



Organisme belge d'Accréditation
Belgische Accreditatieinstelling
Belgische Akkreditierungsstelle
Belgian Accreditation Body

Signatory to EA, ILAC and IAF
Multilateral Agreements

Accreditation Certificate No. 004-CAL

In compliance with the provisions of the Royal Decree of 31 January 2006 setting up BELAC, the Accreditation Board hereby declares, that the calibration laboratory

TRESCAL NV
Vosstraat, 200
2600 BERCHEM - Belgium

has the competence to perform the calibrations as described in the annex which is an integral part of the present certificate, in accordance with the requirements of the standard EN ISO/IEC 17025:2005. The present accreditation is the subject of regular surveillance in order to confirm the compliance with the accreditation conditions.

The Chair of the Accreditation Board BELAC,

Nicole MEURÉE-VANLAETHEM

Issue date : **2018-10-11**

Validity date : **2023-04-21**

Original version of this certificate is in Dutch.



Bijlage bij accreditatie-certificaat
Annexe au certificat d'accréditation
Annex to the accreditation certificate
Beilage zur Akkreditierungszertifikat

004-CAL

EN ISO/IEC 17025:2005

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Nicole Meurée-Vanlaethem

Voorzitster van het Accreditatiebureau
La Présidente du Bureau d'Accréditation
Chair of the Accreditation Board
Vorsitzende des Akkreditierungsbüro

**De accreditatie werd uitgereikt aan/ L'accréditation est délivrée à/
The accreditation is granted to/ Die akkreditierung wurde erteilt für:**

**TRESCAL nv
Vosstraat, 200
2600 BERCHEM**

**Voor activiteiten uitgevoerd door/ Pour des activités exécutés par/
For activities performed by/ Die tätigkeiten werden durchgeführt von:**

locatie 1	BERCHEM	Vosstraat, 200 2600 Berchem
locatie 2	WELLIN	Rue Jean Meunier, 2 6920 Halma (Wellin)

Secrétariat:
**Service public fédéral, Economie,
P.M.E., Classes moyennes et Energie**
Direction générale de la Qualité et de la Sécurité
Division Qualité et Innovation
Bd du Roi Albert II, 16 - 5^{ème} étage - B-1000 Bruxelles
Website: <http://economie.fgov.be>
Numéro d'entreprise: 0314.595.348

Accréditation B E L A C Accreditation

Tél: +32 2 277 54 34
Fax: +32 2 277 54 41
Internet: <http://belac.fgov.be>
E-Mail: Belac@economie.fgov.be

Secretariaat:
**Federale Overheidsdienst, Economie,
K.M.O., Middenstand en Energie**
Algemene Directie Kwaliteit en Veiligheid
Afdeling Kwaliteit en Innovatie
Koning Albert II-laan 16 - 5^{de} verd. - B-1000 Brussel
Website: <http://economie.fgov.be>
Ondernemingsnummer: 0314.595.348

.be

ELEKTRICAL (Berchem, In House or In Situ)

1.1.1 Direct voltage

Measure

Measuring range or point	Frequency	CMC (95%)	Remark
± 100 mV	DC	$5,0 \times 10^{-6} \times U$	<ul style="list-style-type: none"> • Transfer standard in "30 day" loop • Fixed points • positive /negative • measuring
± 1 V	DC	$2,7 \times 10^{-6} \times U$	
± 10 V	DC	$2,1 \times 10^{-6} \times U$	
± 19 V	DC	$2,3 \times 10^{-6} \times U$	
± 100 V	DC	$3,0 \times 10^{-6} \times U$	
± 1000 V	DC	$3,0 \times 10^{-6} \times U$	

Measuring range or point	Frequency	CMC (95%)	Remark
0 mV to 200 mV	DC	$7,0 \times 10^{-6} \times U$ or $0,1 \mu V^1$	<ul style="list-style-type: none"> • measure • positive / negative
0,2 V to 2 V	DC	$5,0 \times 10^{-6} \times U$	
2 V to 20 V	DC	$4,5 \times 10^{-6} \times U$	
20 V to 200 V	DC	$5,5 \times 10^{-6} \times U$	
200 V to 1000 V	DC	$5,5 \times 10^{-6} \times U$	
1 kV to 75 kV	DC	$3,0 \times 10^{-4} \times U$	Measure
0,2 V to 11 V	DC	$5,0 \times 10^{-6} \times U$	Loop calibration

¹ Whichever is greater

Generate

Generating range or point	Frequency	CMC (95%)	Remark
0 mV to 200 mV	DC	$18 \times 10^{-6} \times U$ or $0,5 \mu V^1$	<ul style="list-style-type: none"> • generate • positive / negative
0,2 V to 2 V	DC	$8,0 \times 10^{-6} \times U$	
2 V to 20 V	DC	$4,5 \times 10^{-6} \times U$	
20 V to 200 V	DC	$7,0 \times 10^{-6} \times U$	
200 V to 1100 V	DC	$10 \times 10^{-6} \times U$	
1,1 kV - 40 kV	DC	$3,0 \times 10^{-4} \times U$	Generate
0,2 V to 11 V	DC	$8,0 \times 10^{-6} \times U$	Loop calibration

¹ Whichever is greater

1.1.2 Direct current

Measure

Measuring range or point	Frequency	CMC (95%)	Remark
±100 μA	DC	$24 \times 10^{-6} \times I$	<ul style="list-style-type: none"> • Transfer standard in "30 day" loop • Fixed points • positive / negative • Measurement
±1 mA	DC	$16 \times 10^{-6} \times I$	
±10 mA	DC	$16 \times 10^{-6} \times I$	
±100 mA	DC	$19 \times 10^{-6} \times I$	
±1 A	DC	$31 \times 10^{-6} \times I$	
±10 A	DC	$60 \times 10^{-6} \times I$	

Measuring range or point	Frequency	CMC (95%)	Remark
0 μA to 200 μA	DC	$12 \times 10^{-6} \times I$ or $0,5 nA^1$	<ul style="list-style-type: none"> • measure • in the lowest possible range • positive / negative
0,2 mA to 2 mA	DC	$11 \times 10^{-6} \times I$	
2 mA to 20 mA	DC	$9,0 \times 10^{-6} \times I$	
20 mA to 200 mA	DC	$16 \times 10^{-6} \times I$	
0,2 A to 2 A	DC	$90 \times 10^{-6} \times I$	
2 A to 20 A	DC	$90 \times 10^{-6} \times I$	Loop calibration
0,2 mA to 24 mA	DC	$16 \times 10^{-6} \times I$	

¹ Whichever is greater

Calibration of current clamps

Measuring range or point	Frequency	CMC (95%)	Remark
20 A - 1000 A	DC	$5,0 \times 10^{-3} \times I$	• with current coils

Generate

Generating range or point	Frequency	CMC (95%)	Remark
0 μ A to 20 μ A	DC	1,5 nA	• generate • positive / negative
20 μ A to 200 μ A	DC	$1,7 \times 10^{-4} \times I$	
0,2 mA to 200 mA	DC	$0,7 \times 10^{-4} \times I$	
0,2 A to 2 A	DC	$1,9 \times 10^{-4} \times I$	
2 A to 11 A	DC	$2,7 \times 10^{-4} \times I$	
11 A to 20 A	DC	$6,0 \times 10^{-4} \times I$	
0,2 mA to 24 mA	DC	$0,7 \times 10^{-4} \times I$	Loop calibration

1.1.3 Alternating voltage

Measure

Measuring range or point	Frequency	CMC (95%)	Remark
1 mV	20 Hz to 20 kHz	$3,0 \times 10^{-4} \times U + 2 \mu\text{V}$	• Transfer standard in "30 day" loop • Fixed points • measuring
	30 kHz & 50 kHz	$4,0 \times 10^{-4} \times U + 2 \mu\text{V}$	
	100 kHz	$6,5 \times 10^{-4} \times U + 2 \mu\text{V}$	
10 mV	20 Hz to 20 kHz	$1,7 \times 10^{-4} \times U + 2 \mu\text{V}$	
	30 kHz & 50 kHz	$2,5 \times 10^{-4} \times U + 2 \mu\text{V}$	
	100 kHz	$4,5 \times 10^{-4} \times U + 2 \mu\text{V}$	
100 mV	20 Hz to 20 kHz	$1,2 \times 10^{-4} \times U + 2 \mu\text{V}$	
	30 kHz & 50 kHz	$2,0 \times 10^{-4} \times U + 2 \mu\text{V}$	
	100 kHz	$4,0 \times 10^{-4} \times U + 2 \mu\text{V}$	
1 V	10 Hz to 30 Hz	$4,0 \times 10^{-5} \times U$	
	40 Hz to 30 kHz	$3,0 \times 10^{-5} \times U$	
	50 kHz	$4,0 \times 10^{-5} \times U$	
	100 kHz	$5,0 \times 10^{-5} \times U$	
	300 kHz	$12 \times 10^{-5} \times U$	
	500 kHz	$25 \times 10^{-5} \times U$	
10 V	1 MHz	$60 \times 10^{-5} \times U$	
	10 Hz to 30 Hz	$4,0 \times 10^{-5} \times U$	
	40 Hz to 30 kHz	$3,0 \times 10^{-5} \times U$	
	50 kHz	$3,5 \times 10^{-5} \times U$	
	100 kHz	$4,0 \times 10^{-5} \times U$	
	300 kHz	$11 \times 10^{-5} \times U$	
19 V	500 kHz	$22 \times 10^{-5} \times U$	
	1 MHz	$60 \times 10^{-5} \times U$	
	1 kHz	$4,0 \times 10^{-5} \times U$	
	100 V	10 Hz to 30 Hz	$4,5 \times 10^{-5} \times U$
		40 Hz & 55 Hz	$4,0 \times 10^{-5} \times U$
		300 Hz to 20 kHz	$3,0 \times 10^{-5} \times U$
30 kHz		$3,5 \times 10^{-5} \times U$	
50 kHz		$4,5 \times 10^{-5} \times U$	
100 kHz		$7,4 \times 10^{-5} \times U$	
1000 V	40 Hz to 1 kHz	$4,0 \times 10^{-5} \times U$	
	10 kHz	$4,5 \times 10^{-5} \times U$	
	20 kHz	$5,0 \times 10^{-5} \times U$	
	30 kHz	$7,5 \times 10^{-5} \times U$	
700 V	50 kHz	$13 \times 10^{-5} \times U$	
	100 kHz	$35 \times 10^{-5} \times U$	

Measuring range or point	Frequency	CMC (95%)	Remark
0,7 mV to 2,2 mV	10 Hz to 20 Hz	$17 \times 10^{-4} \times U + 1,3 \mu\text{V}$	• measure
	20 Hz to 40 Hz	$7,4 \times 10^{-4} \times U + 1,3 \mu\text{V}$	
	40 Hz to 20 kHz	$4,2 \times 10^{-4} \times U + 1,3 \mu\text{V}$	
	20 kHz to 50 kHz	$8,2 \times 10^{-4} \times U + 2 \mu\text{V}$	
	50 kHz to 100 kHz	$12 \times 10^{-4} \times U + 2,5 \mu\text{V}$	
	100 kHz to 300 kHz	$23 \times 10^{-4} \times U + 4 \mu\text{V}$	
	300 kHz to 500 kHz	$26 \times 10^{-4} \times U + 8 \mu\text{V}$	
	500 kHz to 1 MHz	$50 \times 10^{-4} \times U + 8 \mu\text{V}$	
2 mV to 7 mV	10 Hz to 20 Hz	$8,5 \times 10^{-4} \times U + 1,3 \mu\text{V}$	• measure
	20 Hz to 40 Hz	$3,7 \times 10^{-4} \times U + 1,3 \mu\text{V}$	
	40 Hz to 20 kHz	$2,1 \times 10^{-4} \times U + 1,3 \mu\text{V}$	
	20 kHz to 50 kHz	$4,1 \times 10^{-4} \times U + 2 \mu\text{V}$	
	50 kHz to 100 kHz	$6,1 \times 10^{-4} \times U + 2,5 \mu\text{V}$	
	100 kHz to 300 kHz	$12 \times 10^{-4} \times U + 4 \mu\text{V}$	
	300 kHz to 500 kHz	$14 \times 10^{-4} \times U + 8 \mu\text{V}$	
	500 kHz to 1 MHz	$36 \times 10^{-4} \times U + 8 \mu\text{V}$	
7 mV to 22 mV	10 Hz to 20 Hz	$2,9 \times 10^{-4} \times U + 1,3 \mu\text{V}$	• measure
	20 Hz to 40 Hz	$1,9 \times 10^{-4} \times U + 1,3 \mu\text{V}$	
	40 Hz to 20 kHz	$1,1 \times 10^{-4} \times U + 1,3 \mu\text{V}$	
	20 kHz to 50 kHz	$2,1 \times 10^{-4} \times U + 2 \mu\text{V}$	
	50 kHz to 100 kHz	$3,1 \times 10^{-4} \times U + 2,5 \mu\text{V}$	
	100 kHz to 300 kHz	$8,2 \times 10^{-4} \times U + 4 \mu\text{V}$	
	300 kHz to 500 kHz	$10 \times 10^{-4} \times U + 8 \mu\text{V}$	
	500 kHz to 1 MHz	$26 \times 10^{-4} \times U + 8 \mu\text{V}$	
22 mV to 70 mV	10 Hz to 20 Hz	$2,4 \times 10^{-4} \times U + 1,5 \mu\text{V}$	• measure
	20 Hz to 40 Hz	$1,3 \times 10^{-4} \times U + 1,5 \mu\text{V}$	
	40 Hz to 20 kHz	$0,69 \times 10^{-4} \times U + 1,5 \mu\text{V}$	
	20 kHz to 50 kHz	$1,3 \times 10^{-4} \times U + 2 \mu\text{V}$	
	50 kHz to 100 kHz	$2,6 \times 10^{-4} \times U + 2,5 \mu\text{V}$	
	100 kHz to 300 kHz	$5,3 \times 10^{-4} \times U + 4 \mu\text{V}$	
	300 kHz to 500 kHz	$6,8 \times 10^{-4} \times U + 8 \mu\text{V}$	
	500 kHz to 1 MHz	$13 \times 10^{-4} \times U + 8 \mu\text{V}$	
70 mV to 220 mV	10 Hz to 20 Hz	$21 \times 10^{-5} \times U + 1,5 \mu\text{V}$	• measure
	20 Hz to 40 Hz	$8,7 \times 10^{-5} \times U + 1,5 \mu\text{V}$	
	40 Hz to 20 kHz	$4,3 \times 10^{-5} \times U + 1,5 \mu\text{V}$	
	20 kHz to 50 kHz	$7,3 \times 10^{-5} \times U + 2 \mu\text{V}$	
	50 kHz to 100 kHz	$16 \times 10^{-5} \times U + 2,5 \mu\text{V}$	
	100 kHz to 300 kHz	$28 \times 10^{-5} \times U + 4 \mu\text{V}$	
	300 kHz to 500 kHz	$40 \times 10^{-5} \times U + 8 \mu\text{V}$	
	500 kHz to 1 MHz	$120 \times 10^{-5} \times U + 8 \mu\text{V}$	
220 mV to 700 mV	10 Hz to 20 Hz	$21 \times 10^{-5} \times U + 1,5 \mu\text{V}$	• measure
	20 Hz to 40 Hz	$8,7 \times 10^{-5} \times U + 1,5 \mu\text{V}$	
	40 Hz to 20 kHz	$3,8 \times 10^{-5} \times U + 1,5 \mu\text{V}$	
	20 kHz to 50 kHz	$5,6 \times 10^{-5} \times U + 2 \mu\text{V}$	
	50 kHz to 100 kHz	$8,4 \times 10^{-5} \times U + 2,5 \mu\text{V}$	
	100 kHz to 300 kHz	$21 \times 10^{-5} \times U + 4 \mu\text{V}$	
	300 kHz to 500 kHz	$34 \times 10^{-5} \times U + 8 \mu\text{V}$	
	500 kHz to 1 MHz	$120 \times 10^{-5} \times U + 8 \mu\text{V}$	

0,7 V to 2,2 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$6,9 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$2,9 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$5,2 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$7,6 \times 10^{-5} \times U$	
	100 kHz to 300 kHz	$20 \times 10^{-5} \times U$	
	300 kHz to 500 kHz	$31 \times 10^{-5} \times U$	
	500 kHz to 1 MHz	$120 \times 10^{-5} \times U$	
2,2 V to 7 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$7,0 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$2,9 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$5,3 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$8,8 \times 10^{-5} \times U$	
	100 kHz to 300 kHz	$22 \times 10^{-5} \times U$	
	300 kHz to 500 kHz	$47 \times 10^{-5} \times U$	
	500 kHz to 1 MHz	$150 \times 10^{-5} \times U$	
7 V to 22 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$7,0 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$3,1 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$5,3 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$8,5 \times 10^{-5} \times U$	
	100 kHz to 300 kHz	$22 \times 10^{-5} \times U$	
	300 kHz to 500 kHz	$47 \times 10^{-5} \times U$	
	500 kHz to 1 MHz	$150 \times 10^{-5} \times U$	
22 V to 70 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$7,2 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$3,9 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$6,3 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$11 \times 10^{-5} \times U$	
	100 kHz to 300 kHz	$22 \times 10^{-5} \times U$	
	300 kHz to 500 kHz	$51 \times 10^{-5} \times U$	
	500 kHz to 1 MHz	$150 \times 10^{-5} \times U$	
70 V to 220 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$7,2 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$3,8 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$7,7 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$11 \times 10^{-5} \times U$	
	100 kHz to 300 kHz	$26 \times 10^{-5} \times U$	
	300 kHz to 500 kHz	$70 \times 10^{-5} \times U$	
220 V to 700 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$11 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$4,7 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$15 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$85 \times 10^{-5} \times U$	
700 V to 1000 V	10 Hz to 20 Hz	$20 \times 10^{-5} \times U$	• measure
	20 Hz to 40 Hz	$11 \times 10^{-5} \times U$	
	40 Hz to 20 kHz	$4,4 \times 10^{-5} \times U$	
	20 kHz to 50 kHz	$15 \times 10^{-5} \times U$	
	50 kHz to 100 kHz	$85 \times 10^{-5} \times U$	
1 kV to 53 kV	50 Hz	$3,0 \times 10^{-3} \times U$	• measure

Generate

Generating range or point	Frequency	CMC (95%)	Remark
2 mV to 20 mV	1 kHz to 10 kHz	$7,0 \times 10^{-4} \times U$	• generate
	10 kHz to 100 kHz	$11 \times 10^{-4} \times U$	
20 mV to 200 mV	10 Hz to 300 Hz	$2,1 \times 10^{-4} \times U$	• generate
	300 Hz to 10 kHz	$1,8 \times 10^{-4} \times U$	
	10 kHz to 30 kHz	$2,8 \times 10^{-4} \times U$	
	30 kHz to 100 kHz	$6,1 \times 10^{-4} \times U$	
0,2 V to 2 V	10 Hz to 300 Hz	$1,6 \times 10^{-4} \times U$	• generate
	300 Hz to 1 kHz	$1,1 \times 10^{-4} \times U$	
	1 kHz to 30 kHz	$0,7 \times 10^{-4} \times U$	
	30 kHz to 100 kHz	$1,6 \times 10^{-4} \times U$	
	100 kHz to 300 kHz	$6,0 \times 10^{-4} \times U$	
	300 kHz to 1 MHz	$30 \times 10^{-4} \times U$	
2 V to 20 V	10 Hz to 300 Hz	$1,6 \times 10^{-4} \times U$	• generate
	300 Hz to 1 kHz	$1,0 \times 10^{-4} \times U$	
	1 kHz to 10 kHz	$0,8 \times 10^{-4} \times U$	
	10 kHz to 30 kHz	$0,7 \times 10^{-4} \times U$	
	30 kHz to 100 kHz	$1,7 \times 10^{-4} \times U$	
	100 kHz to 300 kHz	$6,0 \times 10^{-4} \times U$	
	300 kHz to 1 MHz	$30 \times 10^{-4} \times U$	
20 V to 200 V	10 Hz to 300 Hz	$1,6 \times 10^{-4} \times U$	• generate
	300 Hz to 1 kHz	$1,2 \times 10^{-4} \times U$	
	1 kHz to 10 kHz	$1,0 \times 10^{-4} \times U$	
	10 kHz to 30 kHz	$1,1 \times 10^{-4} \times U$	
	30 kHz to 100 kHz	$2,1 \times 10^{-4} \times U$	
200 V to 1000 V	40 Hz to 300 Hz	$2,3 \times 10^{-4} \times U$	• generate
	300 Hz to 1 kHz	$2,3 \times 10^{-4} \times U$	
	1 kHz to 10 kHz	$1,7 \times 10^{-4} \times U$	
	10 kHz to 30 kHz	$2,2 \times 10^{-4} \times U$	
200 V to 750 V	30 kHz to 100 kHz	$15 \times 10^{-4} \times U$	• generate
1 kV to 45 kV	50 Hz	$3,0 \times 10^{-3} \times U$	• generate

1.1.4 Alternating current

Measure

Measuring range or point	Frequency	CMC (95%)	Remark
100 μ A	10 Hz to 30 Hz	$1,4 \times 10^{-4} \times I$	<ul style="list-style-type: none"> • Transfer standard in "30 day" loop • Fixed points • Measurement
	40 Hz to 1 kHz	$1,1 \times 10^{-4} \times I$	
	5 kHz	$1,7 \times 10^{-4} \times I$	
1 mA	10 Hz to 30 Hz	$1,3 \times 10^{-4} \times I$	
	40 Hz to 1 kHz	$1,0 \times 10^{-4} \times I$	
	5 kHz	$1,5 \times 10^{-4} \times I$	
10 mA	10 Hz to 30 Hz	$1,3 \times 10^{-4} \times I$	
	40 Hz to 1 kHz	$1,0 \times 10^{-4} \times I$	
	5 kHz	$1,5 \times 10^{-4} \times I$	
100 mA	10 Hz to 30 Hz	$1,3 \times 10^{-4} \times I$	
	40 Hz to 1 kHz	$1,0 \times 10^{-4} \times I$	
	5 kHz	$1,5 \times 10^{-4} \times I$	
1 A	10 Hz to 30 Hz	$1,8 \times 10^{-4} \times I$	
	40 Hz to 1 kHz	$1,2 \times 10^{-4} \times I$	
	5 kHz	$2,3 \times 10^{-4} \times I$	
10 A	40 Hz	$3,0 \times 10^{-4} \times I$	
	50 Hz to 1 kHz	$2,9 \times 10^{-4} \times I$	
	5 kHz	$4,0 \times 10^{-4} \times I$	
	10 kHz	$7,0 \times 10^{-4} \times I$	

Measuring range or point	Frequency	CMC (95%)	Remark
5 μ A to 200 μ A	10 Hz to 5 kHz	$1,6 \times 10^{-4} \times I$	<ul style="list-style-type: none"> • measure
	5 kHz to 10 kHz	$5,0 \times 10^{-4} \times I$	
0,2 mA to 2 mA	10 Hz to 5 kHz	$0,6 \times 10^{-4} \times I$	
	5 kHz to 10 kHz	$1,3 \times 10^{-4} \times I$	
2 mA to 20 mA	10 Hz to 5 kHz	$1,0 \times 10^{-4} \times I$	
	5 kHz to 10 kHz	$5,0 \times 10^{-4} \times I$	
20 mA to 200 mA	10 Hz to 1 kHz	$1,0 \times 10^{-4} \times I$	
	1 kHz to 10 kHz	$26 \times 10^{-4} \times I$	
0,2 A to 2 A	10 Hz to 1 kHz	$1,0 \times 10^{-4} \times I$	
	1 kHz to 10 kHz	$4,0 \times 10^{-4} \times I$	
2 A to 20 A	10 Hz to 1 kHz	$1,0 \times 10^{-4} \times I$	
	1 kHz to 5 kHz	$3,0 \times 10^{-4} \times I$	
	5 kHz to 10 kHz	$10 \times 10^{-4} \times I$	

Calibration of current clamps

Measuring range or point	Frequency	CMC (95%)	Remark
20 A to 1000 A	45 Hz to 440 Hz	$5,0 \times 10^{-3} \times I$	• with current coils

Generate

Generating range or point	Frequency	CMC (95%)	Remark
20 µA to 200 µA	10 Hz to 1 kHz	$4,0 \times 10^{-4} \times I$	<ul style="list-style-type: none"> • generate • in the lowest range possible
	1 kHz to 5 kHz	$6,0 \times 10^{-4} \times I$	
0,2 mA to 2 mA	10 Hz to 1 kHz	$3,2 \times 10^{-4} \times I$	
	1 kHz to 5 kHz	$4,0 \times 10^{-4} \times I$	
2 mA to 20 mA	10 Hz to 1 kHz	$3,1 \times 10^{-4} \times I$	
	1 kHz to 5 kHz	$4,1 \times 10^{-4} \times I$	
20 mA to 200 mA	10 Hz to 1 kHz	$3,1 \times 10^{-4} \times I$	
	1 kHz to 5 kHz	$4,0 \times 10^{-4} \times I$	
0,2 A to 2 A	10 Hz to 1 kHz	$6,0 \times 10^{-4} \times I$	
	1 kHz to 5 kHz	$7,1 \times 10^{-4} \times I$	
2 A to 10 A	10 Hz to 1 kHz	$6,1 \times 10^{-4} \times I$	
	1 kHz to 5 kHz	$12 \times 10^{-4} \times I$	
	5 kHz to 10 kHz	$34 \times 10^{-4} \times I$	
10 A to 20 A	45 Hz to 100 Hz	$17 \times 10^{-4} \times I$	
	100 Hz to 1 kHz	$20 \times 10^{-4} \times I$	

1.1.5 Power and Energy

Measuring range or point	Frequency	CMC (95%)	Remark
Mono phase , direct without measuring clamps			
33 mV to 1000 V / 0,33 mA to 330 mA	DC	$3,0 \times 10^{-4} \times P$	11 µW to 330 W generate
33 mV to 1000 V / 0,33 A to 3,3 A	DC	$5,0 \times 10^{-4} \times P$	3,3 kW generate
33 mV to 1000 V / 3,3 A to 10,5 A	DC	$6,0 \times 10^{-4} \times P$	10,5 kW generate
33 mV to 1000 V / 10,5 A to 20,5 A	DC	$11 \times 10^{-4} \times P$	20,5 kW generate
33 mV to 1000 V / 0,1 mA to 20,5A	45 Hz to 1 kHz	$15 \times 10^{-4} \times P$	3,3 µW to 20,5 kW / kVA(r) generate cosphi/sinphi > 0,5
33 mV to 1000 V / 0,1 mA to 20,5A	45 Hz to 1 kHz	$40 \times 10^{-4} \times P$	3,3 µW to 20,5 kW / kVA(r) generate cosphi/sinphi > 0,25
Mono phase , direct with measuring clamps			
33 mV to 1000 V / 20 A to 500 A	DC	$1,0 \times 10^{-4} \times P$	0,66 W to 500 kW / kVA(r) generate
33 mV to 1000 V / 20 A to 500 A	45 Hz to 100 Hz	$1,1 \times 10^{-3} \times P$	0,66 W to 500 kW / kVA(r) generate cosphi/sinphi > 0,25
33 mV to 1000 V / 20 A to 500 A	100 Hz to 440 Hz	$16 \times 10^{-3} \times P$	0,66 W to 500 kW / kVA(r) generate cosphi/sinphi > 0,25
3-phase, direct without measuring clamps			
1 V to 300 V / 0,3 A to 100 A	50 Hz & 60 Hz	$2,0 \times 10^{-3} \times P$	0,3 W to 30 kW / kVA(r) generate cosphi/sinphi > 0,5
1 V to 300 V / 0,3 A to 100 A	50 Hz & 60 Hz	$4,0 \times 10^{-3} \times P$	0,3 W to 30 kW / kVA(r) generate cosphi/sinphi > 0,25
1 V to 1000 V / 0,3 A to 100 A	10 Hz to 1 kHz	$2,0 \times 10^{-3} \times P$	0,3 W to 100 kW / kVA(r) measure cosphi/sinphi > 0,5
1 V to 1000 V / 0,3 A to 100 A	10 Hz to 1 kHz	$4,0 \times 10^{-3} \times P$	0,3 W to 100 kW / kVA(r) measure cosphi/sinphi > 0,25
3-phase, direct with measuring clamps			
1 V to 300 V / 20 A to 500 A	50 Hz & 60 Hz	$11 \times 10^{-3} \times P$	20 W to 150 kW / kVA(r) generate cosphi/sinphi > 0,25
1 V to 1000 V / 20 A to 100 A	15 Hz to 440 Hz	$16 \times 10^{-3} \times P$	20 W to 100 kW / kVA(r) measure cosphi/sinphi > 0,25

Phase / phase angle			
Cosphi/sinphi -1 to 1	10 Hz to 1 kHz	0,000 40	measure / generate
Phase angle -180 to 180 °	10 Hz to 1 kHz	0,02°	measure / generate
P indicates active,reactive as well as apparent power.			

RF Power

Range amplitude	Frequency	CMC (95%)	Remark
-67 dBm to -19 dBm	20 kHz to 100 MHz	0,056 dB	• measure
	100 MHz to 4 GHz	0,047 dB	
	4 GHz to 6 GHz	0,048 dB	
-19 dBm to 1 dBm	20 kHz to 100 MHz	0,066 dB	• measure
	100 MHz to 4 GHz	0,058 dB	
	4 GHz to 6 GHz	0,063 dB	
1 dBm to 23 dBm	20 kHz to 100 MHz	0,083 dB	• measure
	100 MHz to 4 GHz	0,072 dB	
	4 GHz to 6 GHz	0,082 dB	
24 dBm to 20 dBm	10 Hz to 20 kHz	0,050 dB	• generate
	20 kHz to 100 kHz	0,050 dB	
	100 kHz to 10 MHz	0,050 dB	
	10 MHz to 125 MHz	0,050 dB	
20 dBm to 14 dBm	10 Hz to 20 kHz	0,050 dB	• generate
	20 kHz to 100 kHz	0,050 dB	
	100 kHz to 10 MHz	0,050 dB	
	10 MHz to 125 MHz	0,050 dB	
	125 MHz to 300 MHz	0,10 dB	
	300 MHz to 1,4 GHz	0,25 dB	
14 dBm to -17 dBm	10 Hz to 20 kHz	0,050 dB	• generate
	20 kHz to 100 kHz	0,050 dB	
	100 kHz to 10 MHz	0,050 dB	
	10 MHz to 125 MHz	0,050 dB	
	125 MHz to 300 MHz	0,10 dB	
	300 MHz to 1,4 GHz	0,25 dB	
	1,4 GHz to 3 GHz	0,30 dB	
	3 GHz to 4 GHz	0,50 dB	
-17 dBm to -48 dBm	10 Hz to 20 kHz	0,050 dB	• generate
	20 kHz to 100 kHz	0,050 dB	
	100 kHz to 10 MHz	0,050 dB	
	10 MHz to 125 MHz	0,050 dB	
	125 MHz to 300 MHz	0,10 dB	
	300 MHz to 1,4 GHz	0,50 dB	
	1,4 GHz to 3 GHz	0,50 dB	
	3 GHz to 4 GHz	0,50 dB	
-48 dBm to -74 dBm	100 kHz to 10 MHz	0,20 dB	• generate
	10 MHz to 125 MHz	0,20 dB	
	125 MHz to 300 MHz	0,20 dB	
	300 MHz to 1,4 GHz	0,50 dB	
	1,4 GHz to 3 GHz	0,50 dB	
	3 GHz to 4 GHz	0,50 dB	
-74 dBm to -84 dBm	100 kHz to 10 MHz	0,50 dB	• generate
	10 MHz to 125 MHz	0,50 dB	
	125 MHz to 300 MHz	0,50 dB	
	300 MHz to 1,4 GHz	1,0 dB	
	1,4 GHz to 3 GHz	1,0 dB	
	3 GHz to 4 GHz	1,0 dB	

-84 dBm to -94 dBm	100 kHz to 10 MHz	0,50 dB	• generate
	10 MHz to 125 MHz	0,50 dB	
	125 MHz to 300 MHz	0,50 dB	
	300 MHz to 1,4 GHz	1,0 dB	
	1,4 GHz to 3 GHz	1,0 dB	
-94 dBm to -124 dBm	100 kHz to 10 MHz	1,5 dB	• generate
	10 MHz to 125 MHz	1,5 dB	
	125 MHz to 300 MHz	1,5 dB	
	300 MHz to 1,4 GHz	1,5 dB	
	1,4 GHz to 3 GHz	1,5 dB	

1.1.6 Impedance (DC/LF)

Measure

Measuring range or point	Frequency	CMC (95%)	Remark
1 Ω	DC	$11 \times 10^{-6} \times R$	<ul style="list-style-type: none"> • Transfer standard in "30 day" loop • Fixed points • Measuring • 4-wire resistance measurement • Negligible dissipated power
10 Ω	DC	$9,5 \times 10^{-6} \times R$	
100 Ω	DC	$6,5 \times 10^{-6} \times R$	
1 k Ω	DC	$4,5 \times 10^{-6} \times R$	
10 k Ω	DC	$4,5 \times 10^{-6} \times R$	
100 k Ω	DC	$7,5 \times 10^{-6} \times R$	
1 M Ω	DC	$14 \times 10^{-6} \times R$	
10 M Ω	DC	$25 \times 10^{-6} \times R$	
100 M Ω	DC	$200 \times 10^{-6} \times R$	

Measuring range or point	Frequency	CMC (95%)	Remark
0 Ω to 2 Ω	DC	$18 \times 10^{-6} \times R$ or $20 \mu\Omega^1$	<ul style="list-style-type: none"> • measure • 4-wire resistance measurement • negligible dissipated power
2 Ω to 20 Ω	DC	$3,1 \times 10^{-6} \times R$	
20 Ω to 200 Ω	DC	$5,5 \times 10^{-6} \times R$	
0,2 k Ω to 2 k Ω	DC	$2,6 \times 10^{-6} \times R$	
2 k Ω to 20 k Ω	DC	$5,0 \times 10^{-6} \times R$	
20 k Ω to 200 k Ω	DC	$6,3 \times 10^{-6} \times R$	
0,2 M Ω to 2 M Ω	DC	$6,0 \times 10^{-6} \times R$	
2 M Ω to 20 M Ω	DC	$11 \times 10^{-6} \times R$	
20 M Ω to 200 M Ω	DC	$60 \times 10^{-6} \times R$	
200 M Ω to 2 G Ω	DC	$1,2 \times 10^{-3} \times R$	

¹ Whichever is greater

Generate

Generating range or point	Frequency	CMC (95%)	Remark
0 Ω	DC	100 μΩ	<ul style="list-style-type: none"> • generate • fixed points • 4-wire resistance • Negligible dissipated power in the lowest range possible
10 Ω	DC	$39 \times 10^{-6} \times R$	
100 Ω	DC	$13 \times 10^{-6} \times R$	
1 kΩ	DC	$16 \times 10^{-6} \times R$	
10 kΩ	DC	$14 \times 10^{-6} \times R$	
100 kΩ	DC	$14 \times 10^{-6} \times R$	
1 MΩ	DC	$36 \times 10^{-6} \times R$	
10 MΩ	DC	$65 \times 10^{-6} \times R$	
100 MΩ	DC	$340 \times 10^{-6} \times R$	
10 Ω	DC	$0,6 \times 10^{-6} \times R$	
25 Ω	DC	$0,6 \times 10^{-6} \times R$	
100 Ω	DC	$0,6 \times 10^{-6} \times R$	
378 Ω	DC	$2,0 \times 10^{-6} \times R$	<ul style="list-style-type: none"> • generate • standard resistors • also combinations of these resistors¹ • 4- wire resistance
10 Ω	75 Hz	$3,0 \times 10^{-6} \times R$	
25 Ω	75 Hz	$1,5 \times 10^{-6} \times R$	
100 Ω	75 Hz	$1,5 \times 10^{-6} \times R$	
378 Ω	75 Hz	$3,0 \times 10^{-6} \times R$	

¹ The uncertainty varies as the combinations and the dissipated power are different.

Calibration of resistor / insulation meters

Measuring range or point	Frequency	CMC (95%)	Remark
50 V to 250 V	10 kΩ to 40 MΩ	$1,0 \times 10^{-4} \times R$	
	40 MΩ to 200 MΩ	$5,0 \times 10^{-4} \times R$	
250 V to 1000 V	100 kΩ to 200 MΩ	$1,0 \times 10^{-4} \times R$	
	200 MΩ to 1000 MΩ	$3,0 \times 10^{-4} \times R$	
1 kV to 10 kV	1 MΩ to 10 GΩ	$60 \times 10^{-4} \times R$	

Capacity

Measuring range or point	Frequency	CMC (95%)	Remark
10 pF to 100 pF	1 kHz	$15 \times 10^{-4} \times C$	Measure / generate
100 pF to 1000 nF	1 kHz	$10 \times 10^{-4} \times C$	Measure / generate
1000 nF	100 Hz	$4,0 \times 10^{-4} \times C$	Measure / generate
10 pF, 100 pF, 1 nF, 10 nF	1 kHz	$1,0 \times 10^{-4} \times C$	Generate
100 nF, 1 μF	1 kHz	$1,5 \times 10^{-4} \times C$	
10 μF	1 kHz	$3,0 \times 10^{-4} \times C$	
100 μF	1 kHz	$5,0 \times 10^{-4} \times C$	
1 μF	100 Hz	$2,0 \times 10^{-4} \times C$	
10 μF	100 Hz	$3,0 \times 10^{-4} \times C$	
100 μF	100 Hz	$5,0 \times 10^{-4} \times C$	

Inductance

Measuring range or point	Frequency	CMC (95%)	Remark
100 μH to 1 H	1 kHz	$10 \times 10^{-4} \times L$	Measure / generate
1 H to 10 H	1 kHz	$20 \times 10^{-4} \times L$	Measure / generate
100 μH, 1 mH, 10 mH, 100 mH, 1H	1 kHz	$5,0 \times 10^{-4} \times L$	generate
10 H	100 Hz, 1 kHz	$7,0 \times 10^{-4} \times L$	

Oscilloscopes (on screen) – input impedance 50 Ω and 1 MΩ

Measuring range or point	Frequency	CMC (95%)	Remark
± 1 mV to 200 V	DC	$2,5 \times 10^{-4} \times U + 25 \mu\text{V}$	50 Ω to 5,56 V
1 mVpp to 21 mVpp	10 Hz to 10 kHz	$25 \times 10^{-4} \times U + 10 \mu\text{V}$	Square wave
21 mVpp to 556 mVpp	10 Hz to 10 kHz	$10 \times 10^{-4} \times U + 10 \mu\text{V}$	Square wave
556 mVpp to 210 Vpp	10 Hz to 10 kHz	$5,0 \times 10^{-4} \times U + 10 \mu\text{V}$	Square wave 50 Ω to 5,56 V
4,44 mVpp to 5,56 Vpp	100 mHz to 100 MHz	$1,5 \times 10^{-2} \times U$	Sine wave
4,44 mVpp to 5,56 Vpp	100 MHz to 550 MHz	$3,0 \times 10^{-2} \times U$	Sine wave
4,44 mVpp to 3,35 Vpp	550 MHz to 1 GHz	$4,0 \times 10^{-2} \times U$	Sine wave
4,44 mVpp to 3,54 Vpp	1 GHz to 4 GHz	$6,0 \times 10^{-2} \times U$	Sine wave
500 ps	-	40 ps	Rise/ falltime (max. 3 V)
250 ps to 10 ks	-	$5,0 \times 10^{-9} \times t$	Time base
40 Ω to 90 Ω	1 kHz	$1,0 \times 10^{-3} \times Z$	Input impedance
0,8 MΩ to 1,2 MΩ			
10 Ω to 150 Ω	1 kHz	$5,0 \times 10^{-3} \times Z$	Input impedance
50 kΩ to 12 MΩ			
	0,1 Hz to 100 MHz	0,15 dB	Attenuation at bandwidth
	100 MHz to 550 MHz	0,30 dB	Attenuation at bandwidth
	550 MHz to 1 GHz	0,40 dB	Attenuation at bandwidth
	1 GHz to 4 GHz	0,50 dB	Attenuation at bandwidth

Bridge calibration

Measuring range or point	Frequency	CMC (95%)	Remark
-2,5 mV / V to 2,5 mV / V	225 Hz	$50 \times 10^{-6} \text{ mV} / \text{V}$	5 V supply / 350 Ω bridges