



Czech Metrology Institute

Okružní 31, 638 00 Brno, Czech Republic

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www.cmi.cz



Calibration laboratory No. 2022 accredited by the Czech Accreditation Institute according to ISO/IEC 17025:2017

Laboratory: Regional Inspectorate Brno, Okružní 31, 638 00 Brno
Department of Primary Metrology of DC/LF Electrical Quantities,
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CERTIFICATE OF CALIBRATION

6011-KL-L0638-22

Date of issue: 11th July 2022

Page 1 of 13 pages

User:

Measuring Instrument: 3-phase power source
Manufacturer: Meatest
Type: M133C
Serial number: 557291

The results of the calibration have been obtained following the procedures reported in this Certificate and are related only to the date, place and conditions of the calibration.

Date of calibration: 4th July - 11th July 2022

Calibrated by:

Deputy Director of OI Brno

Ing. Michal Hedvíček



Ing. Ivan Kříž

Calibration procedure: Direct measurement of voltage, current and active electrical power by means of CMI standards. Calibration was done following the instructions of manufacturer.

Measurement was carried out according to the calibration procedures
611-MP-C098 (Calibration of DMMs)
611-MP-C097 (Calibration of multicalibrators)
611-MP-C042 (Calibration of power and energy meters)

Results of calibration: The results of calibration are stated in the Tables of results.

Measurement standard used: Power Calibrator Fluke 6105A, s.n. 434974204, cal. Cert. 6011-KL-E0110-21
DSWM (digital sampling wattmeter) consist of :
DMM Agilent 3458A, s.n.US280 328 71, cal. cert. 6011-KL-E0105-21
DMM Agilent 3458A, s.n.US280 328 79, cal. cert. 6011-KL-E0106-21
Set of voltage dividers, manufactured in SP Sweden, s.n. VD3-0401 and 0406, cal cert 6011-KL-E0007-20
Set of currnt sunts, 0.03 - 100 A, manufactured in CMI, cal. cert. 6011-KL-E0011-20

Metrological traceability: The measuremets are traceable to (inter)national standards.

Place of calibration: Czech Metrology Institute, Oblastní inspektorát Brno, Okružní 31, Brno 638 00

Ambient conditions: Air temperature: $(23.0 \pm 0.5) ^\circ\text{C}$
Relative humidity: $(39 \pm 15) \%$

The standard uncertainty of measurement has been determined in accordance with JCGM 100:2008 document. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k corresponding to a coverage probability of approximately 95 %, which for normal distribution corresponds to a coverage factor $k = 2$.

Note The used specifications were obtained from user manual of instrument.

Český metrologický institut
Oblastní inspektorát Brno
Okružní 31
638 00 Brno
-9-

DC Voltage amplitude verification of phase V1

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
12	DC	12.000 43	0.000 43	0.004	14	0.000 36
14		14.000 50	0.000 50	0.004	14	0.000 42
16		16.000 45	0.000 45	0.003	11	0.000 48
18		18.000 54	0.000 54	0.003	12	0.000 54
20		20.000 59	0.000 59	0.003	12	0.000 60
24		24.000 74	0.000 74	0.003	12	0.000 72
26		26.000 83	0.000 83	0.003	13	0.000 78
28		28.000 91	0.000 91	0.003	13	0.000 84
30		30.000 77	0.000 77	0.003	10	0.000 90
-12		-12.000 43	-0.000 43	0.004	-14	0.000 36
-14		-14.000 46	-0.000 46	0.003	-13	0.000 42
-16		-16.000 42	-0.000 42	0.003	-10	0.000 48
-18		-18.000 57	-0.000 57	0.003	-13	0.000 54
-20		-20.000 62	-0.000 62	0.003	-12	0.000 60
-24		-24.000 63	-0.000 63	0.003	-10	0.000 72
-26		-26.000 82	-0.000 82	0.003	-13	0.000 78
-28		-28.000 93	-0.000 93	0.003	-13	0.000 84
-30		-30.000 81	-0.000 81	0.003	-11	0.000 90
10		10.000 21	0.000 21	0.002	8	0.000 30
-10		-10.000 15	-0.000 15	0.001	-6	0.000 30
70		70.001 8	0.001 8	0.003	10	0.002 1
-70		-70.001 1	-0.001 1	0.002	-6	0.002 1
140		140.006 0	0.006 0	0.004	17	0.004 2
-140		-140.004 6	-0.004 6	0.003	-13	0.004 2
280		280.012 4	0.012 4	0.004	18	0.008 4
-280		-280.011 0	-0.011 0	0.004	-16	0.008 4

DC Voltage amplitude verification of phase V2

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
12	DC	12.000 04	0.000 04	0.000	1	0.000 36
14		14.000 09	0.000 09	0.001	3	0.000 42
16		16.000 15	0.000 15	0.001	4	0.000 48
18		18.000 28	0.000 28	0.002	6	0.000 54
20		20.000 37	0.000 37	0.002	7	0.000 60
24		24.000 35	0.000 35	0.001	6	0.000 72
26		26.000 37	0.000 37	0.001	6	0.000 78
28		28.000 44	0.000 44	0.002	6	0.000 84
30		30.000 50	0.000 50	0.002	7	0.000 90
-12		-12.000 30	-0.000 30	0.002	-10	0.000 36
-14		-14.000 37	-0.000 37	0.003	-10	0.000 42
-16		-16.000 40	-0.000 40	0.002	-10	0.000 48
-18		-18.000 58	-0.000 58	0.003	-13	0.000 54
-20		-20.000 59	-0.000 59	0.003	-12	0.000 60
-24		-24.000 58	-0.000 58	0.002	-10	0.000 72
-26		-26.000 61	-0.000 61	0.002	-9	0.000 78
-28		-28.000 75	-0.000 75	0.003	-11	0.000 84
-30		-30.000 82	-0.000 82	0.003	-11	0.000 90
10		10.000 03	0.000 03	0.000	1	0.000 30
-10		-10.000 18	-0.000 18	0.002	-7	0.000 30
70		70.000 3	0.000 3	0.000	2	0.002 1
-70		-70.000 4	-0.000 4	0.001	-2	0.002 1
140		140.002 0	0.002 0	0.001	6	0.004 2
-140		-140.002 1	-0.002 1	0.001	-6	0.004 2
280		280.003 6	0.003 6	0.001	5	0.008 4
-280		-280.005 4	-0.005 4	0.002	-8	0.008 4

DC Voltage amplitude verification of phase V3

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
12	DC	12.000 00	0.000 00	0.000	0	0.000 36
14		14.000 03	0.000 03	0.000	1	0.000 42
16		16.000 09	0.000 09	0.001	2	0.000 48
18		18.000 09	0.000 09	0.000	2	0.000 54
20		20.000 05	0.000 05	0.000	1	0.000 60
24		24.000 08	0.000 08	0.000	1	0.000 72
26		26.000 19	0.000 19	0.001	3	0.000 78
28		28.000 19	0.000 19	0.001	3	0.000 84
30		30.000 03	0.000 03	0.000	0	0.000 90
-12		-12.000 09	-0.000 09	0.001	-3	0.000 36
-14		-14.000 07	-0.000 07	0.001	-2	0.000 42
-16		-16.000 09	-0.000 09	0.001	-2	0.000 48
-18		-18.000 16	-0.000 16	0.001	-4	0.000 54
-20		-20.000 11	-0.000 11	0.001	-2	0.000 60
-24		-24.000 10	-0.000 10	0.000	-2	0.000 72
-26		-26.000 24	-0.000 24	0.001	-4	0.000 78
-28		-28.000 18	-0.000 18	0.001	-3	0.000 84
-30		-30.000 11	-0.000 11	0.000	-1	0.000 90
10		9.999 96	-0.000 04	0.000	-2	0.000 30
-10		-9.999 94	0.000 06	-0.001	2	0.000 30
70		70.000 3	0.000 3	0.000	1	0.002 1
-70		-70.000 1	-0.000 1	0.000	0	0.002 1
140		140.002 1	0.002 1	0.002	6	0.004 2
-140		-140.000 9	-0.000 9	0.001	-3	0.004 2
280		280.001 6	0.001 6	0.001	2	0.008 4
-280		-280.002 0	-0.002 0	0.001	-3	0.008 4

DC Current amplitude verification of phase II

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
0.3	DC	0.300 011	0.000 011	0.004	10	0.000 015
0.4		0.400 017	0.000 017	0.004	12	0.000 020
0.5		0.500 018	0.000 018	0.004	10	0.000 025
0.6		0.600 016	0.000 016	0.003	8	0.000 030
0.7		0.700 023	0.000 023	0.003	9	0.000 035
0.8		0.800 024	0.000 024	0.003	9	0.000 040
0.9		0.900 026	0.000 026	0.003	8	0.000 045
1		1.000 017	0.000 017	0.002	5	0.000 050
-0.3		-0.300 030	-0.000 030	0.010	29	0.000 015
-0.4		-0.400 034	-0.000 034	0.009	24	0.000 020
-0.5		-0.500 038	-0.000 038	0.008	22	0.000 025
-0.6		-0.600 033	-0.000 033	0.006	16	0.000 030
-0.7		-0.700 036	-0.000 036	0.005	15	0.000 035
-0.8		-0.800 043	-0.000 043	0.005	15	0.000 040
-0.9		-0.900 033	-0.000 033	0.004	10	0.000 045
-1		-1.000 039	-0.000 039	0.004	11	0.000 050
2		1.999 99	-0.000 01	0.000	-1	0.000 10
-2		-2.000 05	-0.000 05	0.003	7	0.000 10
5		4.999 84	-0.000 16	-0.003	-7	0.000 25
-5		-4.999 97	0.000 03	-0.001	-1	0.000 25
10		9.999 82	-0.000 18	-0.002	-4	0.000 50
-10		-10.000 04	-0.000 04	0.000	1	0.000 50
20		19.998 2	-0.001 8	-0.009	-18	0.001 0
-20		-20.000 2	-0.000 2	0.001	2	0.001 0
30		29.995 7	-0.004 3	-0.014	-29	0.001 5
-30		-29.999 9	0.000 1	0.000	0	0.001 5

DC Current amplitude verification - HIGH CURRENT ADAPTER

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
40	DC	39.996 3	0.003 7	0.009	19	0.002 0
50		49.993 7	0.006 3	0.013	25	0.002 5
60		59.991 5	0.008 5	0.014	28	0.003 0
70		69.989 7	0.010 3	0.015	29	0.003 5
80		79.988 1	0.011 9	0.015	30	0.004 0
90		89.986 3	0.013 7	0.015	30	0.004 5
-40		-40.001 2	0.001 2	-0.003	-6	0.002 0
-50		-49.999 1	-0.000 9	0.002	4	0.002 5
-60		-59.998 0	-0.002 0	0.003	7	0.003 0
-70		-69.997 8	-0.002 2	0.003	6	0.003 5
-80		-79.996 1	-0.003 9	0.005	10	0.004 0
-90		-89.994 6	-0.005 4	0.006	12	0.004 5

DC Current amplitude verification of phase I2

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
0.3	DC	0.300 011	0.000 011	0.004	10	0.000 015
0.4		0.400 015	0.000 015	0.004	11	0.000 020
0.5		0.500 017	0.000 017	0.003	10	0.000 025
0.6		0.600 019	0.000 019	0.003	9	0.000 030
0.7		0.700 016	0.000 016	0.002	6	0.000 035
0.8		0.800 009	0.000 009	0.001	3	0.000 040
0.9		0.900 009	0.000 009	0.001	3	0.000 045
1		1.000 006	0.000 006	0.001	2	0.000 050
-0.3		-0.300 013	-0.000 013	0.004	12	0.000 015
-0.4		-0.400 026	-0.000 026	0.006	18	0.000 020
-0.5		-0.500 015	-0.000 015	0.003	9	0.000 025
-0.6		-0.600 016	-0.000 016	0.003	7	0.000 030
-0.7		-0.700 004	-0.000 004	0.001	2	0.000 035
-0.8		-0.799 999	0.000 001	0.000	0	0.000 040
-0.9		-0.899 992	0.000 008	-0.001	-3	0.000 045
-1		-0.999 979	0.000 021	-0.002	-6	0.000 050
2		1.999 98	-0.000 02	-0.001	-3	0.000 10
-2		-1.999 96	0.000 04	-0.002	-5	0.000 10
5		4.999 70	-0.000 30	-0.006	-14	0.000 25
-5		-4.999 63	0.000 37	-0.007	-17	0.000 25
10		9.999 86	-0.000 14	-0.001	-3	0.000 50
-10		-9.999 75	0.000 25	-0.003	-6	0.000 50
20		19.997 9	-0.002 1	-0.011	-21	0.001 0
-20		-19.998 5	0.001 5	-0.008	-15	0.001 0
30		29.994 4	-0.005 6	-0.019	-37	0.001 5
-30		-29.997 6	0.002 4	-0.008	-16	0.001 5

DC Current amplitude verification of phase I3

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
0.3	DC	0.300 001	0.000 001	0.000	1	0.000 015
0.4		0.400 003	0.000 003	0.001	2	0.000 020
0.5		0.500 006	0.000 006	0.001	3	0.000 025
0.6		0.599 991	-0.000 009	-0.002	-4	0.000 030
0.7		0.699 985	-0.000 015	-0.002	-6	0.000 035
0.8		0.799 973	-0.000 027	-0.003	-10	0.000 040
0.9		0.899 966	-0.000 034	-0.004	-11	0.000 045
1		0.999 953	-0.000 047	-0.005	-13	0.000 050
-0.3		-0.300 008	-0.000 008	0.003	8	0.000 015
-0.4		-0.400 011	-0.000 011	0.003	8	0.000 020
-0.5		-0.500 008	-0.000 008	0.002	5	0.000 025
-0.6		-0.600 000	0.000 000	0.000	0	0.000 030
-0.7		-0.699 992	0.000 008	-0.001	-3	0.000 035
-0.8		-0.799 980	0.000 020	-0.003	-7	0.000 040
-0.9		-0.899 979	0.000 021	-0.002	-7	0.000 045
-1		-0.999 976	0.000 024	-0.002	-7	0.000 050
2		1.999 87	-0.000 13	-0.006	-18	0.000 10
-2		-1.999 87	0.000 13	-0.006	-19	0.000 10
5		4.999 47	-0.000 53	-0.011	-24	0.000 25
-5		-4.999 51	0.000 49	-0.010	-22	0.000 25
10		9.999 13	-0.000 87	-0.009	-19	0.000 50
-10		-9.999 17	0.000 83	-0.008	-18	0.000 50
20		19.997 8	-0.002 2	-0.011	-22	0.001 0
-20		-19.998 2	0.001 8	-0.009	-18	0.001 0
30		29.994 4	-0.005 6	-0.019	-37	0.001 5
-30		-29.997 6	0.002 4	-0.008	-16	0.001 5

Energy test of phase V1/I1 at frequency 50 Hz

287.5 W·h was set 230 V / 5 A / 900 s

17.25 W·h was set 230 V / 0.30 A / 900 s

Set value	Frequency	Measured value	Absolute error	Relative error	Uncertainty
[W·h]	[Hz]	[W·h]	[W·h]	[%]	[%]
287.5	50	287.51	0.01	0.003	0.010
17.25		17.251	0.001	0.006	0.010

AC Voltage amplitude verification of phase V1

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
12	55	11.999 52	-0.000 48	-0.004	-10	0.000 43
14	55	13.999 66	-0.000 34	-0.002	-7	0.000 51
16	55	15.998 97	-0.001 03	-0.006	-19	0.000 65
18	55	17.999 15	-0.000 85	-0.005	-15	0.000 73
20	55	19.999 0	-0.001 0	-0.005	-17	0.001 0
22	55	21.999 2	-0.000 8	-0.004	-13	0.001 1
24	55	23.998 9	-0.001 1	-0.004	-16	0.001 2
26	55	25.998 9	-0.001 1	-0.004	-17	0.001 3
28	55	27.999 0	-0.001 0	-0.004	-14	0.001 4
30	55	29.998 8	-0.001 2	-0.004	-16	0.001 5
10	55	9.999 50	-0.000 50	-0.005	-20	0.000 64
30	20	29.998 9	-0.001 1	-0.004	-12	0.001 9
30	55	29.998 7	-0.001 3	-0.004	-17	0.001 9
30	120	29.998 9	-0.001 1	-0.004	-12	0.001 9
30	1000	29.999 7	-0.000 3	-0.001	-3	0.001 9
70	55	69.999 2	-0.000 8	-0.001	-5	0.002 9
140	55	139.991 5	-0.008 5	-0.006	-24	0.006 8
280	55	279.983	-0.017	-0.006	-25	0.013
600	55	599.981	-0.019	-0.003	-11	0.028

AC Voltage amplitude verification of phase V2

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
12	55	11.999 53	-0.000 47	-0.004	-10	0.000 43
14	55	13.999 68	-0.000 32	-0.002	-6	0.000 51
16	55	15.999 13	-0.000 87	-0.005	-16	0.000 65
18	55	17.999 35	-0.000 65	-0.004	-11	0.000 73
20	55	19.999 3	-0.000 7	-0.004	-12	0.001 0
22	55	21.999 5	-0.000 5	-0.002	-8	0.001 1
24	55	23.999 3	-0.000 7	-0.003	-11	0.001 2
26	55	25.999 1	-0.000 9	-0.003	-13	0.001 3
28	55	27.999 3	-0.000 7	-0.002	-9	0.001 4
30	55	29.999 3	-0.000 7	-0.002	-9	0.001 5
10	55	9.999 49	-0.000 51	-0.005	-20	0.000 64
30	20	29.999 3	-0.000 7	-0.002	-8	0.001 9
30	55	29.999 2	-0.000 8	-0.003	-11	0.001 9
30	120	29.999 3	-0.000 7	-0.002	-8	0.001 9
30	1000	30.000 6	0.000 6	0.002	7	0.001 9
70	55	69.999 1	-0.000 9	-0.001	-5	0.002 9
140	55	139.990 2	-0.009 8	-0.007	-28	0.006 8
280	55	279.982	-0.018	-0.006	-25	0.013
600	55	599.975	-0.025	-0.004	-14	0.028

AC Voltage amplitude verification of phase V3

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
12	55	11.999 19	-0.000 81	-0.007	-17	0.000 43
14	55	13.999 38	-0.000 62	-0.004	-12	0.000 51
16	55	15.999 54	-0.000 46	-0.003	-8	0.000 65
18	55	17.999 74	-0.000 26	-0.001	-5	0.000 73
20	55	19.999 5	-0.000 5	-0.002	-8	0.001 0
22	55	21.999 4	-0.000 6	-0.003	-9	0.001 1
24	55	23.999 4	-0.000 6	-0.003	-10	0.001 2
26	55	25.999 5	-0.000 5	-0.002	-8	0.001 3
28	55	27.999 6	-0.000 4	-0.001	-5	0.001 4
30	55	29.999 6	-0.000 4	-0.001	-6	0.001 5
10	55	9.999 49	-0.000 51	-0.005	-20	0.000 64
30	20	29.999 7	-0.000 3	-0.001	-4	0.001 9
30	55	29.999 6	-0.000 4	-0.001	-5	0.001 9
30	120	29.999 4	-0.000 6	-0.002	-7	0.001 9
30	1000	29.999 7	-0.000 3	-0.001	-3	0.001 9
70	55	70.000 0	0.000 0	0.000	0	0.002 9
140	55	139.985 1	-0.014 9	-0.011	-43	0.006 8
280	55	279.980	-0.020	-0.007	-28	0.013
600	55	599.973	-0.027	-0.005	-15	0.028

Frequency test of phase V1

Voltage	Set frequency	Measured value	Absolute error	Spec.	Part of specification	Uncertainty
[V]	[Hz]	[Hz]	[Hz]	[Hz]	[%]	[Hz]
230	20	20.000 0	0.000 0	0.5	0.0	0.000 1
	50	50.000 0	0.000 0		0.0	0.000 1
	100	100.000 0	0.000 0		0.0	0.000 1
	1000	1000.000	0.000		0.0	0.001

Frequency test of phase V2

Voltage	Set frequency	Measured value	Absolute error	Spec.	Part of specification	Uncertainty
[V]	[Hz]	[Hz]	[Hz]	[Hz]	[%]	[Hz]
230	20	20.000 0	0.000 0	0.5	0.0	0.000 1
	50	50.000 0	0.000 0		0.0	0.000 1
	100	100.000 0	0.000 0		0.0	0.000 1
	1000	1000.000	0.000		0.0	0.001

Frequency test of phase V3

Voltage	Set frequency	Measured value	Absolute error	Spec.	Part of specification	Uncertainty
[V]	[Hz]	[Hz]	[Hz]	[Hz]	[%]	[Hz]
230	20	20.000 0	0.000 0	0.5	0.0	0.000 1
	50	50.000 0	0.000 0		0.0	0.000 1
	100	100.000 0	0.000 0		0.0	0.000 1
	1000	1000.000	0.000		0.0	0.001

AC Current amplitude verification of phase I1

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
0.3	55	0.300 024	-0.000 024	-0.008	-23	0.000 036
0.5	55	0.500 021	-0.000 021	-0.004	-6	0.000 060
1	55	1.000 02	-0.000 02	-0.002	-5	0.000 12
1	800	0.999 97	0.000 03	0.003	6	0.000 12
2	55	2.000 06	-0.000 06	-0.003	-8	0.000 24
5	55	4.999 91	0.000 09	0.002	5	0.000 60
10	55	9.999 7	0.000 3	0.003	7	0.001 2
20	55	19.998 2	0.001 8	0.009	12	0.002 4
30	55	29.997 4	0.002 6	0.009	17	0.003 6

AC Current amplitude verification of phase I2

[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
0.3	55	0.300 009	-0.000 009	-0.003	-8	0.000 036
0.5	55	0.499 999	0.000 001	0.000	0	0.000 060
1	55	0.999 98	0.000 02	0.002	7	0.000 12
1	800	0.999 91	0.000 09	0.009	17	0.000 12
2	55	1.999 94	0.000 06	0.003	8	0.000 24
5	55	4.999 61	0.000 39	0.008	22	0.000 60
10	55	9.999 3	0.000 7	0.007	16	0.001 2
20	55	19.996 9	0.003 1	0.016	21	0.002 4
30	55	29.995 3	0.004 7	0.016	32	0.003 6

AC Current amplitude verification of phase I2

[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
0.3	55	0.299 997	0.000 003	0.001	3	0.000 036
0.5	55	0.499 989	0.000 011	0.002	3	0.000 060
1	55	0.999 93	0.000 07	0.007	20	0.000 12
1	800	0.999 87	0.000 13	0.013	26	0.000 12
2	55	1.999 87	0.000 13	0.007	17	0.000 24
5	55	4.999 48	0.000 52	0.010	30	0.000 60
10	55	9.999 2	0.000 8	0.008	17	0.001 2
20	55	19.996 6	0.003 4	0.017	23	0.002 4
30	55	29.995 7	0.004 3	0.014	29	0.003 6

AC Current amplitude verification - HIGH CURRENT ADAPTER

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[A]	[Hz]	[A]	[A]	[%]	[%]	[A]
40	55	39.997 5	0.002 5	0.006	12	0.004 8
50		49.995 6	0.004 4	0.009	18	0.006 0
60		59.993 9	0.006 1	0.010	20	0.007 2
70		69.992	0.008	0.011	22	0.008
80		79.991	0.009	0.012	23	0.010
90		89.989	0.011	0.012	24	0.011

DC Current amplitude verification of Internal multimeter

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Current	Frequency					
[mA]	[Hz]	[mA]	[mA]	[%]	[%]	[mA]
1.999 94	DC	2.000 0	0.000 1	0.004	18	0.000 1
3.999 92		3.999 9	0.000 0	-0.001	-4	0.000 3
5.999 91		5.999 9	0.000 0	0.000	-2	0.000 4
7.999 91		7.999 9	0.000 0	0.000	0	0.000 6
9.999 90		9.999 8	-0.000 1	-0.001	-3	0.000 7
11.999 87		11.999 8	-0.000 1	-0.001	-5	0.000 9
13.999 86		13.999 8	-0.000 1	-0.001	-3	0.001 0
15.999 85		15.999 9	0.000 1	0.000	2	0.001 2
17.999 84		17.999 9	0.000 0	0.000	0	0.001 3
19.999 83		19.999 9	0.000 1	0.000	2	0.001 5
-2.000 03		-2.000 1	0.000 0	0.001	5	0.000 2
-4.000 02		-4.000 1	0.000 0	0.001	5	0.000 3
-6.000 00		-6.000 0	0.000 0	0.000	0	0.000 5
-7.999 99		-8.000 1	-0.000 1	0.001	7	0.000 6
-9.999 98		-10.000 1	-0.000 1	0.001	6	0.000 7
-11.999 97		-11.999 9	0.000 1	-0.001	-4	0.000 9
-13.999 96		-13.999 8	0.000 2	-0.001	-6	0.001 0
-15.999 95		-15.999 8	0.000 1	-0.001	-4	0.001 2
-17.999 93		-17.999 8	0.000 1	-0.001	-4	0.001 3
-19.999 93		-19.999 7	0.000 3	-0.001	-7	0.001 5

Frequency verification of Internal multimeter

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Frequency					
[V]	[Hz]	[Hz]	[Hz]	[%]	[%]	[Hz]
10	19.999 9	20.0000	0.000 1	0.001	14	0.001 0
	99.999 4	100.000	0.000 7	0.001	13	0.001 0
	1000.000	1000.00	0.000 2	0.000	0	0.004 5
	10000.00	10000.0	0.003	0.000	1	0.005

DC Voltage amplitude verification of Internal multimeter

Set value		Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Frequency					
[V]	[Hz]	[V]	[V]	[%]	[%]	[V]
1.999 53	DC	1.999 73	0.000 20	0.010	50	0.000 08
3.999 90		4.000 13	0.000 22	0.006	28	0.000 08
5.999 81		6.000 05	0.000 24	0.004	20	0.000 12
7.999 92		8.000 16	0.000 24	0.003	15	0.000 16
9.999 96		10.000 13	0.000 17	0.002	8	0.000 20
11.999 97		11.999 99	0.000 02	0.000	1	0.000 24
-1.999 68		-1.999 80	-0.000 12	0.006	30	0.000 08
-3.999 91		-3.999 86	0.000 05	-0.001	-6	0.000 08
-5.999 86		-5.999 94	-0.000 08	0.001	7	0.000 12
-7.999 94		-8.000 04	-0.000 10	0.001	6	0.000 16
-9.999 94		-10.000 19	-0.000 24	0.002	12	0.000 20
-11.999 99		-12.000 38	-0.000 39	0.003	16	0.000 24

AC Power amplitude verification of phase V1I1

Set value			Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Current	PF					
[V]	[A]	[-]	[W]	[W]	[%]	[%]	[W]
240	2	1	480.007	-0.007	-0.002	-3	0.048
		0.5 cap.	240.005	-0.005	-0.002	-3	0.024
		0.5 ind.	240.013	-0.013	-0.005	-7	0.024
	10	1	2399.90	0.10	0.004	8	0.24
		0.5 cap.	1199.98	0.02	0.002	2	0.12
		0.5 ind.	1199.96	0.04	0.003	4	0.12

AC Power amplitude verification of phase V2I2

Set value			Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Current	PF					
[V]	[A]	[-]	[W]	[W]	[%]	[%]	[W]
240	2	1	479.993	0.007	0.001	3	0.048
		0.5 cap.	240.007	-0.007	-0.003	-4	0.024
		0.5 ind.	239.989	0.011	0.005	6	0.024
	10	1	2399.83	0.17	0.007	13	0.24
		0.5 cap.	1199.93	0.07	0.006	7	0.12
		0.5 ind.	1199.92	0.08	0.007	8	0.12

AC Power amplitude verification of phase V3I3

Set value			Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Current	PF					
[V]	[A]	[-]	[W]	[W]	[%]	[%]	[W]
240	2	1	479.961	0.039	0.008	18	0.048
		0.5 cap.	239.976	0.024	0.010	13	0.024
		0.5 ind.	239.987	0.013	0.006	7	0.024
	10	1	2399.68	0.32	0.013	25	0.24
		0.5 cap.	1199.79	0.21	0.017	21	0.12
		0.5 ind.	1199.93	0.07	0.006	7	0.12

DC Power amplitude verification

Set value			Measured value	Absolute error	Relative error	Part of specification	Uncertainty
Voltage	Current	Phase					
[V]	[A]	[-]	[W]	[W]	[%]	[%]	[W]
240	2	V1I1	479.997	0.003	0.001	1	0.048
	10		2399.86	0.14	0.006	11	0.24
	2	V2I2	479.990	0.010	0.002	5	0.048
	10		2399.92	0.08	0.003	6	0.24
	2	V3I3	479.969	0.031	0.007	15	0.048
	10		2399.72	0.28	0.012	22	0.24

End of Calibration certificate.

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