

Calmet C300B
3-Phase Power Calibrator
& Tester



CALMET Sp. z o.o.

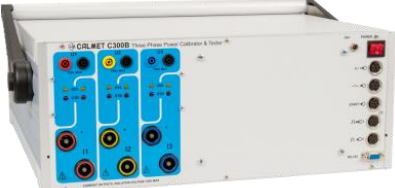
- ❑ Calmet = **CAL**ibrators + **MET**rology
- ❑ founded in **1989**, roots come from LUMEL, big factory of measurement equipment in Poland, Zielona Gora
- ❑ designing, production, selling and servicing new kind of calibrators and electric equipment testers
- ❑ employs over 25 engineers, including 3 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

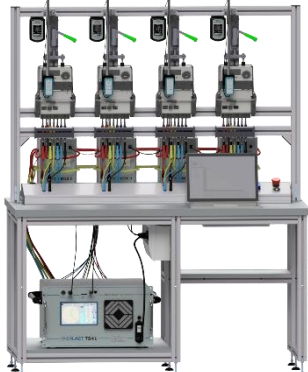
AC/DC Voltage, Current & Power Calibrators, Test Benches



3 phase U,I,φ,P,Q,S,E



1 phase U,I,φ,P,Q,S,E

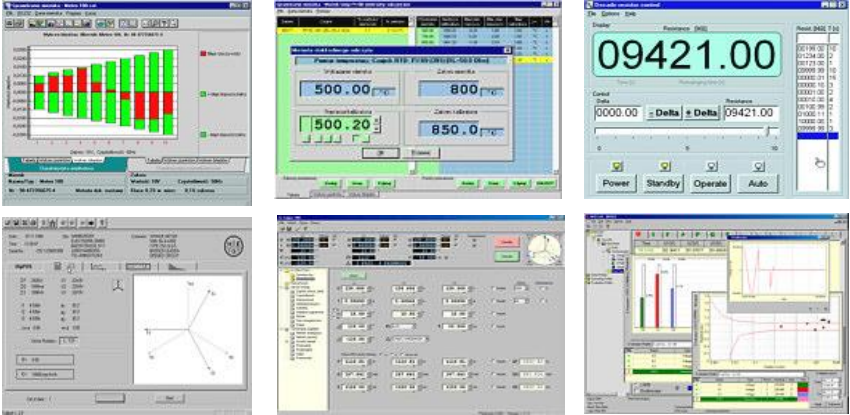


3 phase Test Bench



Multifunctions DC/AC

Control Software for measurement equipment



Current and Voltage Source with Integrated Reference Standard



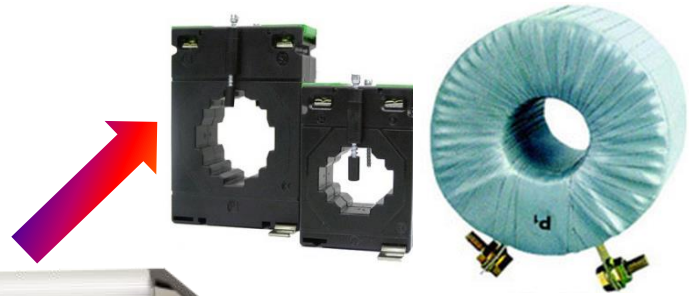
Whole Power Laboratory in one case!

Accuracy of all kinds of meters ϵ [%]



Electromechanical (Ferraris)
Electronic (static)
4-Quadrants Smart Meters
Max. demand

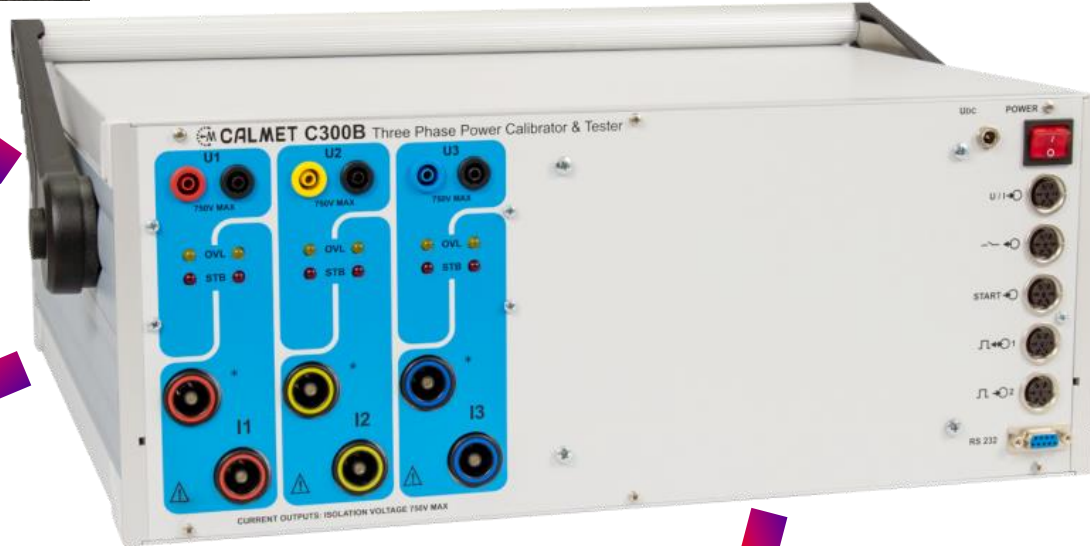
CT burden, ratio, phase shift error



Accuracy of electrical measuring transducers



AC electrical quantities,
like: voltage, current,
active power, reactive
power, frequency, phase
angle, power factor



Accuracy of current clamps



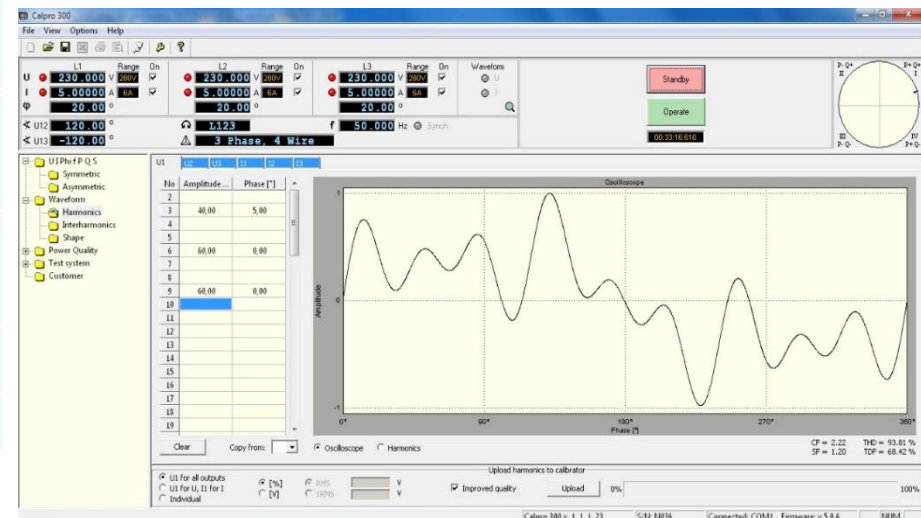
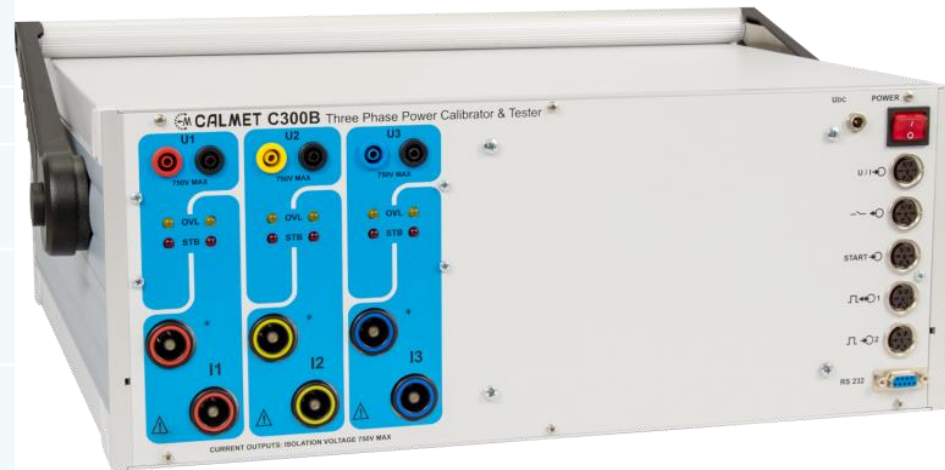
Accuracy of protective relays

Checking of tripping
time and tripping level



With AC & DC voltage
and current output
including measuring
the accuracy of current
and phase angle

- ▶ Accuracy class **0.02%** or **0.05%** to calibrate digital instruments
- ▶ 3-phase voltage source in range **0.5...560V**
- ▶ 3-phase current source in range **0.001...120A** and 1-phase up to **360A**
- ▶ Testing of energy meters, potential and current transformers (**CT / PT**)
- ▶ **Automatic operation** with predefined load points with calculating of errors and standard deviation
- ▶ Single pair of current sockets for each current outputs
- ▶ Single product in a single case without auxiliary amplifiers
- ▶ High burden of outputs to drive older analogue instruments
- ▶ **Manual** mode and **automatic** test procedures
- ▶ Calibration Certificate

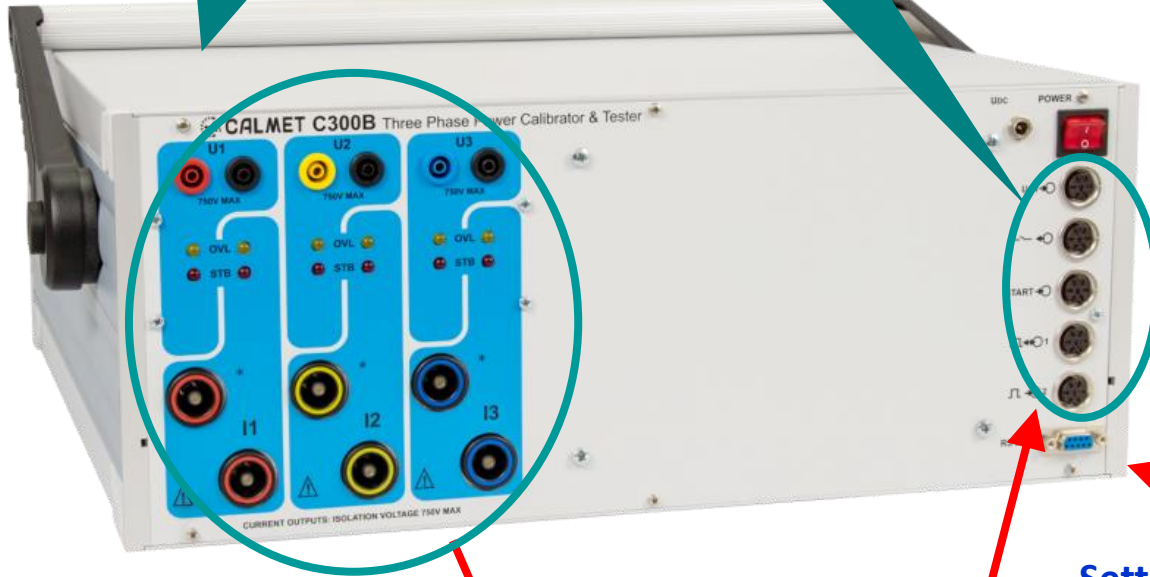


C300 outputs

C300 inputs

In Manual Mode it is possible to set:

- Voltages up to 3 x 560V
- Currents up to 3 x 120A
(360A in single phase connection)
- Frequency in range 40...500Hz
- Phase angles in range 0...360°
- Wave shapes of signals
- Signal changes in time



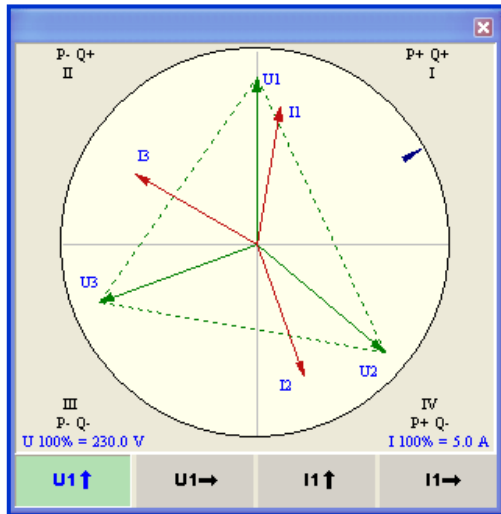
Settings by PC

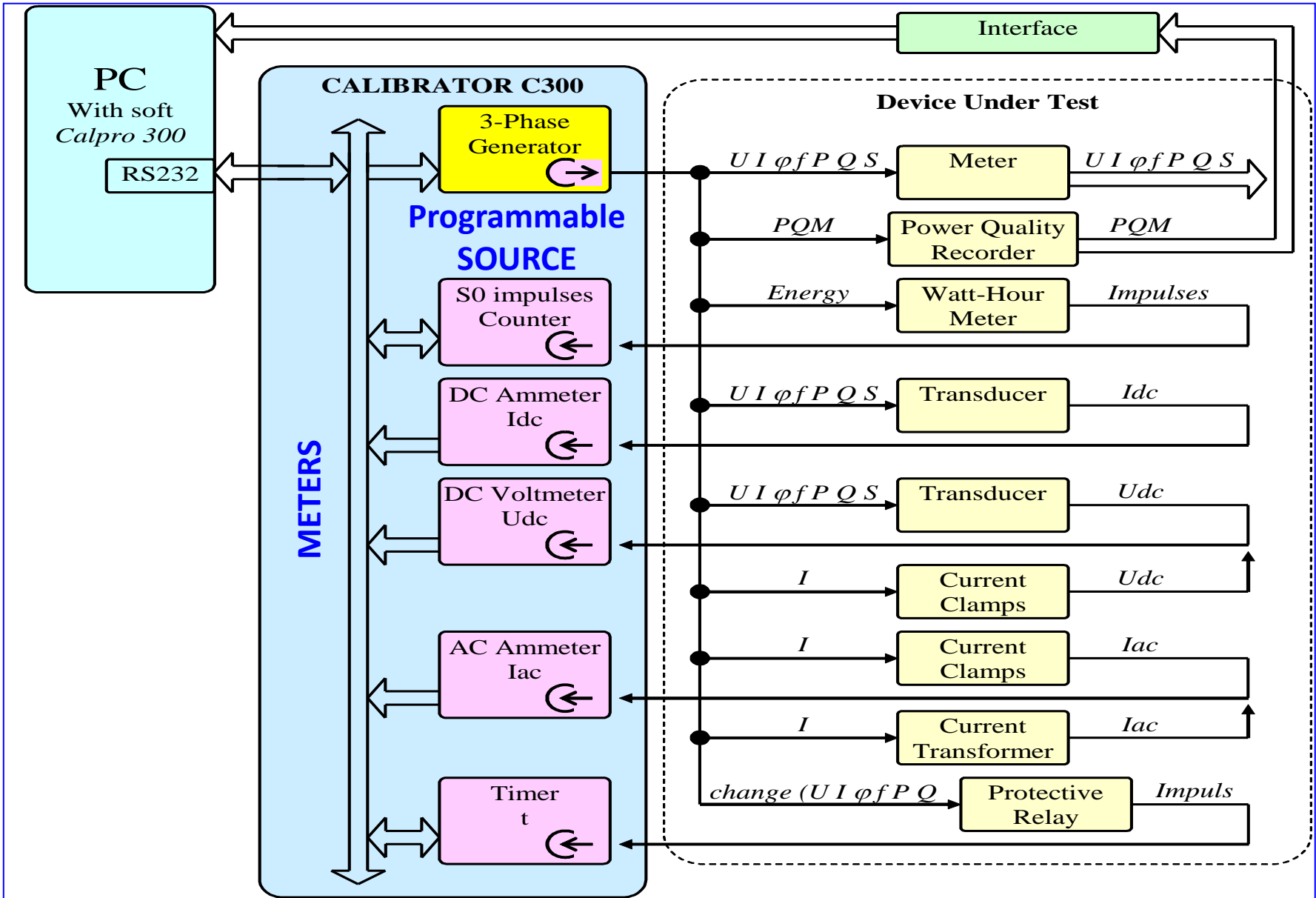
Only in Automated Mode

In Automated Mode it is possible to test:

- Electricity meters
- Protective relays
- Current transformers
- Current clamps
- Measurement transducers

Device Under Test





Voltage:

- range: 0.5000V ... 560.000V
- uncertainty: $\pm 0.02\%$
- short term stability: $\pm 0.005\%$
- long term stability: $\pm 0.01\%$
- temp. drift: $\pm 0.0005\%/1^\circ\text{C}$

Maximum load:

- 560mA@70V
- 280mA@140V
- 140mA@280V
- 70mA@560V
- sin distortion: 0.05%

Frequency:

- range: 40.000Hz... 500.000Hz
- uncertainty: $\pm 0.005\%$

Phase shift:

- range: $0.00^\circ \dots \pm 360.00^\circ$
- uncertainty: $\pm 0.05^\circ$

Power:

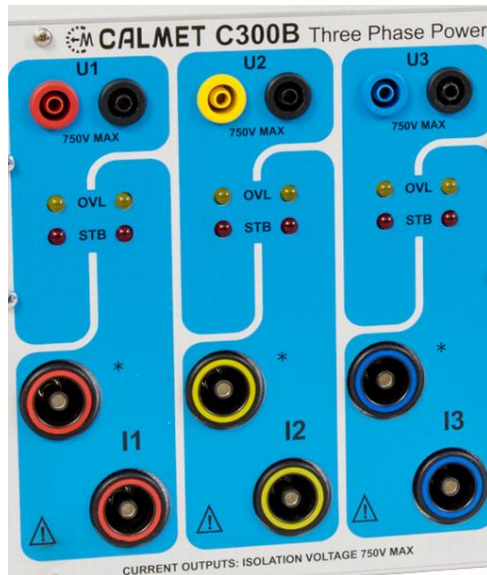
- range: 0...3 x 67200 W,var,VA
- resolution: 0.00001-1W,var,VA

Maximum load:

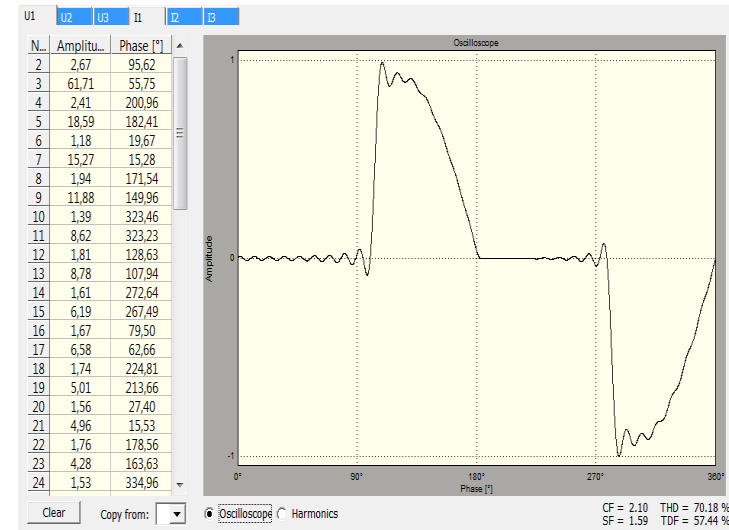
- 17V@0.5A
- 8.5V@6A
- 3.3V@20A
- 0.70V@120A
- sin distortion: 0.1%

Current:

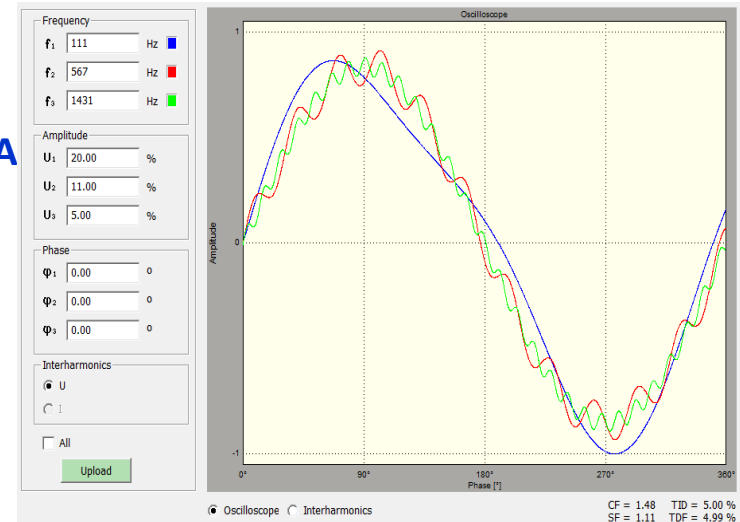
- range: 0.001000A ... 120.000A
- uncertainty: $\pm 0.02\%$
- short term stability: $\pm 0.005\%$
- long term stability: $\pm 0.01\%$
- temp. drift: $\pm 0.0005\%/1^\circ\text{C}$

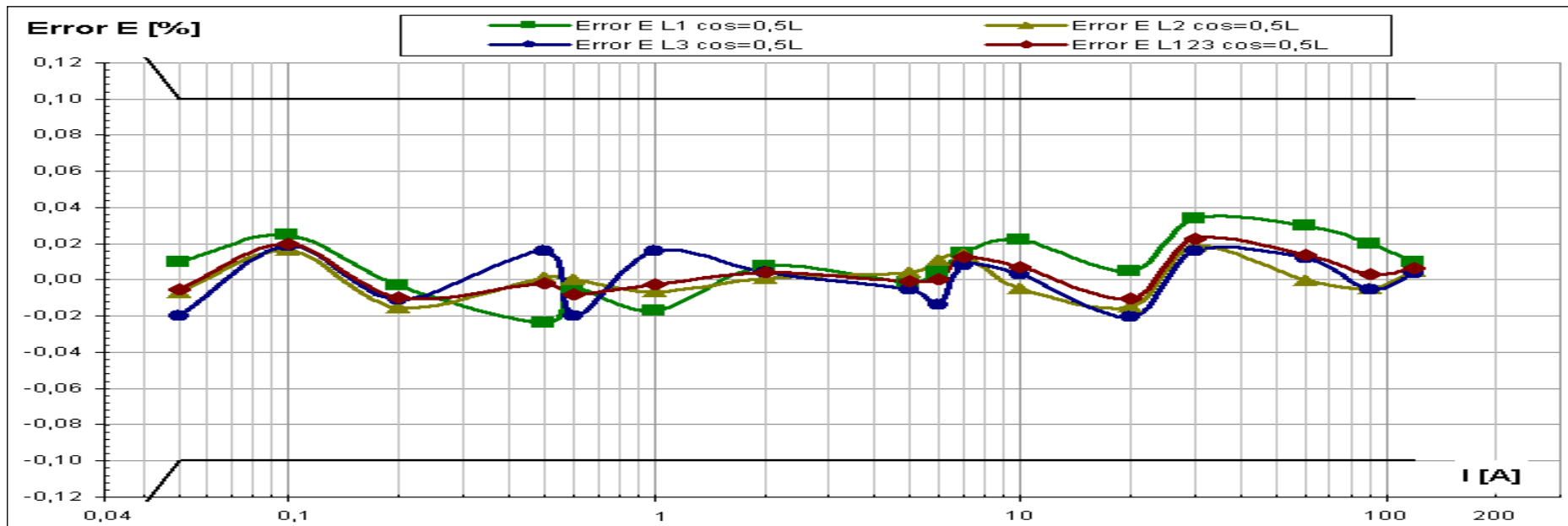
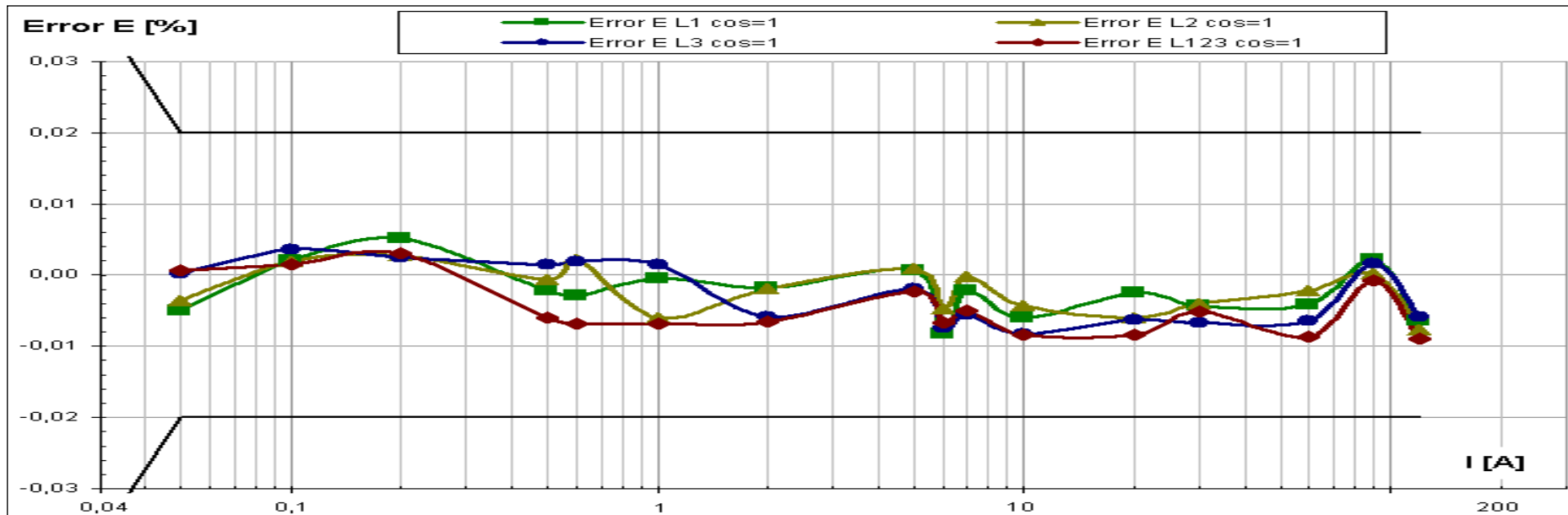


Waveform: harmonics (up to 3200Hz)



Waveform: interharmonics (up to 9kHz)





C300 is controlled via RS232/USB by PC Software

The transmission protocol (simple text eg.: U_230,57.70,1[CR][LF]) is available for customers

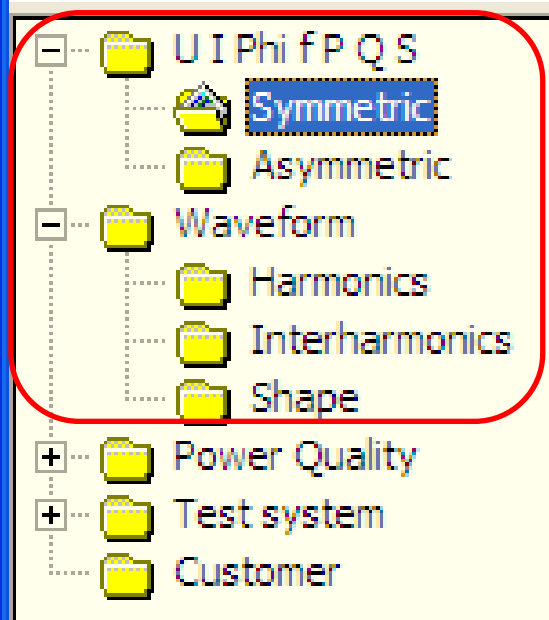
Calpro 300 Basic version enables setting:

- voltages, currents, frequency, phase angles and powers (Symmetric and Asymmetric)
- Harmonics, Interharmonics and Special Shapes of signals

Function field

Calibrator status field

Operation field



Calpro 300

File View Options Help

U L1 Range On: 230.000 V 280V ✓
I L1 Range On: 1.00000 A 6A ✓
φ L1 Range On: 10.00 ° ✓

U L2 Range On: 230.000 V 280V ✓
I L2 Range On: 1.00000 A 6A ✓
φ L2 Range On: 10.00 ° ✓

U L3 Range On: 230.000 V 280V ✓
I L3 Range On: 1.00000 A 6A ✓
φ L3 Range On: 10.00 ° ✓

Waveform: U, I

Standby

Operate

U12: 120.00 °, U13: -120.00 °, f: 50.000 Hz, L123, 3 PHASE, 4 WIRE

U I Phi f P Q S

U: 230.000 V, I: 1.00000 A, φ: 10.00 °, P: 226.506 W, Q: 39.9391 VAR, S: 230.000 VA

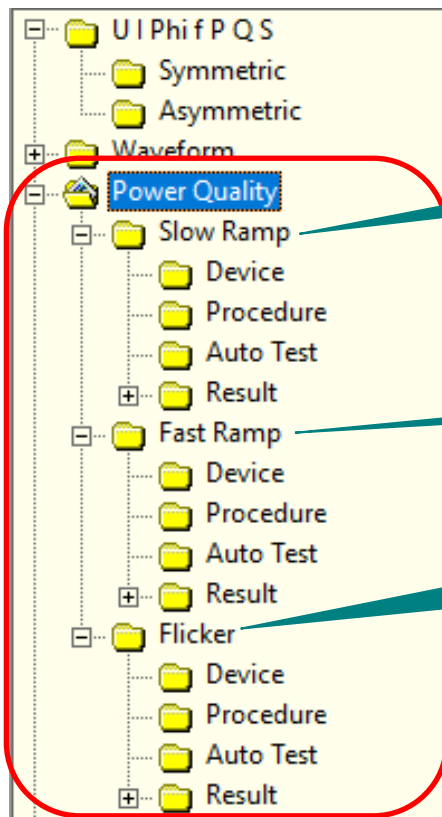
φ cos, sin

Set POWER by change: U, I, φ.cos, sin

SP: 679.518 W, SQ: 119.8173 VAR, SS: 690.000 VA

Calpro 300 v. 1. 0. 20. 1 | 5/N: 21144 | Connected: COM6, Firmware: v.2.5.6.3

Calpro 300 PQ (Power Quality) version enables to generate voltage and current with value changing in time for testing meters, recorders and power quality analyzers and consists of the following functions:



Slow Ramp function for generating voltage and current which value is changed relative slow to the time (slower than one time per 1s)

Fast Ramp function for generating voltage and current which value is changed relative fast to the time (slower than one time per 20ms)

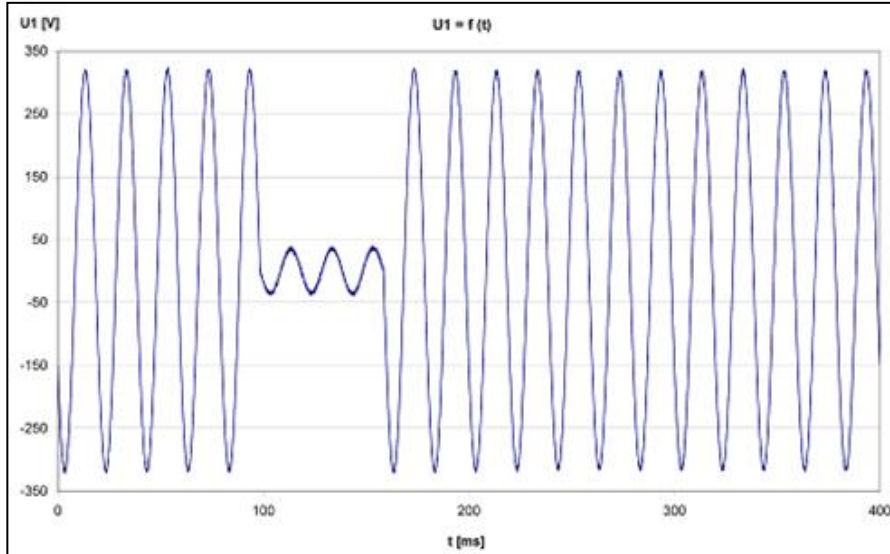
Flicker function for generating voltage fluctuation (Flicker) levels expressed in Plt and Pst coefficients

The changes in the output signals include the following parameters:

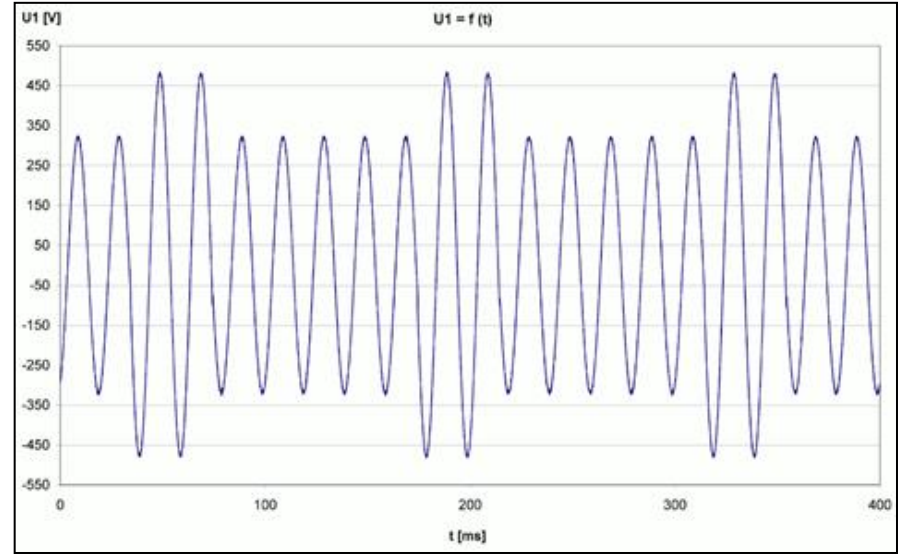
- RMS value of voltage and current,
- phase shift between U and I and phase angle between voltages,
- frequency,
- waveform of voltage and current.

Calibrator output signal change versus time

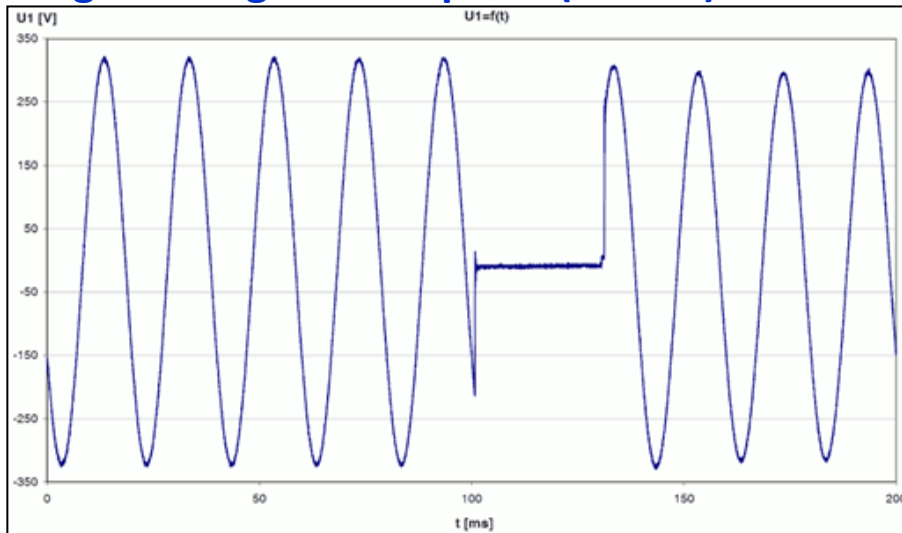
Single Voltage Dip (100ms)



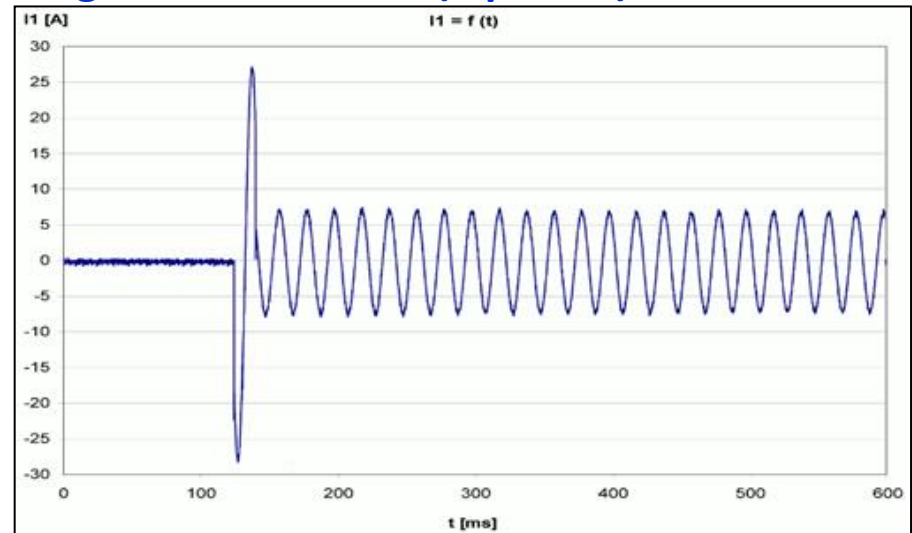
Periodic Voltage Swells (2 periods)



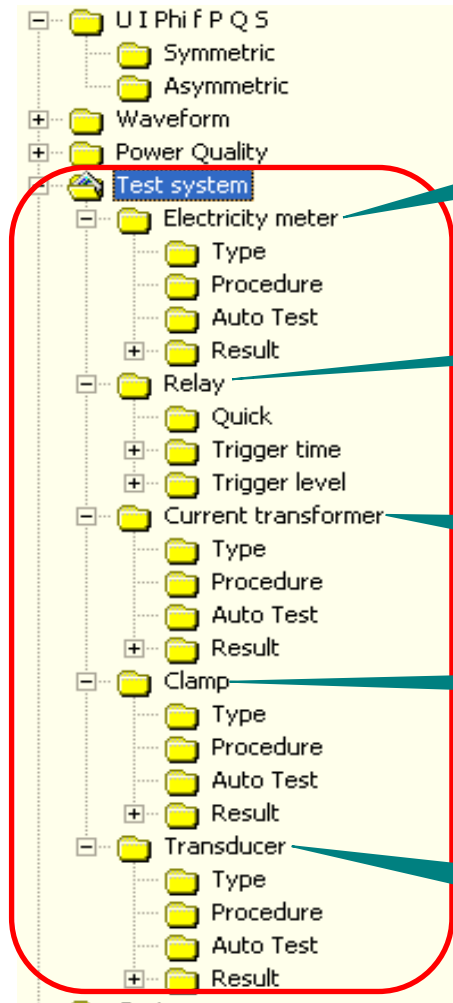
Single Voltage Interruption (100ms)



Single Current Shock (1 period)



Calpro 300 TS (Test System) version enables testing of the following devices in fully automatic way under sinusoidal and nonsinusoidal conditions:



Electricity meter function for automatic testing of meters

Relay function for automatic testing of protective relays

Current transformer function for automatic testing of current transformers

Clamp function for automatic testing of current clamps

Transducer function for automatic testing of measurement transducers

Calpro 300 PC Software allows to create Data Base with:

- **Type** of Device Under Test – properties of device like meter constant, range, class of accuracy etc.

- **Procedure** – set of load points for testing (settings of U, I, φ , f, P, Q, S, harmonics, no. of impulses...)

and then to perform testing:

- **Auto Test** – automatic testing based on **Type** and **Procedure**
and **Result evaluation:**

- **Result** – presentation in form of **Table** (user editable) or **Diagram** with possibility of printout or export to Excel

| Error test | Counting | | Counter test | | | | | | | | | | | | | | | |
|------------|------------------|----------|--------------|---------|---------|----------|----------|----------|--------|------------|------------|------------|--|------|-----------|-------------------|---------------------|----|
| No | Point name | Time | U1 [V] | U2 [V] | U3 [V] | I1 [A] | I2 [A] | I3 [A] | f [Hz] | Phi1 | Phi2 | Phi3 | | | Limit [%] | ε [%] | ε_s [%] | OK |
| 1 | 100A sym cos=1,0 | 10:57:03 | 230.000 | 230.000 | 230.000 | 100.000 | 100.000 | 100.000 | 50.000 | Cos 1.00 L | Cos 1.00 L | Cos 1.00 L | | L123 | 1.000 | -0.485 | 0.000 | ✓ |
| 2 | 10A sym cos=1,0 | 10:58:14 | 230.000 | 230.000 | 230.000 | 10.0000 | 10.0000 | 10.0000 | 50.000 | Cos 1.00 L | Cos 1.00 L | Cos 1.00 L | | L123 | 1.000 | -0.343 | 0.011 | ✓ |
| 3 | 10A sym cos=0,5L | 10:58:44 | 230.000 | 230.000 | 230.000 | 10.0000 | 10.0000 | 10.0000 | 50.000 | Cos 0.50 L | Cos 0.50 L | Cos 0.50 L | | L123 | 1.000 | -0.165 | 0.000 | ✓ |
| 4 | 1A sym cos=1,0 | 10:59:15 | 230.000 | 230.000 | 230.000 | 1.00000 | 1.00000 | 1.00000 | 50.000 | Cos 0.50 L | Cos 0.50 L | Cos 0.50 L | | L123 | 1.000 | -0.222 | 0.025 | ✓ |
| 5 | 10A L1 cos=1,0 | 11:00:27 | 230.000 | 230.000 | 230.000 | 10.0000 | 0.000000 | 0.000000 | 50.000 | Cos 1.00 L | Cos 1.00 L | Cos 1.00 L | | L123 | 1.000 | -0.389 | 0.009 | ✓ |
| 6 | 10A L2 cos=1,0 | 11:01:03 | 230.000 | 230.000 | 230.000 | 0.000000 | 10.0000 | 0.000000 | 50.000 | Cos 1.00 L | Cos 1.00 L | Cos 1.00 L | | L123 | 1.000 | -0.326 | 0.009 | ✓ |
| 7 | 10A L3 cos=1,0 | 11:01:38 | 230.000 | 230.000 | 230.000 | 0.000000 | 0.000000 | 10.0000 | 50.000 | Cos 1.00 L | Cos 1.00 L | Cos 1.00 L | | L123 | 1.000 | -0.320 | 0.000 | ✓ |
| 8 | 10A L1 cos=0,5L | 11:02:14 | 230.000 | 230.000 | 230.000 | 10.0000 | 0.000000 | 0.000000 | 50.000 | Cos 0.50 L | Cos 0.50 L | Cos 0.50 L | | L123 | 1.000 | -0.225 | 0.055 | ✓ |
| 9 | 10A L2 cos=0,5L | 11:02:52 | 230.000 | 230.000 | 230.000 | 0.000000 | 10.0000 | 0.000000 | 50.000 | Cos 0.50 L | Cos 0.50 L | Cos 0.50 L | | L123 | 1.000 | -0.103 | 0.009 | ✓ |
| 10 | 10A L3 cos=0,5L | 11:03:30 | 230.000 | 230.000 | 230.000 | 0.000000 | 0.000000 | 10.0000 | 50.000 | Cos 0.50 L | Cos 0.50 L | Cos 0.50 L | | L123 | 1.000 | -0.135 | 0.040 | ✓ |

Testing Energy meter with C300 as a Source and Reference
Reference Energy is calculated on base of equation:

$$E_{Ref} = U \times I \times \cos\varphi(\sin\varphi) \times t$$

Where:

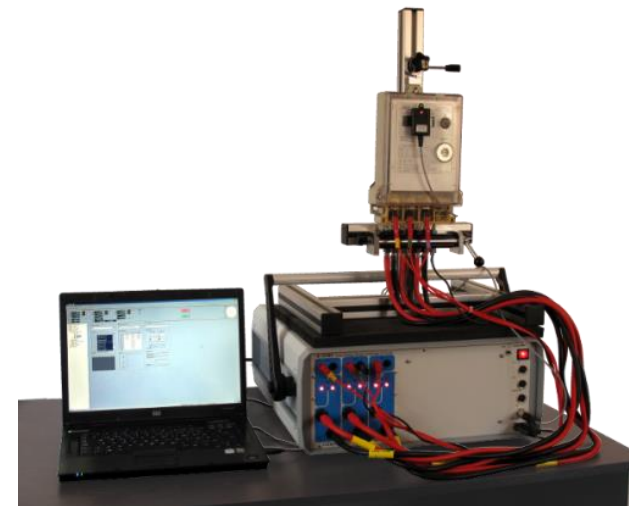
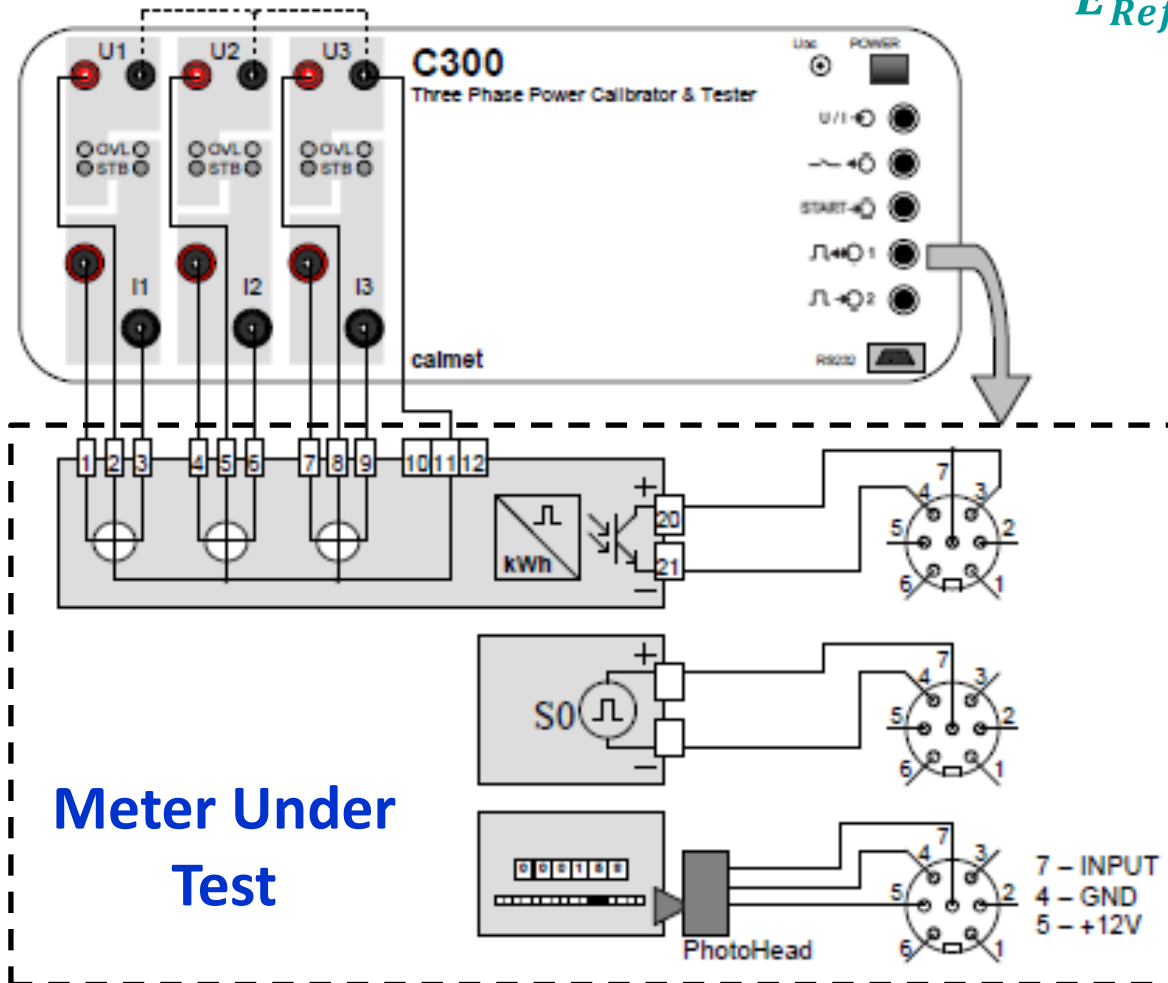
E_{ref} – reference energy

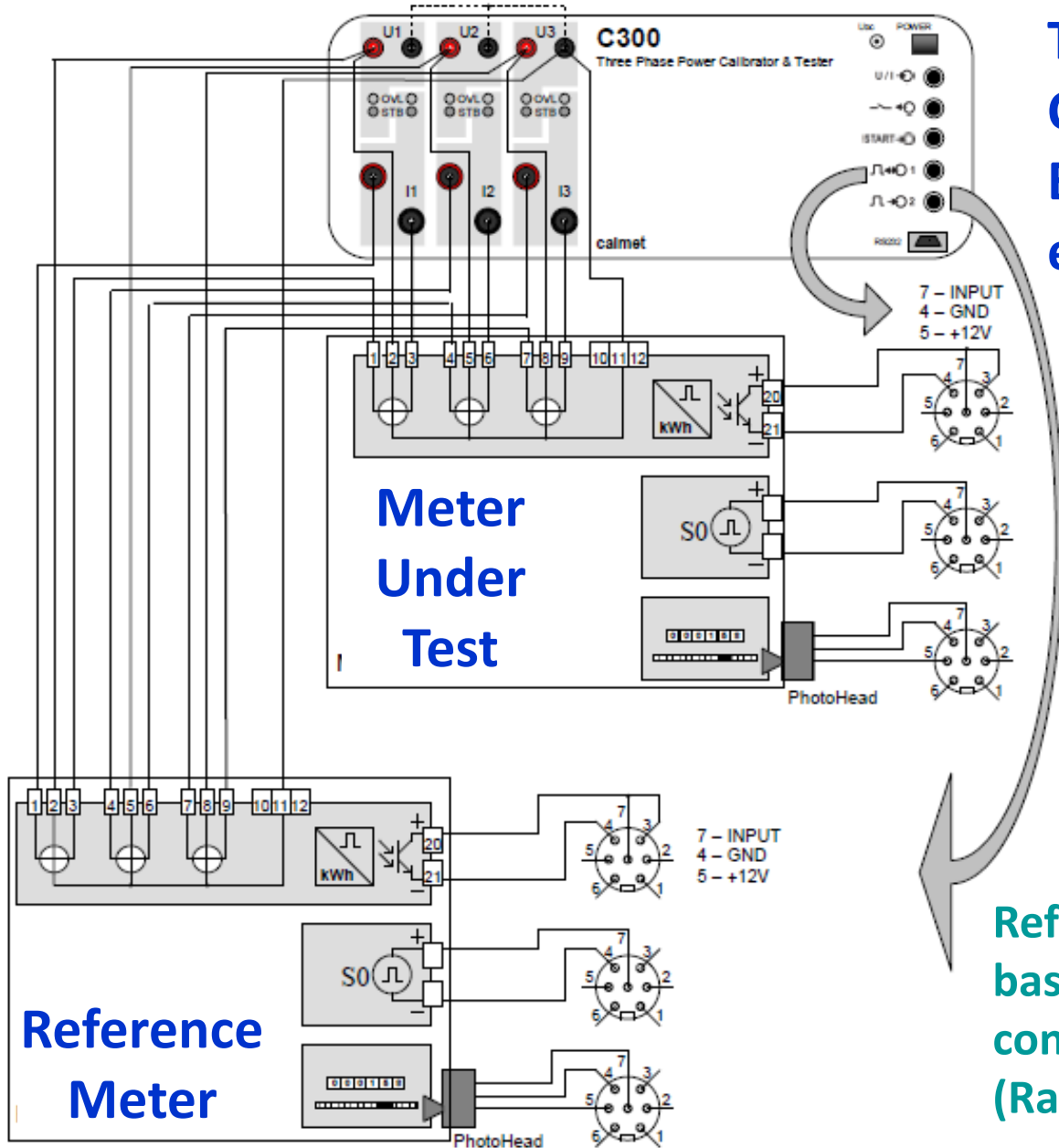
U – set value of voltage

I – set value of current

$\cos/\sin\varphi$ – power factor

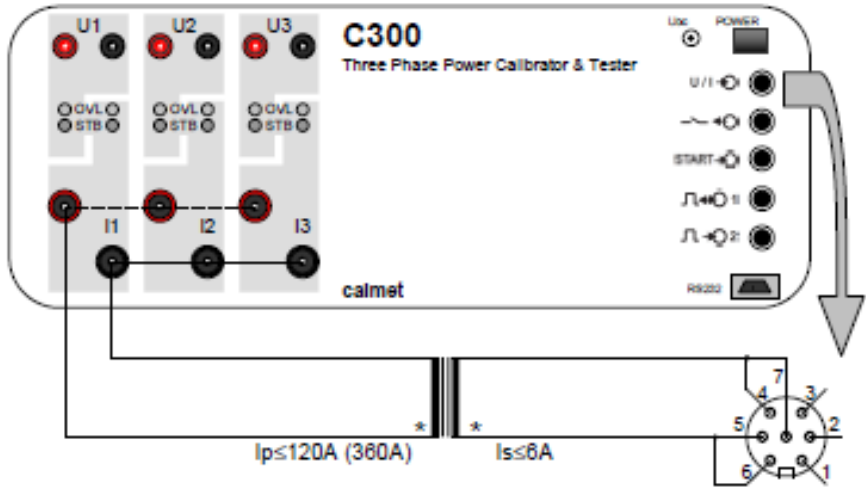
t – time of impulses counting





Testing Energy meter with C300 as a Source and Error Calculator with external Reference Meter

Reference Energy is calculated on base of number of impulses and constant of any Reference Meter (Radian, ZERA, MTE....)



$I_{pmax} = 120A$
when using current I1 only

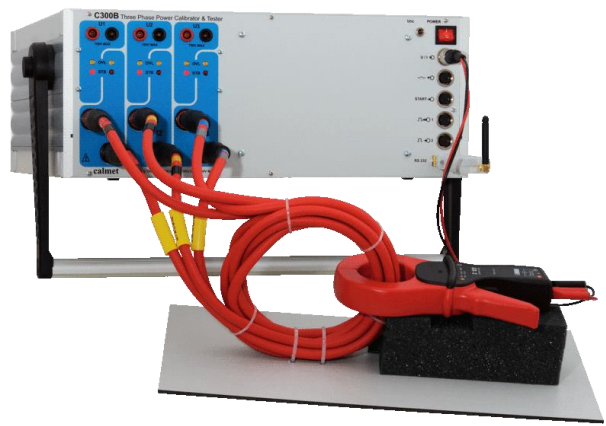
$I_{pmax} = 360A$
when shorted I1, I2 and I3
HI terminals and I1, I2, I3
LO terminals



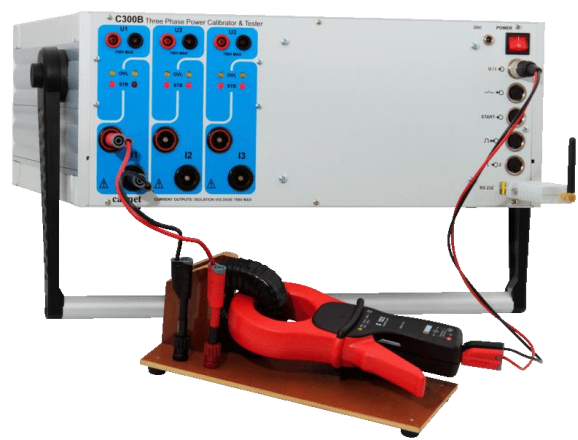
Up to 360A in parallel



CT 100A / 5A



1000A clamp and sum of currents



1000A clamp with 100 turns coil



100A clamp and 100A cable

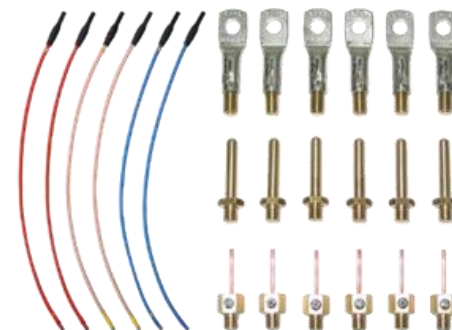
All completed Calmet C300B Calibrator's set consists of:

- C300B calibrator class 0.02 or 0.05 (19" Rack or Desktop case),
- power cord,
- Calpro 300 Soft – Basic PC Soft,
- USB / RS232 adapter,
- fuse T4A, 250V, 5x20 (2units),
- EA36 set (12units) of safety voltage and current cables up to 20A,
- EA21 set of accessories for safety cables (12units banana plug + 12units Cu),
- AD300 sockets adapter,
- C091A T3475-001 plug Amphenol for Calibrator inputs,
- operation manual of calibrator and software (2units),
- warranty card,
- calibration certificate.



Optionally for Calmet C300B Calibrator are available:

- computer Laptop,
- Calpro 300TS PC Soft for automatic test of electric equipment,
- Calpro 300PQ PC Soft for programming of Power Quality parameters,
- C300LabView-LabView Driver for C300B Calibrator,
- EA30 current cables up to 120A (6units) with set (18units) of replaceable terminals,
- KAS300 transportation case for portable work,
- CF106H photo head with holder for inductive meter and meter with LED,

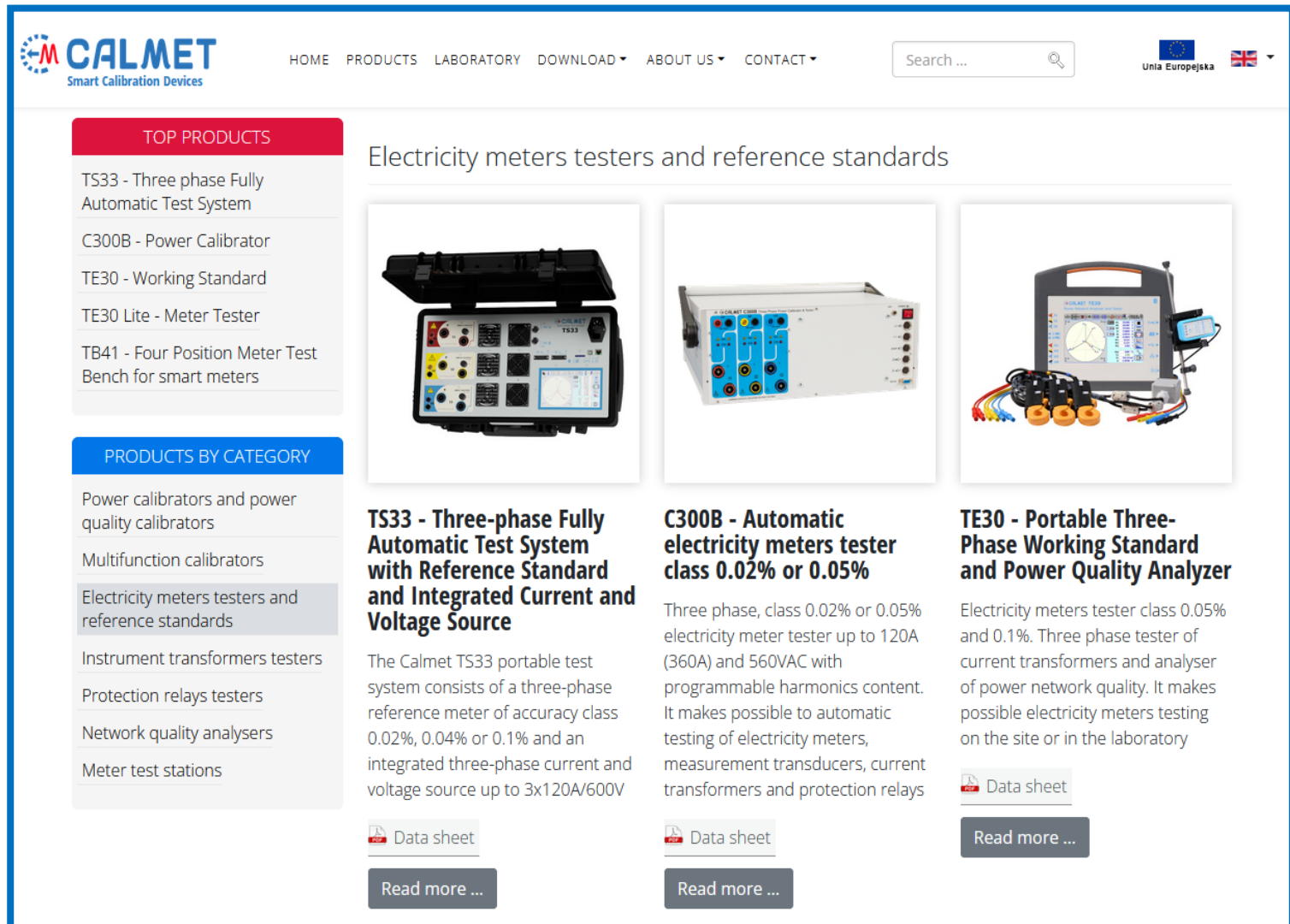


Optionally for Calmet C300B Calibrator are available:

- MPX8 Eight Inputs Multiplexer with MPX8 PC Soft for simultaneously testing up to eight electricity meters,
- ER10 rack for hanging of meter under test,
- ER10H.3 rack for hanging of meter with 3-phase quick connection device,
- ZW100/10A coil 100 turns / 10A,
- ZW10/20A coil 10 turns / 20A,
- RS232 – Bluetooth adapter for wireless connection.



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 on the right. 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 brief description, a "Data sheet" link, and a "Read more ..." button. A sidebar on the left lists "TOP PRODUCTS" and "PRODUCTS BY CATEGORY".


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