

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

### Calmet TE30

- Measure of power network parameters in class 0.05 or 0.1
- Voltage ranges 0.05...600V and 0.1...40kV
- Current ranges 0.001...12(120)(1200)(30/300/3000)A
- Testing of electricity meters and CT/PT Transformers
- Recording and analyse of power quality
- Vector, oscilloscope, bar and trend charts of three phase network
- Powering from 50...450V AC power network and internal battery with charger
- 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



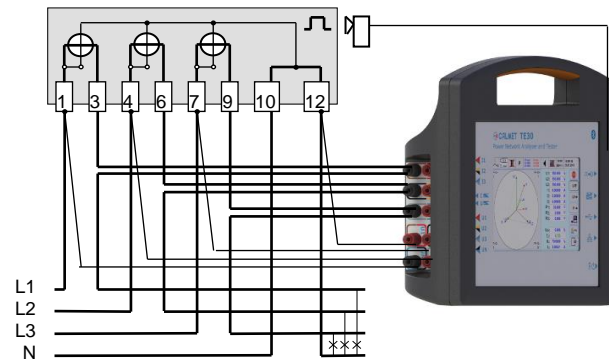
The Calmet TE30 Analyser and Tester is used for:



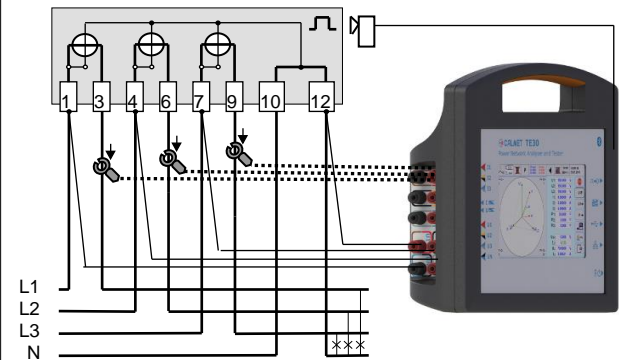
- verification of power network wiring with measure and recording of power network parameters,
- calibration and testing of electricity meters and instrument transformers (CT Current Transformers and PT Potential Transformers) directly on site:
  - electricity meters** EN 50470, IEC 62052 and IEC 62053 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

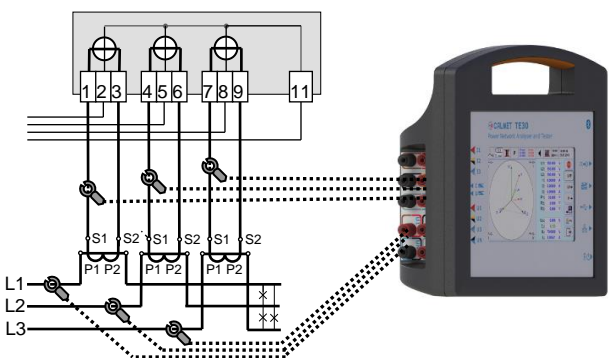
Electricity meter testing – direct connection



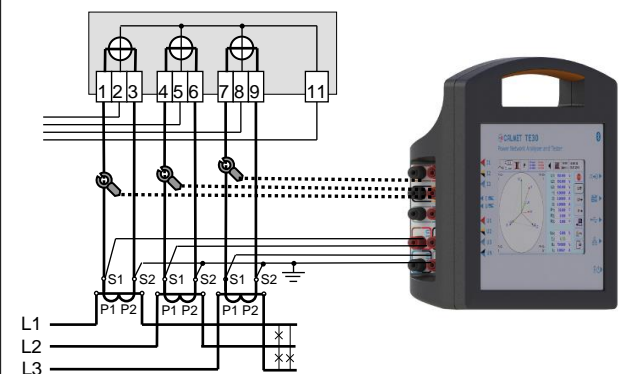
Electricity meter testing – connection with clamps

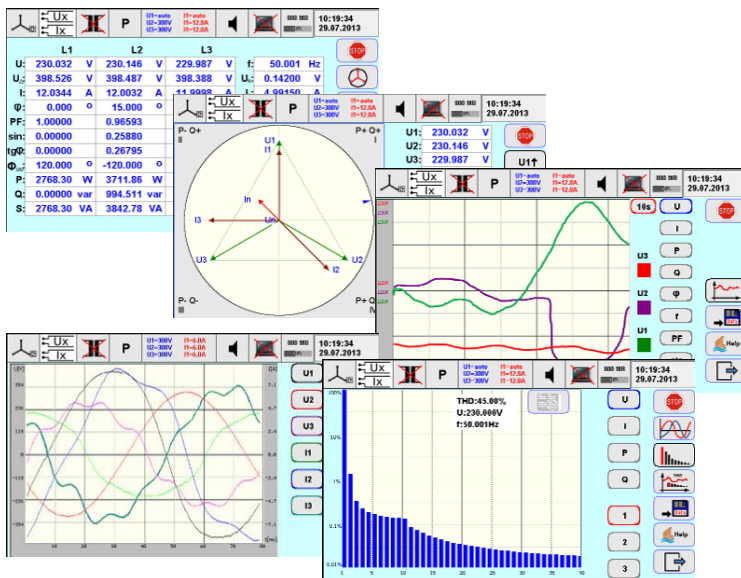


CT Ratio error and phase error testing



Electricity meter testing – connection with clamps





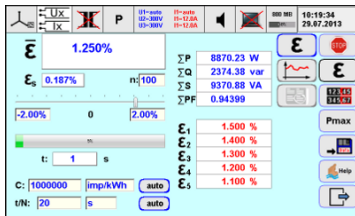
Large Touchscreen with display and keyboard functions for easy operation enables:

- 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  $\sin\varphi_1, \sin\varphi_2, \sin\varphi_3, \Sigma\sin\varphi, \text{tg}\varphi_1, \text{tg}\varphi_2, \text{tg}\varphi_3, \Sigma\text{tg}\varphi$ , 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 analyser			
Parameter	Range	Error limits 1)2)3)4)	
		class 0.05	class 0.1
Voltage (Direct)	0.05...600V	$\pm 0.05\%$ 5)	$\pm 0.1\%$ 5)
Voltage (VoltLiteWire 40kV)	0.1...40kV	$\pm 0.1\% \pm \text{Em}$	
Current (Direct)	0.01...12A	$\pm 0.05\%$	$\pm 0.1\%$
	0.001...0.01A	$\pm 0.05\%*$	$\pm 0.1\%*$
Current (Clamps CT10AC)	0.1...12A	$\pm 0.2\%$	
	0.003...0.1A	$\pm 0.2\%*$	
Current (Clamps CT100AC)	0.1...120A	$\pm 0.2\%$	
	0.01...0.1A	$\pm 0.2\%*$	
Current (Clamps CT1000AC)	10...1200A	$\pm 0.2\%$	
	0.3...10A	$\pm 0.2\%*$	
Current (Flexible Clamps FCT3000AC)	0.3...30A/3...300A/30...3000A	$\pm 0.1\% \pm \text{Em}$	
Current (AmpLiteWire 2000A)	30...2000A	$\pm 0.1\% \pm \text{Em}$	
Power and energy (Direct)	0.01...12A / 10...600V	$\pm 0.05\%$	$\pm 0.1\%$
	0.001...0.01A / 10...600V	$\pm 0.05\%*$	$\pm 0.1\%*$
Power and energy (Clamps CT10AC)	0.1...12A / 10...600V	$\pm 0.2\%$	
	0.01...0.1A / 10...600V	$\pm 0.2\%*$	
Power and energy (Clamps CT100AC)	0.1...120A / 10...600V	$\pm 0.2\%$	
	0.01...0.1A / 10...600V	$\pm 0.2\%*$	
Power and energy (Clamps CT1000AC)	10...1200A / 10...600V	$\pm 0.2\%$	
	1...10A / 10...600V	$\pm 0.2\%*$	
Power and energy (Flexible Clamps FCT3000AC)	0.3...30A/3...300A/30...3000A / 10...600V	$\pm 0.1\% \pm \text{Em}$	
Power and energy (VoltLiteWire 40kV + AmpLiteWire 2000A)	30...2000A / 0.5...40kV	$\pm 0.1\% \pm \text{Em}$	
Frequency	40...70Hz	$\pm 0.01\text{Hz}$	
Phase shift (Direct)	-180...+180°	$\pm 0.02^\circ$ 5)6)	$\pm 0.04^\circ$ 5)6)
Phase shift (Clamps)	-180...+180°	$\pm 0.1^\circ$ 5)7)	
Power factor $\cos\varphi$ and $\sin\varphi$	0...±1	$\pm 0.001$ 5)6)7)	
Temperature coefficient (Direct)	0.005% per 1°C in range -10...+50°C		
Time stability (Direct)	Short term [1h] = 0.01%, long term [1 year] = 0.03%		

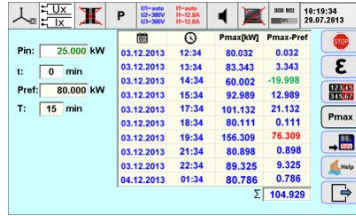
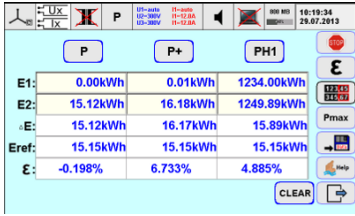
1) % - related to the measuring value, %\* - related to the measuring range final value (is underlined)  
 2) error limits include reference uncertainty of standards, stability in 12 months, influence quantities (ambient temperature in range +20...+26°C, humidity and power supply voltage in range 50...450V, frequency in range 45...65Hz)  
 3) Em - sensor basic error,  $\text{Em}=1\%+0.1\%*$  (Flexible Clamps FCT3000AC),  $\text{Em}=2\%+0.2\%*$  (VoltLiteWire 40kV and AmpLiteWire 2000A)  
 4) power and energy errors related to apparent power  
 5) in voltage range 10...600V (Direct)  
 6) in current range 0.01...12A (Direct)  
 7) in current range: 0.1A...12A (Clamps CT10AC), 0.1A...120A (Clamps CT100AC), 10A...1200A (Clamps CT1000AC)

General parameters	
Weight and dimensions (width x height x depth)	2kg (with internal battery) and (270x245x90)mm
Power supply	50...450V / 47...63Hz / 15VA or replaceable batteries Ni-MH 5xAA 1.2V / 2600mAh / 2h
Safety: Isolation protection and Measurement Category	IEC 61010-1 and 300V CAT III
Degree of protection	Device is placed in IP67 housing
Operation / storage temperature	-10...+50°C / -20...+60°C
Operation / storage relative humidity	<90% @ +0...+30°C and <75% @ +30...+50°C / <95% @ 0...+50°C

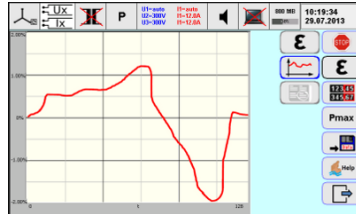
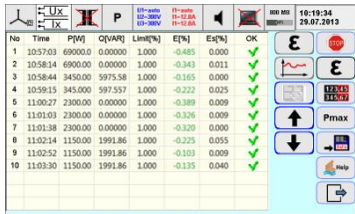


**Testing of electricity meters directly on site:**

- 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,



- P
- P+
- P-
- Q
- Q+
- Q-
- S
- PH1

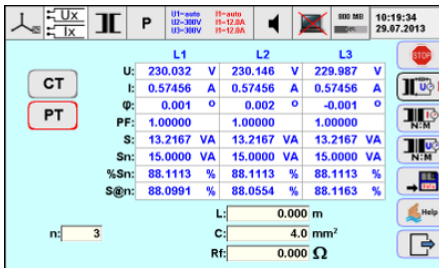
- function of measuring energy for power P, P+, P-, Q, Q+, Q-, S,
- function of measuring energy for the first harmonic of active power PH1.

**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	0.00001Hz...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 = 30 000 [imp/Wh(varh,Vah)]

**Testing of instrument transformers (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**

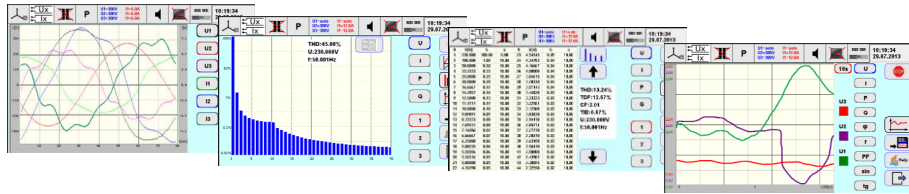
Parameter	Current range	Voltage range	Error limits <sup>1)2)</sup>
CT Burden	0.01...12A (Direct)	1...10V (Direct) 0.05...1V (Direct)	±0.2% ±0.2%*
PT Burden	0.01...12A (Direct) 0.001...0.01A (Direct)	10...600V (Direct) 10...600V (Direct)	±0.1% ±0.1%*

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

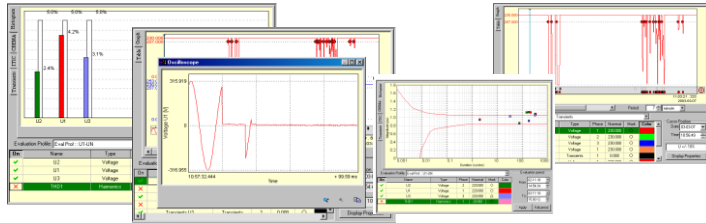
Parameter	Primary current/voltage range	Secondary current/voltage range	Error limits <sup>1)2)3)</sup>
CT Ratio	0.2...120A (Clamps CT100AC)	0.01...12A (Direct) 0.001...0.01A (Direct)	±0.2% ±0.2%*
CT Ratio	10...1200A (Clamps CT1000AC)	0.01...12A (Direct)	±0.2%
CT Ratio	0.3...30A/3...300A/30...3000A (Flexible Clamps FCT3000AC)	0.01...12A (Direct)	±0.1%±Em
CT Ratio	30...2000A (AmpLiteWire 2000A)	0.01...12A (Direct)	±0.1%±Em
PT Ratio	0.5...40kV (VoltLiteWire 40kV)	10...600V (Direct)	±0.1%±Em

<sup>1)</sup> % - related to the measuring value, %\* - related to the measuring range final value (is underlined)  
<sup>2)</sup> 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 50-450V, frequency in range 45...65Hz)  
<sup>3)</sup> Em - sensor basic error, Em=1%+0.1%\* (Flexible Clamps FCT3000AC), Em=2%+0.2%\* (AmpLiteWire 2000A and VoltLiteWire 40kV)

Power quality analyser function enables:



- measuring of power quality parameters according to IEC 61000-4-30 class A 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, currents, P and Q powers	amplitude	0...100% of input	$\pm 0.1\%$ <sup>2)</sup>
	phase	-180...+180°	$\pm 0.5^\circ$ <sup>3)</sup>
Total harmonic distortion THD in voltages and currents		0...100% of input	$\pm 0.1\%$ <sup>2)</sup>
Total interharmonic distortion TID in voltages and currents		0...15% of input	$\pm 0.2\%$ <sup>4)</sup>
Signal voltage <sup>5)</sup>		0...15% of input	$\pm 5\%$
Flicker P <sub>st</sub> and P <sub>lt</sub> (option)		0...40	$\pm 5\%$
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 50-450V, frequency in range 45...65Hz  
<sup>2)</sup> of input for 80-140Hz frequency range of harmonics with linear rise to 0.4% of input for 3200Hz  
<sup>3)</sup> for 80-140Hz frequency range of harmonics with linear rise to 8° 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 Analyser's equipment			
<b>All completed Calmet TE30 Analyser's set consists of:</b>			
<ul style="list-style-type: none"> <li>Calmet TE30 analyser class 0.05 or 0.1,</li> <li>power cord,</li> <li>fuse T500mA 250V (2pcs),</li> <li>memory card SD 8GB,</li> <li>operation manual,</li> <li>warranty card,</li> <li>calibration certificate.</li> </ul>			
<b>Optionally for Calmet TE30 Analyser are available:</b>			
<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>CT10AC electronic compensated clamps up to 12A (1compl),</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>CT100AC electronic compensated clamps up to 120A (1compl),</li> </ul>	
<ul style="list-style-type: none"> <li>EA30 set of safety measurement cables (10pcs),</li> </ul>		<ul style="list-style-type: none"> <li>CT1000AC electronic compensated clamps up to 1200A (1compl),</li> </ul>	
<ul style="list-style-type: none"> <li>AKD100 additional accessories (handlers and terminals 42pcs) of safety cables,</li> </ul>		<ul style="list-style-type: none"> <li>FCT3000AC electronic compensated flexible clamps in ranges 30/300/3000A (1compl),</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>AmpLiteWire 2000A primary current sensors up to 2000A for LV and MV nets (1pc),</li> </ul>	
<ul style="list-style-type: none"> <li>DR200C miniature thermal printer with Bluetooth,</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>ET30 transportation case,</li> </ul>		<ul style="list-style-type: none"> <li>rechargeable battery NiMH AA R6 1.2V 2700mAh (5pcs),</li> </ul>	
<ul style="list-style-type: none"> <li>ET32 transportation case for additional accessories,</li> </ul>		<ul style="list-style-type: none"> <li>Calmet TE30 option set 01 (Calmet TE30+ET30+CT100AC+CF106H+EA30+AKD100).</li> </ul>	
<ul style="list-style-type: none"> <li>FCT1000AC electronic compensated flexible clamps up to 1000A (1compl),</li> </ul>			

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