

CERTIFICATE OF CALIBRATION

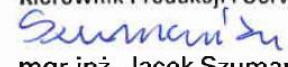
Date of issue: 15 May 2018

Certificate Number: CT/407/2018

Page 1/3

CALIBRATION OBJECT	Name: Three Phase Power Calibrator and Power Engineering Apparatus Tester Model: C300B class 0.02 Serial No.: 25180 Manufacturer: Calmet sp. z o.o. Poland, 65-472 Zielona Gora, Kukulcza Street 18
APPLICANT	██ ██
CALIBRATION METHOD	Method of Direct Comparison - according to a procedure CT-PW-02-04
ENVIRONMENTAL CONDITIONS	Calibration was performed in +23°C±2°C ambient temperature and 35...60% relative humidity
CALIBRATION DATE	15 May 2018
TRACEABILITY	This instrument was calibrated by a Three-phase Electricity Standard Radian RD-33-223 SN 301589, which is traceable to the National Institute of Standards and Technology (NIST). For calibration was also used Keysight 3458A Multimeter SN MY45051722
CALIBRATION RESULTS	The calibration results are presented on the next pages of this certificate including uncertainty of measurement
UNCERTAINTY OF MEASUREMENT	Uncertainty of measurement has been evaluated in compliance with EA-4/02. The expanded uncertainty assigned corresponds to a coverage probability of 95% and the coverage factor k=2
COMPLIANCE WITH THE REQUIREMENTS	As a result of calibration, it has been found, that the instrument listed above meets metrological requirements specified in manufacturer documentation
DECLARATION	This is to confirm, that Calmet's Laboratory of Measurement meets requirements of the EN ISO/IEC 17025:2005 standard

CALMET sp. z o.o.
65-472 Zielona Góra, ul. Kukulcza 18
tel. +48 68 324 04 56, www.calmet.com.pl
NIP 929-10-19-640 REGON 970602765

Kierownik Produkcji i Serwisu

mgr inż. Jacek Szumański
.....
Stamp and signature

CERTIFICATE OF CALIBRATION issued by LABORATORY OF MEASUREMENT
 Calmet sp. z o.o. in Zielona Gora Poland

Date of issue: 15 May 2018

Certificate Number: CT/407/2018

Page 2/3

CALIBRATION RESULTS

The results are presented below

ID.	Function symbol Range	Setting				Uncertainty of calibrator	Measurement results			Uncertainty of measurement
		U	I	f	φ		Errors in phase			
		[V]	[A]	[Hz]	[°]		L1	L2	L3	
1	U 70V	3.0	50	50		±0.0042V	+0.0007V	+0.0008V	+0.0009V	0.0040V
2		20.0				±0.0042V	-0.0004V	-0.0006V	-0.0005V	0.0046V
3		65.0				±0.0130V	-0.0011V	-0.0011V	-0.0010V	0.0038V
4	U 140V	40				±0.008V	-0.001V	-0.002V	-0.001V	0.003V
5		130				±0.026V	-0.003V	-0.003V	-0.002V	0.008V
6	U 280V	85				±0.017V	-0.003V	-0.003V	-0.003V	0.005V
7		260				±0.052V	-0.003V	-0.004V	-0.003V	0.015V
8	U 560V	170				±0.034V	-0.005V	-0.003V	-0.002V	0.010V
9		510				±0.102V	-0.006V	-0.008V	-0.007V	0.029V
10	I 0,5A	0.020				±0.000010A	-0.000002A	-0.000002A	-0.000002A	0.000002A
11		0.125				±0.000025A	-0.000001A	-0.000002A	-0.000001A	0.000007A
12		0.480				±0.000096A	-0.000025A	-0.000023A	-0.000024A	0.000028A
13	I 6A	0.5				±0.00012A	-0.00001A	-0.00002A	-0.00002A	0.00003A
14		1.5				±0.00030A	+0.00002A	+0.00001A	+0.00001A	0.00009A
15		5.8				±0.00116A	-0.00026A	-0.00024A	-0.00025A	0.00034A
16	I 20A	5				±0.0010A	-0.0001A	-0.0001A	-0.0001A	0.0003A
17		10				±0.0020A	-0.0004A	-0.0005A	-0.0005A	0.0006A
18		19				±0.0038A	-0.0007A	-0.0007A	-0.0008A	0.0011A
19	I 120A	30				±0.006A	+0.000A	+0.000A	+0.000A	0.001A
20		60				±0.012A	-0.003A	-0.003A	-0.003A	0.004A
21		115				±0.023A	-0.004A	-0.004A	-0.004A	0.007A
22	f		50	±0.0020Hz	-0.0001Hz	-	-	0.0031Hz		
23			60	±0.0020Hz	+0.0000Hz	-	-	0.0037Hz		
24	φ	230	5	50	0	±0.05°	+0.00°	-0.01°	+0.00°	0.02°
25					+90	±0.05°	+0.00°	-0.01°	+0.01°	0.02°
26					-90	±0.05°	-0.01°	-0.01°	+0.00°	0.02°

ID.	Function symbol [unit]	Setting				Uncertainty of calibrator	Measurement results				Uncertainty of measurement		
		U	I	f	φ		Errors in phase						
		[V]	[A]	[Hz]	[°]		L1	L2	L3	L123			
1	P [W]	100	1	50	0	±0.020%	-0.004%	-0.004%	-0.003%	-0.002%	0.006%		
2					60	±0.150%	+0.006%	-0.017%	-0.024%	-0.015%	0.007%		
3					-60	±0.150%	-0.012%	-0.025%	-0.030%	-0.023%	0.007%		
4					0	±0.020%	+0.001%	+0.001%	+0.001%	+0.001%	0.006%		
5					60	±0.150%	-0.027%	-0.029%	+0.001%	-0.009%	0.007%		
6					-60	±0.150%	+0.016%	-0.011%	-0.022%	-0.013%	0.007%		
7		0	±0.020%		-0.006%	-0.008%	-0.008%	-0.007%	0.006%				
8		60	±0.150%		-0.008%	-0.011%	-0.015%	-0.013%	0.007%				
9		-60	±0.150%		-0.005%	-0.001%	-0.017%	-0.012%	0.007%				
10		Q [var]	200		2	90	±0.020%	+0.004%	+0.004%	+0.006%	+0.004%	0.007%	
11						150	±0.150%	+0.018%	-0.008%	-0.021%	-0.021%	0.007%	
12						30	±0.150%	-0.010%	-0.027%	-0.004%	-0.014%	0.007%	
13	S [VA]			100		1	0	±0.020%	-0.004%	-0.003%	-0.002%	-0.004%	0.006%
14							200	±0.020%	+0.001%	+0.001%	+0.002%	+0.001%	0.006%
15							400	±0.020%	-0.007%	-0.007%	-0.007%	-0.007%	0.006%

Measured by:

Kuszyk

CERTIFICATE OF CALIBRATION issued by LABORATORY OF MEASUREMENT
 Calmet sp. z o.o. in Zielona Gora Poland

Date of issue: 15 May 2018

Certificate Number: CT/407/2018

Page 3/3

CALIBRATION RESULTS

The results are presented below

ID.	Function symbol [unit]	<i>Results of test active, reactive and apparent energy accuracy in four wire, star connection</i>											
		Setting				Uncertainty of calibrator	Measurement results				Uncertainty of measurement		
		U	I	f	φ		Errors in phase						
		[V]	[A]	[Hz]	[°]		L1	L2	L3	L123			
1	EP [Wh]	57	5	50	0	±0.020%	+0.000%	-0.002%	-0.002%	-0.002%	0.006%		
2					60	±0.150%	-0.036%	-0.020%	-0.032%	-0.029%	0.007%		
3					-60	±0.150%	+0.027%	+0.016%	-0.032%	-0.011%	0.007%		
4					0	±0.020%	-0.001%	-0.001%	-0.001%	-0.001%	0.006%		
5					60	±0.150%	-0.026%	+0.001%	-0.015%	-0.025%	0.007%		
6					-60	±0.150%	+0.020%	+0.000%	-0.027%	-0.002%	0.007%		
7		110	5		0	±0.020%	-0.003%	-0.005%	-0.003%	-0.002%	0.006%		
8					0	±0.020%	-0.006%	-0.009%	-0.008%	-0.006%	0.006%		
9					60	±0.150%	+0.010%	+0.003%	-0.017%	-0.002%	0.007%		
10					-60	±0.150%	-0.021%	-0.018%	-0.031%	-0.025%	0.007%		
11					0	±0.020%	+0.001%	-0.002%	-0.001%	+0.002%	0.006%		
12					0	±0.020%	-0.006%	-0.007%	-0.007%	-0.007%	0.006%		
13					0	±0.020%	-0.002%	-0.002%	-0.003%	-0.001%	0.006%		
14					0	±0.020%	+0.002%	+0.003%	+0.002%	+0.004%	0.006%		
15					230	5	0	±0.020%	-0.001%	-0.001%	-0.001%	-0.001%	0.006%
16							60	±0.150%	-0.007%	-0.020%	-0.033%	-0.021%	0.007%
17		-60	±0.150%				+0.028%	-0.021%	-0.031%	-0.022%	0.007%		
18		0	±0.020%				-0.004%	-0.005%	-0.005%	-0.007%	0.006%		
19		0	±0.020%				-0.005%	-0.006%	-0.006%	-0.007%	0.006%		
20		0	±0.020%				-0.007%	-0.004%	-0.007%	-0.006%	0.006%		
21		0	±0.020%				-0.005%	-0.006%	-0.008%	-0.006%	0.006%		
22		60	±0.150%				-0.027%	-0.014%	-0.021%	-0.021%	0.007%		
23		400	5		-60	±0.150%	-0.002%	-0.016%	-0.012%	-0.007%	0.007%		
24					0	±0.020%	-0.002%	-0.003%	-0.003%	-0.003%	0.006%		
25				60	±0.150%	-0.020%	+0.002%	-0.022%	-0.016%	0.007%			
26				-60	±0.150%	+0.020%	-0.004%	-0.015%	+0.001%	0.007%			
27	90			±0.020%	+0.002%	-0.001%	+0.001%	+0.001%	0.007%				
28	150			±0.150%	+0.023%	-0.022%	-0.005%	+0.007%	0.007%				
29	EQ [varh]	57	5	30	±0.150%	-0.040%	-0.041%	-0.036%	-0.044%	0.007%			
30				90	±0.020%	+0.002%	+0.000%	+0.001%	+0.001%	0.007%			
31				230	5	150	±0.150%	+0.024%	-0.020%	-0.005%	+0.009%	0.007%	
32						30	±0.150%	-0.021%	-0.025%	-0.035%	-0.028%	0.007%	
33	ES [VAh]	230	5	0	±0.020%	-0.001%	-0.002%	+0.000%	-0.002%	0.006%			
34				0	±0.020%	-0.001%	-0.001%	+0.000%	-0.001%	0.006%			
35				0	±0.020%	+0.001%	-0.002%	-0.002%	-0.001%	0.006%			
36				0	±0.020%	+0.000%	-0.001%	+0.000%	-0.001%	0.006%			
37				0	±0.020%	-0.005%	-0.005%	-0.005%	-0.005%	0.006%			
38				0	±0.020%	+0.000%	+0.002%	+0.000%	+0.001%	0.006%			
39				0	±0.020%	+0.001%	+0.001%	+0.001%	+0.000%	0.006%			

Measured by:

Kuszyk