

# calmet

# Measurement Equipment



# Calmet's Presentation

Mesurement Equipment since 1989

Customer Support in problems solving Service

Power network analysers, Watt – hour meter testers, Current Transformers testers, Power quality analysers

Voltage, Current, Power & Resistance Calibrators



1 phase



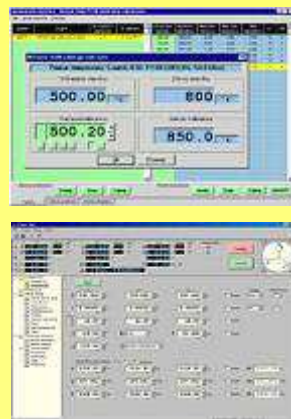
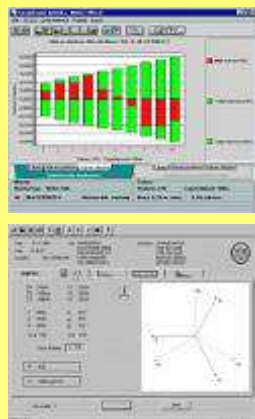
3 phase



3 phase 0,05% Power Quality



Control Software for measurement equipment



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Calmet Ltd.

Zielona Gora ul. Kukulcza 18  
Poland [www.calmet.com.pl](http://www.calmet.com.pl)



°C



Resistance GΩ



=, ~, U, I



1 phase U, I, φ



3 phase U, I, φ



3 phase U, I, φ, P, Q, S, E

# POWER NETWORK ANALYSER AND ENERGY METER TESTER

## Type Calport 100 Plus

**Calport 100 Plus – Portable Tester of 3 – phase Watt – hour meters and Current Transformers**

**❑ multifunction:**

- Connection verification – vector diagram,
- Power network parameters measurement,
- Harmonics analysis – U, I, P, Q,
- Energy meter testing
- CT & PT ratio & burden testing in 3-phase circuits

**❑ accuracy 0,1% (or 0,2%)**

**❑ wide range of currents 0,005...1000A**

**❑ data output:**

- Graphic LCD display,
- Internal memory for results,
- Local printing,
- PC Software for data analysis



# POWER NETWORK ANALYSER AND ENERGY METER TESTER

## type Caltest 10

### Caltest 10 single phase energy meter tester

- ☐ accuracy 0,5% or 0,2%
- ☐ current range 0,01...100A (10A)(1000A)(3000A) with current clamp input enables connection without break in circuit
- ☐ power up from measurement circuit
- ☐ dummy load function
- ☐ graphic LCD display,
- ☐ internal memory for results,
- ☐ local results printing,
- ☐ PC Software for data analyzis



## Power network parameters & power quality analyser NSQ



**Power network  
parameters recording  
for many weeks.**

**Measurement of 4 voltages:  
U1,U2,U3,Un  
& 5 currents: I1,I2,I3,In,Ie**

**Harmonics U, I, P, Q  
The source of  
disturbances can be  
pointed out!**

**Automatic Report  
generation for  
compliance with the  
standards (EN50160)**

**Frequency, THD, flicker, dips, interruptions, swells & overvoltage, asymmetry .....**

# POWER NETWORK ANALYSER, ENERGY METER TESTER & CURRENT AND VOLTAGE TRANSFORMER TESTER

## type Caltest 300

### Portable Analyzer Caltest 300

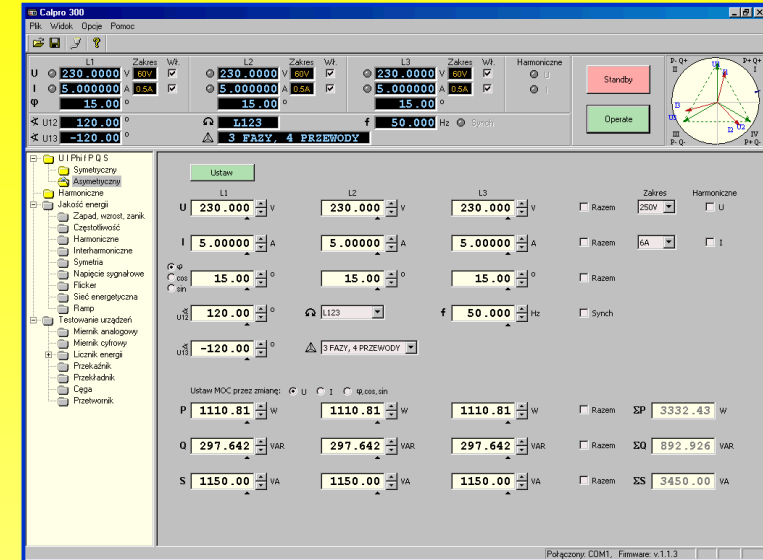
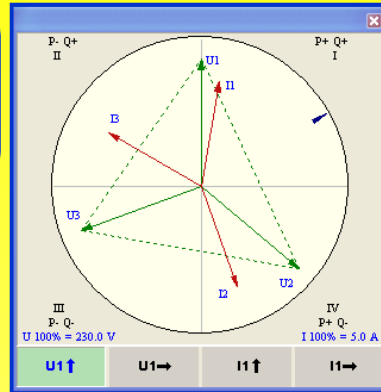
- ☐ three devices in one case:
  - Energy meter tester,
  - CT & PT tester in low & medium voltage networks,
  - Power quality analyzer
- ☐ high accuracy 0,05% (or 0,1%)
- ☐ wide range of input currents 0,005...3000A



# Power Calibrator & measurement instruments Tester C300

**3-phase Calibrator**  
**3x [0...500V, 0...100A]**  
**Accuracy: 0.05%**

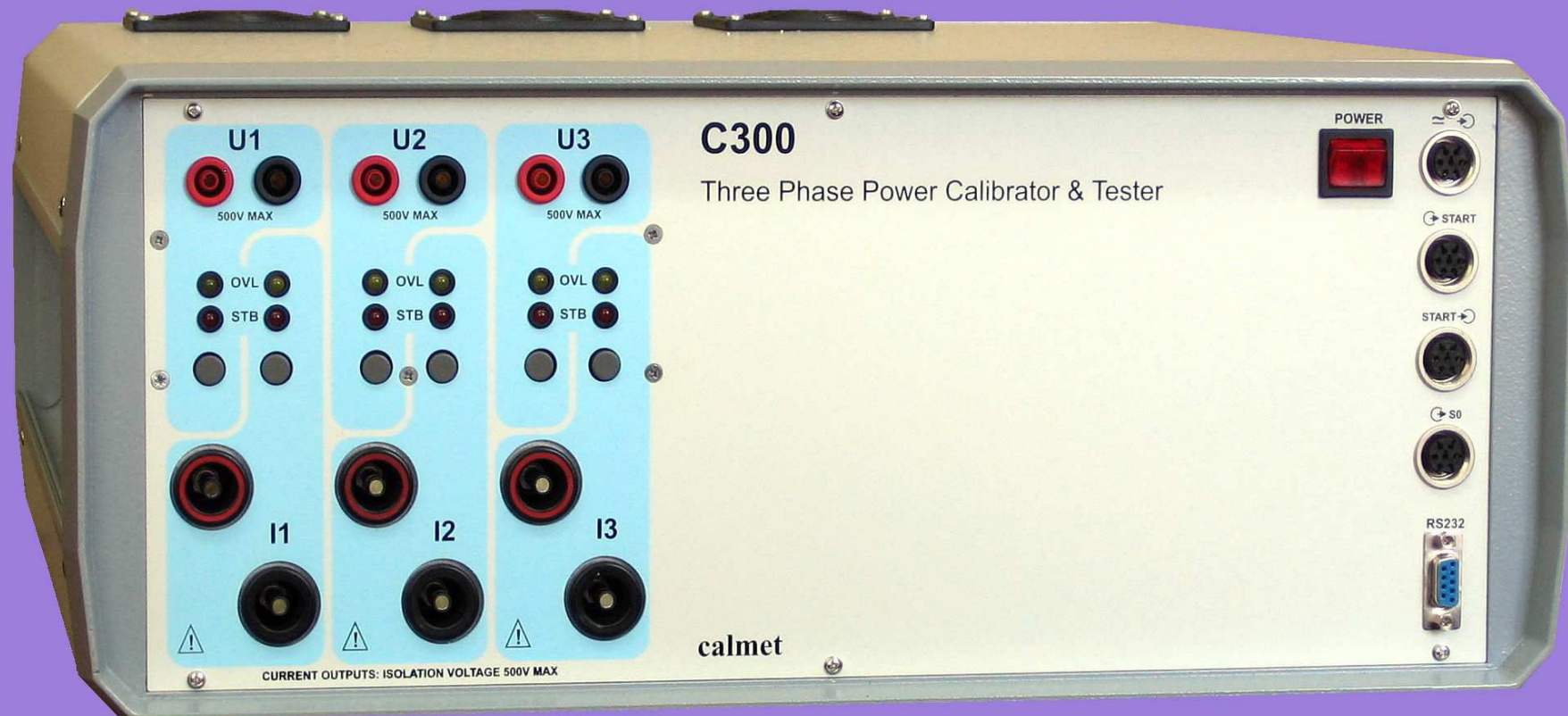
**Possibility to set any phase angle  
 between voltages and currents  
 Programmable harmonics up to 31**



**Automatic testing:**

- energy meters (0.05%);
- protective relays;
- current transformers;
- current clamps;
- Measurement transducers

**Power Calibrator  
& measurement instruments Tester  
type C300**



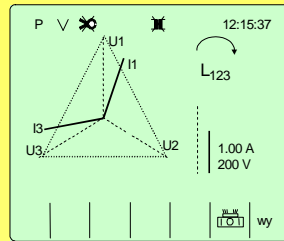
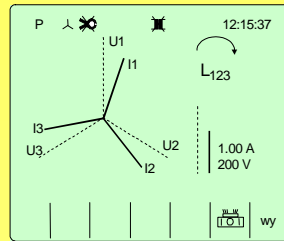
## POWER NETWORK ANALYSE AND ENERGY METERS TESTER type Calport 100A

**The analyser Calport 100A (version with 10A direct current range) is a portable electronic device**

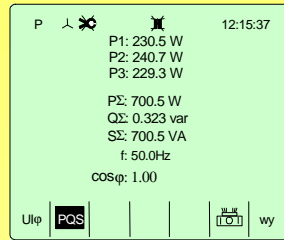
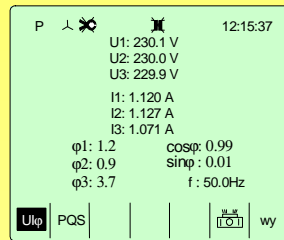
- ☐ **multifunction:**
  - verification of power network wiring – vector chart,
  - measure of power network wiring,
  - harmonics analysis,
  - checking of energy meters
- ☐ **high accuracy 0,1% or 0,2%**
- ☐ **wide current range 0,001...3000A**
- ☐ **multi-variant data entering:**
  - digital and graphical display,
  - internal memory,
  - local printing,
  - transmission by interface and analysis on PC computer.



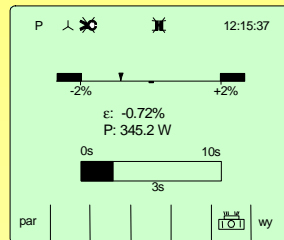
# FUNCTIONS OF THE ANALYSER Calport 100A



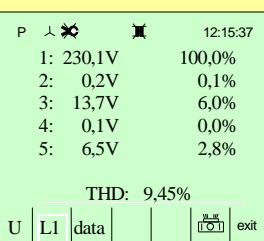
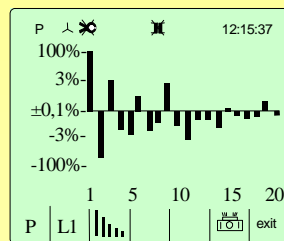
Verification of power network wiring in "star" and "delta" connection – graphical display of three phase voltage and current vector.



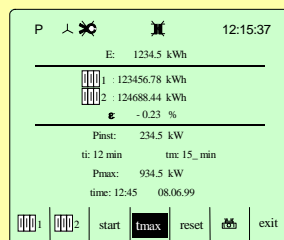
Measure of three phase power network parameters – digital measure of voltages, currents, active, reactive and apparent power in one and three phase, phase shifts and cosφ, active and reactive energy, frequency. Programming of voltage and current transformers ratios.



Testing of active and reactive energy meters directly on site – functions of computing meter error directly in percentages with method of setting time of measurements or number of impulses. Input in S0 standard is used for testing energy meters with impulse output. Photo head CF101 is used for automatic counting of meter rotor turns for testing induction meters. Photo head CF100 is used for automating testing of meters with LED.



Full harmonics analysis of phase voltages and currents as well as up to 20th harmonic analysis of active and reactive power for diagnostic of distortion sources. Graphical and numerical presentation of results.



Measure of active and reactive energy with method of setting time periods for verification of energy meter counters and testing of maximum power meters as well as measure maximum powers.

## EQUIPMENT OF THE ANALYSER Calport 100A



**Transportation  
case**



Krzysztof Urbanski  
Calmet Ltd.



**Clamps 100A, 3pcs.**



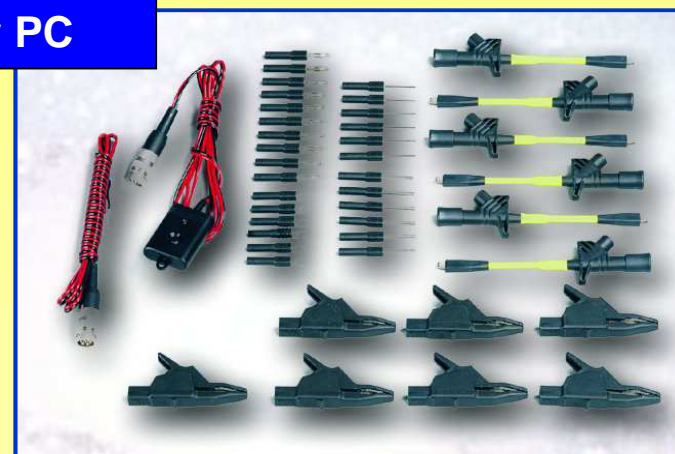
**Calsoft 100  
programme  
for PC**



**Portable printer**



**Photo head for  
inductive meters**



**S0 cord, photo head for meters  
with LED, adapters, crocodiles**

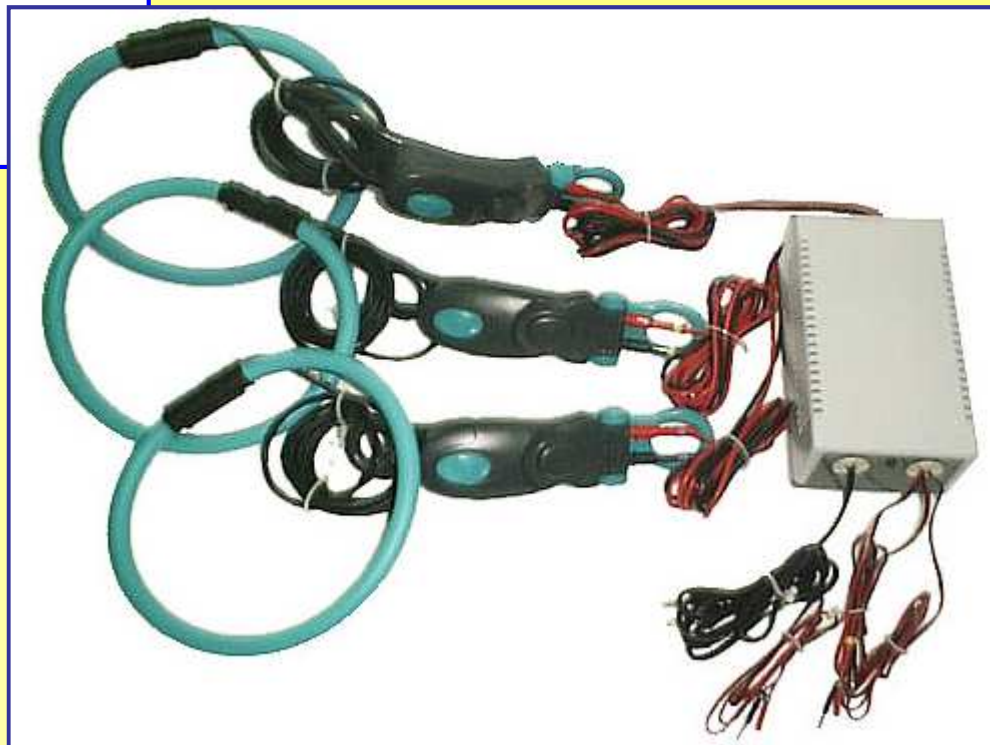
Zielona Gora ul. Kukulcza 18  
Poland [www.calmet.com.pl](http://www.calmet.com.pl)

## ADDITIONAL EQUIPMENT OF THE ANALYSER Calport 100A

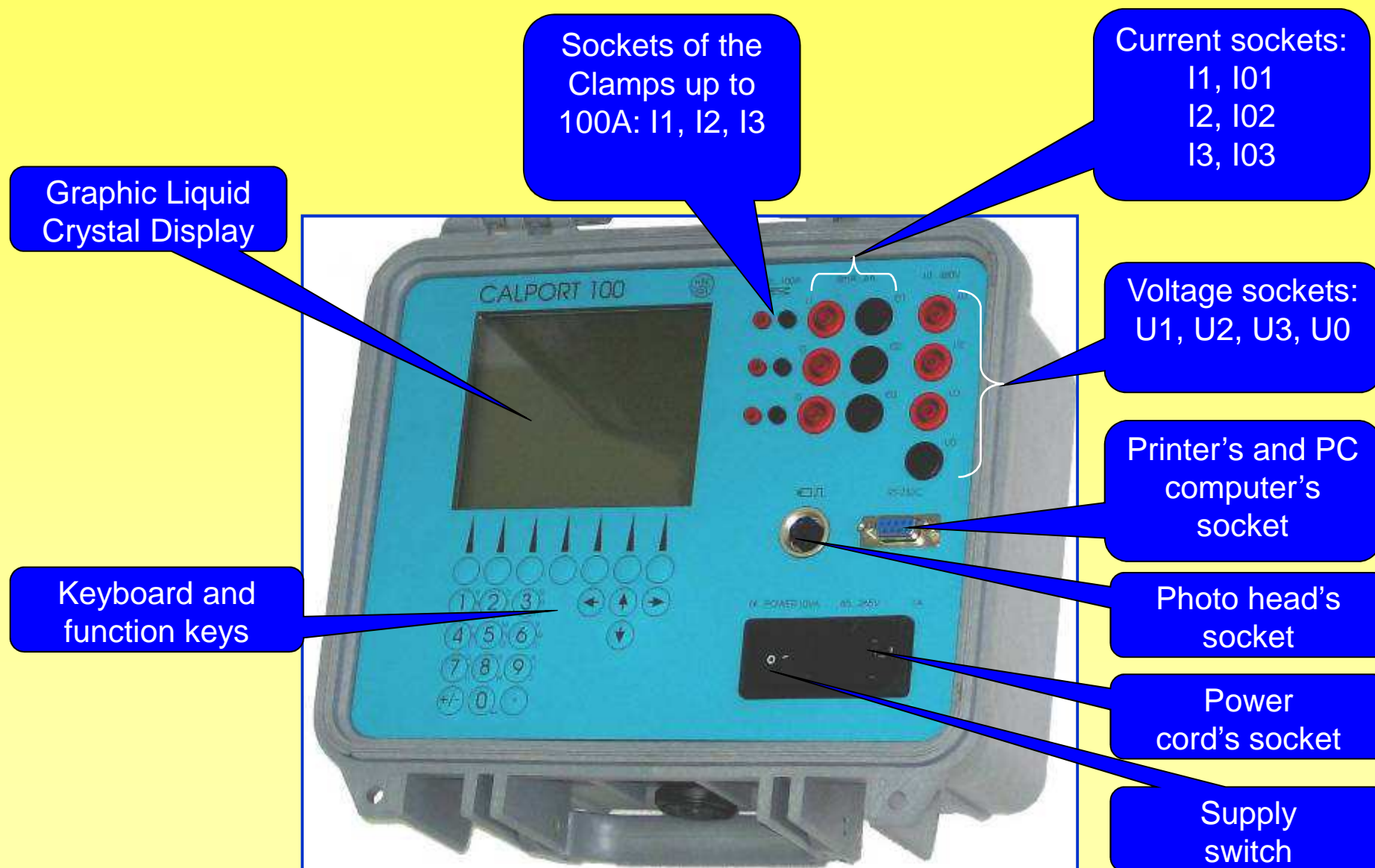


**Electronic compensated clamps  
for current measurement up to  
1000A in class 0,5**

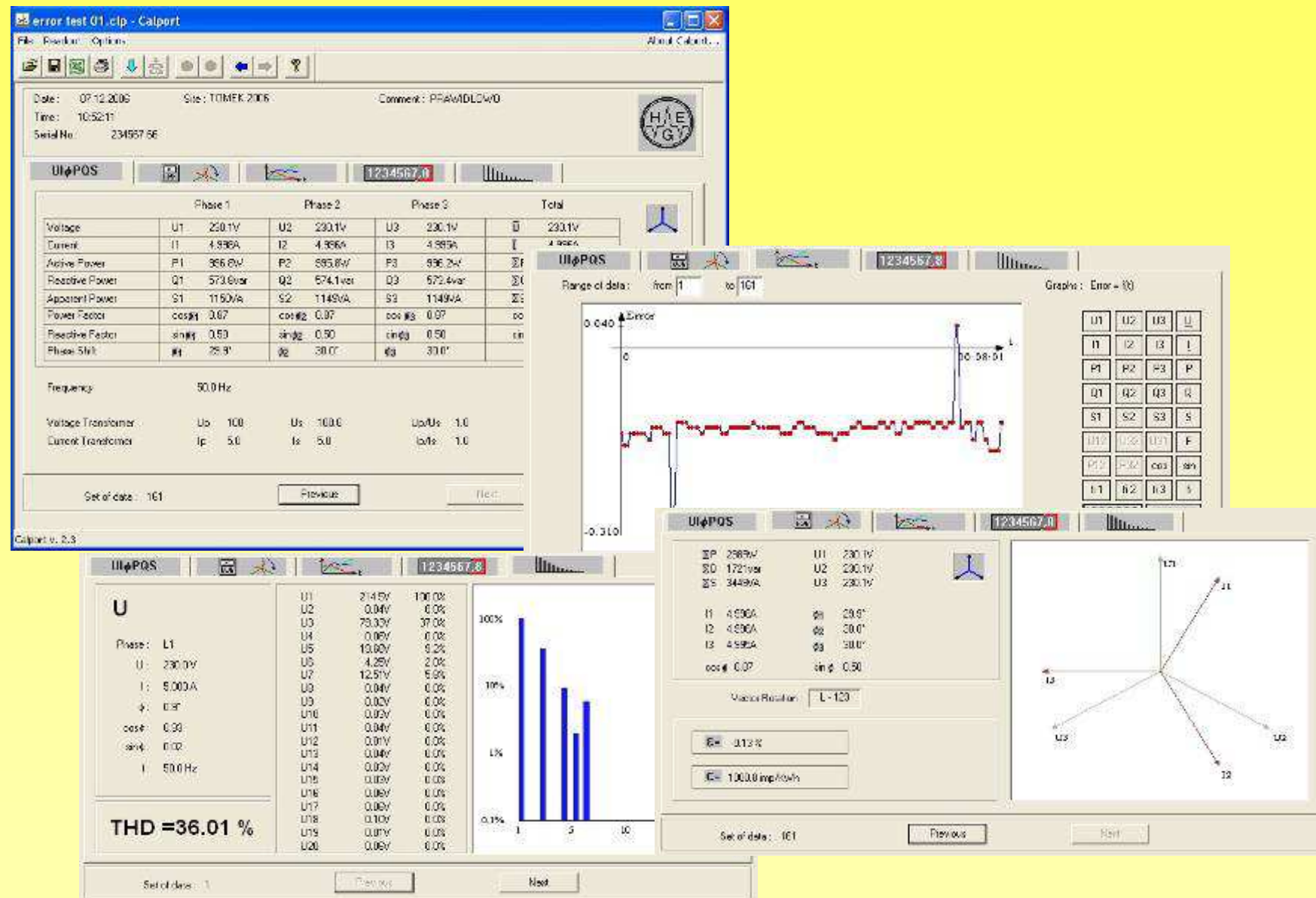
**Electronic compensated  
flexible clamps with  
converter for current  
measurement in ranges  
30/300/3000A**



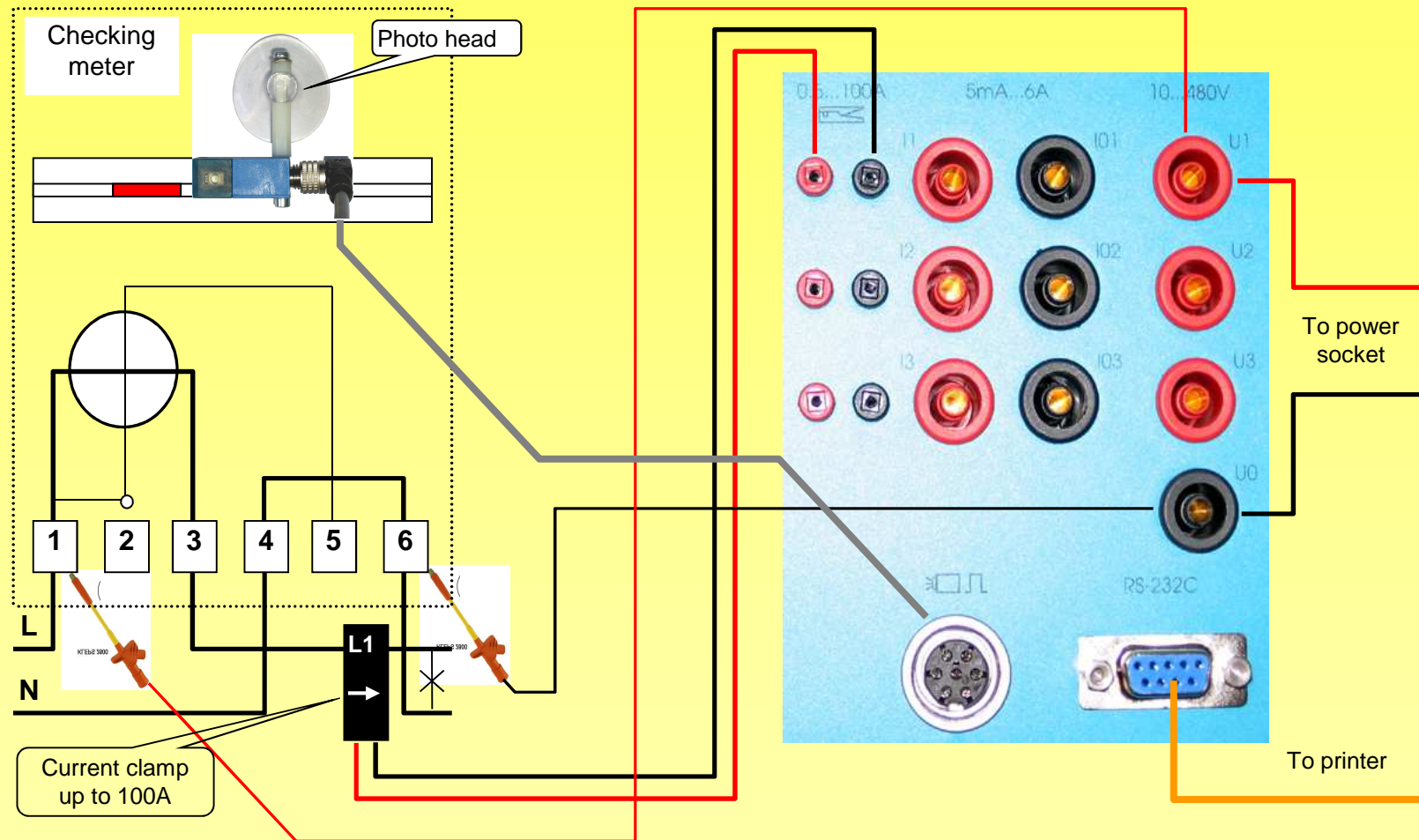
## FRONT PLATE OF THE ANALYSER Calport 100A



# PC SOFTWARE FOR ANALYSER Calport 100A

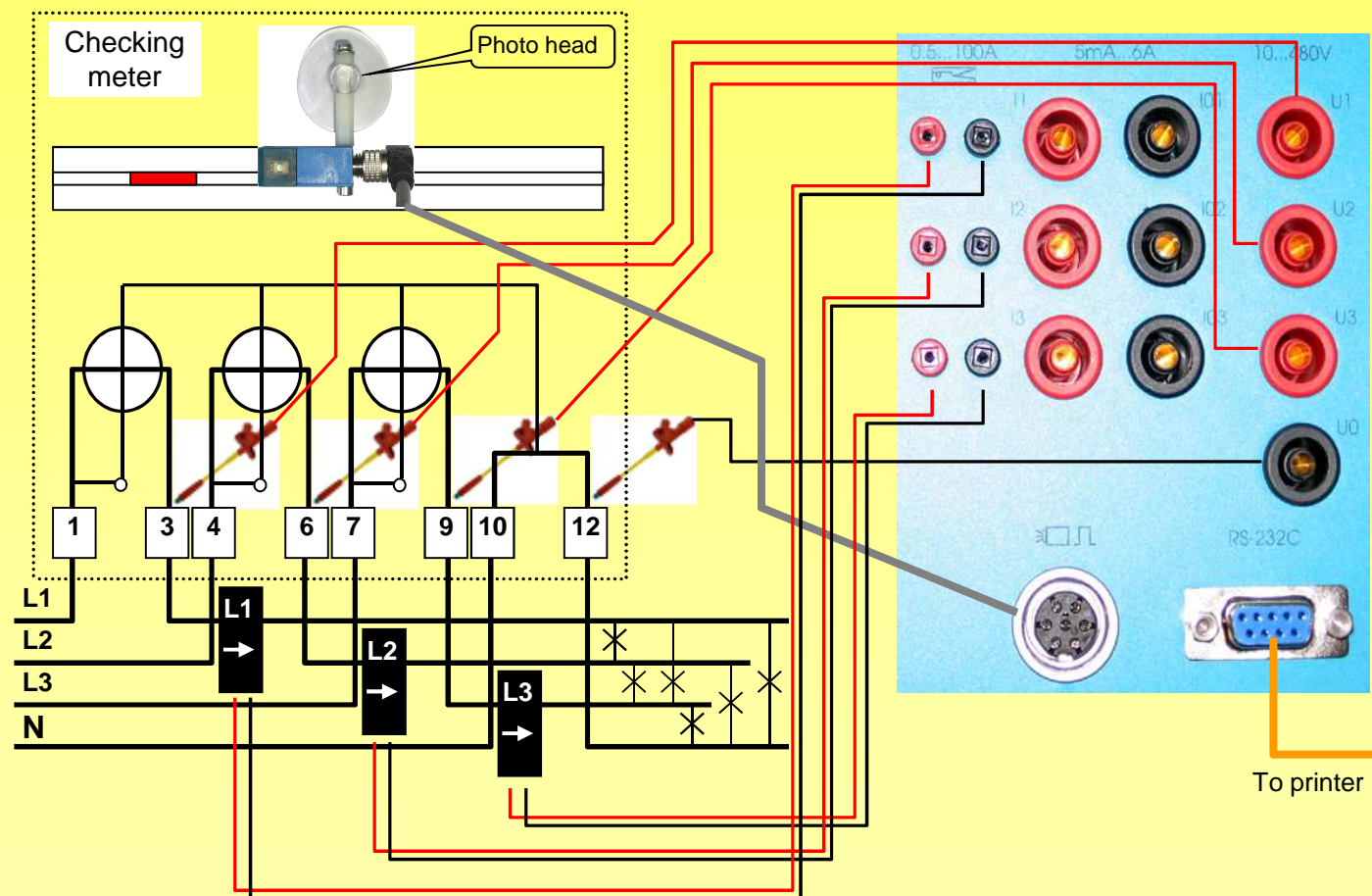


# CHECKING THE ERROR OF THE ONE PHASE METER WITH USING ANALYSER Calport 100A



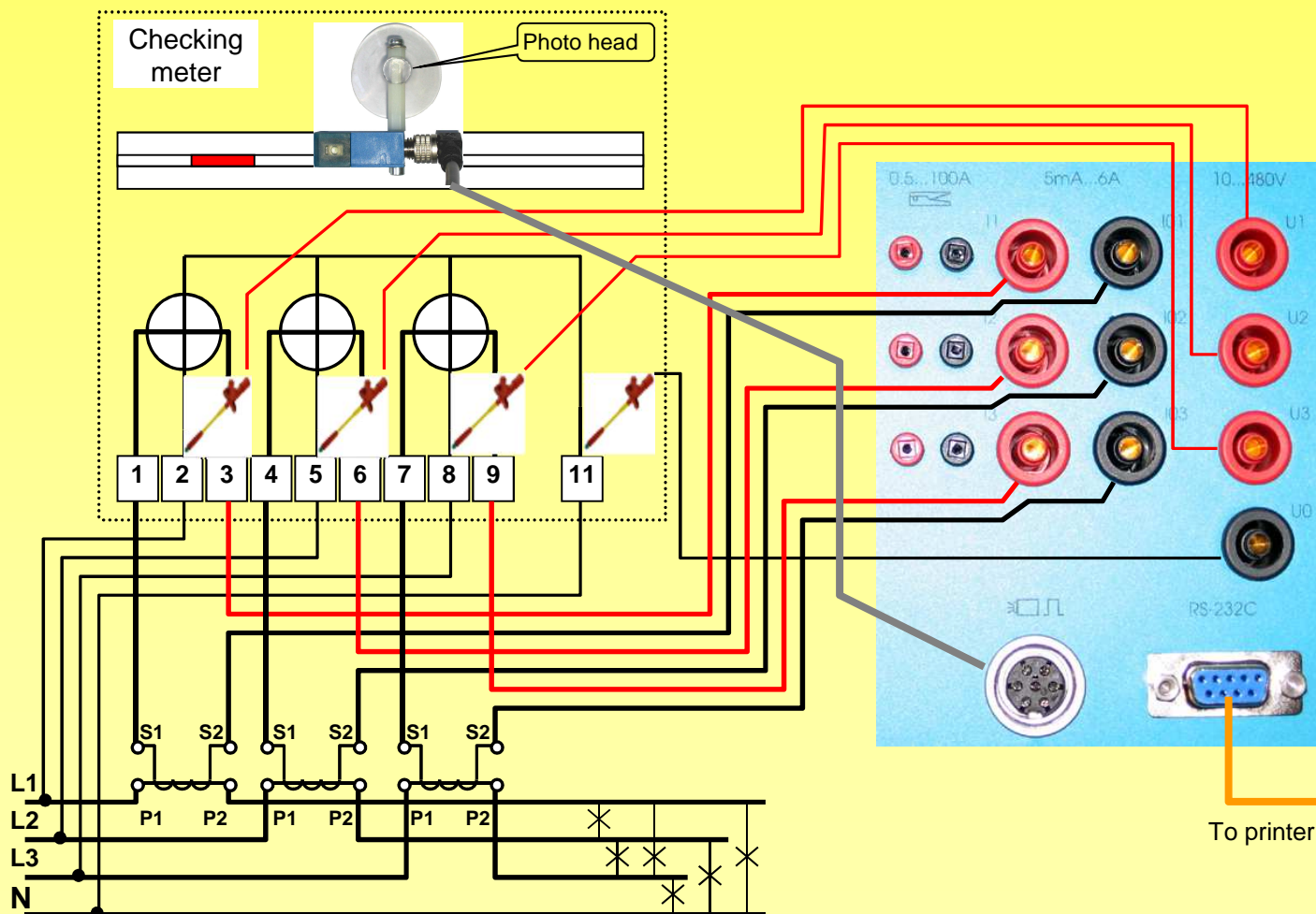
# CHECKING THE ERROR OF THE THREE PHASE METER WITH USING ANALYSER Calport 100A

*Connecting of the Analyser Calport 100A to three phase meter directly connected*



# CHECKING THE ERROR OF THE THREE PHASE METER WITH USING ANALYSER Calport 100A

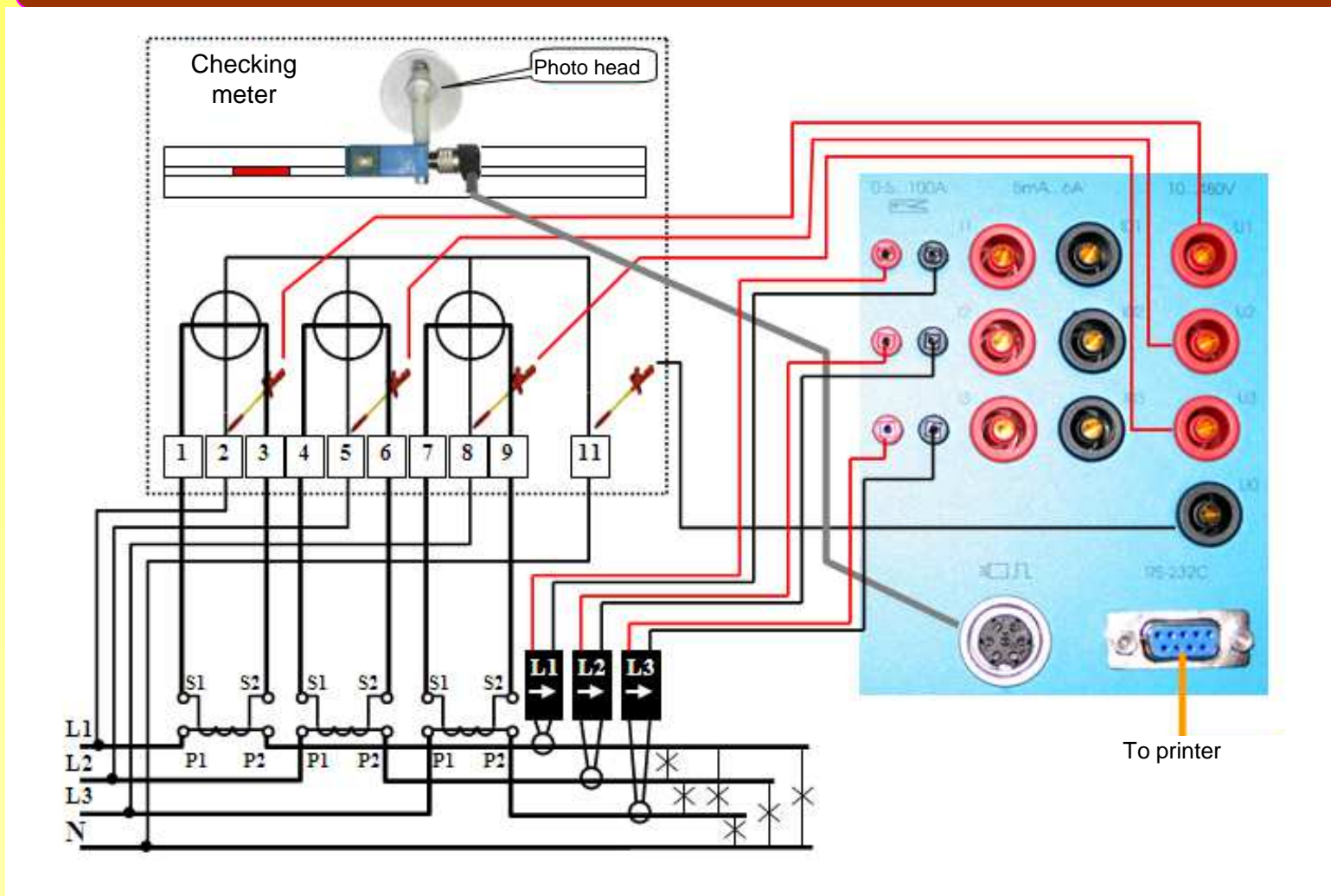
*Connecting of the Analyser Calport 100A to three phase meter connected with CT*



## MEASUREMENT OF THE ERROR OF METER CONNECTED WITH CT AND TRANSFORMER WITH USING ANALYSER Calport 100A

$(\text{meter and transformer error}) = (\text{meter error}) + (\text{transformer error})$

$(\text{transformer error}) = (\text{meter and transformer error}) - (\text{meter error})$

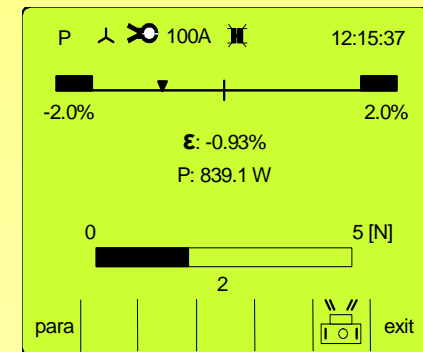
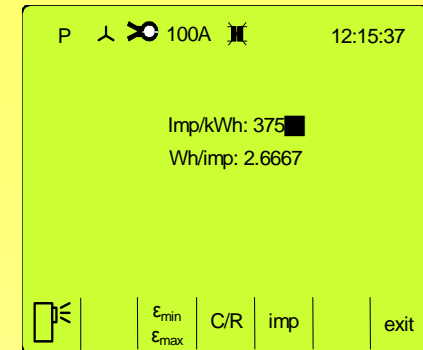


# MEASUREMENT OF THE ERROR OF METER CONNECTED WITH CT AND TRANSFORMER WITH USING ANALYSER Calport 100A

## Measurement of the error of meter and transformer ratio

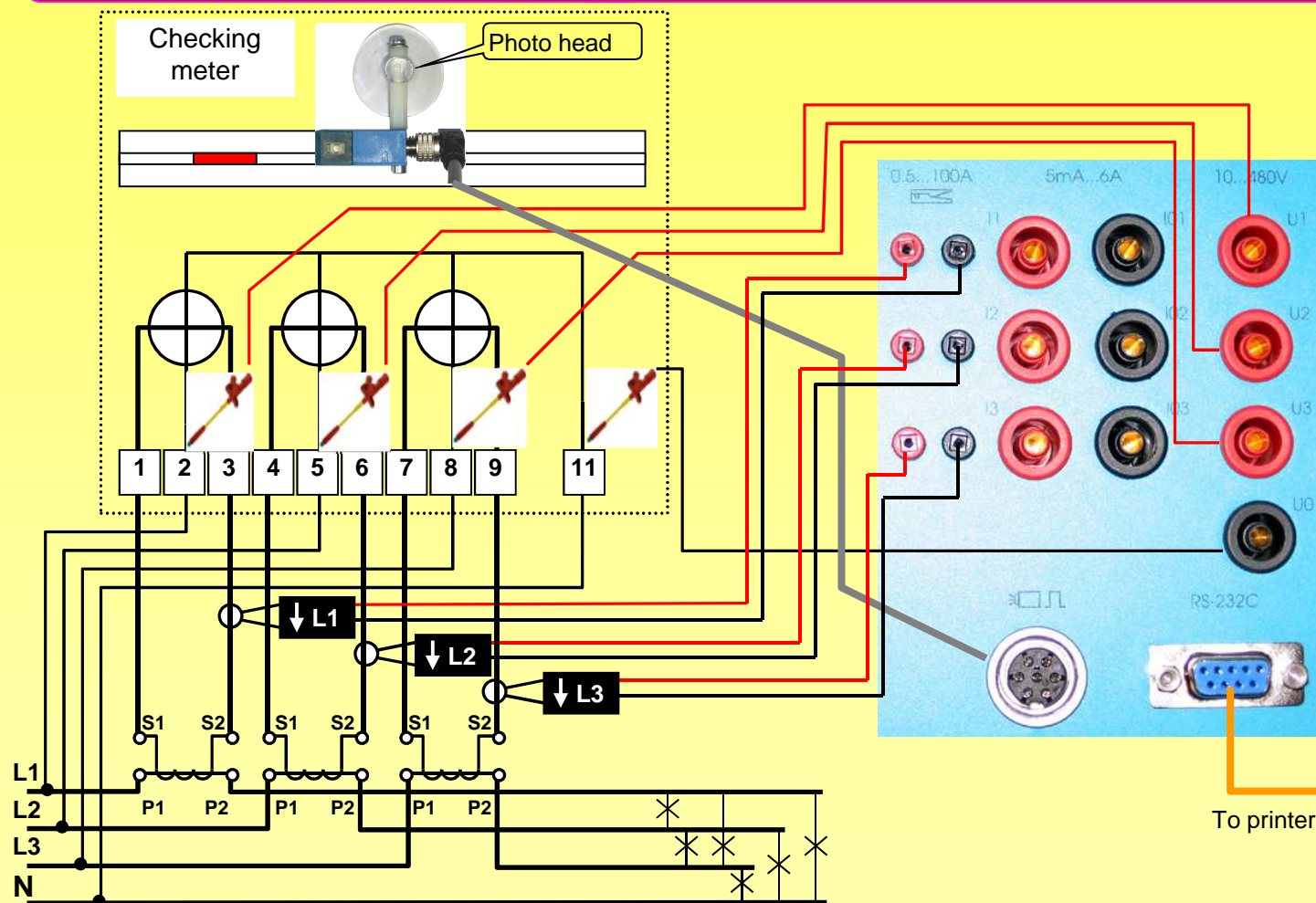
Connecting of the Analyser Calport 100A to the three phase meter connected with CT:

- CT100A current clamps are connected on the primary side for monitoring all measuring system together with a ratio of the current transformer,
- the current transformer has a ratio with nominal value  $K=100A/5A$ ,
- the meter has the impulse constant  $CL=4000imp/kWh$  – in this constant is not taken into account a ratio of the transformer,
- in menu we are choosing the function of measurement by clamps 100A – the sign  $\otimes 100A$ ,
- in menu we are choosing the function of lack of the ratio – the sign  $\parallel$ ,
- we are entering the impulse constant  $C = CL / K = 4000 / (100/5) = 200$ ,
- we are entering the number of impulses or the time of error measure, for example  $T=20s$ ,
- after pressing the key "exit" Calport shows the error of meter and transformer.



# MEASUREMENT OF THE ERROR OF METER CONNECTED WITH CT WITH USING ANALYSER Calport 100A

(meter and transformer error) = (meter error) + (transformer error)  
(transformer error) = (meter and transformer error) – (meter error)



# MEASUREMENT OF THE ERROR OF METER CONNECTED WITH CT WITH USING ANALYSER Calport 100A

## Measurement of the error of meter

**Connecting of the Analyser Calport 100A to the three phase meter connected with CT:**

- **CT100A current clamps are connected on the secondary side for monitoring the measuring system of meter connected with CT,**
- **the current transformer has a ratio with nominal value  $K=100A/5A$ ,**
- **the meter has the impulse constant  $CL=4000imp/kWh$  – in this constant is not taken into account a ratio of the transformer,**
- **in menu we are choosing the function of measurement by clamps 100A – the sign  $\text{⌂}$ 100A,**
- **in menu we are choosing the function of lack of the ratio – the sign  $\text{⌂}$ ,**
- **we are entering the impulse constant  $C = CL = 4000$  ,**
- **we are entering the number of impulses or the time of error measure, for example  $T=20s$ ,**
- **after pressing the key "exit" Calport shows the error of meter.**

### WHY THIS MEASURE IS VERY IMPORTANT?

Because only in this case we can identify the wrong energy counting caused by wrong connection of the meter with transformer.

Because, a good meter and a good transformer can wrongly count an energy if they are connected in a wrong way.

Because the separate checking of the meter and separate checking of the transformer does not find this defect.

