



Calmet TE30

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



Calmet Sp. z o.o.

- ❑ Calmet = **CAL**ibrators + **MET**rology
- ❑ founded in **1989**, roots come from LUMEL, big factory of measurement equipment in Poland, Zielona Gora
- ❑ designing, production, selling and servicing new kind of calibrators and electric equipment testers
- ❑ employs over 25 engineers, including 3 with Ph.D.
- ❑ cooperates with University of Zielona Gora; common projects and lectures
- ❑ since **1996** – electricity meters testing and power network parameters analysing
- ❑ since **2002** – generating and measuring network quality parameters
- ❑ since **2006** – automation of electro-utility automatic protective equipment testing
- ❑ since **2011** – automatic Test Benches for energy meter testing
- ❑ since **2019** – new group of Automatic Test Systems

Measurement Equipment since 1989

Customer Support in problems solving

Energy meter testers, Current Transformers testers, Power quality analysers

AC/DC Voltage, Current & Power Calibrators, Test Benches



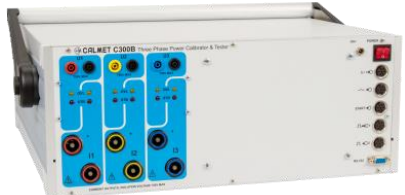
1 phase, 0,2%



3 phase, 0.05%



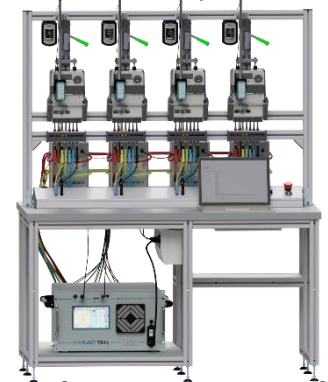
3 phase, 120A, 0.02%



3 phase U,I,φ,P,Q,S,E



1 phase U,I,φ,P,Q,S,E

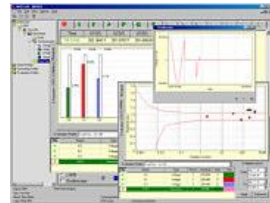
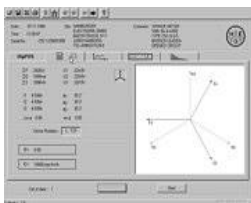


3 phase Test Bench



Multifunctions DC/AC

Control Software for measurement equipment



Current and Voltage Source with Integrated Reference Standard



Testing whole measurement system!

Accuracy of all kind of Electricity Meters ϵ [%]

CT/PT burden, ratio, phase shift error



Electromechanical Meters



Electronic (static) Meters



4-Quadrants Meters



Max Demand Meters

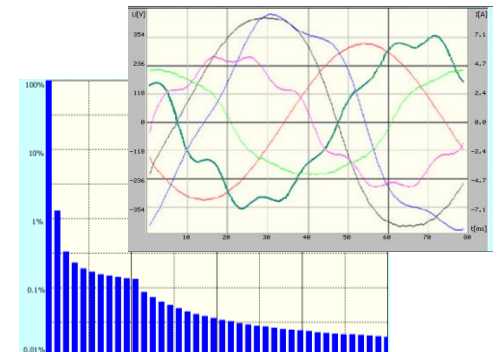


Connection errors



TE30

Power Quality in point of measurement

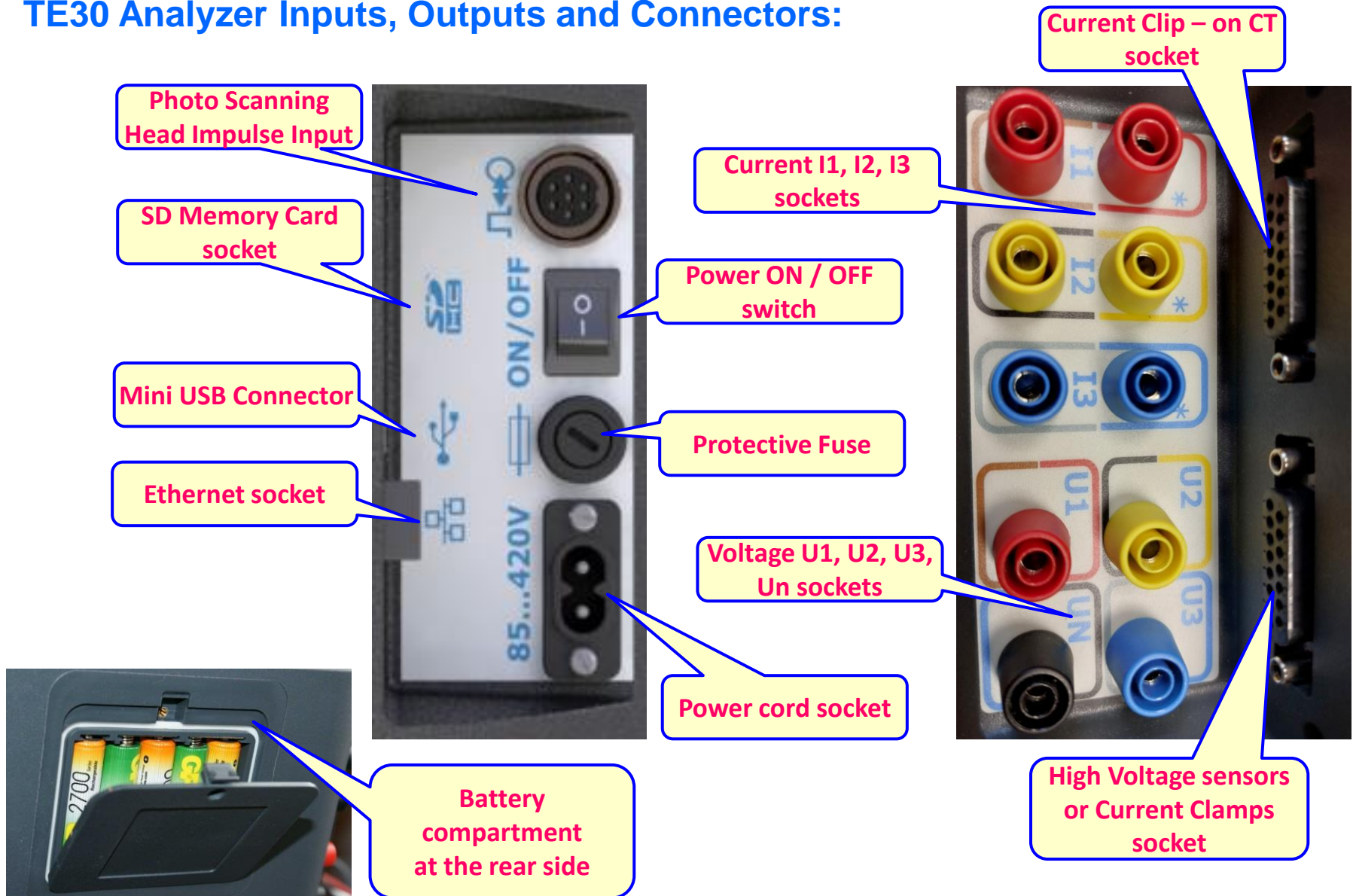


- ▶ Measure of power network parameters and Meters testing in accuracy class **0.05** or **0.1**
- ▶ Voltage range **0.05...600V**
- ▶ Current range **0.001...12(100)(1000)(30/300/3000)A**
- ▶ Testing of energy meters, potential and current transformers (**CT / PT**)
- ▶ Recording and analyse of **Power Quality**
- ▶ **Vector, oscilloscope**, bar and trend charts of three phase network
- ▶ Automatic Meter Constant recognition
- ▶ Automatic setting of measurement conditions
- ▶ Powering from measurement network 50...450V AC and from internal battery with its own charger
- ▶ Big 7-inch full colour touch screen and computer software Calmet TE30 PC-Soft
- ▶ Reading data and remote controlled via **USB, Ethernet, Bluetooth**
- ▶ Recording data on flash memory SD card up to **32GB**
- ▶ Calibration Certificate



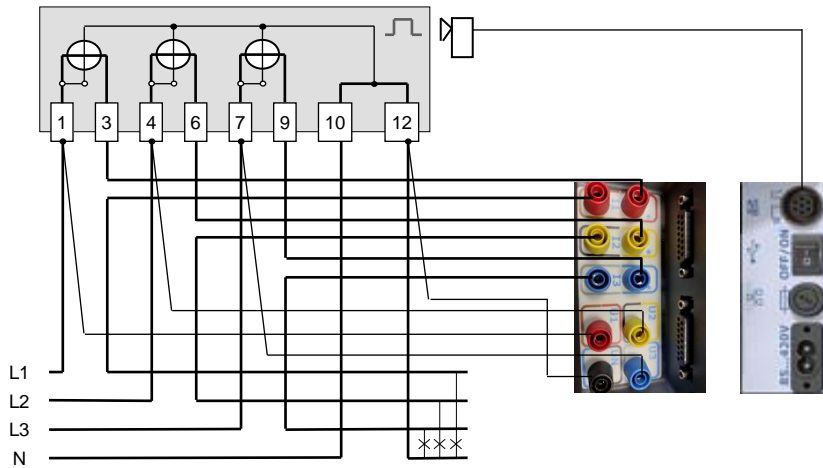
			P	U1=auto U2=auto U3=auto	I1=auto I2=auto I3=auto			09:13:16 17-04-2014	
							30%		
	L1	L2	L3						
U:	230.009 V	229.991 V	230.007 V	f:	50.000 Hz				
U_Δ:	398.183 V	398.360 V	398.584 V	U_N:	461.055 mV				
I:	3.79945 A	3.79889 A	3.79917 A	I_N:	1.83073 A				
φ:	29.956 °	15.045 °	0.102 °						
PF:	0.71017	0.83297	0.88787	Σ:	0.87698				
sin:	0.44334	0.25457	0.00189	Σ:	0.25246				
tgφ:	0.62427	0.30561	0.00212	Σ:	0.28787				
φ_{uu}:	119.886 °	119.991 °	-120.123 °	Σ:	2.29897 kW				
P:	671.640 W	787.718 W	839.607 W	Σ:	661.809 var				
Q:	419.288 var	240.737 var	1.78406 var	Σ:	2.62145 kVA				
S:	873.907 VA	873.710 VA	873.836 VA						

TE30 Analyzer Inputs, Outputs and Connectors:

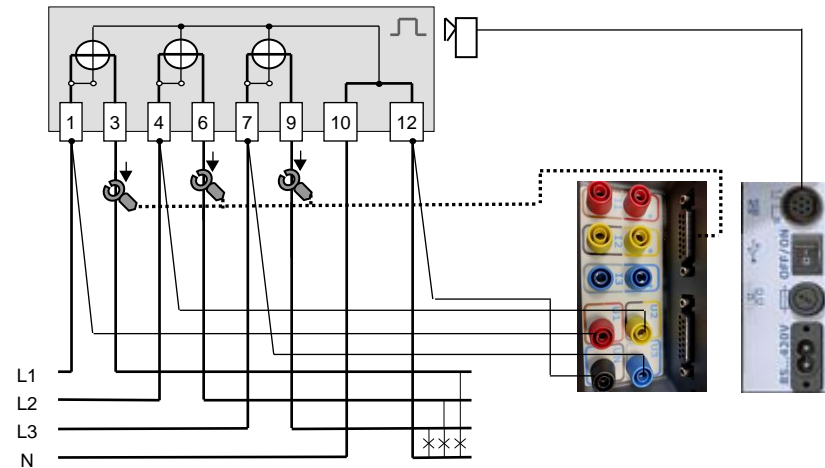


All possible types of connection: 1P2W, 3P4W, 3P3W, ... , direct or with clamps

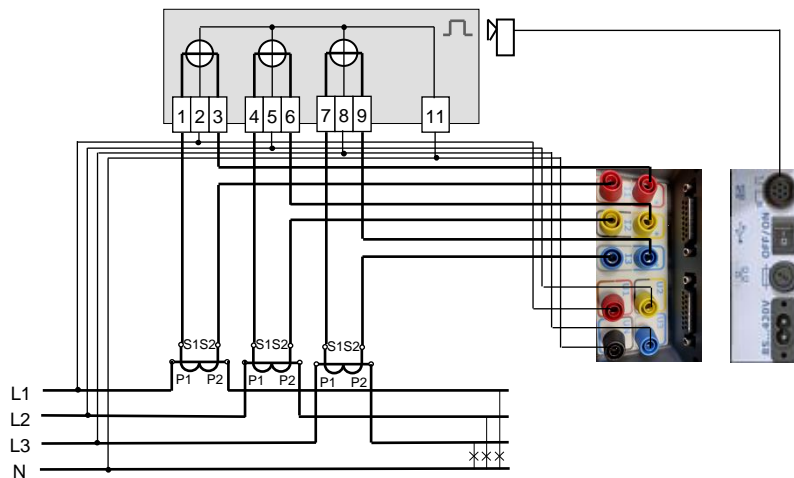
Electricity meter testing – direct connection



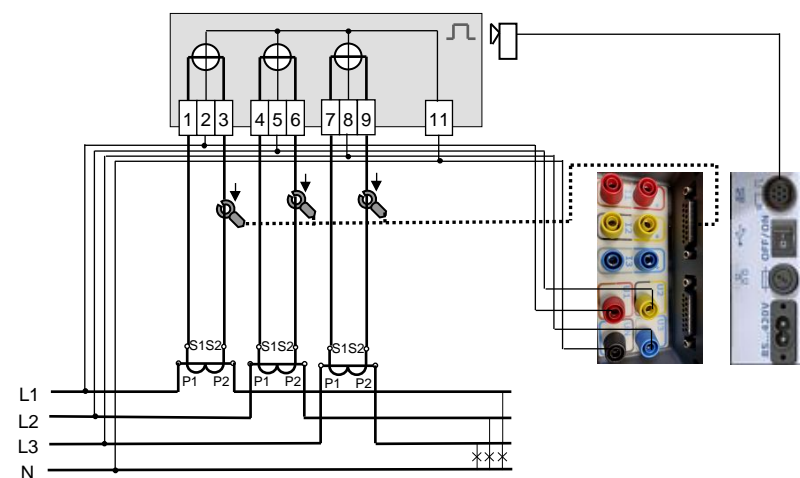
Electricity meter testing – connection with clamps



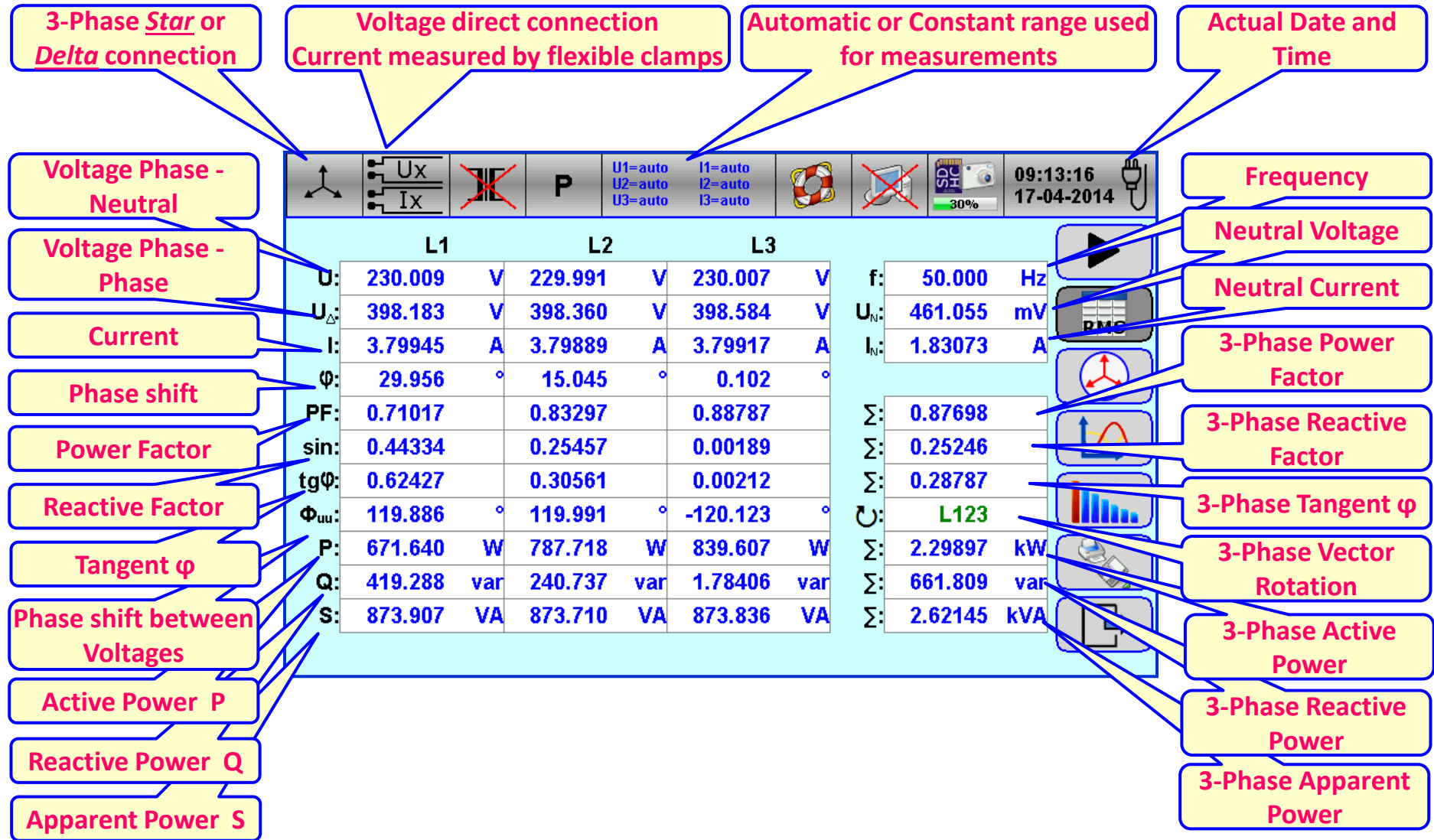
Electricity meter (CT) testing – direct connection



Electricity meter testing (CT) – connection with clamps



RMS measurement results and TE30 Analyzer configuration:



3-Phase *Star* or *Delta* connection

**Voltage direct connection
Current measured by flexible clamps**

Automatic or Constant range used for measurements

Actual Date and Time

Voltage Phase - Neutral

Voltage Phase - Phase

Current

Phase shift

Power Factor

Reactive Factor

Tangent φ

Phase shift between Voltages

Active Power P

Reactive Power Q

Apparent Power S

Frequency

Neutral Voltage

Neutral Current

3-Phase Power Factor

3-Phase Reactive Factor

3-Phase Tangent φ

3-Phase Vector Rotation

3-Phase Active Power

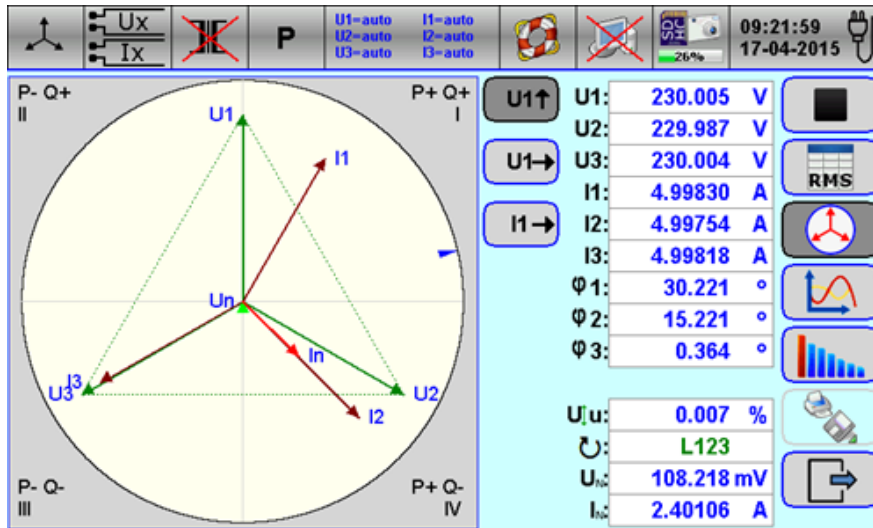
3-Phase Reactive Power

3-Phase Apparent Power

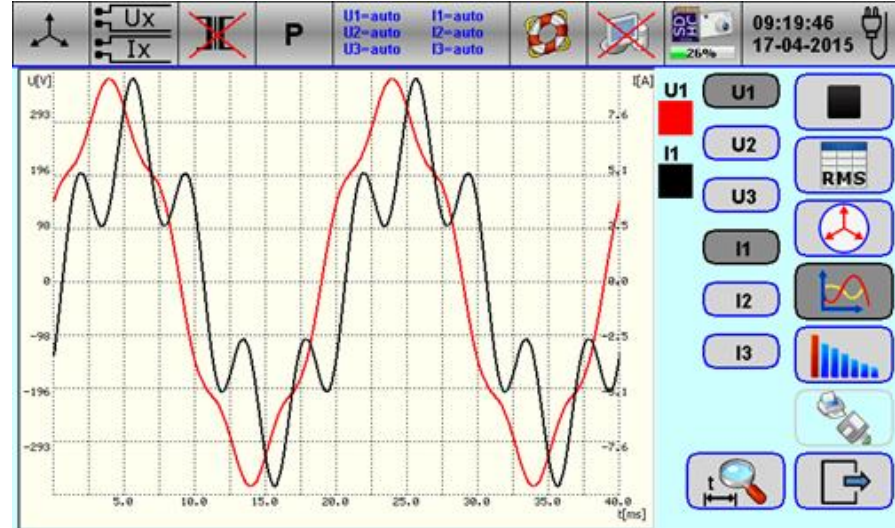
	L1	L2	L3
U:	230.009 V	229.991 V	230.007 V
U _Δ :	398.183 V	398.360 V	398.584 V
I:	3.79945 A	3.79889 A	3.79917 A
φ:	29.956 °	15.045 °	0.102 °
PF:	0.71017	0.83297	0.88787
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P:	671.640 W	787.718 W	839.607 W
Q:	419.288 var	240.737 var	1.78406 var
S:	873.907 VA	873.710 VA	873.836 VA

f: 50.000 Hz
 U_N: 461.055 mV
 I_N: 1.83073 A
 Σ: 0.87698
 Σ: 0.25246
 Σ: 0.28787
 C: L123
 Σ: 2.29897 kW
 Σ: 661.809 var
 Σ: 2.62145 kVA

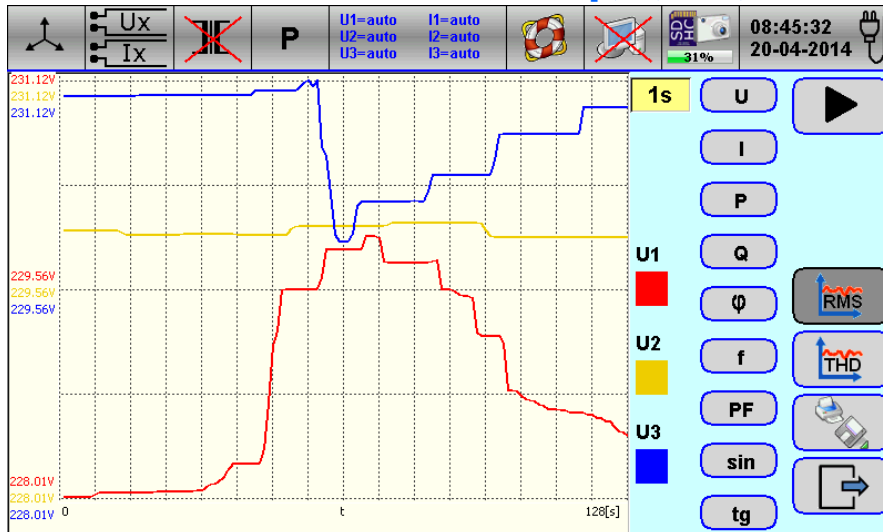
Vector diagram with calculated U_n & I_n



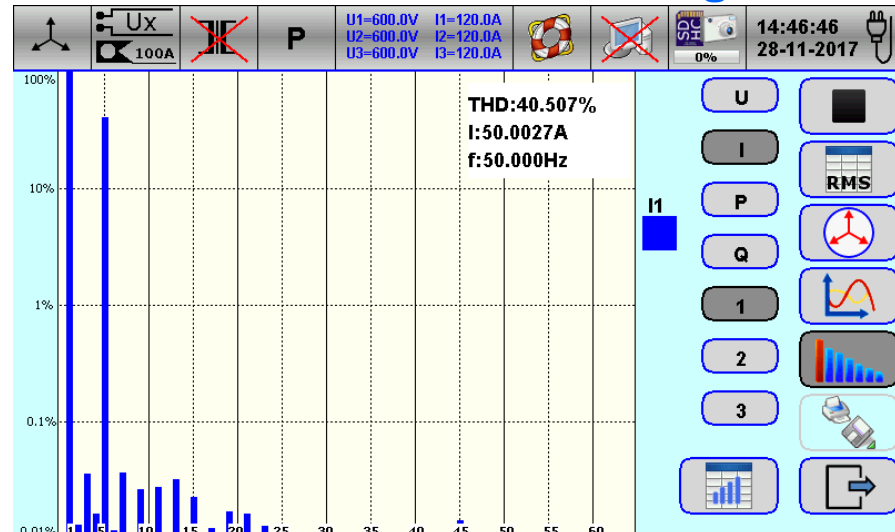
Oscilloscope of U1, U2, U3, I1, I2, I3



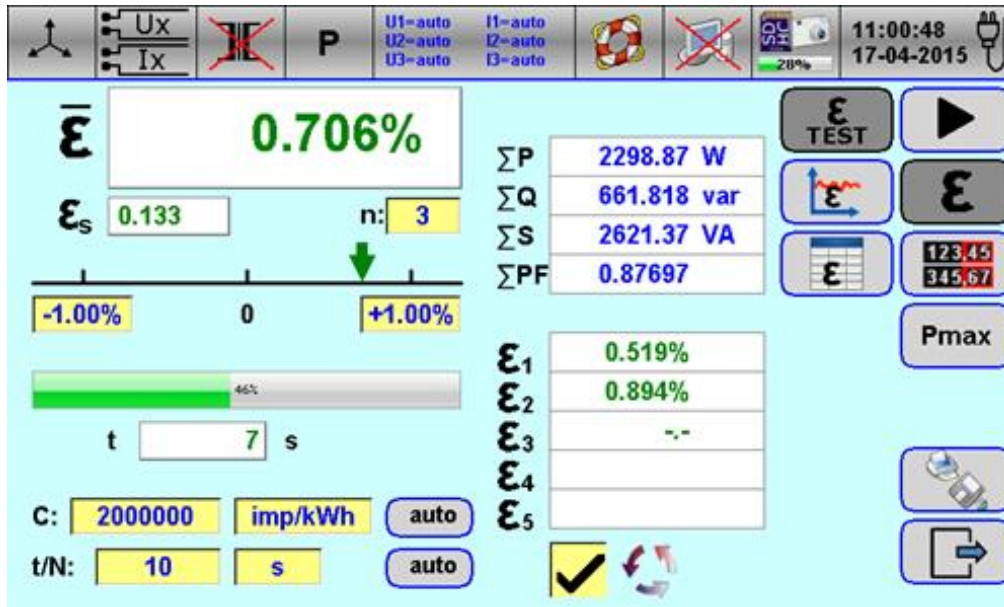
Time trend of U, I, P, Q, ϕ , f, PF,



Harmonics table & bar diagram

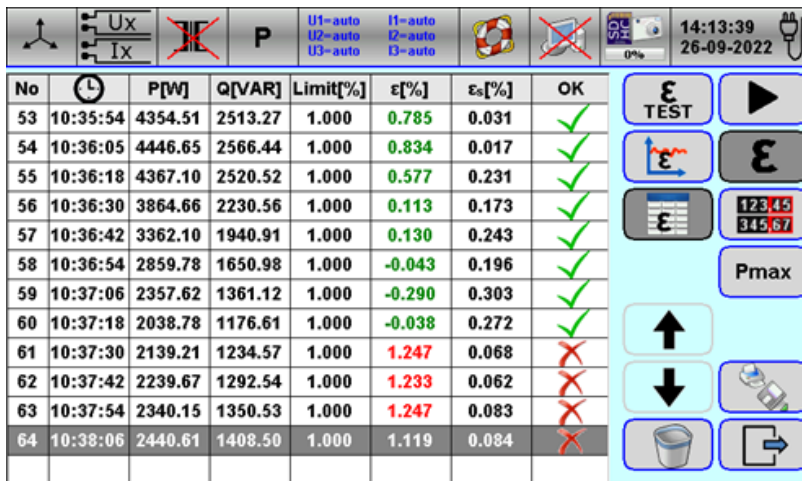


Energy meter testing on site and in laboratory



- ▶ function of computing meter error (partial errors, average error, standard deviation) directly in percentages [%] with method of setting time of measurement or number of impulses,
- ▶ function of automatic identification energy meter constant,
- ▶ function of automatic determining measurement time or number of pulses.

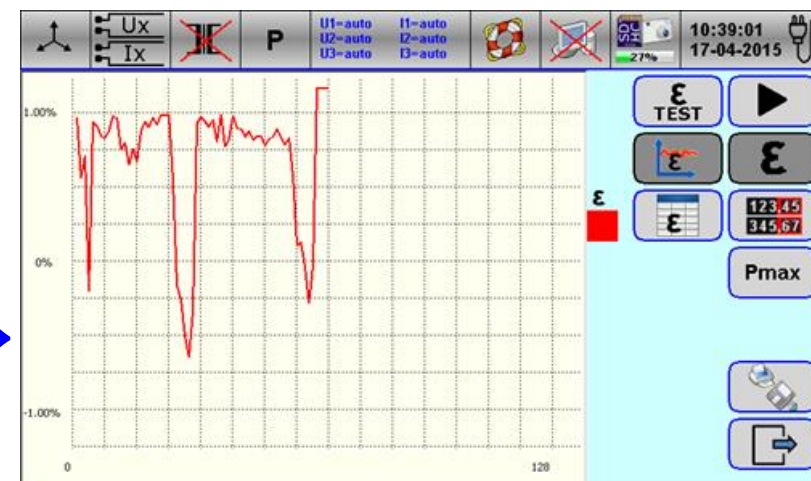
Results of testing are presented as:



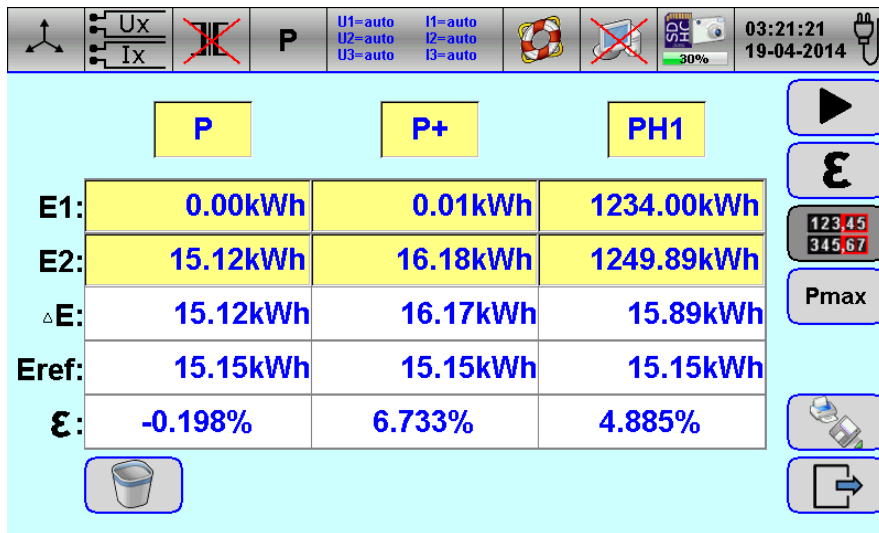
No	⌚	P[W]	Q[VAR]	Limit[%]	ϵ [%]	ϵ_s [%]	OK
53	10:35:54	4354.51	2513.27	1.000	0.785	0.031	✓
54	10:36:05	4446.65	2566.44	1.000	0.834	0.017	✓
55	10:36:18	4367.10	2520.52	1.000	0.577	0.231	✓
56	10:36:30	3864.66	2230.56	1.000	0.113	0.173	✓
57	10:36:42	3362.10	1940.91	1.000	0.130	0.243	✓
58	10:36:54	2859.78	1650.98	1.000	-0.043	0.196	✓
59	10:37:06	2357.62	1361.12	1.000	-0.290	0.303	✓
60	10:37:18	2038.78	1176.61	1.000	-0.038	0.272	✓
61	10:37:30	2139.21	1234.57	1.000	1.247	0.068	✗
62	10:37:42	2239.67	1292.54	1.000	1.233	0.062	✗
63	10:37:54	2340.15	1350.53	1.000	1.247	0.083	✗
64	10:38:06	2440.61	1408.50	1.000	1.119	0.084	✗

← TABLE

CHART →

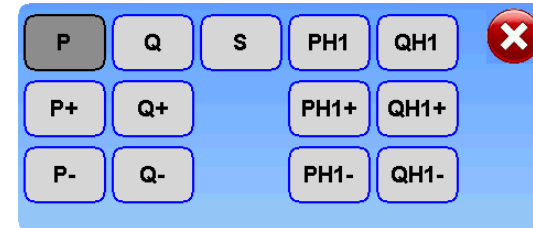


Energy meter Register testing on site and laboratory



	P	P+	PH1
E1:	0.00kWh	0.01kWh	1234.00kWh
E2:	15.12kWh	16.18kWh	1249.89kWh
ΔE:	15.12kWh	16.17kWh	15.89kWh
Eref:	15.15kWh	15.15kWh	15.15kWh
ε:	-0.198%	6.733%	4.885%

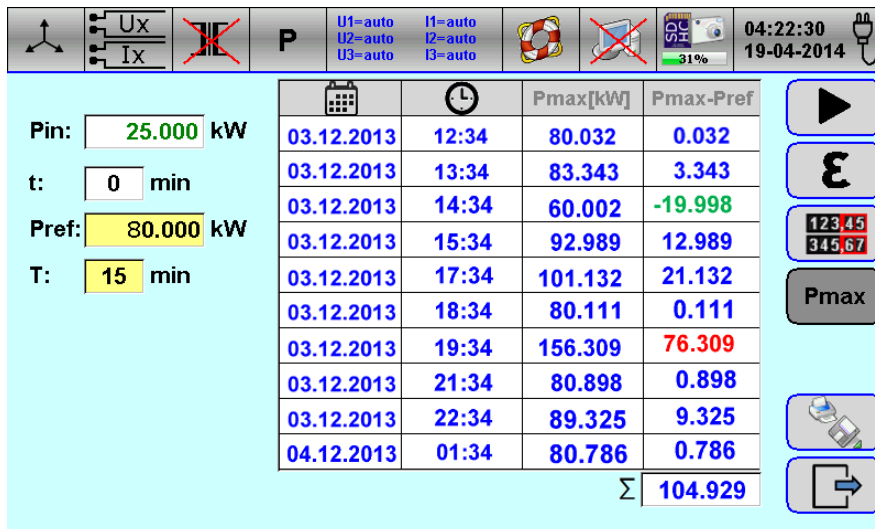
▶ function of energy measurement with method of setting time periods for verification of energy meter Register directly in percent [%],



▶ function of energy measurement for power P, P+, P-, Q, Q+, Q-, S,

▶ function of energy measurement for the first (fundamental) harmonic of active power PH1 and reactive power QH1,

Maximum Demand Energy meter testing



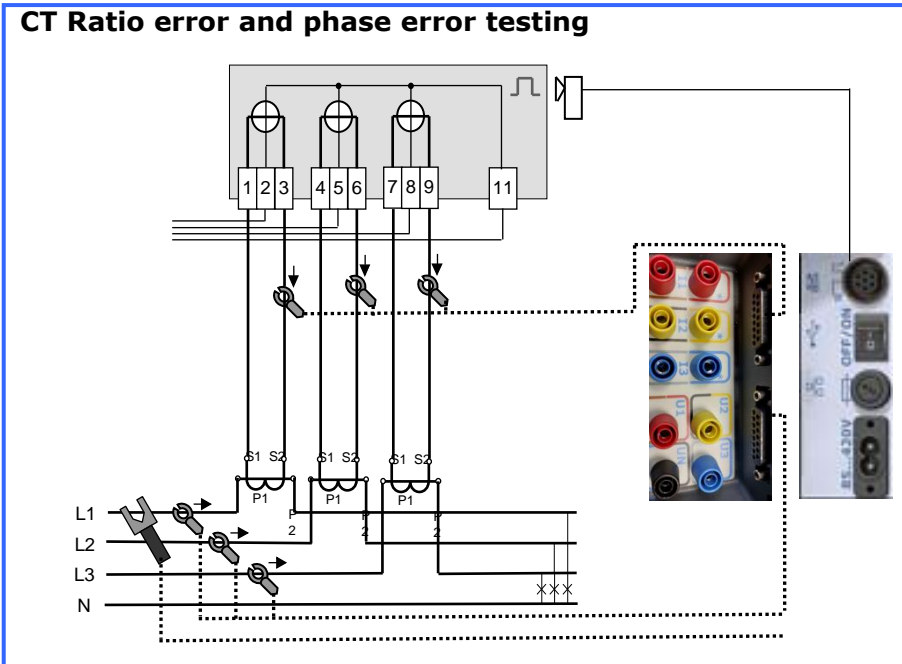
	Calendar	Clock	Pmax[kW]	Pmax-Pref
Pin:	03.12.2013	12:34	80.032	0.032
t:	03.12.2013	13:34	83.343	3.343
Pref:	03.12.2013	14:34	60.002	-19.998
T:	03.12.2013	15:34	92.989	12.989
	03.12.2013	17:34	101.132	21.132
	03.12.2013	18:34	80.111	0.111
	03.12.2013	19:34	156.309	76.309
	03.12.2013	21:34	80.898	0.898
	03.12.2013	22:34	89.325	9.325
	04.12.2013	01:34	80.786	0.786
	Σ			104.929

IEC 62053-24/Ed.1 Static meters for reactive energy at fundamental frequency (classes 0,5 S, 1 S and 1)

▶ function of maximum power measuring for testing of maximum demand energy meters,

CT, PT Transformers testing (LV & MV, voltage and current, simultaneously in three phases) directly on site: ratio error and phase shift error testing

Connection diagram



$\frac{U_x}{I_x}$

P

U1=auto
U2=auto
U3=auto

I1=auto
I2=auto
I3=auto

06:51:45
03-10-2022

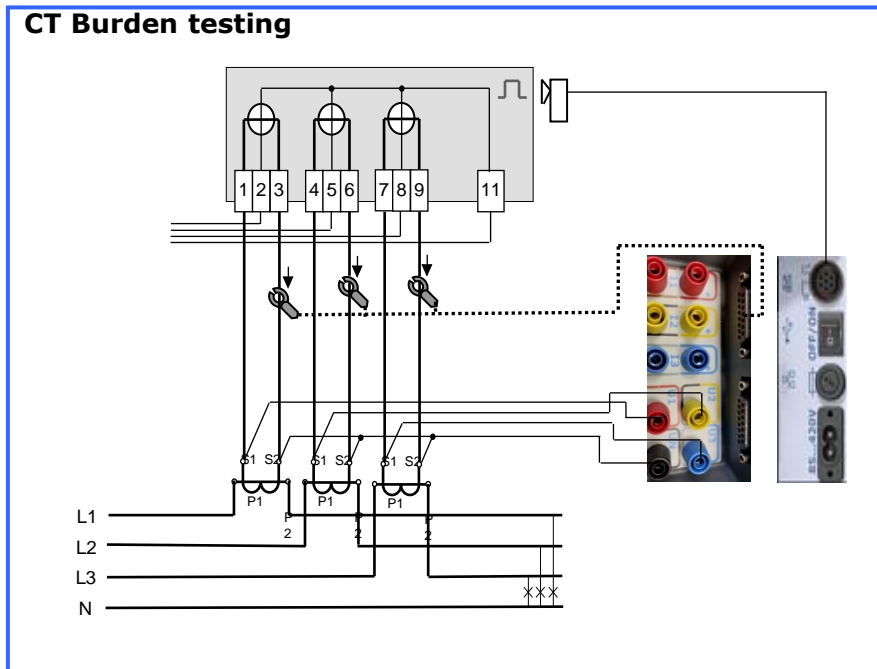
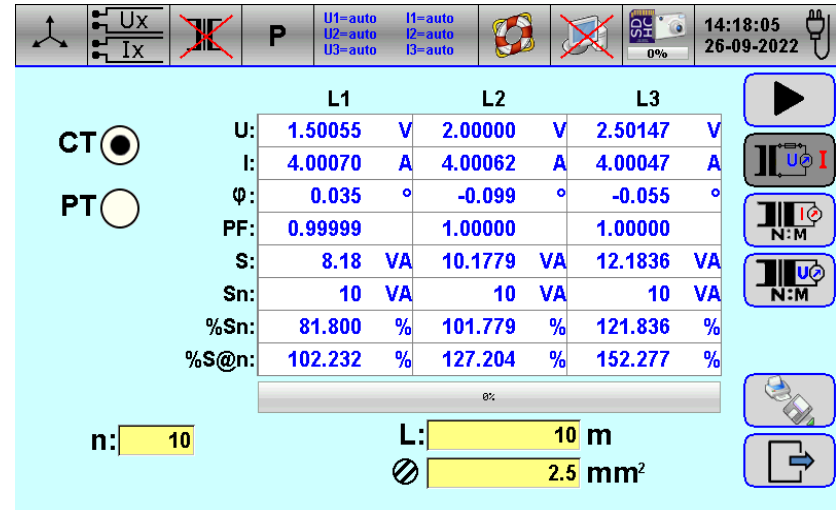
n: 10

	L1		L2		L3	
Ip:	397.933	A	397.800	A	405.297	A
Is:	4.00063	A	4.00057	A	4.00060	A
φ :	2.864	°	2.886	°	2.875	°
Ip/Is:	99.4677		99.4357		101.309	
δ :	0.534	%	0.575	%	-1.288	%
δ_s :	0.001	%	0.006	%	0.003	%
δ_{lim} :	1.000	%	1.000	%	1.000	%
Ipn:	500	A	500	A	500	A
Isn:	5	A	5	A	5	A
	0%					

- ▶ function of computing transformer ratio error directly in percent [%]
- ▶ function of computing phase shift error [°]

CT, PT Transformers testing (LV i MV, voltage and current, simultaneously in three phases) directly on site: CT / PT burden testing

Test can be done by taking into account the length (L) and cross-section of connection wires and serial fuse (Rf) resistance

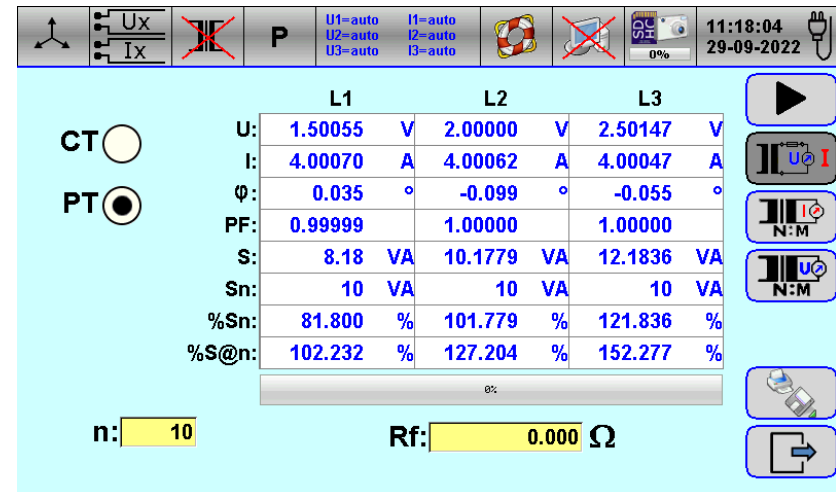



	L1	L2	L3
U:	1.50055 V	2.00000 V	2.50147 V
I:	4.00070 A	4.00062 A	4.00047 A
φ:	0.035 °	-0.099 °	-0.055 °
PF:	0.99999	1.00000	1.00000
S:	8.18 VA	10.1779 VA	12.1836 VA
Sn:	10 VA	10 VA	10 VA
%Sn:	81.800 %	101.779 %	121.836 %
%S@n:	102.232 %	127.204 %	152.277 %

CT
 PT

n: 10

L: 10 m
 ∅ 2.5 mm²



	L1	L2	L3
U:	1.50055 V	2.00000 V	2.50147 V
I:	4.00070 A	4.00062 A	4.00047 A
φ:	0.035 °	-0.099 °	-0.055 °
PF:	0.99999	1.00000	1.00000
S:	8.18 VA	10.1779 VA	12.1836 VA
Sn:	10 VA	10 VA	10 VA
%Sn:	81.800 %	101.779 %	121.836 %
%S@n:	102.232 %	127.204 %	152.277 %

CT
 PT

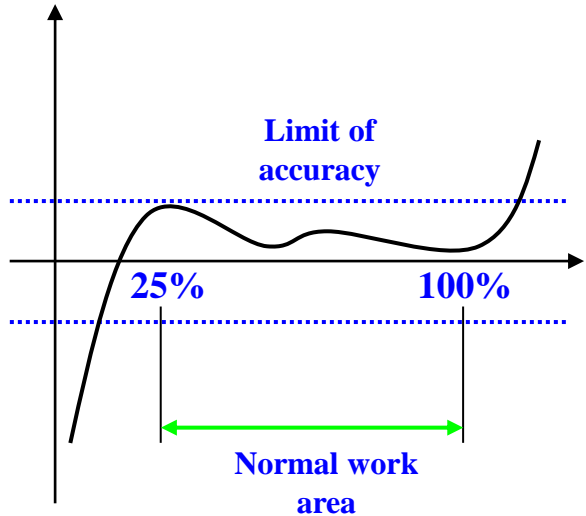
n: 10

Rf: 0.000 Ω

Why the transformer burden (load) is so important?!

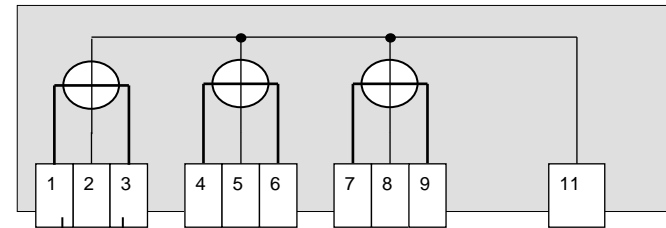
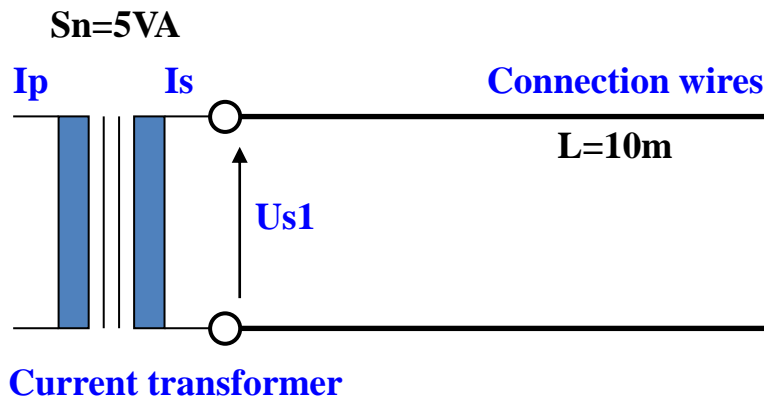
CT Transformer testing: burden testing

ε – ratio error [%]



CT – current transformer can operate with stated accuracy only between 25% - 100% of burden (load). In case of **too long**, or **too thin** wire dimension or **too small load**, the result, secondary current can be **out of accuracy** limits

[%] transformer power rating S_n

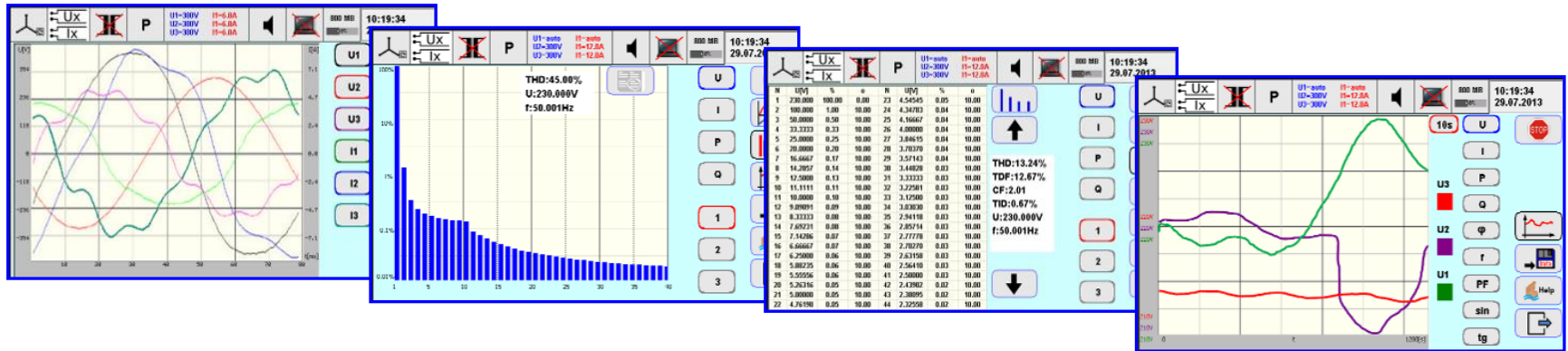


Example (power loss in cables):

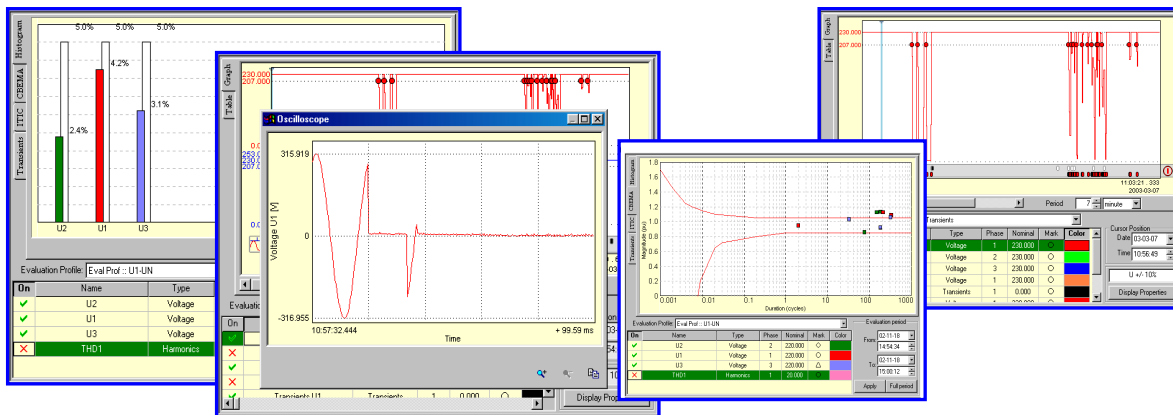
$$R_p = \frac{\rho_{Cu} \cdot l}{S} = \frac{0,0175\Omega \frac{mm^2}{m} \cdot 2 \cdot 10m}{1mm^2} = 0,35\Omega$$

$$P_p = I_2^2 \cdot R_p = 5^2 A \cdot 0,35\Omega = 8,75VA$$

Function of power quality analyser + recording



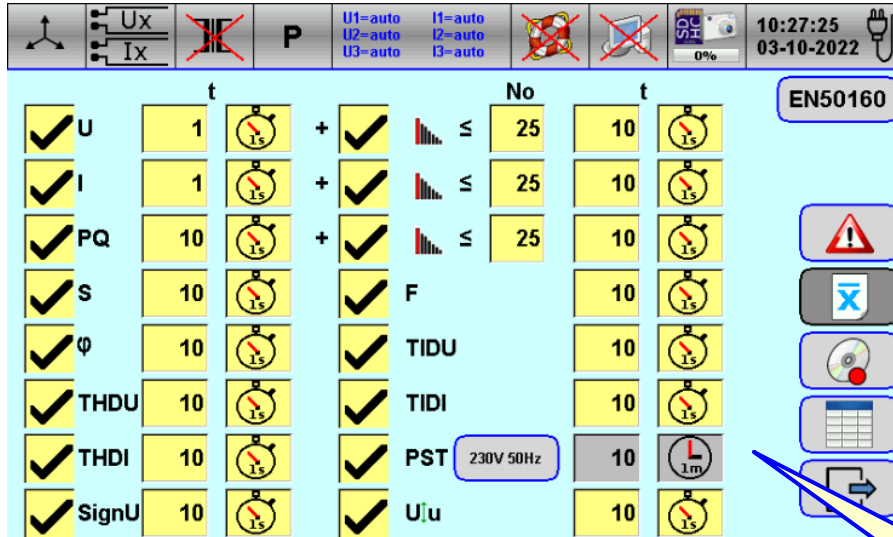
► measuring of power quality parameters according to IEC 61000-4-30 class A with visualization of measurement results in the real time mode



► analyzing of measurement results for EN 50160 compatibility or individual requirements of user

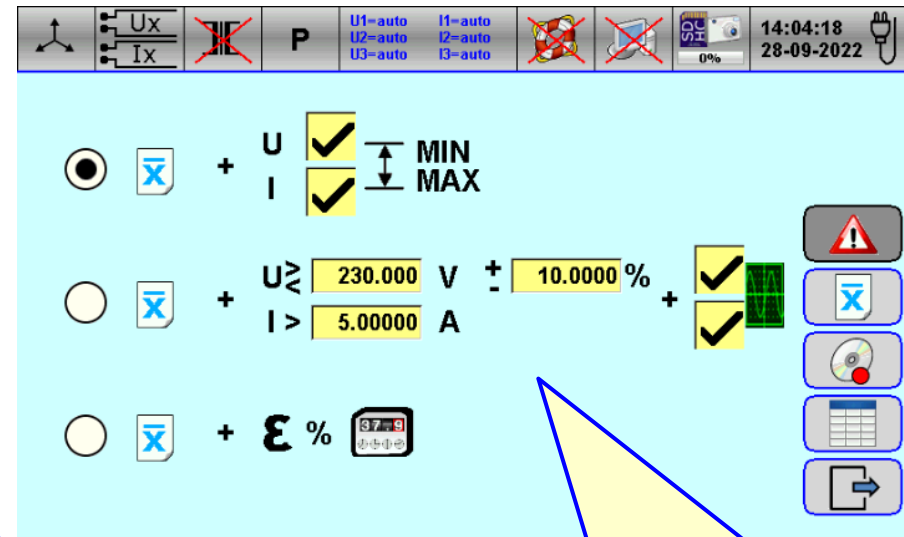
► recording of power network parameters in the SD Flash 4-32GB memory, which gives (8192) x 106 sets of network parameters or long-term registration of power quality

Function of power quality analyser + recording



EN50160

Parameter	Value	Unit	Filter	Time
U	1	V	1.5	1.5
I	1	A	1.5	1.5
PQ	10		1.5	1.5
S	10		1.5	1.5
ϕ	10		1.5	1.5
THDU	10		1.5	1.5
THDI	10		1.5	1.5
SignU	10		1.5	1.5
No	25		1.5	1.5
F	10		1.5	1.5
TIDU	10		1.5	1.5
TIDI	10		1.5	1.5
PST	10	230V 50Hz	1.5	1m
U _u	10		1.5	1.5

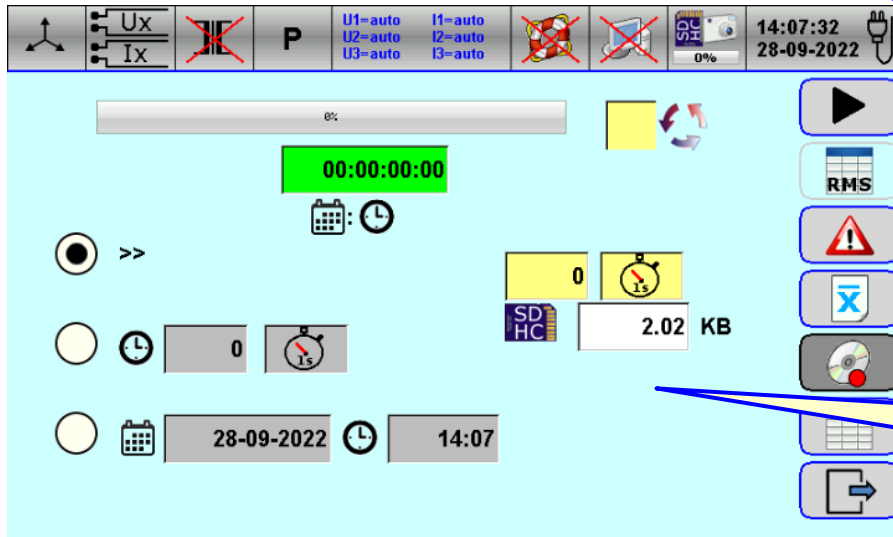


MIN MAX

U ≥ 230.000 V ± 10.0000 %

I > 5.00000 A

ε % 0.7



00:00:00:00

28-09-2022 14:07

2.02 KB

selecting recording method: average value, max / min value, outside limits, every Energy Meter error

selecting recorded parametrs and averaging times

selecting time length of recording and start date & time

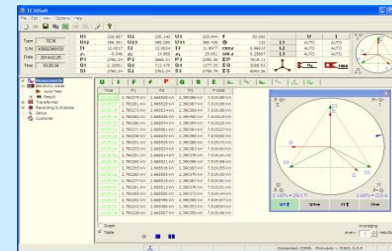
TE30 Analyzer's equipment delivered in price:

- TE30 analyzer class 0.05 or 0.1 with Basic function;
- Power supply cord;
- Fuse T500mA@230V (2pcs);
- Memory SD card (8GB);
- Operation manual of analyzer;
- Warranty card;
- Manufacturer calibration certificate;



TE30 Analyzer's optional equipment:

- Calmet TE30 PC-Soft with operation manual and USB mini / USB A interface cable,



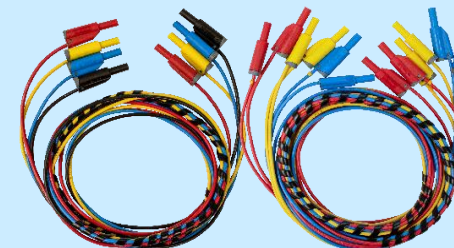
- REC function - recording of power network parameters,

Parameter	Unit	Scale	Limit	Threshold	Alarm
U	V	20	≤ 25	10	Yes
I	A	20	≤ 25	10	Yes
PQ	W	10	≤ 25	10	Yes
S	VA	10	≤ 25	10	Yes
ψ	°	10	≤ 25	10	Yes
THDU	%	10	≤ 25	10	Yes
THDI	%	10	≤ 25	10	Yes
SignU	V	10	≤ 25	10	Yes

- AD100EXT extension for powering TE30 from measurement network,



- EA34 set of safety measurement cables (10pcs),



TE30 Analyzer's optional equipment:

- EA20 additional accessories (handlers and terminals 21pcs) of safety cables,



- CF106H photo head with holder for inductive meter and meter with LED,



- DR200D miniature thermal printer with Bluetooth,



- ET30 transportation case,
- ET31/ET32 transportation case for additional accessories,

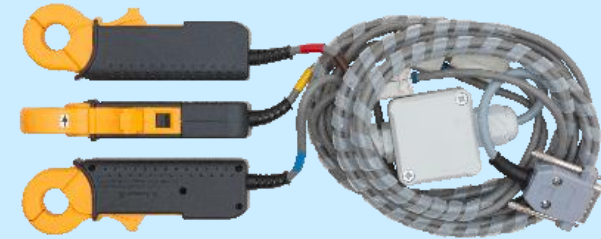


TE30 Analyzer's optional equipment:

- **CT10AC** electronic compensated clamps up to 12A (1compl),



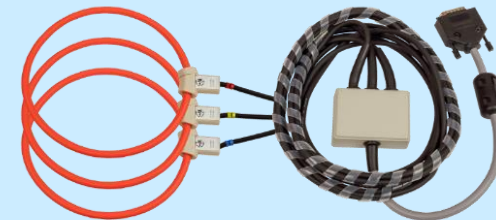
- **CT100AC** electronic compensated clamps up to 120A (1compl),



- **CT1000AC** electronic compensated clamps up to 1200A (1compl),

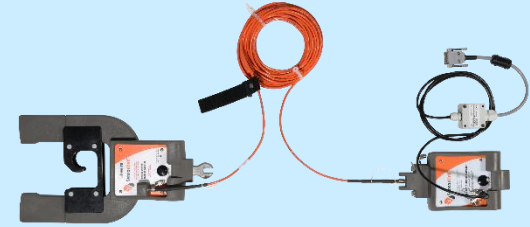


- **FCT3000AC.B** electronic compensated flexible clamps in ranges 30/300/3000A (1compl),

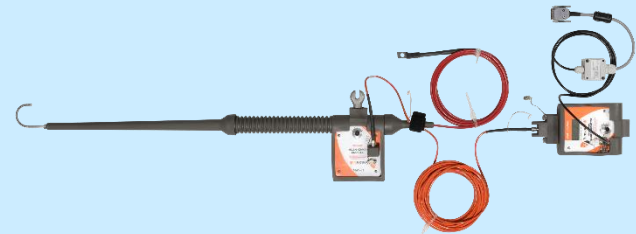


TE30 Analyzer's optional equipment:

- AmpLiteWire 2000A primary current sensors up to 2000A for LV and MV nets (1pc),



- VoltLiteWire 40kV primary sensors up to 40kV (1pc),



- rechargeable battery NiMH
AA R6 1.2V 2700mAh (5pcs),



- Calmet TE30 option set 01
(Calmet TE30+ET30+CT100AC+
+CF106H+EA34+EA20).



**TE30 Analyzer set
ready for operation**



Contact:

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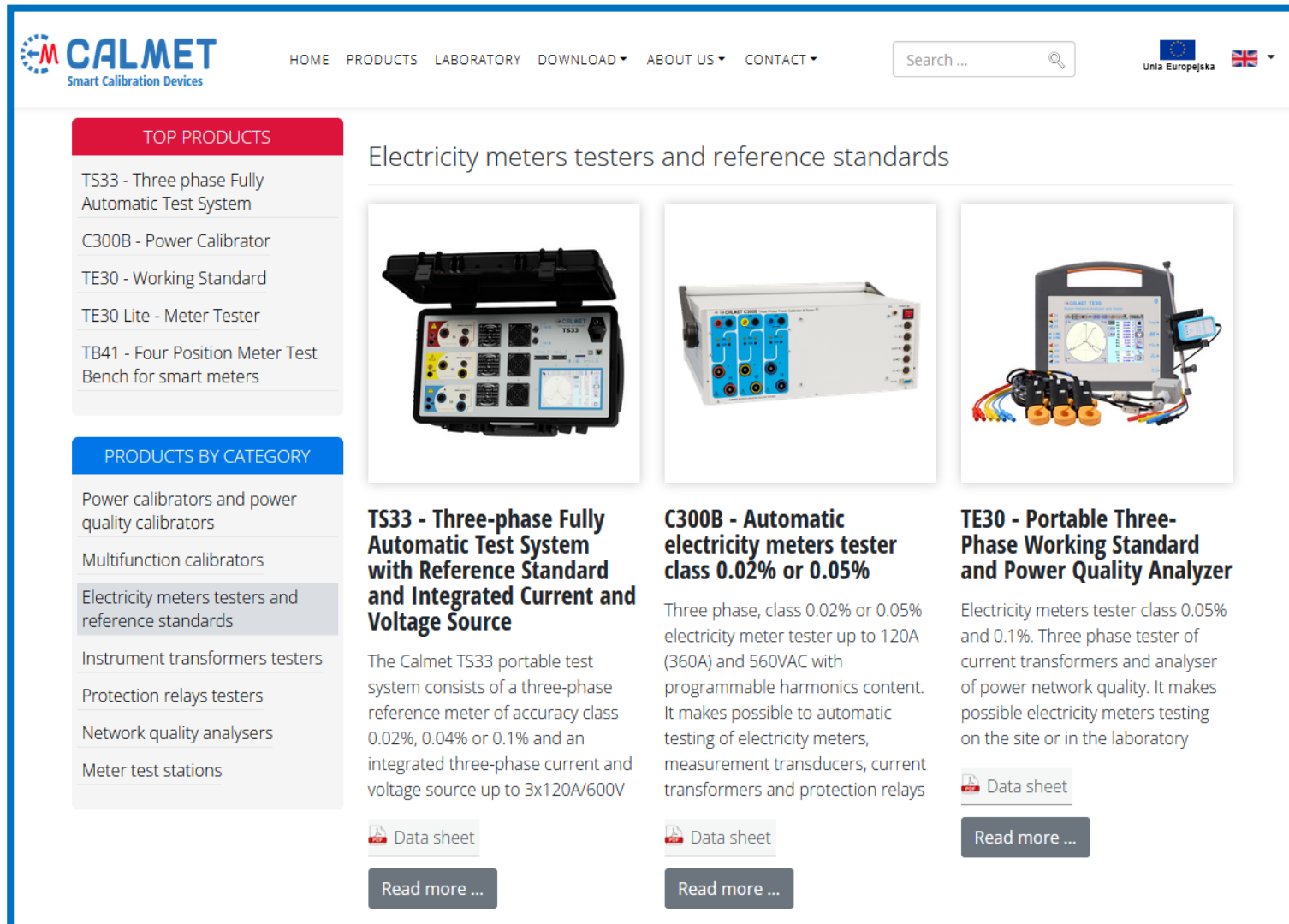
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To see more devices and information visit our Web site: www.calmet.com.pl



The screenshot shows the CALMET website interface. At the top, there is a navigation menu with links for HOME, PRODUCTS, LABORATORY, DOWNLOAD, ABOUT US, and CONTACT. A search bar is located to the right of the menu. The main content area is titled "Electricity meters testers and reference standards" and features three product cards. Each card includes an image of the device, a title, a description, a "Data sheet" link, and a "Read more ..." button. A left sidebar contains "TOP PRODUCTS" and "PRODUCTS BY CATEGORY" sections.

TOP PRODUCTS

- TS33 - Three phase Fully Automatic Test System
- C300B - Power Calibrator
- TE30 - Working Standard
- TE30 Lite - Meter Tester
- TB41 - Four Position Meter Test Bench for smart meters

PRODUCTS BY CATEGORY

- Power calibrators and power quality calibrators
- Multifunction calibrators
- Electricity meters testers and reference standards
- Instrument transformers testers
- Protection relays testers
- Network quality analysers
- Meter test stations

Electricity meters testers and reference standards

TS33 - Three-phase Fully Automatic Test System with Reference Standard and Integrated Current and Voltage Source

The Calmet TS33 portable test system consists of a three-phase reference meter of accuracy class 0.02%, 0.04% or 0.1% and an integrated three-phase current and voltage source up to 3x120A/600V

[Data sheet](#)

[Read more ...](#)

C300B - Automatic electricity meters tester class 0.02% or 0.05%

Three phase, class 0.02% or 0.05% electricity meter tester up to 120A (360A) and 560VAC with programmable harmonics content. It makes possible to automatic testing of electricity meters, measurement transducers, current transformers and protection relays

[Data sheet](#)

[Read more ...](#)

TE30 - Portable Three-Phase Working Standard and Power Quality Analyzer

Electricity meters tester class 0.05% and 0.1%. Three phase tester of current transformers and analyser of power network quality. It makes possible electricity meters testing on the site or in the laboratory

[Data sheet](#)

[Read more ...](#)

or contact by e-mail: mail@calmet.com.pl