

### Three Phase Network Analyzer and Tester of Electricity Meters and Instrument Transformers

#### Calmet TE30 Lite

- Measure of power network parameters in class 0.2
- Voltage ranges 0.05...600V and 0.1...40kV
- Current ranges 0.01...120(1000)(30/300/3000)A
- Testing of electricity meters
- Testing of CT/PT Transformers (option)
- Recording and analyze of power quality (option)
- Vector, oscilloscope, bar and trend charts of three phase network
- Powering from 85...265V AC power network and external battery (powerbank)
- Large 7" color Touchscreen and Calmet TE30 PC soft
- Data readout and meter control via USB, Ethernet and Bluetooth
- Data storage in SD flash memory card up to 32GB
- Calibration Certificate



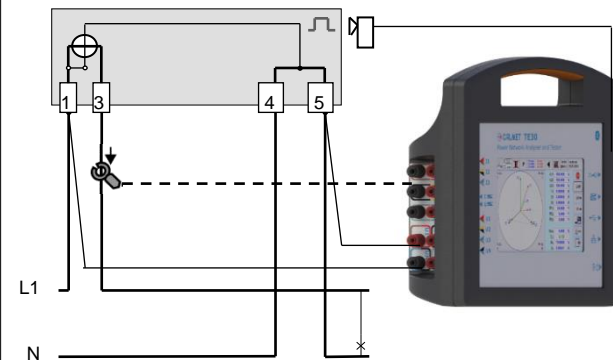
The Calmet TE30 Lite Analyzer and Tester is used for:



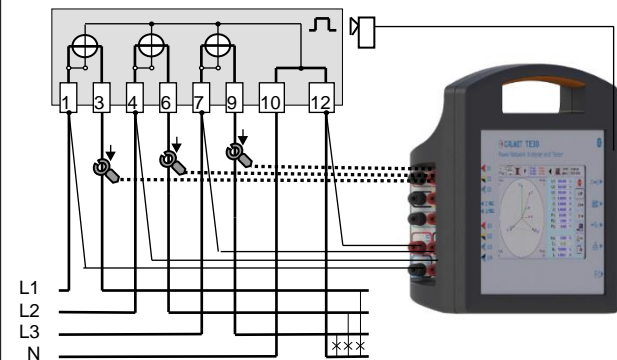
- verification of power network wiring with measure and recording of power network parameters,
- calibration and testing of electricity meters and instrument transformers (CT Current Transformers and PT Potential Transformers) directly on site:  
**electricity meters** EN 50470, IEC 62052 and IEC 62053 with accuracy relative to internal reference including measure of meter error, counter error and maximum power meter error,  
**instrument transformers** EN 60044 including CT/PT Ratio error and phase error as well as CT/PT burden simultaneously in three phases,
- measuring, recording and analyzing of power quality.

#### Examples of applications

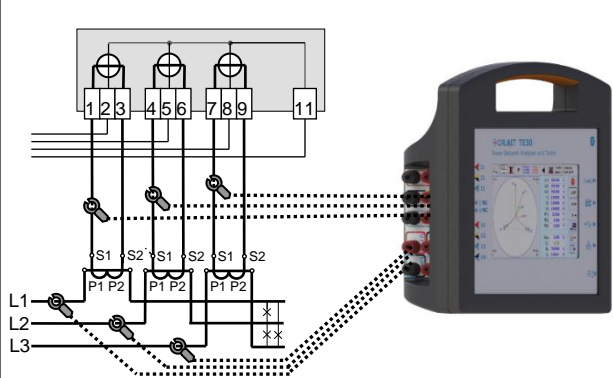
##### Single phase electricity meter testing with clamps



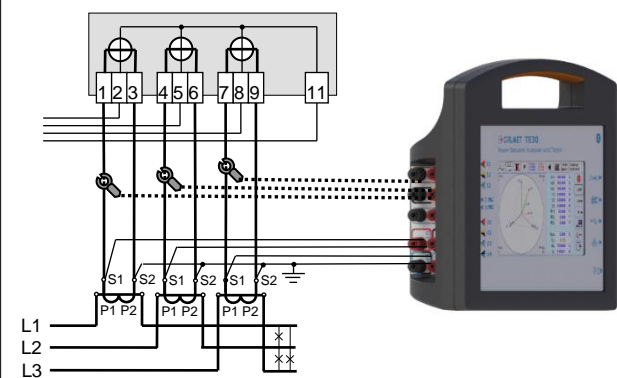
##### 3-phase electricity meter testing with clamps

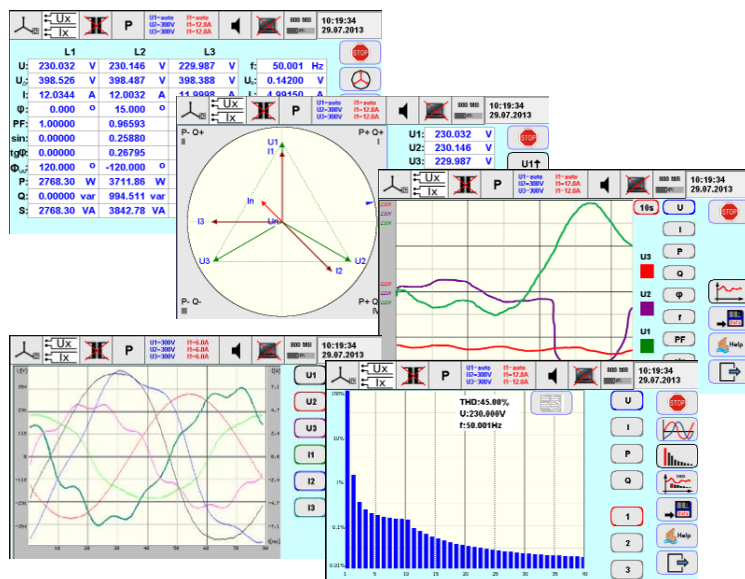


##### CT Ratio error and phase error testing



##### CT burden testing - connection with clamps





Large Touchscreen with display and keyboard functions for easy operation enables:

- measure of power network parameters: voltages U1, U2, U3, U12, U23, U31, UN, currents I1, I2, I3, IN, frequency f, phase angles  $\varphi_1, \varphi_2, \varphi_3$ , power factors PF1, PF2, PF3,  $\Sigma$ PF, factors  $\sin\varphi_1, \sin\varphi_2, \sin\varphi_3, \Sigma\sin\varphi, \tan\varphi_1, \tan\varphi_2, \tan\varphi_3, \Sigma\tan\varphi$ , angles between voltages  $\angle U_{12}, \angle U_{23}, \angle U_{31}$ , powers P1, P2, P3,  $\Sigma$ P, Q1, Q2, Q3,  $\Sigma$ Q, S1, S2, S3,  $\Sigma$ S,
- visualization of measurement results in form of: table, vectors, trend chart, oscilloscope (waveform) or bar chart (harmonics of U, I, P, Q).

### Specifications for a power network analyzer

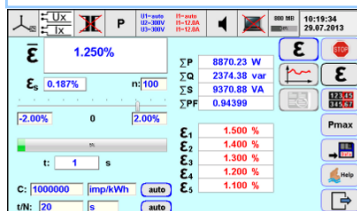
Parameter	Range	Error limits <sup>1)2)3)4)</sup>
		class 0.2
Voltage (Direct)	0.05...600V	$\pm 0.1\%$ <sup>5)</sup>
Voltage (VoltLiteWire 40kV)	0.1...40kV	$\pm 0.1\% \pm E_m$
Current (Clamps CT100AC.B)	0.1...120A 0.01...0.1A	$\pm 0.2\%$ $\pm 0.2\%*$
Current (Clamps CT1000AC.B)	10...1000A 0.3...10A	$\pm 0.2\%$ $\pm 0.2\%*$
Current (Flexible Clamps FCT3000AC.B)	0.3...30A/3...300A/30...3000A	$\pm 0.1\% \pm E_m$
Current (AmpLiteWire 2000A)	1...2000A	$\pm 0.1\% \pm E_m$
Power and energy (Clamps CT100AC.B)	0.1...120A / 10...600V 0.01...0.1A / 10...600V	$\pm 0.2\%$ $\pm 0.2\%*$
Power and energy (Clamps CT1000AC.B)	10...1000A / 10...600V 1...10A / 10...600V	$\pm 0.2\%$ $\pm 0.2\%*$
Power and energy (Flexible Clamps FCT3000AC.B)	0.3...30A/3...300A/30...3000A / 10...600V	$\pm 0.1\% \pm E_m$
Power and energy (VoltLiteWire 40kV + AmpLiteWire 2000A)	1...2000A / 0.5...40kV	$\pm 0.1\% \pm E_m$
Frequency	40...70Hz	$\pm 0.01\text{Hz}$
Phase shift (Clamps)	-180...+180°	$\pm 0.1^\circ$ <sup>5)6)</sup>
Power factor $\cos\varphi$ and $\sin\varphi$	0...±1	$\pm 0.001$ <sup>5)6)</sup>
Temperature coefficient	0.02% per 1°C in range -10...+50°C	
Time stability	Short term [1h] = 0.05%, long term [1 year] = 0.1%	

<sup>1)</sup> % - related to the measuring value, %\* - related to the measuring range final value (is underlined)  
<sup>2)</sup> error limits include reference uncertainty of standards, stability in 12 months, influence quantities (ambient temperature in range +20...+26°C, humidity and power supply voltage in range 80...265V, frequency in range 45...65Hz)  
<sup>3)</sup>  $E_m$  – sensor basic error,  $E_m = 1\% + 0.1\%*$  (Flexible Clamps FCT3000AC.B),  $E_m = 2\% + 0.2\%*$  (VoltLiteWire 40kV and AmpLiteWire 2000A)  
<sup>4)</sup> power and energy errors related to apparent power  
<sup>5)</sup> in voltage range 10...600V (Direct)  
<sup>6)</sup> in current range: 0.1A...120A (Clamps CT100AC.B), 10A...1000A (Clamps CT1000AC.B)

### General parameters

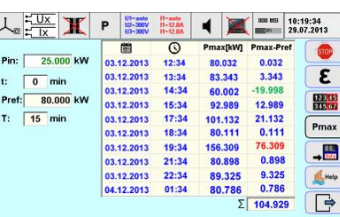
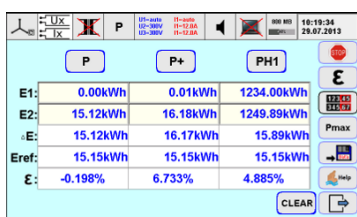
Weight and dimensions (width x height x depth)	1.6kg and (270x245x90)mm
Standard power supply	85...265V / 47...63Hz / 8VA or DC 5 ... 12V/1.5A
Extended power supply	50...450V / 47...63Hz / 10VA protected to 500V
Safety: Isolation protection and Measurement Category	IEC 61010-1 and 300V CAT III
Degree of protection	Device is placed in IP40 housing
Operation / storage temperature	-10...+50°C / -20...+60°C
Operation / storage relative humidity	<95% @ +0...+25°C and <75% @ +25...+50°C / <95% @ 0...+50°C

## The Calmet TE30 Lite as an electricity meters and transformers tester (option)



### Testing of electricity meters directly on site:

- function of calculating meter error (partial errors, average error, standard deviation) directly in [%] with method of settings time of measurements or number of impulses,
- function of automatic identification meter constant,
- function of automatic determining measurement time or number of pulses,



- function of measuring energy with method of setting time for verification of meter counters directly in [%],
- function of maximum power measuring for testing of maximum power meters,
- visualization in form of table or trend chart,



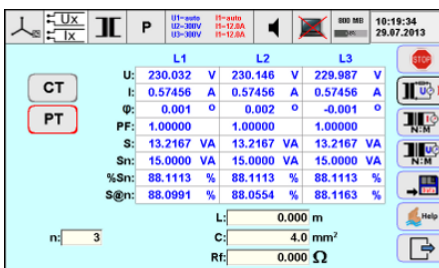
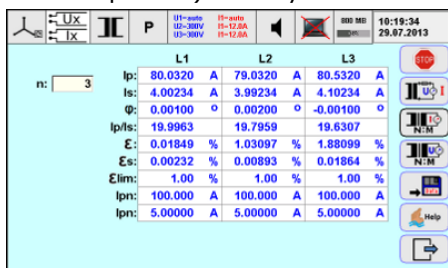
- function of measuring energy for power P, P+, P-, Q, Q+, Q-, S,
- function of measuring energy for the first harmonic of active power PH1.

### Specifications for automatic tests of electricity meters

Parameter	Voltage and current range	Frequency range	Resolution
Impulse Input for counting pulses from electricity meter, photo scanning head or reference meter	0...2V/4...30V	0.000001Hz...200kHz	0.0001% @ t ≥ 1s
Impulse Output for Calmet TE30 testing <sup>1)</sup>	28V/100mA open collector	0.0001Hz...210kHz	

<sup>1)</sup> Programmable constant of Impulse Output - preferred value: C = 3 000 [imp/Wh(varh,Vah)] - for CT100AC.B, C = 300 [imp/Wh(varh,Vah)] for CT1000AC.B

### Testing of instrument transformers – TT function (LV and MV current CT and potential PT simultaneously in three phases) directly on site:



- functions of calculating transformer ratio error directly in [%],
- functions of calculating phase error,
- functions of burden measurements of transformer

### Specifications for Burden measurement tests of CT and PT transformers

Parameter	Current range	Voltage range	Error limits <sup>1)2)4)</sup>
CT Burden	0.01...12A (Clamps CT100AC.B)	1...10V (Direct)	±0.3%
PT Burden	0.01...12A (Clamps CT100AC.B)	0.05...1V (Direct)	±0.3%*
		10...600V (Direct)	±0.3%

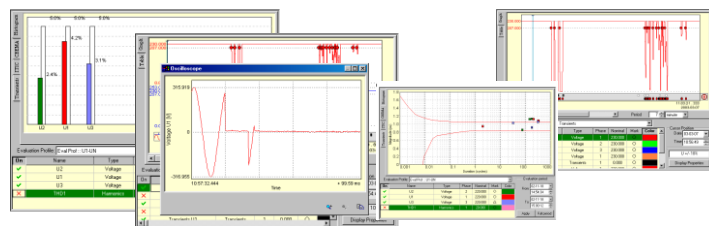
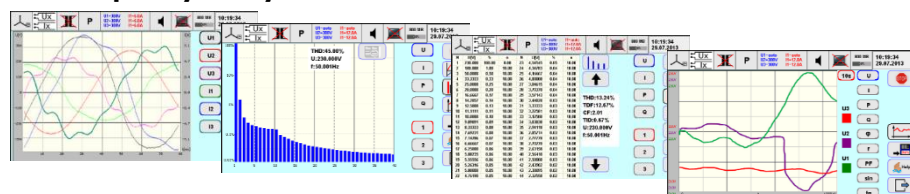
### Specifications for Ratio measurement tests of CT and PT transformers

Parameter	Primary current/voltage range	Secondary current/voltage range	Error limits <sup>1)2)3)4)</sup>
CT Ratio	0.2...120A (Clamps CT100AC.B)	0.01...12A (Clamps CT100AC.B)	±0.4%
CT Ratio	10...1000A (Clamps CT1000AC.B)	0.01...12A (Clamps CT100AC.B)	±0.4%
CT Ratio	0.3...30A/3...300A/30...3000A (Flexible Clamps FCT3000AC.B)	0.01...12A (Clamps CT100AC.B)	±0.3%±Em
CT Ratio	1...2000A (AmpLiteWire 2000A)	0.01...12A (Clamps CT100AC.B)	±0.3%±Em
PT Ratio	0.5...40kV (VoltLiteWire 40kV)	10...600V (Direct)	±0.2%±Em

- % - related to the measuring value, %\* - related to the measuring range final value (is underlined)
- error limits of operating Burden or Ratio - covers reference uncertainty of standards, stability in 12 months, influence quantities (ambient temperature in range +20...+26°C, humidity and power supply voltage in range 85-265V, frequency in range 45...65Hz)
- Em - sensor basic error, Em=1%+0.1%\* (Flexible Clamps FCT3000AC.B), Em=2%+0.2%\* (AmpLiteWire 2000A and VoltLiteWire 40kV)
- for CT100AC.B clamps, the error limits are specified for I ≥ 0.1A

## The Calmet TE30 *Lite* as a power quality analyzer (option)

### Power quality analyzer – REC function enables:



- measuring of power quality parameters according to IEC 61000-4-30 with visualization of measurement results in the real time mode,

- recording of power network parameters in the SD Flash 4-32GB memory, which gives  $(8 \div 64) \times 10^6$  sets of network parameters or long-term registration of power quality (option),
- analyzing of measurement results for EN 50160 compatibility or individual requirements of user (option).

Specifications for a power quality parameters				
Parameter		Range		Error limits <sup>1)</sup>
Harmonics in voltages	amplitude	0...100% of input	1 <sup>st</sup> ...63 <sup>rd</sup>	$\pm 0.1\%$ <sup>2)</sup>
	phase	-180...+180°		$\pm 0.5^\circ$ <sup>3)</sup>
Harmonics in currents, P and Q powers	amplitude	0...100% of input	1 <sup>st</sup> ...63 <sup>rd</sup>	$\pm 0.2\%$ <sup>2)</sup>
	phase	-180...+180°		$\pm 0.5^\circ$ <sup>3)</sup>
Total harmonic distortion THD	in voltages	0...100% of input	1 <sup>st</sup> ...63 <sup>rd</sup>	$\pm 0.1\%$ <sup>2)</sup>
	in currents	0...100% of input		$\pm 0.2\%$ <sup>2)</sup>
Total interharmonic distortion TID in voltages and currents		0...15% of input	40...3200Hz	$\pm 0.2\%$ <sup>4)</sup>
Signal voltage <sup>5)</sup>		0...15% of input	40...3200Hz	$\pm 5\%$
Flicker P <sub>st</sub> and P <sub>lt</sub> (option)		0...40	0.000833...33.33Hz	$\pm 5\%$
Voltage asymmetry		0...100%		$\pm 2\%$







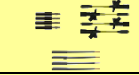


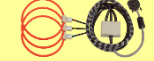




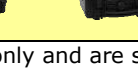
<sup>1)</sup> error limits covers reference uncertainty of standards, stability in 12 months, influence quantities (ambient temperature in range +20...+26°C, humidity and power supply voltage in range 80-265V, frequency in range 45...65Hz)  
<sup>2)</sup> of input for 80-140Hz frequency range of harmonics with linear rise to twice value of error limits for 3200Hz  
<sup>3)</sup> for 80-140Hz frequency range of harmonics with linear rise to 16° for 3200Hz  
<sup>4)</sup> of input for 80-140Hz frequency range of interharmonics with linear rise to 5% of input for 3200Hz  
<sup>5)</sup> the highest non-harmonic amplitude and frequency

### Calmet TE30 *Lite* Analyzer's equipment

#### All completed Calmet TE30 *Lite* Analyzer's set consists of:

- Calmet TE30 *Lite* analyzer class 0.2 with Basic function,
- power supply with power cord,
- memory card SD 8GB,
- operation manual,
- warranty card,
- calibration certificate.

#### Optionally for Calmet TE30 *Lite* Analyzer are available:

<ul style="list-style-type: none"> <li>Calmet TE30 PC Soft with operation manual and USB mini / USB A interface cable,</li> </ul>		<ul style="list-style-type: none"> <li>EA35 set of safety measurement cables (4pcs),</li> </ul>	
<ul style="list-style-type: none"> <li>TT function – for CT and PT Transformers testing,</li> </ul>		<ul style="list-style-type: none"> <li>AD100EXT extension for powering from measurement network,</li> </ul>	
<ul style="list-style-type: none"> <li>REC function – recording of power network parameters,</li> </ul>		<ul style="list-style-type: none"> <li>CT100AC electronic compensated clamps up to 120A (1 set),</li> </ul>	
<ul style="list-style-type: none"> <li>EA23 additional accessories (handlers and terminals 12pcs) of safety cables,</li> </ul>		<ul style="list-style-type: none"> <li>CT1000AC.B electronic compensated clamps up to 1000A (1 set),</li> </ul>	
<ul style="list-style-type: none"> <li>CF106H photo head with holder for inductive meter and meter with LED,</li> </ul>		<ul style="list-style-type: none"> <li>FCT3000AC.B electronic compensated flexible clamps in ranges 30/300/3000A (1 set),</li> </ul>	
<ul style="list-style-type: none"> <li>DR200D miniature thermal printer with Bluetooth,</li> </ul>		<ul style="list-style-type: none"> <li>AmpLiteWire 2000A primary current sensors up to 2000A for LV and MV nets (1pc),</li> </ul>	
<ul style="list-style-type: none"> <li>ET33 transportation case,</li> </ul>		<ul style="list-style-type: none"> <li>VoltLiteWire 40kV primary sensors up to 40kV (1pc),</li> </ul>	
<ul style="list-style-type: none"> <li>ET32 transportation case for additional accessories,</li> </ul>			

\*) all images are for illustrative purposes only and are subject to change

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