

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

TE30 Power Network Analyser and Tester

- Measure of power network parameters in class 0.05 or 0.1
- Voltage ranges 0.05...300V and 0.1...40kV
- Current ranges 0.001...12(100)(1000)(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
- 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 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:

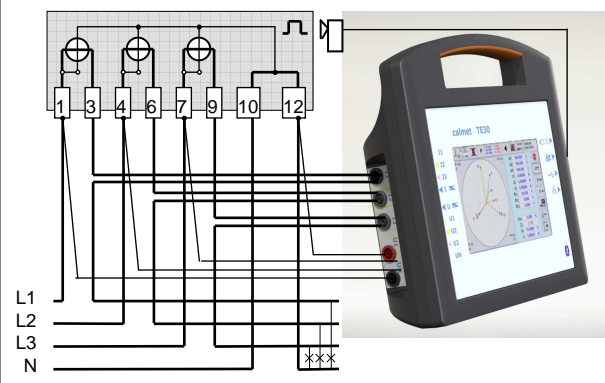
electricity meters EN 50470 with accuracy relative to internal reference including measure of meter error, counter error and maximum power meter error,

instrument transformers EN 60044 including CT/PT Ratio error and phase error as well as CT/PT burden simultaneously in three phases,

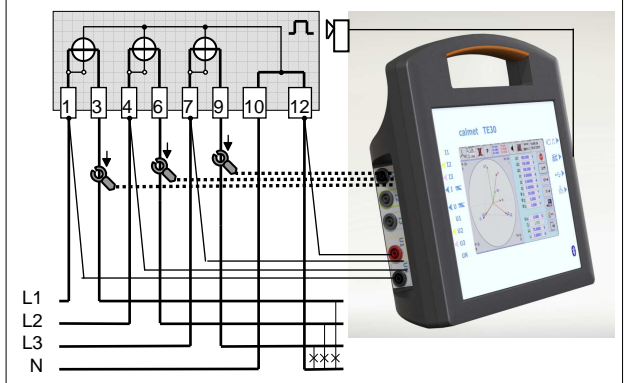
- measuring, recording and analyzing of power quality.

Examples of the TE30 applications

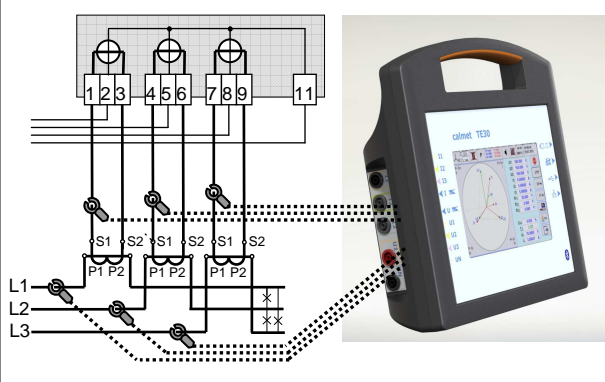
Electricity meter testing – direct connection



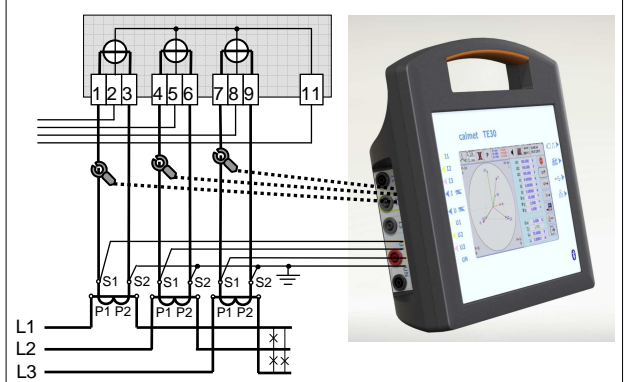
Electricity meter testing – connection with clamps

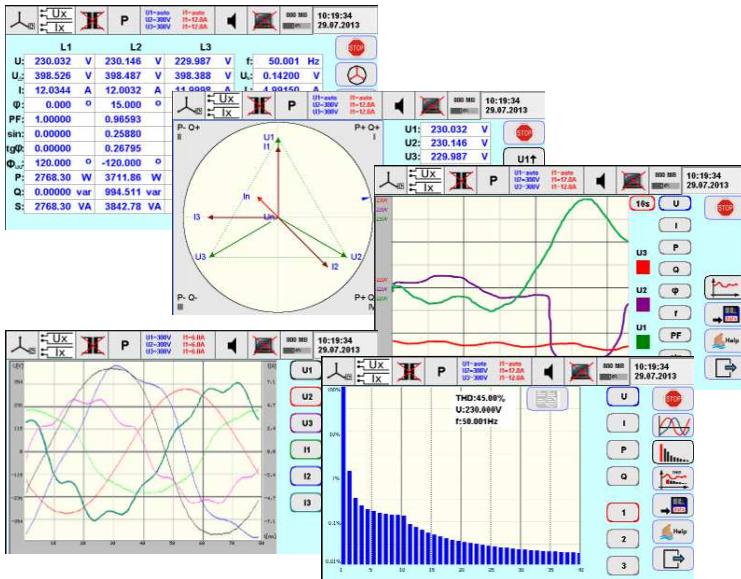


CT Ratio error and phase error testing



CT Burden testing





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 ϕ_1, ϕ_2, ϕ_3 , power factors PF1, PF2, PF3, Σ PF, factors $\sin\phi_1, \sin\phi_2, \sin\phi_3, \Sigma\sin\phi, \text{tg}\phi_1, \text{tg}\phi_2, \text{tg}\phi_3, \Sigma\text{tg}\phi$, angles between voltages $\angle U_{12}, \angle U_{23}, \angle U_{31}$, powers P1, P2, P3, Σ P, Q1, Q2, Q3, Σ Q, S1, S2, S3, Σ S,
- visualization of measurement results in form of: table, vectors, trend chart, oscilloscope (waveform) or bar chart (harmonics of U, I, P, Q).

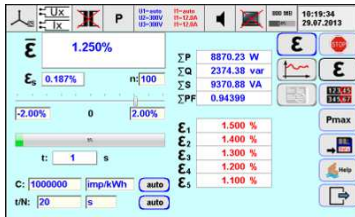
Specifications for a power network analyser

Parameter	Range	Error limits ¹⁾²⁾³⁾⁴⁾	
		class 0.05	class 0.1
Direct voltage	10...300V 0.05... <u>10V</u>	$\pm 0.05\%$ $\pm 0.05\%*$	$\pm 0.1\%$ $\pm 0.1\%*$
Voltage with VoltLiteWire	0.1...40kV	$\pm 0.1\% \pm \text{Em}$	
Direct current	0.02...12A 0.001... <u>0.02A</u>	$\pm 0.05\%$ $\pm 0.05\%*$	$\pm 0.1\%$ $\pm 0.1\%*$
Current with clamps 10A	0.2...10A 0.001... <u>0.2A</u>	$\pm 0.2\%$ $\pm 0.2\%*$	
Current with clamps 100A for current inputs I:	0.1...100A 0.01... <u>0.1A</u>	$\pm 0.2\%$ $\pm 0.2\%*$	
Current with clamps 100A for voltage inputs U:	0.2...100A 0.01... <u>0.2A</u>	$\pm 0.2\%$ $\pm 0.2\%*$	
Current with clamps 1000A	20...1000A 0.1... <u>20A</u>	$\pm 0.2\%$ $\pm 0.2\%*$	
Current with flexible clamps	0.3...30A/300A/3000A	$\pm 0.1\% \pm \text{Em}$	
Current with AmpLiteWire	30...2000A	$\pm 0.1\% \pm \text{Em}$	
Power and energy direct measure	0.02...12A / 10...300V 0.001... <u>0.02A</u> / 10...300V	$\pm 0.05\%$ $\pm 0.05\%*$	$\pm 0.1\%$ $\pm 0.1\%*$
Power and energy with clamps 10A	0.2...10A / 10...300V 0.001... <u>0.2A</u> / 10...300V	$\pm 0.2\%$ $\pm 0.2\%*$	
Power and energy with clamps 100A	0.1...100A / 10...300V 0.01... <u>0.1A</u> / 10...300V	$\pm 0.2\%$ $\pm 0.2\%*$	
Power and energy with clamps 1000A	20...1000A / 10...300V 0.1... <u>20A</u> / 10...300V	$\pm 0.2\%$ $\pm 0.2\%*$	
Power and energy with flexible clamps	0.3...30A/300A/3000A / 10...300V	$\pm 0.1\% \pm \text{Em}$	
Power and energy with LiteWire sensors	30...2000A / 0.5...40kV	$\pm 0.1\% \pm \text{Em}$	
Frequency	40...70Hz	$\pm 0.01\text{Hz}$	
Phase shift for direct connection	0... $\pm 360^\circ$	$\pm 0.1^\circ$ ⁵⁾	
Power factor $\cos\phi$ and $\sin\phi$	0... ± 1	± 0.002	
Temperature coefficient (for Energy direct)	0.005% per 1°C in range -5...+50°C		
Time stability (for Energy 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, Em=1%+0.1%* for Flex flexible clamps and Em=2%+0.2%* for LiteWire sensors
 4) power and energy errors related to apparent power
 5) in current range 0.02...12A and voltage range 10...300V

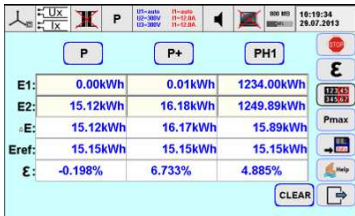
General parameters

Weight and dimensions (width x height x depth)	2kg (with internal battery) and (270x245x90)mm
Power supply	50...450V / 47...63Hz / 15VA or internal battery 5xAA 1,2V / 2600mAh / 2h
Safety: Isolation protection and Measurement Category	IEC 61010-1 and 300V CAT III
Degree of protection	IP-40
Operation / storage temperature	-5...+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,
- 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...2mA/10...27mA	0.00001Hz...200kHz	0.0001%@t≥1s
Impulse Output for TE30 testing	28V/100mA open collector	0.0001Hz...210kHz	

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 ¹⁾²⁾
CT Burden	0.02...12A (Direct)	0.05...10V (Direct)	±0.1%*
PT Burden	0.02...12A (Direct) 0.001...0.02A (Direct)	10...300V (Direct) 10...300V (Direct)	±0.1% ±0.1%*

Specifications for Ratio measurement tests of CT and PT transformers

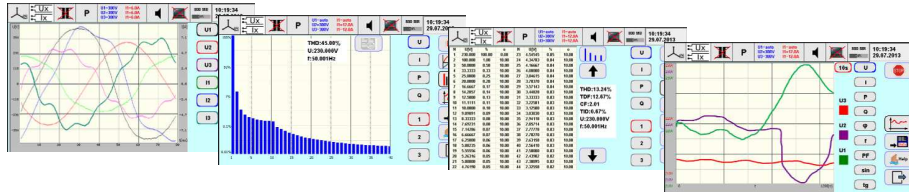
Parameter	Primary current/voltage range	Secondary current/voltage range	Error limits ¹⁾²⁾³⁾
CT Ratio	0.1...100A (Clamps 100A)	0.02...12A (Direct) 0.001...0.02A (Direct)	±0.2% ±0.2%*
CT Ratio	10...1000A (Clamps 1000A)	0.02...12A (Direct)	±0.2%
CT Ratio	0.3...30A/300A/3000A (Flexible Clamps)	0.02...12A (Direct)	±0.1%±Em
CT Ratio	30...2000A (AmpLiteWire)	0.02...12A (Direct)	±0.1%±Em
PT Ratio	0.5...40kV (VoltLiteWire)	10...300V (Direct)	±0.1%±Em

¹⁾ % - related to the measuring value, %* - related to the measuring range final value (is underlined)

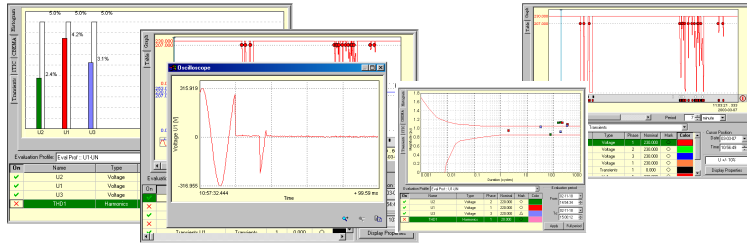
²⁾ error limits of operating Burden or Ratio - covers reference uncertainty of standards, stability in 12 months, influence quantities (ambient temperature in range +20...+26°C, humidity and power supply voltage in range 50-450V, frequency in range 45...65Hz)

³⁾ Em – sensor basic error, Em=1%+0.1%* for Flex flexible clamps and Em=2%+0.2%* for LiteWire sensors

Power quality analyser function enables:



- measuring of power quality parameters according to IEC6 1000-4-30 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 $(8÷64) \times 10^6$ sets of network parameters or long-term registration of power quality,
- analyzing of measurement results for EN50160 compatibility or individual requirements of user.

Specifications for a power quality parameters				
Parameter		Range		Error limits ¹⁾
Harmonics in voltages, currents, P and Q powers	amplitude	0...100% of input	1 st ...63 rd	$\pm 0.1\%$ ²⁾
	phase	0...360°		$\pm 0.5^\circ$ ³⁾
Total harmonic distortion THD in voltages and currents		0...100% of input	1 st ...63 rd	$\pm 0.1\%$ ²⁾
Total interharmonic distortion TID in voltages and currents		0...30% of input	16...3200Hz	$\pm 0.2\%$ ⁴⁾
Signal voltage ⁵⁾		0...30% of input	16...3200Hz	$\pm 5\%$
Flicker P _{st} and P _{It}		0...40	0.000833...33.33Hz	$\pm 5\%$
Voltage asymmetry		0...200%		$\pm 2\%$

¹⁾ 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)
²⁾ of input for 80-140Hz frequency range of harmonics with linear rise to 0.4 of output for 3200Hz
³⁾ for 80-140Hz frequency range of harmonics with linear rise to 8° for 3200Hz
⁴⁾ of input for 80-140Hz frequency range of interharmonics with linear rise to 5% of output for 3200Hz
⁵⁾ the highest non-harmonic amplitude and frequency

TE30 Analyser's equipment			
All completed TE30 Analyser's set consists of:			
<ul style="list-style-type: none"> TE30 analyser class 0.05 or 0.1, power cord, fuse T250mA@230V or T500mA@110V (2units), operation manual of analyser, warranty card, calibration certificate. 			
Optionally for TE30 Analyser are available:			
<ul style="list-style-type: none"> Calmet TE30 PC Soft with operation manual and USB mini / USB A interface cable, 		<ul style="list-style-type: none"> CT10AC electronic compensated clamps up to 10A (1compl), 	
<ul style="list-style-type: none"> AD100EXT extension for powering from measurement network, 		<ul style="list-style-type: none"> CT100AC electronic compensated clamps up to 100A (1compl), 	
<ul style="list-style-type: none"> EA30 set of safety measurement cables (10pcs), 		<ul style="list-style-type: none"> CT1000AC electronic compensated clamps up to 1000A (1compl), 	
<ul style="list-style-type: none"> AKD100 additional accessories (handlers and terminals 42pcs) of safety cables, 		<ul style="list-style-type: none"> FCT3000AC electronic compensated flexible clamps in ranges 30/300/3000A (1compl), 	
<ul style="list-style-type: none"> CF102 photo head with holder for inductive meter and meter with LED, 		<ul style="list-style-type: none"> AmpLiteWire 2000A primary current sensors up to 2000A for LV and MV nets (1pc) 	
<ul style="list-style-type: none"> DR200B miniature thermal printer with Bluetooth, 		<ul style="list-style-type: none"> VoltLiteWire 40kV primary sensors up to 40kV (1pc), 	
<ul style="list-style-type: none"> ET30 transportation case. 			

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