ROHDE&SCHWARZ

CALIBRATION CERTIFICATE

Kalibrierschein

Certificate Number
Zertifikatsnummer

1080A300774165

General Data

Item Gegenstand	**Harmonics-/Flicker Analyzer**		
Manufacturer Hersteller	**EM-Test**		
Type Type	**DPA500N**		
Material Number Material Number	**--**	**Serial Number** Seriennummer	**P2007238464**
Order Number Bestellnummer	**8800067787 10, 312025687**	**Asset Number** Inventarnummer	**--**
Customer Auftraggeber	**Exporta s.r.o. Patočkova 1434/51 CZ 160 00 Praha 6**		

Performance

Place and Date of Calibration Ort und Datum der Kalibrierung	**Köln, 2025-01-06**
Statement of Compliance Incoming Konformitätsaussage (Anlieferung)	**All measured values are within the datasheet specifications.**
Statement of Compliance Outgoing Konformitätsaussage (Auslieferung)	**All measured values are within the datasheet specifications.**
Agreed Calibration Interval Vereinbartes Kalibrierintervall	**--**
Extent of Calibration Document Umfang des Kalibrierdokumentes	**3 Pages Certificate 3 Pages Outgoing Results**

Date of Issue Ausstelldatum	**Approval of the Certificate by** Freigabe des Kalibrierscheins durch	
2025-01-06	**Christian May**	**Björn Klingemann**
	Laboratory Management Leitung des Laboratoriums	**Person Responsible** Bearbeiter

Calibration Mark
Kalibrierzeichen

300774165
D-K-15195-01-00
2025-01

Member of Deutscher Kalibrierdienst
Mitglied im Deutschen Kalibrierdienst

This calibration certificate documents the metrological traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have the object recalibrated at appropriate intervals. This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates with the full name of the approval responsible person are valid without signature.

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European cooperation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
Dieser Kalibrierschein darf nur vollständig weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine sind bei Nennung des für die Freigabe Verantwortlichen in Klarschrift auch ohne Unterschrift gültig.

Calibration Procedure

The calibration was done according to EN 61000-4-7:2002 +A1:2009 and EN 61000-4-15:2011 by applying known voltages and currents to the related connectors of the device unter test.
Flicker test signals (item 3) were generated by a special test source and monitored with a multimeter. The flicker intensity was calculated from the voltage readings using the definitions in EN 61000-4-15:2011.

Working Standards Used

Item	Type	Serial Number	Calibration Certificate Number	Cal. Due
Calibrator	5522A	5591901	11A300726386	2025-01-31
Flicker Source	PMF2000	35.700.05	11A300748772	2026-06-30
Audio Analyzer	UPV	100577	0001A300751549	2025-06-30

Remarks

DUT controlled via dpa.control V5.4.8.0

Environmental Conditions			
Ambient Temperature	(23 ± 3) °C	**Relative Humidity**	(45 ± 30) %

Comments on Measurement Results

The reported results apply only to those items specifically listed on this calibration certificate and have been tested for compliance with the specifications. The associated uncertainty of measurement has been taken into account if not otherwise stated. The non-binary decision rule with guard band is used according to ILAC G8:09/2019 'Guidelines on Decision Rules and Statements of Conformity'. Pass is normally not marked. Conditional Pass is marked with UGB1, Conditional Fail with UGB2 and Fail with Fail.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor (k = 2) such that the coverage probability corresponds to approximately 95 %. It is consistent with the EA-4/02 M:2022.

In addition to the calibration results, the calibration certificate includes functional measurements that might have an influence on the measurement uncertainty of the calibration results.
The functional measurement results are marked and are not intended to be used to support the further dissemination of metrological traceability. They are intended to verify the requirements on the measurement object according to manufacturer specifications and technical standards.

The following abbreviations may be used in this certificate:

[1]	Measurement results that are not covered by the DAkkS accreditation.
{a}	No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluted as "PASS" is pass.
{b}	The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. Measurement results outside the close area have a higher measurement uncertainty but are within the specification.
{c} , [2]	Functional test, therefore no measurement uncertainty is stated.
{d}	Typical value, refer to performance test.
{e}	The measurement uncertainty is taken into account when setting the measuring system.
{g}	Verification of specified requirements, non-accredited measurements. Technical operation that consist of the determination of one or more characteristics to a specified procedure (formerly {f}).
DL , DT	Data Limit for symmetrical tolerance limits
UGB	Uncertainty guard band: Measuring uncertainty violates the data sheet tolerance
UGB1 , u	Measurement results marked as UGB1 show conformity with a probability of >50 % and <95 %.
UGB2 , **u**	Measurement results marked as UGB2 show non-conformity with a probability of >50 % and <95 %.
FAIL , f	Measurement results marked as FAIL show non-conformity
n. i.	not installed: Does not apply due to instrument configuration
n. m.	not measured
ref.	Reference value, used for relative measurements

Test Description		Lower Limit	Result Measured	Upper Limit	Uncertainty
1 Voltage Input					
230 V	50 Hz	229,08 V	230,1 V	230,92 V	0,1 V
120 V	60 Hz	119,52 V	120,1 V	120,48 V	0,1 V
2 Harmonics Analysis 50 Hz					
10 A	50 Hz	9,872 A	10,010 A	10,128 A	20 mA
8 A	50 Hz	7,872 A	8,007 A	8,128 A	16 mA
6 A	50 Hz	5,872 A	6,003 A	6,128 A	12 mA
5 A	50 Hz	4,936 A	5,003 A	5,064 A	10 mA
2 A	50 Hz	1,936 A	2,001 A	2,064 A	4 mA
1 A	50 Hz	0,984 A	1,0020 A	1,016 A	0,5 mA
0,8 A	50 Hz	0,784 A	0,8003 A	0,816 A	0,4 mA
0,5 A	50 Hz	0,484 A	0,5004 A	0,516 A	0,3 mA
0,4 A	50 Hz	0,384 A	0,4004 A	0,416 A	0,2 mA
0,2 A	50 Hz	0,184 A	0,2003 A	0,216 A	0,1 mA
0,1 A	50 Hz	0,084 A	0,1005 A	0,116 A	0,1 mA
50 mA	400 Hz	34 mA	49,86 mA	66 mA	25 µA
100 mA	2000 Hz	84 mA	98,99 mA	116 mA	50 µA
500 mA	800 Hz	484 mA	498,1 mA	516 mA	250 µA
1 A	350 Hz	0,984 A	0,998 A	1,016 A	500 µA
2 A	200 Hz	1,936 A	1,998 A	2,064 A	4 mA
5 A	250 Hz	4,936 A	4,997 A	5,064 A	10 mA
10 A	100 Hz	9,872 A	10,010 A	10,128 A	20 mA
3 Harmonics Analysis 60 Hz					
10 A	60 Hz	9,872 A	10,020 A	10,128 A	20 mA
8 A	60 Hz	7,872 A	8,006 A	8,128 A	16 mA
6 A	60 Hz	5,872 A	6,005 A	6,128 A	12 mA
5 A	60 Hz	4,936 A	5,003 A	5,064 A	10 mA
2 A	60 Hz	1,936 A	2,001 A	2,064 A	4 mA
1 A	60 Hz	0,984 A	1,001 A	1,016 A	0,5 mA
0,8 A	60 Hz	0,784 A	0,8002 A	0,816 A	0,4 mA
0,5 A	60 Hz	0,484 A	0,5002 A	0,516 A	0,3 mA
0,4 A	60 Hz	0,384 A	0,4002 A	0,416 A	0,2 mA
0,2 A	60 Hz	0,184 A	0,2005 A	0,216 A	0,1 mA
0,1 A	60 Hz	0,084 A	0,1004 A	0,116 A	0,1 mA
50 mA	480 Hz	34 mA	49,77 mA	66 mA	25 µA
100 mA	2400 Hz	84 mA	96,54 mA	116 mA	50 µA
500 mA	960 Hz	484 mA	497,8 mA	516 mA	250 µA
1 A	420 Hz	0,984 A	0,9980 A	1,016 A	500 µA
2 A	240 Hz	1,936 A	1,997 A	2,064 A	4 mA
5 A	300 Hz	4,936 A	4,995 A	5,064 A	10 mA
10 A	120 Hz	9,872 A	10,005 A	10,128 A	20 mA

Test Description			Lower Limit	Result Measured	Upper Limit	Uncertainty
4 Flicker Analysis						
test signals calculated from voltage measurements						
120 V / 50 Hz						
ΔU/U	*r /min*	*f*				
3,178 %	1	8,35 mHz	0,95	1,00	1,05	0,01
2,561 %	2	16 mHz	0,95	1,00	1,05	0,01
1,694 %	7	58,3 mHz	0,95	1,00	1,05	0,01
1,045 %	39	325 mHz	0,95	1,00	1,05	0,01
0,844 %	110	916 mHz	0,95	1,01	1,05	0,01
0,545 %	1620	13,5 Hz	0,95	1,03	1,05	0,01
3,426 %	4000	33,33 Hz	0,95	0,96	1,05	0,01
120 V / 60 Hz						
ΔU/U	*r /min*	*f*				
3,181 %	1	8,35 mHz	0,95	1,03	1,05	0,01
2,564 %	2	16 mHz	0,95	0,99	1,05	0,01
1,694 %	7	58,3 mHz	0,95	1,01	1,05	0,01
1,040 %	39	325 mHz	0,95	1,03	1,05	0,01
0,844 %	110	916 mHz	0,95	1,03	1,05	0,01
0,548 %	1620	13,5 Hz	0,95	1,00	1,05	0,01
4,837 %	4800	40 Hz	0,95	0,99	1,05	0,01
230 V / 50 Hz						
ΔU/U	*r /min*	*f*				
2,715 %	1	8,35 mHz	0,95	1,04	1,05	0,01
2,191 %	2	16 mHz	0,95	1,03	1,05	0,01
1,450 %	7	58,3 mHz	0,95	1,01	1,05	0,01
0,894 %	39	325 mHz	0,95	1,02	1,05	0,01
0,722 %	110	916 mHz	0,95	1,01	1,05	0,01
0,407 %	1620	13,5 Hz	0,95	1,00	1,05	0,01
2,343 %	4000	33,33 Hz	0,95	0,97	1,05	0,01
230 V / 60 Hz						
ΔU/U	*r /min*	*f*				
2,719 %	1	8,35 mHz	0,95	0,99	1,05	0,01
2,194 %	2	16 mHz	0,95	0,99	1,05	0,01
1,450 %	7	58,3 mHz	0,95	0,98	1,05	0,01
0,895 %	39	325 mHz	0,95	0,98	1,05	0,01
0,723 %	110	916 mHz	0,95	0,96	1,05	0,01
0,409 %	1620	13,5 Hz	0,95	1,00	1,05	0,01
3,263 %	4800	40 Hz	0,95	0,97	1,05	0,01

Test Description	Lower Limit	Result Measured	Upper Limit	Uncertainty
5 Line Impedance				
5.1 N + L				
Resistance R_{N+L}				
Resistor 400 mΩ	--	399,56 mΩ	--	0,5 mΩ
Resistance X_{N+L} 50 Hz				
Inductor 250,0 mΩ	--	[1] 259,08 mΩ	--	0,32 mΩ