

Calmet Calibration Laboratory

Unique Laboratory

Calmet Calibration Laboratory is Unique Laboratory of Power Network Parameters and Power Quality, which offers calibration (checking, testing) of measuring instruments and calibrators of electro-energetic values such as: DC and AC voltage and current, phase angle, frequency, power, energy and resistance.

There are many accredited and non-accredited laboratories to offer these services, but Calmet Calibration Laboratory offers calibration service in the field:

- ▶ highest accuracy 0,007% for voltage, current, power and energy up to 3x120A AC,
- ▶ distorted signals as harmonic of voltage, current and power, interharmonics, subharmonics,
- ▶ time-varying signals as flicker, dips, sags, overvoltages, inrush current.

what means, that **we specialize in:**

- ▶ **highest accuracy power network parameters,**
- ▶ **power quality parameters.**

Who needs us?

Power engineering and industries associated with it, where are used voltmeters, ammeters, clamp meters, frequency meters, phase meters, meters of power network parameters, watt-meters, electricity meters, power quality analysers, calibrators of voltage, current and power, reference meters and testers of electrical devices, protection relays, measurement transducers ...

What we offer?

1. Increasing energy prices resulted in need of electricity meter testers with high accuracy classes from 0.5% to 0.02% inclusive. These testers are working under difficult conditions on site and the measurement results can have financial consequences, so there is a need of periodical checking these testers. Currently we offer calibration of testers (reference meters) of all accuracy classes in the scope of accreditation No. AP 216, with the CMC at the level 0.007%.
2. For more than 30 years we have manufactured several thousand of electrical standards that determine the Calibration and Measurement Capability (CMC) of many domestic and foreign laboratories, and which for many years we regularly calibrated and maintain. During this time our staff has acquired a lot of experience, which is the basis for the submission of proposals for calibration in difficult cases, impossible to achieve in other laboratories.
3. Standardization of power quality parameters acc. to EN 61000-4-7, EN 61000-4-15, EN 61000-4-30 and EN 50160 made it possible to assess the power quality analyzers, which should be tested periodically. Since 2002, we produced and calibrated measuring instruments and calibrators with measurement and generation functions of power quality parameters.

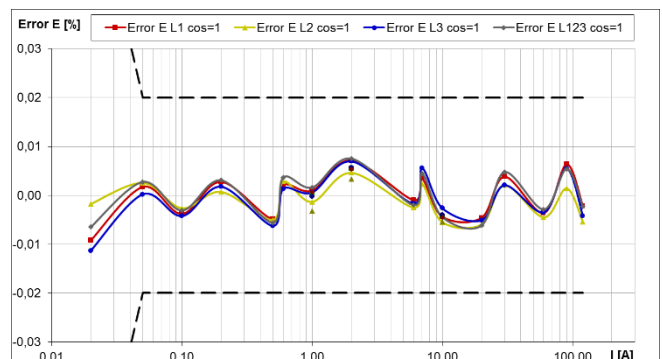
Hardware base

It is obvious, that for calibration is required in addition to the competence the necessary equipment.

We have automatic measuring stations for calibration the Three Phase Power Calibrators and reference meters, included 0.02% accuracy alas manufactured. In the serial production of power calibrators and reference meters we have obtained such high level of automation that it is possible to use these systems for calibrating instruments from other manufacturers. *The diagram shows an example of the error characteristics of the Energy as a function of current (50mA-120A) of the C300B Calibrator for balanced and unbalanced loads, which was obtained in fully automatic way.*

We have semi-automatic measuring stations for calibration the manufactured by us Multifunction Calibrators 0.05% accuracy class and we have other instruments, too.

In the adjustment and calibration on the design, production and maintenance process we meet the requirements of PN-EN ISO/IEC 17025:2018-02 with traceability to the standards maintained at Polish Central Office of Measures (GUM), PTB or NIST.



Scope of laboratory activities, for which Calmet Calibration Laboratory declares compliance with the requirements of the standard PN-EN ISO/IEC 17025:2018-02, including activities covered by the scope of accreditation No. AP 216 (yellow color)

Object of calibration	Measuring range	Uncertainty of measurement for CMC ¹⁾	Conditions
7.01. DC Voltage			
Meters Calibrators	(0.001÷1050) V (0.001÷1.2) V (1.2÷12) V (12÷120) V (120÷1050) V	0.0014%+0.3 µV 0.0014%+1 µV 0.0014%+0.04 mV 0.0032%+1.9 mV	Except p.7.7.2 PT/ILC
7.02. DC Current			
Meters Calibrators	(0.00001÷20.5) A (0.01÷0.12) mA (0.12÷1.2) mA (0.12÷12) mA (0.012÷0.12) A (0.12÷1.05) A (1.05÷20.5) A	0.0034%+1 nA 0.0034%+6 nA 0.0034%+0.06 µA 0.0052%+0.6 µA 0.014%+11 µA 0.025%+30 µA	Except p.7.7.2 PT/ILC
7.03. AC Voltage			
Meters Calibrators	(0.001÷700) V (45÷65) Hz (10÷30) V (30÷525) V (40÷1000) Hz (0.001÷0,012) V (0.012÷0,12) V (0.12÷1,2) V (1.2÷12) V (12÷120) V (120÷700) V	0.015% 0.006% 0.023%+1,3 µV 0.008%+2,3 µV 0.008%+23 µV 0.008%+0,23 mV 0.023%+2,3 mV 0.046%+23 mV	
Power quality analyzers Power quality calibrators	(50 i 60) Hz (30÷525) V		Except p.7.7.2 PT/ILC
- Voltage harmonics	(0÷100)% (0÷360)°	0.02% ²⁾ 0.5° ³⁾	Harmonics up to 64th or 3200 Hz
- Voltage THD	(0÷100)%	0.02%	Harmonics up to 64th or 3200 Hz
- Voltage asymmetry	(0÷100)%	0.05%	
- Voltage interharmonics	(0÷30)%	0.2% ⁴⁾	Interharmonics (16÷9000) Hz
- Voltage dips and interruptions	(0÷100)% (0.02÷999) s	0.05% 0.001 s	
- Overvoltage	(0÷200)% (0.02÷999) s	0.05% 0.001 s	
- Flicker Pst	0.2÷40	1%	Rectangular modulation (0,000833÷33,33) Hz

7.04. AC Current			
Meters Calibrators	(0.00001÷120) A (45÷65) Hz (0.001÷0.01) A (0.01+0.25) A (0.25÷120) A	0.05% 0.01% 0.007%	
	(45÷1000) Hz (0.01÷0.12) mA	0.063%+0.04 µA	
	(45÷5000) Hz (0.12÷1.2) mA (1.2÷12) mA (0.012÷0.12) A (0.12÷1.05) A	0.089%+0.2 µA 0.089%+2 µA 0.089%+0.02 mA 0.12%+0.2 mA	
	(45÷2000) Hz (1.05÷20.5) A	0.028%+52 µA	
	(40÷500) Hz (0.05÷120) A	0.02%	
Clamp meters	(0.001÷3000) A (45÷65) Hz (0.25÷120) A (0.001÷3000) A	0.05% 0.05%	
Power quality analyzers Power quality calibrators	(50 i 60) Hz (0.25÷120) A		Except p.7.7.2 PT/ILC
- Voltage harmonics	(0÷100)% (0÷360)°	0.02% ²⁾ 0.5° ³⁾	Harmonics up to 64th or 3200 Hz
- Voltage THD	(0÷100)%	0.02%	Harmonics up to 64th or 3200 Hz
- Current interharmonics	(0÷30)%	0.2% ⁴⁾	Interharmonics (16÷9000) Hz
- Inrush current	(0÷500)% (0.02÷999) s	0.05% 0.001 s	
7.5. Resistance DC			
Meters Calibrators	1 mΩ÷1.2 GΩ (1.2÷12) Ω (12÷120) Ω (120÷1200) Ω (1.2÷12) kΩ (12÷120) kΩ (0.12÷1.2) MΩ (1.2÷12) MΩ (12÷120) MΩ (0.12÷1.2) GΩ	0.0026%+0.12 mΩ 0.0026%+1.2 mΩ 0.003% 0.003% 0.003% 0.003%+5 Ω 0.009%+0.1 kΩ 0.12%+1.2 kΩ 1.16%	Except p.7.7.2 PT/ILC
7.10. Phase angle			
Meters Calibrators	(0÷360)° (45÷65) Hz (30÷525) V (0.25÷120) A (0÷360)° (45÷500) Hz (30÷520) V (0.05÷120) A	0.005° 0.04°	
Clamp meters	(0÷360)° (45÷65) Hz (30÷525) V (0.25÷120) A	0.04°	

7.11. AC Energy			
Meters of power network parameters Electricity meters Devices for checking energy meters Calibrators	(45÷65) Hz (30÷525) V (0÷360)° cosφ or sinφ: 0.5÷1 (0.001÷0,01) A (0.01÷0,25) A (0.25÷120) A	CMC is applicable to active, reactive and apparent energy 0.05% 0.015% 0.007%	
Clamp meters	(45÷65) Hz (30÷525) V (0÷360)° cosφ or sinφ: 0,5÷1 (0.25÷120) A (120÷3000) A	CMC is applicable to active, reactive and apparent energy 0.05% 0.07%	
7.13. AC Power			
Meters of power network parameters Electricity meters Devices for checking energy meters Calibrators	0.015 W÷0.15 W÷189 kW 0.015 var÷0.15 var÷189 kvar 0.03 VA÷0.3 VA÷189 kVA (45÷65) Hz (30÷525) V (0÷360)° cosφ or sinφ: 0.5÷1 (0.001÷0.01) A (0.01÷0.25) A (0.25÷120) A	0.05% 0.015% 0.007%	
Clamp meters	3.75 W÷189 kW÷4.725 MW 3.75 var÷189 kvar÷4.725 Mvar 7.5 VA÷189 kVA÷4.725 MVA (45÷65) Hz (30÷525) V (0÷360)° cosφ or sinφ: 0.5÷1 (0.25÷120) A (120÷3000) A	0.05% 0.07%	
10.01. Time (interval)			
Meters Calibrators	1 μs÷1 s	0.0003%	
10.02. Frequency			
Meters Calibrators	1 Hz÷100 MHz 45 Hz÷65 Hz	0.0003% 0.0003%	
<p>¹⁾ Measurement uncertainty for CMC is the expanded uncertainty with a probability of expansion about 95%. The value expressed in percentages is the relative measurement uncertainty and concerns the percentage share in the measured value. In other cases, the measurement uncertainty for CMC is expressed in units of the measured value</p> <p>²⁾ 0.02% output value for the range of harmonics frequency (80÷120) Hz with linear rise up to 0.2% output value for harmonics frequency 3200 Hz</p> <p>³⁾ 0.5° for the range of harmonics frequency (80÷120) Hz with linear rise up to 4° for harmonics frequency 3200 Hz</p> <p>⁴⁾ 0.2% output value for the range of interharmonics frequency (16÷120) Hz with linear rise up to 2% output value for interharmonics frequency 9000 Hz</p>			