ /	
Calibration of ammeters	0,1 mA ... < 0,77 mA	40 Hz ... 1 kHz	$350 \cdot 10^{-6}$ /	Also possible in the branches and on site [2]
		> 1 kHz … 5 kHz	$450 \cdot 10^{-6}$ /	
	0.77 mA ... < 2 mA	40 Hz ... 1 kHz	$250 \cdot 10^{-6}$ /	
		> 1 kHz … 5 kHz	$350 \cdot 10^{-6}$ /	
	2 mA ... < 10 mA	20 Hz ... < 40 Hz	$165 \cdot 10^{-6}$ / + 0,5 µA	
		40 Hz ... < 1 kHz	$110 \cdot 10^{-6}$ / + 0,5 µA	
		1 kHz ... < 5 kHz	$120 \cdot 10^{-6}$ / + 0,8 µA	
		5 kHz ... 10 kHz	$480 \cdot 10^{-6}$ / + 1,3 µA	
	10 mA ... < 30 mA	20 Hz ... < 40 Hz	$170 \cdot 10^{-6}$ / + 4,5 µA	
		40 Hz ... < 1 kHz	$120 \cdot 10^{-6}$ / + 4,5 µA	
		1 kHz ... < 5 kHz	$130 \cdot 10^{-6}$ / + 5,5 µA	
		5 kHz ... 10 kHz	$480 \cdot 10^{-6}$ / + 7,5 µA	
	30 mA ... < 100 mA	20 Hz ... < 40 Hz	$170 \cdot 10^{-6}$ / + 4,5 µA	
		40 Hz ... < 1 kHz	$120 \cdot 10^{-6}$ / + 4,5 µA	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
		1 kHz ... < 5 kHz	$130 \cdot 10^{-6}$ / + 5,5 µA	
		5 kHz ... 10 kHz	$480 \cdot 10^{-6}$ / + 7,5 µA	
	100 mA ... < 300 mA	20 Hz ... < 40 Hz	$170 \cdot 10^{-6}$ / + 40 µA	
		40 Hz ... < 1 kHz	$150 \cdot 10^{-6}$ / + 40 µA	
		1 kHz ... < 5 kHz	$170 \cdot 10^{-6}$ / + 45 µA	
		5 kHz ... 10 kHz	$940 \cdot 10^{-6}$ / + 70 µA	
	300 mA ... < 2 A	20 Hz ... < 1 kHz	$175 \cdot 10^{-6}$ / + 40 µA	
		1 kHz ... < 5 kHz	$165 \cdot 10^{-6}$ / + 45 µA	
		5 kHz ... 10 kHz	$940 \cdot 10^{-6}$ / + 70 µA	
	2 A ... < 5 A	20 Hz ... < 40 Hz	$140 \cdot 10^{-6}$ / + 160 µA	
		40 Hz ... < 5 kHz	$115 \cdot 10^{-6}$ / + 160 µA	
		5 kHz ... 10 kHz	$115 \cdot 10^{-6}$ / + 160 µA	
	5 A ... < 10 A	20 Hz ... < 40 Hz	$140 \cdot 10^{-6}$ / + 170 µA	
		40 Hz ... < 5 kHz	$115 \cdot 10^{-6}$ / + 180 µA	
		5 kHz ... 10 kHz	$115 \cdot 10^{-6}$ / + 170 µA	
	10 A ... 20 A	20 Hz ... < 40 Hz	$145 \cdot 10^{-6}$ / + 230 µA	
		40 Hz ... 5 kHz	$120 \cdot 10^{-6}$ / + 180 µA	
	> 20 A … 120 A	45 Hz … 55 Hz	210•10-6 /	
Calibration of current clamps	50 A … 500 A	45 Hz … 55 Hz	0,58 % + 270 mA	With current coil
	>500 A … 3000 A		0,58 %	
Calibration of Rogowski coils	50 A … 1000 A	45 Hz … 55 Hz	0,58 % + 540 mA	With current coil
	1000 A … 6000 A		0,58 %	
Capacitance				Decadic values only
Calibration of capacitance measuring devices	1 pF	100 Hz; 1 kHz; 10 kH	$0{,}37 \cdot 10^{-3}$ *C*	Also possible in the branches [2]
	10 pF	100 Hz; 1 kHz; 10 kHz	$0{,}36 \cdot 10^{-3}$ *C*	C = Measurement value
	100 pF	100 Hz; 1 kHz; 10 kHz	$0{,}36 \cdot 10^{-3}$ *C*	
	1000 pF	100 Hz; 1 kHz; 10 kHz	$0{,}36 \cdot 10^{-3}$ *C*	
	10 nF	100 Hz	$0{,}13 \cdot 10^{-3}$ *C*	
		1 kHz	$0{,}10 \cdot 10^{-3}$ *C*	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
	100 nF	100 Hz	0,23•10^{-3} *C*	
		1 kHz	0,11•10^{-3} *C*	
	1 µF	100 Hz	0,43•10^{-3} *C*	
		1 kHz	0,14•10^{-3} *C*	
Inductance				Decadic values only
Calibration of induct-ance meters	100 µH	100 Hz	3,6•10-3 *L*	Also possible in the branches [2]
		1 kHz	1,3•10-3 *L*	L = Measurement value
	1 mH	100 Hz	0,49•10-3 *L*	
		1 kHz	0,39•10-3 *L*	
	10 mH	100 Hz; 1 kHz	0,25•10-3 *L*	
	100 mH	100 Hz; 1 kHz	0,24•10-3 *L*	
	1 H	100 Hz	0,25•10-3 *L*	
		1 kHz	0,24•10-3 *L*	
AC Power		48,5 Hz ... 51,5 Hz		
	2,4 W … 30 kW	40 V … 480 V		Measuring range referred to cos φ = 1
Calibration of power sources (effective power)		60 mA … 100 A		
		cos φ = 1	160•10^{-6} *P*	Also possible in Fehr-altorf and on site [2] P = Measurement value
		cos φ = 0,5 ... < 1 (c, i)	295•10^{-6} *P*	
Calibration of power measurement instruments (effective power)		48,5 Hz ... 51,5 Hz		Measuring range referred cos φ = 1
	330 µW … < 2,4 W	100 mV … 40 V		
		3,3 mA … 60 A		
		cos φ = 1	0,13 %	Also possible in Fehraltorf and on site [2]
		cos φ = 0,5 ... < 1 (c, i)	0,37 %	
	2,4 W … 30 kW	40 V … 480 V		Voltages up to 1000 V with greater uncer-tainty possible
		60 mA … 100 A		
		cos φ = 1	160•10^{-6} *P*	
		cos φ = 0,5 ... < 1 (c, i)	295•10^{-6} *P*	
Calibration of power meter clamps (effective power)		48,5 Hz ... 51,5 Hz		Measuring range referred cos φ = 1
	330 µW … < 1 MW	100 mV … 1000 V		
		3,3 mA … 1000 A		With current coil

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
		cos φ = 1	0,62 %	Also possible in Fehrltorf and on site [2]
		cos φ = 0,5 ... < 1 (c, i)	0,71 %	
Frequency		Measurement period:		
Calibration of frequency counters	1 mHz ... < 1 Hz	≥ 100 s	$2{,}0 \cdot 10^{-5}\ f$	Also possible in the branches and on site [2]
	1 Hz … < 10 Hz		$2{,}0 \cdot 10^{-7}\ f$	f = Measurement value
	10 Hz … < 100 Hz		$2{,}0 \cdot 10^{-8}\ f$	
	100 Hz … < 1 kHz		$2{,}0 \cdot 10^{-9}\ f$	
	1 kHz … < 10 kHz		$2{,}0 \cdot 10^{-10}\ f$	
	10 kHz … < 1 MHz		$2{,}0 \cdot 10^{-11}\ f$	
	1 MHz … < 3 GHz	≥ 10 s	$1{,}0 \cdot 10^{-11}\ f$	
	3 GHz … 50 GHz		$1{,}0 \cdot 10^{-10}\ f$	
		Measurement period:		
Calibration of frequency generators	1 mHz ... < 1 Hz	≥ 100 s	$2{,}0 \cdot 10^{-5}\ f$	Also possible in the branches and on site [2]
	1 Hz … < 10 Hz		$2{,}0 \cdot 10^{-7}\ f$	
	10 Hz … < 100 Hz		$2{,}0 \cdot 10^{-8}\ f$	
	100 Hz … < 1 kHz		$2{,}0 \cdot 10^{-9}\ f$	
	1 kHz … < 10 kHz		$2{,}0 \cdot 10^{-10}\ f$	
	10 kHz … < 1 MHz		$2{,}0 \cdot 10^{-11}\ f$	
	1 MHz … < 3 GHz	≥ 10 s	$1{,}0 \cdot 10^{-11}\ f$	
	3 GHz ... 50 GHz	≥ 10 s	$1{,}0 \cdot 10^{-10}\ f$	
	1 MHz; 5 MHz; 10 MHz	≥ 1 h	$1{,}0 \cdot 10^{-11}\ f$	Phase comparison
Period		Measurement period:		
	10 ns … < 10 µs	≥ 10 s	$2 \cdot 10^{-16}\ t$	t = Measurement value
	10 µs … < 100 µs		$2 \cdot 10^{-15}\ t$	
	100 µs … < 1 ms		$1 \cdot 10^{-15}\ t$	
	1 ms … < 10 ms		$2 \cdot 10^{-11}\ t$	
	10 ms … < 100 ms		$2 \cdot 10^{-9}\ t$	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
	100 ms … < 1 s		$0{,}2 \cdot 10^{-6}\ t$	
	1 s … 10 s	≥ 100 s	$20 \cdot 10^{-6}\ t$	
Number of revolutions	6 U/min … < 30 U/min		$5{,}8 \cdot 10^{-4}\ n$	Optical
	30 U/min … < 60 U/min		$1{,}2 \cdot 10^{-3}\ n$	n = Measurement value
	60 U/min … < 1000 U/min		$6{,}7 \cdot 10^{-3}\ n$	
	1000 U/min … 100000 U/min		$5{,}6 \cdot 10^{-1}\ n$	
RF- Power				
Calibration of RF power meters	10 µW ... 5 mW	100 kHz ... 2,6 GHz	2,9 % + 0,84 µW	Analyzer: VSWR ≤1,3
	(-20 dBm … + 7 dBm)			
	0,001 pW … 1 mW	2,5 MHz ... 1,3 GHz	3,8 %	
	(-120 dBm … 0 dBm)			
	>1 µW ... 2,5 mW	9 kHz ... < 2,4 GHz	2,7 % + 66 nW	
	(-30 dBm ... +4 dBm)	2,4 GHz ... < 12,4 GHz	3,4 % + 66 nW	
		12,4 GHz ... 18 GHz	4,7 % + 66 nW	
	1 nW … 1 µW	10 MHz ... < 2,4 GHz	3,8 % + 0,16 nW	
	(-60 dBm ... -30 dBm)	2,4 GHz ... <12,4 GHz	4,8 % + 0,16 nW	
		12,4 GHz ... 18 GHz	6,6 % + 0,16 nW	
Calibration of signal generators	10 µW ... 100 mW	100 kHz ... 2,6 GHz	2,7 % + 0,84 µW	Generator: VSWR ≤1,3
	(-20 dBm ... +20 dBm)			
	>0.1 pW … 1 mW	2,5 MHz ... 1,3 GHz	3,2 %	
	(-100 dBm ... 0 dBm)			
	0,001pW … 0,1 pW	2,5 MHz ... 1,3 GHz	4,9 %	
	(-120 dBm ... -100 dBm)			
	>1 µW … 100 mW	9 kHz ... < 2,4 GHz	2,9 % + 66 nW	
	(-30 dBm ... +20 dBm)	2,4 GHz ... < 12,4 GHz	3,8 % + 66 nW	
		12,4 GHz ... 18 GHz	4,6 % + 66 nW	
	1 nW … 1 µW	10 MHz ... < 2,4 GHz	3,4 % + 0,16 nW	
	(-60 dBm ... -30 dBm)	2,4 GHz ... < 12,4 GHz	4,5 % + 0,16 nW	
		12,4 GHz ... 18 GHz	5,7 % + 0,16 nW	
Reflection factor				

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
One port	0 … 1	9 kHz … 20 GHz		Z = 50 Ω
(Value and phase)				3.5mm Connector
			See matrix M.1 & M.2	Also possible on site
	0 … 1	9 kHz … 18 GHz		Z = 50 Ω
				N Connector
			See matrix M.3 & M.4	Also possible on site
	0 … 1	9 kHz … 18 GHz		Z = 50 Ω
				7mm Connector
			See matrix M.5 & M.6	Also possible on site
	0 … 1	9 kHz … 3 GHz		Z = 50 Ω
				BNC Connector
			See matrix M.7 & M.8	Also possible on site
Transmission factor				
Two ports	0 dB … 80 dB	9 kHz … 20 GHz		Z = 50 Ω
(Value and phase)				3.5mm Connector
			See matrix M.9 & M.10	Also possible on site
	0 dB … 80 dB	9 kHz … 18 GHz		Z = 50 Ω
				N Connector
			See matrix M.11 & M.12	Also possible on site
	0 dB … 80 dB	9 kHz … 18 GHz		Z = 50 Ω
				7mm Connector
			See matrix M.13 & M.14	Also possible on site
	0 dB … 80 dB	9 kHz … 3 GHz		Z = 50 Ω
				BNC Connector
			See matrix M.15 & M.16	Also possible on site

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Matrix M.1: HF- Reflection factor, Value |G|; 3.5mm - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 20 GHz
0	0.004	0.003 to 0.004	0.004	0.004 to 0.005
0.1	0.005 to 0.003	0.003 to 0.004	0.003 to 0.004	0.004 to 0.005
0.2	0.005 to 0.003	0.003 to 0.004	0.004	0.004 to 0.005
0.3	0.005 to 0.003	0.003 to 0.004	0.004	0.004 to 0.005
0.4	0.004 to 0.006	0.004	0.004 to 0.005	0.004 to 0.005
0.5	0.004 to 0.006	0.004	0.004 to 0.005	0.004 to 0.005
0.6	0.004 to 0.006	0.005 to 0.004	0.004 to 0.006	0.006 to 0.004
0.7	0.005 to 0.007	0.006 to 0.005	0.005 to 0.006	0.006 to 0.004
0.8	0.006 to 0.008	0.006 to 0.005	0.005 to 0.007	0.007 to 0.005
0.9	0.006 to 0.009	0.007 to 0.004	0.005 to 0.008	0.007 to 0.005
1	0.003 to 0.008	0.008 to 0.003	0.007 to 0.004	0.004 to 0.007

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Accreditation number: SCS 0058

Matrix M.2: HF- Reflection factor, Phase angle φ; 3.5mm - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 20 GHz
0	-	-	-	-
0.1	2.4 deg to 1.7 deg	1.7 deg to 1.9 deg	1.8 deg to 2.0 deg	2.3 deg to 2.8 deg
0.2	1.4 deg to 0.9 deg	0.9 deg to 1.0 deg	1.0 deg to 1.1 deg	1.2 deg to 1.5 deg
0.3	0.9 deg to 0.6 deg	0.6 deg to 0.7 deg	0.7 deg to 0.8 deg	0.9 deg to 1.2 deg
0.4	0.8 deg to 0.5 deg	0.6 deg to 0.5 deg	0.6 deg to 0.7 deg	0.7 deg to 1.0 deg
0.5	0.7 deg to 0.5 deg	0.5 deg	0.5 deg to 0.7 deg	0.6 deg to 0.9 deg
0.6	0.5 deg to 0.6 deg	0.5 deg to 0.4 deg	0.4 deg to 0.6 deg	0.6 deg to 0.8 deg
0.7	0.4 deg to 0.6 deg	0.5 deg to 0.4 deg	0.4 deg to 0.6 deg	0.6 deg to 0.8 deg
0.8	0.4 deg to 0.6 deg	0.5 deg to 0.4 deg	0.4 deg to 0.6 deg	0.5 deg to 0.7 deg
0.9	0.3 deg to 0.6 deg	0.5 deg to 0.3 deg	0.4 deg to 0.6 deg	0.4 deg to 0.7 deg
1	0.2 deg to 0.4 deg	0.5 deg to 0.2 deg	0.3 deg to 0.4 deg	0.4 deg to 0.7 deg

Matrix M.3: HF- Reflection factor, Value |G|; N - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 18 GHz
0	0.004	0.004	0.005 to 0.004	0.005 to 0.006
0.1	0.005 to 0.004	0.004	0.005 to 0.004	0.005 to 0.006
0.2	0.005 to 0.004	0.004 to 0.005	0.005 to 0.004	0.005 to 0.007
0.3	0.005 to 0.004	0.004 to 0.005	0.004 to 0.005	0.005 to 0.007
0.4	0.006 to 0.004	0.004 to 0.005	0.004 to 0.005	0.005 to 0.007
0.5	0.006 to 0.004	0.004 to 0.005	0.004 to 0.006	0.005 to 0.006
0.6	0.005 to 0.006	0.005 to 0.006	0.005 to 0.006	0.005 to 0.006
0.7	0.005 to 0.007	0.005 to 0.006	0.005 to 0.007	0.005 to 0.007
0.8	0.006 to 0.008	0.006 to 0.007	0.005 to 0.007	0.007 to 0.005
0.9	0.009 to 0.005	0.004 to 0.008	0.004 to 0.008	0.008 to 0.005
1	0.003 to 0.007	0.003 to 0.009	0.008 to 0.004	0.004 to 0.009

Matrix M.4: HF- Reflection factor, Phase angle φ; N - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 18 GHz
0	-	-	-	-
0.1	2.5 deg to 1.8 deg	1.9 deg to 2.3 deg	2.4 deg to 2.0 deg	2.5 deg to 3.1 deg
0.2	1.5 deg to 0.9 deg	1.0 deg to 1.2 deg	1.0 deg to 1.2 deg	1.3 deg to 2.0 deg
0.3	1.0 deg to 0.7 deg	0.7 deg to 0.8 deg	0.7 deg to 0.9 deg	0.9 deg to 1.3 deg
0.4	0.8 deg to 0.6 deg	0.6 deg to 0.7 deg	0.6 deg to 0.8 deg	0.7 deg to 1.0 deg
0.5	0.7 deg to 0.5 deg	0.5 deg to 0.6 deg	0.5 deg to 0.7 deg	0.6 deg to 0.8 deg
0.6	0.6 deg to 0.5 deg	0.5 deg	0.5 deg to 0.6 deg	0.5 deg to 0.7 deg
0.7	0.4 deg to 0.6 deg	0.4 deg to 0.5 deg	0.4 deg to 0.6 deg	0.5 deg to 0.7 deg
0.8	0.4 deg to 0.6 deg	0.4 deg to 0.5 deg	0.4 deg to 0.6 deg	0.5 deg to 0.6 deg
0.9	0.6 deg to 0.4 deg	0.3 deg to 0.5 deg	0.3 deg to 0.6 deg	0.4 deg to 0.6 deg
1	0.2 deg to 0.4 deg	0.2 deg to 0.5 deg	0.2 deg to 0.5 deg	0.3 deg to 0.6 deg

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Matrix M.5: HF- Reflection factor, Value |G|; 7mm - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 18 GHz
0	0.004	0.004	0.004 to 0.005	0.005 to 0.007
0.1	0.005 to 0.004	0.004	0.004	0.005 to 0.006
0.2	0.006 to 0.004	0.004	0.004	0.005 to 0.006
0.3	0.006 to 0.004	0.004 to 0.005	0.004 to 0.005	0.005 to 0.007
0.4	0.004 to 0.006	0.005 to 0.004	0.004 to 0.005	0.005 to 0.007
0.5	0.005 to 0.007	0.005 to 0.004	0.005 to 0.006	0.005 to 0.008
0.6	0.005 to 0.007	0.006 to 0.005	0.005 to 0.006	0.006 to 0.009
0.7	0.005 to 0.008	0.006 to 0.005	0.005 to 0.007	0.006 to 0.010
0.8	0.006 to 0.009	0.007 to 0.005	0.006 to 0.008	0.007 to 0.010
0.9	0.007 to 0.010	0.008 to 0.005	0.006 to 0.009	0.008 to 0.013
1	0.004	0.004 to 0.005	0.005 to 0.007	0.006 to 0.009

Matrix M.6: HF- Reflection factor, Phase angle φ; 7mm - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 18 GHz
0	-	-	-	-
0.1	2.8 deg to 2.2 deg	2.2 deg to 2.3 deg	2.3 deg to 2.2 deg	2.6 deg to 3.2 deg
0.2	1.6 deg to 1.1 deg	1.1 deg to 1.2 deg	1.2 deg	1.3 deg to 1.7 deg
0.3	1.1 deg to 0.8 deg	0.8 deg	0.8 deg to 0.9 deg	0.9 deg to 1.3 deg
0.4	0.9 deg to 0.6 deg	0.7 deg to 0.6 deg	0.6 deg to 0.8 deg	0.8 deg to 1.1 deg
0.5	0.7 deg to 0.5 deg	0.6 deg to 0.5 deg	0.5 deg to 0.7 deg	0.7 deg to 0.9 deg
0.6	0.5 deg to 0.7 deg	0.5 deg	0.5 deg to 0.6 deg	0.6 deg to 0.9 deg
0.7	0.5 deg to 0.7 deg	0.5 deg to 0.4 deg	0.5 deg to 0.6 deg	0.6 deg to 0.9 deg
0.8	0.4 deg to 0.7 deg	0.5 deg to 0.4 deg	0.5 deg to 0.6 deg	0.5 deg to 0.7 deg
0.9	0.4 deg to 0.7 deg	0.5 deg to 0.4 deg	0.4 deg to 0.6 deg	0.5 deg to 0.8 deg
1	0.4 deg to 0.3 deg	0.3 deg	0.3 deg to 0.4 deg	0.4 deg to 0.6 deg

Matrix M.7: HF- Reflection factor, Value |G|; BNC - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz
0	0.008	0.008 to 0.009
0.1	0.008	0.008 to 0.009
0.2	0.008 to 0.009	0.008 to 0.010
0.3	0.008 to 0.009	0.008 to 0.011
0.4	0.008 to 0.009	0.009 to 0.013
0.5	0.008 to 0.009	0.009 to 0.016
0.6	0.008 to 0.010	0.010 to 0.018
0.7	0.009 to 0.011	0.011 to 0.021
0.8	0.010 to 0.012	0.012 to 0.024
0.9	0.011 to 0.013	0.013 to 0.027
1	0.011 to 0.013	0.013 to 0.030

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Matrix M.8: HF- Reflection factor, Phase angle φ; BNC - Connector 50 Ω

Value |Γ|	9 kHz … 300 MHz	300 MHz … 3 GHz
0	-	-
0.1	4.1 deg to 4.6 deg	4.6 deg to 5.2 deg
0.2	2.1 deg to 2.4 deg	2.4 deg to 3.3 deg
0.3	1.4 deg to 1.6 deg	1.6 deg to 2.8 deg
0.4	1.1 deg to 1.3 deg	1.3 deg to 2.6 deg
0.5	0.9 deg to 1.1 deg	1.1 deg to 2.5 deg
0.6	0.8 deg to 1.0 deg	1.0 deg to 2.4 deg
0.7	0.7 deg to 0.9 deg	0.9 deg to 2.4 deg
0.8	0.7 deg to 0.9 deg	0.9 deg to 2.4 deg
0.9	0.7 deg to 0.9 deg	0.9 deg to 2.4 deg
1	0.6 deg to 0.8 deg	0.8 deg to 2.4 deg

Matrix M.9: HF- Transmission factor; 3.5mm - Connector 50 Ω

Attenuation absolute	9 kHz … 300 MHz	300 MHz … 3 GHz	3 GHz … 9 GHz	9 GHz … 20 GHz
0 dB	0.04 dB to 0.05 dB	0.05 dB to 0.09 dB	0.09 dB to 0.15 dB	0.15 dB
3 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
6 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
10 dB	0.09 dB to 0.08 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
20 dB	0.09 dB to 0.07 dB	0.07 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB to 0.15 dB
30 dB	0.09 dB to 0.07 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
40 dB	0.09 dB to 0.08 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
50 dB	0.10 dB to 0.08 dB	0.08 dB to 0.12 dB	0.12 dB to 0.17 dB	0.16 dB to 0.17 dB
60 dB	0.14 dB to 0.12 dB	0.12 dB to 0.15 dB	0.15 dB to 0.19 dB	0.19 dB to 0.20 dB
70 dB	0.20 dB to 0.16 dB	0.17 dB to 0.19 dB	0.19 dB to 0.23 dB	0.26 dB to 0.31 dB
80 dB	0.36 dB to 0.21 dB	0.21 dB to 0.24 dB	0.24 dB to 0.27 dB	0.50 dB to 0.71 dB

Matrix M.10: HF- Transmission factor, Phase angle φ; 3.5mm - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz	3 GHz to 9 GHz	9 GHz to 20 GHz
0 dB	0.4 deg	0.4 deg to 0.8 deg	0.8 deg to 1.3 deg	1.3 deg to 1.8 deg
3 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.9 deg
6 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.9 deg
10 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.9 deg
20 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.9 deg
30 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.9 deg
40 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.9 deg
50 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.4 deg to 1.9 deg
60 dB	0.8 deg to 0.9 deg	0.8 deg to 1.1 deg	1.1 deg to 1.5 deg	1.5 deg to 2.1 deg
70 dB	1.4 deg to 1.1 deg	1.1 deg to 1.3 deg	1.3 deg to 1.7 deg	1.9 deg to 2.6 deg
80 dB	2.4 deg to 1.4 deg	1.5 deg to 1.6 deg	1.6 deg to 2.0 deg	3.4 deg to 4.9 deg

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Matrix M.11: HF- Transmission factor r; N - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz	3 GHz to 9 GHz	9 GHz to 18 GHz
0 dB	0.04 dB to 0.05 dB	0.05 dB to 0.09 dB	0.09 dB to 0.15 dB	0.15 dB
3 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
6 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
10 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
20 dB	0.09 dB to 0.07 dB	0.07 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB to 0.15 dB
30 dB	0.09 dB to 0.07 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
40 dB	0.09 dB to 0.08 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
50 dB	0.08 dB to 0.10 dB	0.08 dB to 0.12 dB	0.12 dB to 0.17 dB	0.16 dB to 0.17 dB
60 dB	0.14 dB to 0.12 dB	0.12 dB to 0.15 dB	0.15 dB to 0.19 dB	0.19 dB to 0.20 dB
70 dB	0.20 dB to 0.16 dB	0.17 dB to 0.19 dB	0.19 dB to 0.23 dB	0.26 dB to 0.31 dB
80 dB	0.36 dB to 0.21 dB	0.22 dB to 0.24 dB	0.24 dB to 0.27 dB	0.50 dB to 0.68 dB

Matrix M.12: HF- Transmission factor, Phase angle φ; N - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz	3 GHz to 9 GHz	9 GHz to 18 GHz
0 dB	0.4 deg	0.4 deg to 0.8 deg	0.8 deg to 1.3 deg	1.3 deg to 1.7 deg
3 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.8 deg
6 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.8 deg
10 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.8 deg
20 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.8 deg
30 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.8 deg
40 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.8 deg
50 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.4 deg to 1.8 deg
60 dB	0.8 deg to 1.0 deg	0.8 deg to 1.1 deg	1.1 deg to 1.5 deg	1.5 deg to 2.0 deg
70 dB	1.4 deg to 1.1 deg	1.1 deg to 1.3 deg	1.3 deg to 1.7 deg	1.9 deg to 2.5 deg
80 dB	2.4 deg to 1.4 deg	1.5 deg to 1.6 deg	1.6 deg to 2.0 deg	3.5 deg to 4.8 deg

Matrix M.13: HF- Transmission factor; 7mm - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz	3 GHz to 9 GHz	9 GHz to 18 GHz
0 dB	0.04 dB to 0.05 dB	0.05 dB to 0.09 dB	0.09 dB to 0.15 dB	0.15 dB
3 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
6 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
10 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
20 dB	0.09 dB to 0.07 dB	0.07 dB to 0.11 dB	0.11 dB to 0.16 dB	0.15 dB to 0.16 dB
30 dB	0.09 dB to 0.07 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
40 dB	0.09 dB to 0.08 dB	0.08 dB to 0.11 dB	0.11 dB to 0.16 dB	0.16 dB
50 dB	0.08 dB to 0.10 dB	0.08 dB to 0.12 dB	0.12 dB to 0.17 dB	0.16 dB to 0.17 dB
60 dB	0.14 dB to 0.12 dB	0.12 dB to 0.15 dB	0.15 dB to 0.19 dB	0.19 dB to 0.21 dB
70 dB	0.20 dB to 0.16 dB	0.17 dB to 0.19 dB	0.19 dB to 0.23 dB	0.26 dB to 0.31 dB
80 dB	0.36 dB to 0.21 dB	0.22 dB to 0.24 dB	0.24 dB to 0.27 dB	0.51 dB to 0.70 dB

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Matrix M.14: HF- Transmission factor, Phase angle φ; 7mm - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz	3 GHz to 9 GHz	9 GHz to 18 GHz
0 dB	0.4 deg	0.4 deg to 0.8 deg	0.8 deg to 1.3 deg	1.3 deg to 1.7 deg
3 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.8 deg
6 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.8 deg
10 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.3 deg	1.3 deg to 1.8 deg
20 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.8 deg
30 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.8 deg
40 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.3 deg to 1.8 deg
50 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg	0.9 deg to 1.4 deg	1.4 deg to 1.9 deg
60 dB	0.8 deg to 1.0 deg	0.8 deg to 1.1 deg	1.1 deg to 1.5 deg	1.5 deg to 2.0 deg
70 dB	1.4 deg to 1.1 deg	1.1 deg to 1.3 deg	1.3 deg to 1.7 deg	1.9 deg to 2.5 deg
80 dB	2.4 deg to 1.4 deg	1.5 deg to 1.6 deg	1.6 deg to 2.0 deg	3.5 deg to 4.9 deg

Matrix M.15: HF- Transmission factor; BNC - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz
0 dB	0.04 dB to 0.05 dB	0.05 dB to 0.09 dB
3 dB	0.08 dB to 0.09 dB	0.08 dB to 0.11 dB
6 dB	0.10 dB to 0.08 dB	0.08 dB to 0.11 dB
10 dB	0.10 dB to 0.08 dB	0.08 dB to 0.11 dB
20 dB	0.10 dB to 0.07 dB	0.07 dB to 0.11 dB
30 dB	0.10 dB to 0.07 dB	0.08 dB to 0.11 dB
40 dB	0.10 dB to 0.08 dB	0.08 dB to 0.11 dB
50 dB	0.11 dB to 0.08 dB	0.08 dB to 0.12 dB
60 dB	0.15 dB to 0.12 dB	0.12 dB to 0.15 dB
70 dB	0.21 dB to 0.16 dB	0.17 dB to 0.19 dB
80 dB	0.37 dB to 0.21 dB	0.22 dB to 0.24 dB

Matrix M.16: HF- Transmission factor; Phase angle φ; BNC - Connector 50 Ω

Attenuation absolute	9 kHz to 300 MHz	300 MHz to 3 GHz
0 dB	0.4 deg	0.4 deg to 0.8 deg
3 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg
6 dB	0.6 deg to 0.7 deg	0.6 deg to 0.9 deg
10 dB	0.7 deg to 0.6 deg	0.6 deg to 0.9 deg
20 dB	0.8 deg to 0.6 deg	0.6 deg to 0.9 deg
30 dB	0.8 deg to 0.6 deg	0.6 deg to 0.9 deg
40 dB	0.8 deg to 0.6 deg	0.6 deg to 0.9 deg
50 dB	0.8 deg to 0.6 deg	0.6 deg to 0.9 deg
60 dB	1.0 deg to 0.8 deg	0.8 deg to 1.1 deg
70 dB	1.4 deg to 1.1 deg	1.1 deg to 1.3 deg
80 dB	2.5 deg to 1.4 deg	1.5 deg to 1.6 deg

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
Calibration of Oscilloscopes				
Rectangular voltage amplitude	1 mV ... 120 mV	1 kHz/1 MΩ	$1{,}3 \cdot 10^{-3}\ U$ + 16 µV	Also possible on site [2]
	> 120 mV ... 1,2 V	1 kHz/1 MΩ	$1{,}3 \cdot 10^{-3}\ U$ + 62 µV	
	> 1,2 V ... 12 V	1 kHz/1 MΩ	$1{,}2 \cdot 10^{-3}\ U$ + 698 µV	
	> 12 V … 60 V	1 kHz/1 MΩ	$1{,}2 \cdot 10^{-3}\ U$ + 3,3 mV	
	> 60 V ... 120 V	1 kHz/1 MΩ	$1{,}2 \cdot 10^{-3}\ U$ + 5,9 mV	
	> 120 V ... 200 V	1 kHz/1 MΩ	$1{,}2 \cdot 10^{-3}\ U$ + 27 mV	
	1 mV ... 120 mV	1 kHz/50 Ω	$1{,}3 \cdot 10^{-3}\ U$ + 16 µV	
	> 120 mV ... 1,2 mV	1 kHz/50 Ω	$1{,}3 \cdot 10^{-3}\ U$ + 62 µV	
	> 1,2 mV ... 3 V	1 kHz/50 Ω	$1{,}2 \cdot 10^{-3}\ U$ + 307µV	
	> 3 V ... 5,5 V	1 kHz/50 Ω	$1{,}2 \cdot 10^{-3}\ U$ + 305µV	
DC voltage	1 mV ... 300 mV	DC/1 MΩ	$290 \cdot 10^{-6}\ U$ + 32 µV	
	> 300 mV ... 3 V	DC/1 MΩ	$290 \cdot 10^{-6}\ U$ + 122 µV	
	> 3 V … 15 V	DC/1 MΩ	$290 \cdot 10^{-6}\ U$ + 623 µV	
	> 15 V ... 120 V	DC/1 MΩ	$290 \cdot 10^{-6}\ U$ + 801 µV	
	> 120 V ... 200 V	DC/1 MΩ	$290 \cdot 10^{-6}\ U$ + 1,1mV	
	1 mV ... 300 mV	DC/50 Ω	$290 \cdot 10^{-6}\ U$ + 32 µV	
	> 300 mV ... 3 V	DC/50 Ω	$290 \cdot 10^{-6}\ U$ + 122 µV	
	> 3 V ... 5,5 V	DC/50 Ω	$290 \cdot 10^{-6}\ U$ + 100 µV	
Time base				
Sampling rate	0,2 ms	99,5 MHz; 100,5 MHz 30 mVpp … 1 Vpp 100 MS/s	$0{,}05 \cdot 10^{-6}\ t$	t = Measurement value
Time interval	1 ms	10 MHz / 1 Vpp	$0{,}4 \cdot 10^{-6}\ t$	
Time marker	0,5 ns ... 20 s	100 mV … 1 V	$1{,}2 \cdot 10^{-6}\ t$ + 12 ps	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
Risetime	≥ 350 ps	4,4 mV … 3,1 V	37 ps	
Flatness	5 mVpp ... 5 Vpp	≤ 300 MHz	3,10 %	50 Ω, VSWR ≤ 1,6
		> 300 MHz ... 550 MHz	4,00 %	Calibrated to U_{inc}
	5 mVpp ... 3 Vpp	> 550 MHz ... 1,1 GHz	5,10 %	
	5 mVpp ... 5 Vpp	≤ 10 MHz	3,10 %	1 MΩ, C_{in} ≤ 7 pF
		> 10 MHz ... 100 MHz	5,90 %	Calibrated to U_{Load}
		> 100 MHz ... 150 MHz	10,40 %	
		> 150 MHz ... 250 MHz	13,60 %	
Input resistance	50 Ω		0,09 %	
	1 MΩ		0,07 %	
Optical power				
Calibration of fiber optic power measure-ment instruments	-24 dBm … -30 dBm	λ = 850 nm	2,0 %	50 µm Multimode
Absolute power	-22 dBm … -30 dBm	λ = 1300 nm	1,8 %	
	-5 dBm … -30 dBm	λ = 1310 nm	1,2 %	9 µm Singlemode
	-5 dBm … -30 dBm	λ = 1550 nm	1,2 %	
Linearity	-24 dBm … -60 dBm	λ = 850 nm	1,5 %	50 µm Multimode
	-22 dBm … -60 dBm	λ = 1300 nm	1,5 %	
	-5 dBm … -60 dBm	λ = 1310 nm	1,5 %	9 µm Singlemode
	-5 dBm … -60 dBm	λ = 1550 nm	1,6 %	
Calibration of fiber optic sources	0 dBm … -60 dBm	λ = 800 … 900 nm	1,5 %	50 µm Multimode
	-5 dBm … -60 dBm	λ = 1250 … 1350 nm	1,2 %	
Absolute power	-5 dBm … -60 dBm	λ = 1200 … 1650 nm	1,2 %	9 µm Singlemode
	Attenuation range			
Calibration of fiber optic attenuators	0 dB ... 40 dB	λ = 850 nm	1,6 %	50 µm Multimode
	0 dB ... 40 dB	λ = 1300 nm	1,6 %	
	0 dB ... 60 dB	λ = 1310 nm	1,6 %	9 µm Singlemode
Insertion loss	0 dB ... 60 dB	λ = 1550 nm	1,6 %	
Wavelength of sources				
	600 nm ... < 1530 nm	P = +10 … -60 dBm	0,35 nm	
	1530 nm ... 1570 nm		0,08 nm	
	> 1570 nm ... 1750 nm		0,35 nm	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
Calibration of OTDR	Distance:	λ:	Deviation of the distance scale:	Also possible on site [2]
SM-modules	0 km … 100 km	1200 nm … 1650 nm	$3{,}7 \cdot 10^{-5}$ m/m	
			Position offset: 0,70 m	
Scale of attenuation			Deviation of the scale of attenuation:	
	0 dB … 30 dB	1310 nm	0,012 dB/dB	
		1550 nm	0,017 dB/dB	
		1625 nm	0,016 dB/dB	
		1650 nm	0,015 dB/dB	
Temperature				
Thermal calibration				More units possible: °F; K
Fixed-point for ITS-90	0,01 °C	Triple point of water	0,015 °C	
Thermometer with direct display and resistance thermometer	-90 °C … 125 °C	Comparison with a standard platinum resistance thermometer in air in the bloc calibrator	0,026 °C	Also possible in the branches and on site [2], [8]
	> 125 °C … 165 °C		0,09 °C	
	> 165 °C … 300 °C		0,21 °C	
	> 300 °C … 450 °C		0,24 °C	
	> -30 °C … 165 °C	Comparison with a standard platinum resistance thermometer in liquid in the bath	0,11 °C	Also possible in the branches and on site [2], [8]
	-35 °C … <5 °C	Comparison with a standard platinum resistance thermometer in air in the climatic chamber	0,37 °C	
	5 °C … 30 °C		0,25 °C	
	> 30 °C … 45 °C		0,27 °C	
Thermocouple elements				
Type K; Type N	-90 °C … 125 °C	Comparison with a standard platinum resistance thermometer in air in the bloc calibrator	0,28 °C + 0,001•|t|	Also possible in the branches and on site [2], [8]
	> 125 °C … 300 °C		0,26 °C + 0,0017•|t|	
	> 300 °C … 450 °C		0,2 °C + 0,002•|t|	
Type J; Type T	-90 °C … 125 °C		0,25 °C + 0,004•|t|	
	> 125 °C … 300 °C		0,25 °C + 0,005•|t|	
	> 300 °C … 450 °C		0,3 °C + 0,0053•|t|	
Type R; Type S	0 °C … 450 °C		1,0 °C	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

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Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
Type K; Type N	-30 °C … 165 °C	Comparison with a standard platinum resistance thermometer in liquid in the bath	0,3 °C + 0,0012•|t|	Also possible in the branches and on site [2], [8]
Type J; Type T	-30 °C … 165 °C		0,3 °C + 0,0042•|t|	
Type R; Type S	-30 °C … 165 °C		1,0 °C	
Type K; Type N	-35 °C … <5 °C	Comparison with a standard platinum resistance thermometer in air in the climatic chamber	0,5 °C	
	5 °C … 30 °C		0,4 °C	
	> 30 °C … 45 °C		0,4 °C	
Type J; Type T	-35 °C … <5 °C		0,5 °C	
	5 °C … 45 °C		0,4 °C	
Type R; Type S	-35 °C … < 5 °C		0,4 °C	
	5 °C … 45 °C		1.1 °C	
Thermal installations				
(Bloc calibrator, bath)	-90 °C … <-50 °C	With PRT Pt 100	0,065 °C	Also possible in the branches and on site [2]
	-50 °C … 125 °C		0,055 °C	
	> 125 °C … 300 °C		0,21 °C	
	> 300 °C … 450 °C		0,24 °C	
(Ovens, climate chambers) Display deviation from the (reference-) measuring point	-90 °C … -50 °C	With PRT Pt 100	0,31 °C	Also possible on site [2]
	> -50 °C … 125 °C		0,30 °C	
	> 125 °C … 250 °C		0,45 °C	
	> 250 °C … 350 °C	With TC type J	1,22 °C + 0.003•|t|	
Electric calibration				
Measurement of RTD- temperature calibrator	-200 °C … 300 °C	Pt 100	0,01 °C	Also possible in the branches and on site [2]
	300 °C … 800 °C		0,01 °C	
Simulations of RTD-temperature measuring instruments	-200 °C … 0 °C	Pt 100	0,06 °C	
	>0 °C … 100 °C		0,08 °C	
	>100 °C … 630 °C		0,12 °C	
	>630 °C … 800 °C		0,27 °C	
Measurement and simulations of thermocouple measuring instruments and -calibrators	600 °C … 800 °C	Typ B	0,51 °C	Also possible in the branches and on site [2]
	>800 °C … 1820 °C		0,39 °C	
	0 °C … 1000 °C	Typ C	0,36 °C	
	>1000 °C … 1800 °C		0,58 °C	
	>1800 °C … 2316 °C		0,97 °C	

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
	-250 °C … <-100 °C	Typ E	0,58 °C	
	-100 °C … 650 °C		0,19 °C	
	>650 °C … 2100 °C		0,24 °C	
	-210 °C … <-100 °C	Typ J	0,31 °C	
	-100 °C …<-30 °C		0,19 °C	
	-30 °C …<150 °C		0,16 °C	
	150 °C …760 °C		0,20 °C	
	>760 °C … 1200 °C		0,27 °C	
	-210 °C … <-100 °C	Typ K	0,38 °C	
	-100 °C … <-25 °C		0,21 °C	
	-25 °C … 120 °C		0,19 °C	
	>120 °C … 1000 °C		0,30 °C	
	>1000 °C … 1372 °C		0,46 °C	
	-210 °C … <-100 °C	Typ L	0,43 °C	
	-100 °C … 800 °C		0,30 °C	
	>800 … 900 °C		0,20 °C	
	-210 °C … <-100 °C	Typ N	0,46 °C	
	-100 °C … <-25 °C		0,25 °C	
	-25 °C … 410 °C		0,22 °C	
	>410 °C … 1300 °C		0,31 °C	
	0 °C … <250 °C	Typ R	0,66 °C	
	250 °C … 1000 °C		0,40 °C	
	>1000 °C … 1767 °C		0,46 °C	
	0 °C … <250 °C	Typ S	0,54 °C	
	250 °C … 1400 °C		0,43 °C	
	>1400 °C … 1767 °C		0,53 °C	
	-250 °C … <-150 °C	Typ T	0,73 °C	
	-150 °C … <0 °C		0,28 °C	
	0 °C … 400 °C		0,19 °C	
	-200 °C … <0 °C	Typ U	0,65 °C	
	0 °C … 600 °C		0,31 °C	

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SCS-Directory

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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1]	Remarks
Pressure				
Absolute pressure in fluids	13,8 mbar ... 14 bar		0,0035 % + 0,004 mbar	Also other units possible: Pa; psi; mmHg; mmH2O
	> 14 bar ... 70 bar		0,005 %	
	> 70 bar ... 210 bar		0,005 %	
	> 210 bar ... 1000 bar		0,025 %	
Positive and negative gauge pressure in fluids	-900 mbar ... 14 bar		0,0035 %	Also possible on site [2]
	> 14 bar ... 70 bar		0,005 %	
	> 70 bar ... 210 bar		0,005 %	
	> 210 bar ... 1000 bar		0,025 %	
Differential pressure in fluids	-160 mbar ... -77 mbar		0,015 mbar	
	>-77 mbar ... -10 mbar		0,012 % + 0,006 mbar	
	> -10 mbar ... < 10 mbar		0,01 % + 0,006 mbar	
	10 mbar ... <77 mbar		0,012 % + 0,006 mbar	
	77 mbar ... 160 mbar		0,015 mbar	
Manometer of blood pressure monitor	0 … 46,7 kPa	20 °C … 25 °C	0,08 kPa	According to Standards:
	0 … 350 mmHg		0,6 mmHg	SN EN 1060-1 SN EN 1060-2 SN EN 1060-3 EN ISO 81060-1 OMIL R16-1 OMIL R16-2
Magnetic flux density				
Calibration of magnetic field analyzers	0,1 µT … 200 µT	10 Hz ... 1 kHz	1,80 % + 0,12 µT	Also other units possible: A/m; A/cm, Gauss
	0,1 µT … 25 µT	1 kHz … 2 kHz		
	>200 µT … 250 µT	10 Hz ... 1 kHz	1,85 % + 0,12 µT	
Electric field strength				
Calibration of electric field analyzers	0 V/m … 1330 V/m	10 Hz … 1 kHz	1,60 % + 0,12 V/m	
	0 V/m … 293 V/m	1 kHz … 100 kHz		
	1,3 kV/m ... 20 kV/m	50 Hz		

1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.

SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
CDN				
Impedance	0 Ω … 250 Ω	9 kHz … 230 MHz	4,0 Ω	According to SN EN 61000-4-6
Voltage Division Factor	0 dB …60 dB	9 kHz … 230 MHz	0,4 dB	Also possible on site
LISN				
Impedance	0 Ω … 250 Ω	9 kHz … 100 kHz	0,35 Ω	According to CISPR 16-1-2
		>100 kHz … 5 MHz	0,8 Ω	Also possible on site
		>5 MHz … 30 MHz	0,8 Ω	
Phase	-180 ° … 180 °	9 kHz … 100 kHz	2,0 °	
		>100 kHz … 5 MHz	1,0 °	
		>5 MHz … 30 MHz	4,0 °	
Voltage Division Factor		9 kHz … 30 MHz	0,4 dB	
Isolation	40 dB	9 kHz … 20 MHz	1,2 dB	
		>20 MHz … 30 MHz	2,8 dB	
	50 dB	9 kHz … 20 MHz	2,4 dB	
		>20 MHz … 30 MHz	2,8 dB	
	60 dB	25 kHz … 20 MHz	2,2 dB	
		>20 MHz … 30 MHz	2,8 dB	
	70 dB	100 kHz … 3 MHz	1,6 dB	
		>3 MHz … 30 MHz	3,6 dB	
Surge				According to SN EN 61000-4-5
Peak Voltage	0,4 kV … 5 kV		5,4 %	Also possible on site
Peak Current	1 A … 4 kA		5.2 %	
Rise Time Voltage	0,4 µs … 10 µs		22 ns	
Rise Time Current	0,4 µs … 10 µs		100 ns	
Pulse duration Voltage	10 µs … 100 µs		800 ns	
Pulse duration Current	10 µs … 100 µs		100 ns	
Burst				According to SN EN 61000-4-4
Peak Voltage	0,1 kV … 4,2 kV		4,5 %	Also possible on site
Rise Time	2 ns … 1 µs		0,32 ns	

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SCS-Directory

Accreditation number: SCS 0058

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty ± [1)]	Remarks
Pulse duration	5 ns … 1 µs		1,1 ns	
Burst duration	2 ms … 20 ms	5 kHz Pulse	2 ms	
	0,2 … 20 ms	100 kHz Pulse	0,2 ms	
Burst period	10 ms … 500 ms		20 ms	
NSA Of semi-anechoic chambers				According to CISPR 16-1-4: 2020
	30 MHz … <59 MHz		3.29 dB	Only possible on site.
	59 MHz … < 85 MHz		2.74 dB	
	85 MHz … < 200 MHz		2.17 dB	
	200 MHz … 1000 MHz		2.03 dB	
Site VSWR Of semi-anechoic chambers				According to CISPR 16-1-4: 2020
	1 GHz … 6 GHz		1.20 dB	Only possible on site.
	> 6 GHz … 12 GHz		1.43 dB	
	> 12 GHz … 18 GHz		1.53 dB	

The dimensionless parts of the measurement uncertainty are relative values, referred to the measured value.

Notes and limitations:

2) Calibration on site with larger measurement uncertainties

3) in Gümligen up to 35 kV, in Fehraltorf and on site up to 50 kV

4) in Gümligen up to 12 kV, in Fehraltorf and on site up to 50 kV

5) in the branches and on site up to 5 TΩ possible

6) in Gümligen up to 30 kV, in Fehraltorf and on site up to 100 kV

7) in Gümligen up to 20 kV, in Fehraltorf and on site up to 100 kV (Generator should be available on site)

8) in the branches and on site: -30 °C … 165 °C

In case of contradictions in the language versions of the directories, the German version shall apply.

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1) The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, witch corresponds to a confidence level of about 95% for a normal distribution.