How to check an electricity meter using the Calmet C300B Calibrator

Calmet
Calibration

01
Application note

This Application manual describes the step-by-step method of electricity meter checking. The Calmet C300B Calibrator and the *Test System* function of the Calpro C300 software allows us to perform the following checks:

- error check,
- counting check,
- counter test.

The system for one-phase electricity meter testing consists of the following hardware:

- the C300B calibrator
- the photo head,
- the single position rack,
- wires,
- a PC or laptop.

We can see an example of such a system in Fig.1

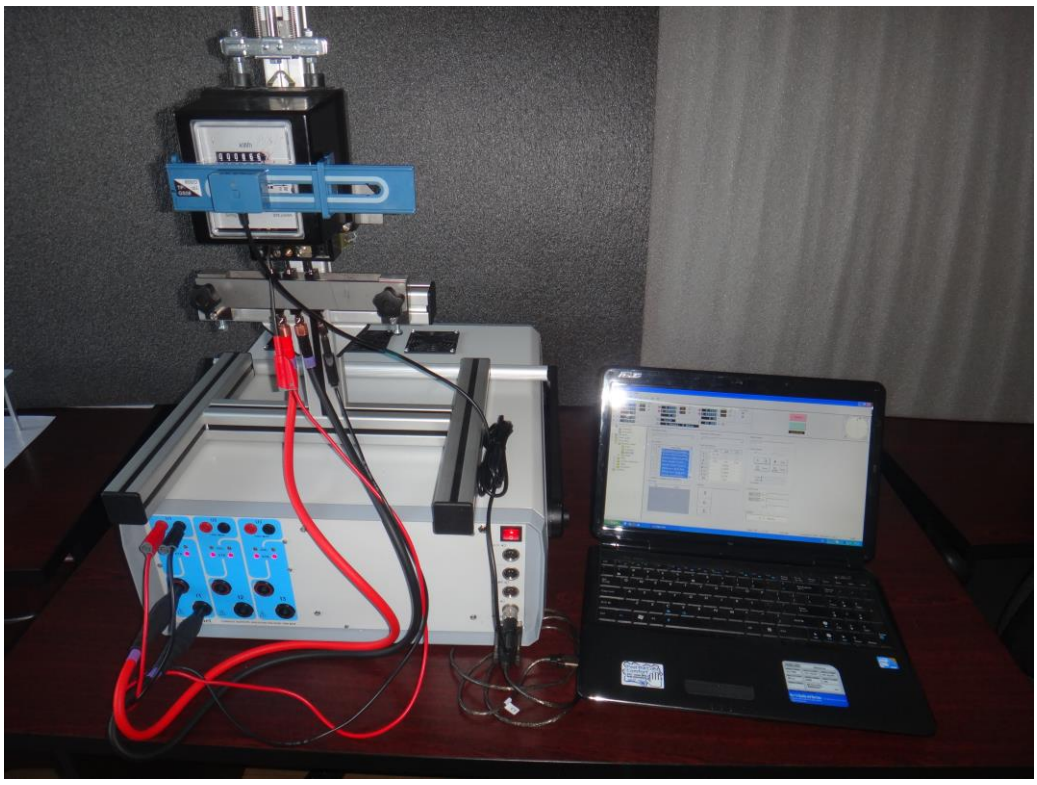


Fig.1. The system for one-phase electricity meter checking

To build the test system perform the following steps:

- connect the U input of the electricity meter to the U1 voltage output of the C300B calibrator,
- connect the I input of the electricity meter to the I1 current output of the C300B calibrator,
- connect the photo head to the input of the C300B calibrator, marked as ⎍ ⟲,
- connect the computer to the RS232 input of the C300B calibrator,

The complete system is presented in Fig.2

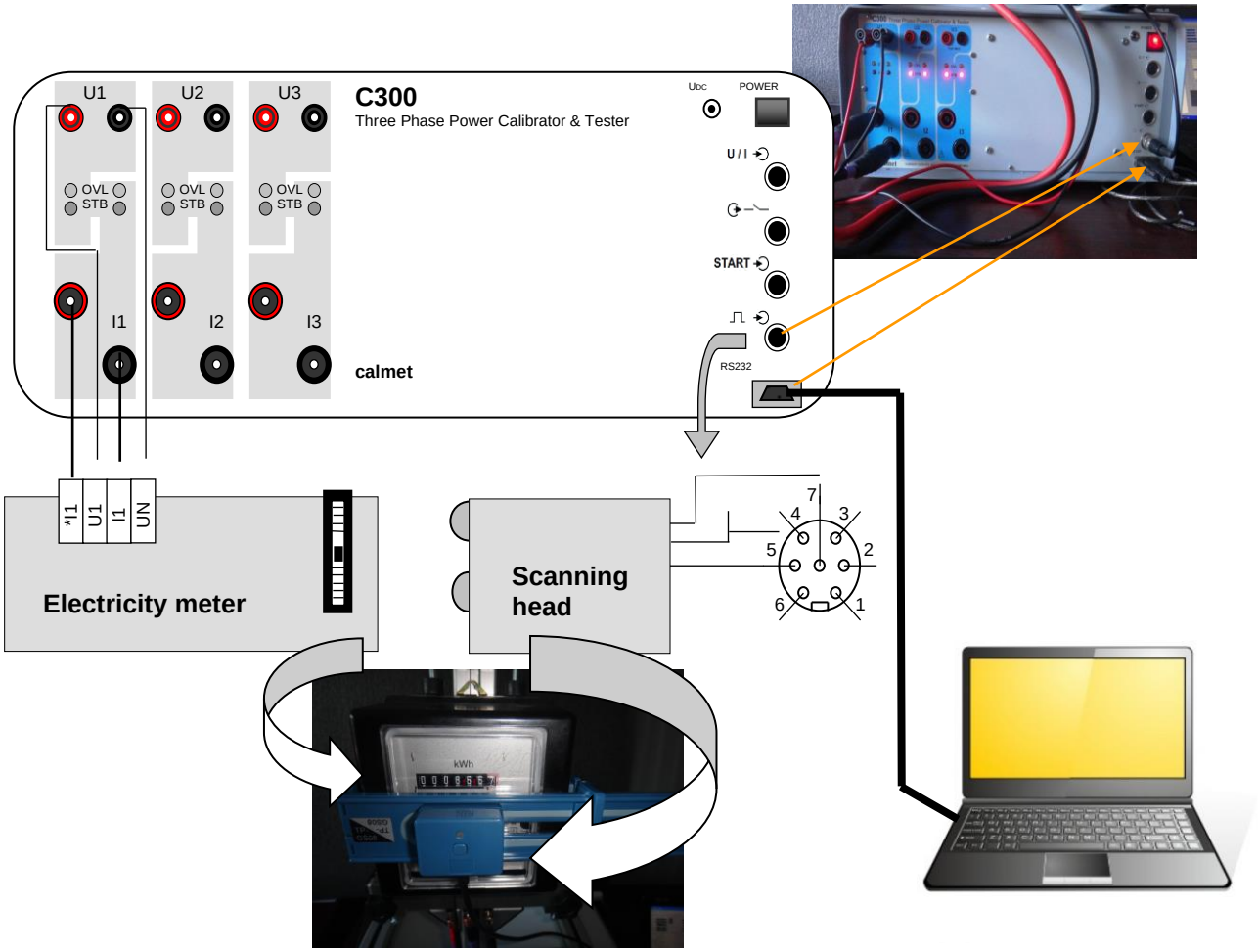


Fig.2. An overview of the connections in the system for one-phase electricity meter checking

To check if the system works correctly, perform the following test:

- run the Calpro C300 software described in *Calpro300 Basic user manual,*
- set up the connection between the C300B Calibrator and the computer as described in *Calpro300 Basic user manual*,
- set up the nominal value for the electricity meter current and voltage and press the *Operate* button as in Fig.3,

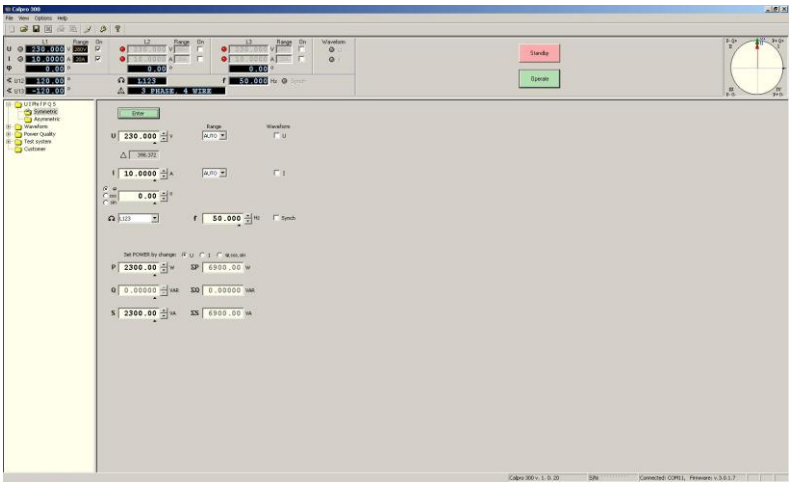


Fig.3 Main window of *Calpro 300* PC Soft

- if the voltage and current circuits have been connected correctly, the disc of the electricity meter will rotate,
- press the button on the photo head to switch it on, see fig.2,
- if the photo head is set up correctly, the red LED (see fig. 2) will blink according to the rotating black spot on the electricity meter's disc. Otherwise, reposition the photo head until the red LED begins blinking,
- the system for electricity meter testing is ready to work.

To begin the electricity meter checking process, enter the basic information about the device and prepare the testing procedure. To do so, open the folders *Type* and *Procedure*, which are located in the folder *Electricity Meter* in the *Functional field* (see Fig. 4).

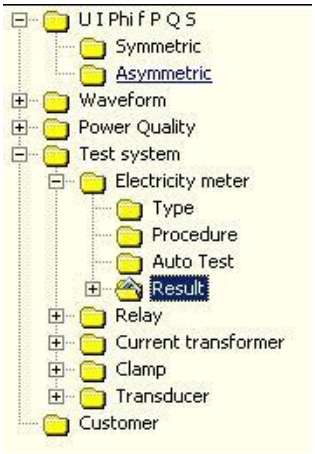


Fig.4. View of the Function field

Fig. 5 illustrates how to set the "Type" of electricity meter - enter information about the input parameters, accuracy class, meter constant, and the type of connection into the relevant fields.

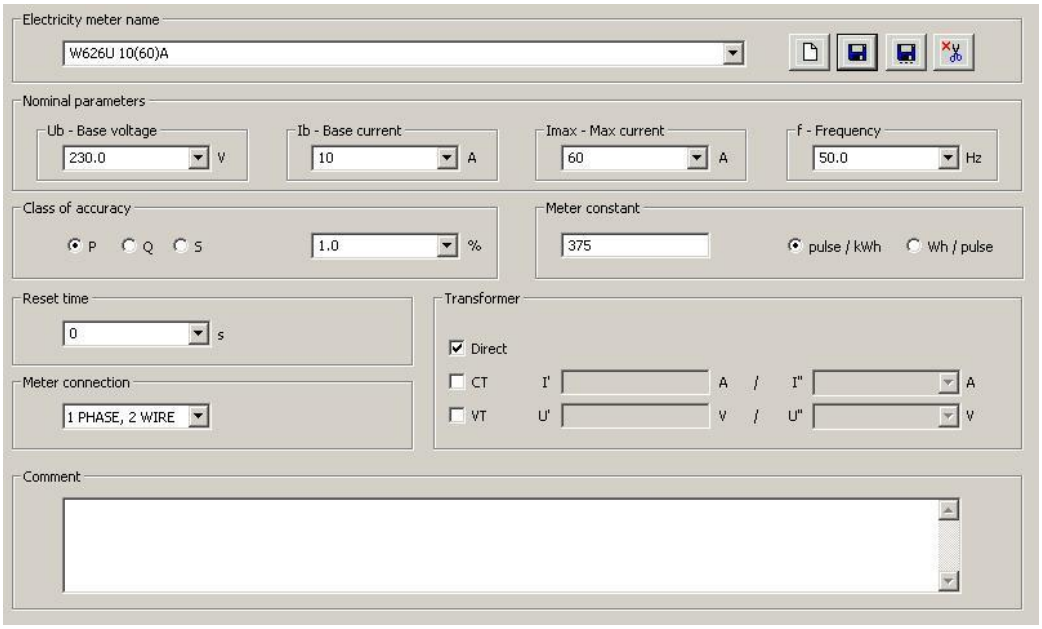
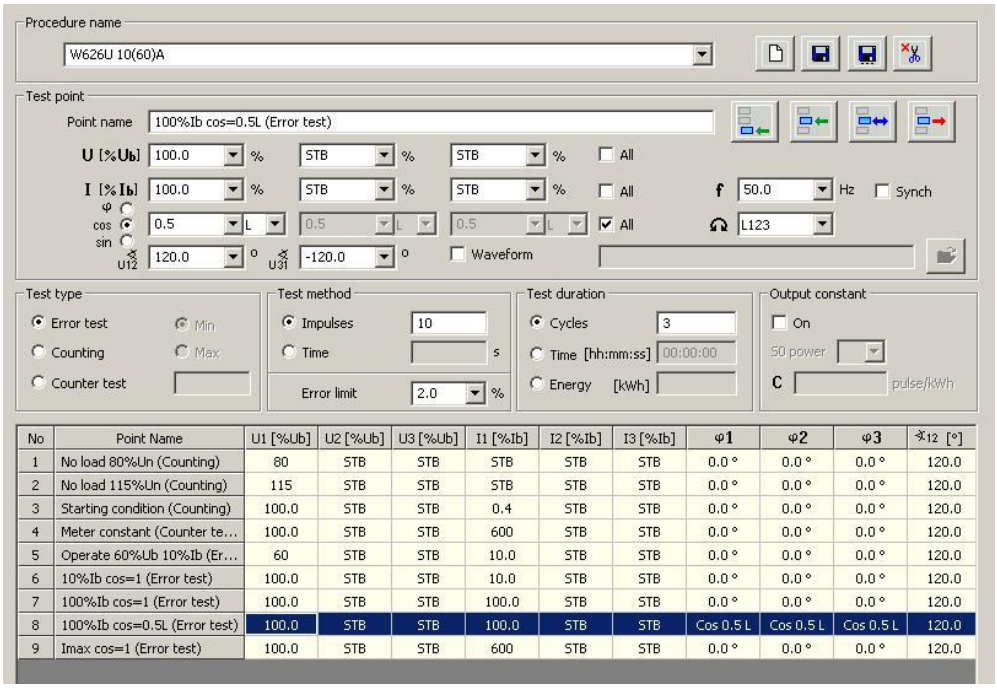


Fig.5 View of the Type window

The next step is to define the “Procedure” of testing by setting points of input parameters which will be used to test the electricity meter. The example of setting for one point is presented in Fig.6. Rules on filling out the fields are described in *Calpro300 TS user manual*



No	Point Name	U1 [%Ub]	U2 [%Ub]	U3 [%Ub]	I1 [%Ib]	I2 [%Ib]	I3 [%Ib]	φ1	φ2	φ3	∢12 [°]
1	No load 80%Un (Counting)	80	STB	STB	STB	STB	STB	0.0 °	0.0 °	0.0 °	120.0
2	No load 115%Un (Counting)	115	STB	STB	STB	STB	STB	0.0 °	0.0 °	0.0 °	120.0
3	Starting condition (Counting)	100.0	STB	STB	0.4	STB	STB	0.0 °	0.0 °	0.0 °	120.0
4	Meter constant (Counter te...	100.0	STB	STB	600	STB	STB	0.0 °	0.0 °	0.0 °	120.0
5	Operate 60%Ub 10%Ib (Er...	60	STB	STB	10.0	STB	STB	0.0 °	0.0 °	0.0 °	120.0
6	10%Ib cos=1 (Error test)	100.0	STB	STB	10.0	STB	STB	0.0 °	0.0 °	0.0 °	120.0
7	100%Ib cos=1 (Error test)	100.0	STB	STB	100.0	STB	STB	0.0 °	0.0 °	0.0 °	120.0
8	100%Ib cos=0.5L (Error test)	100.0	STB	STB	100.0	STB	STB	Cos 0.5 L	Cos 0.5 L	Cos 0.5 L	120.0
9	Imax cos=1 (Error test)	100.0	STB	STB	600	STB	STB	0.0 °	0.0 °	0.0 °	120.0

Fig.6 View of the Procedure window

After setting the type of electricity meter and the points of testing in the procedure, it is possible to run Auto Test as presented in Fig.7. Select the type of meter from the "Electricity meter name" field and the desired procedure from the "Procedure name" Next, select all the valid test points from the ones defined in the Procedure from the "Test points" field. As a result, we get ratio error (ε).

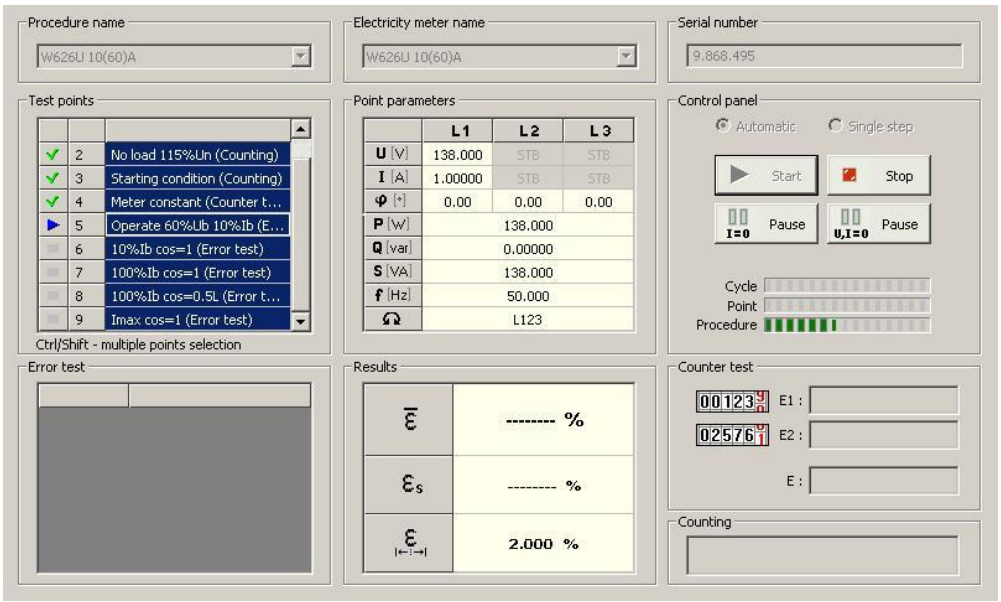


Fig.7 View of the Auto test window

The results of the electricity meter testing are presented in the form of a table and/or diagram. An example of the results being presented in table and diagram form can be seen in Fig.8

Error test | Counting | Counter test

No	Date	Time	U1 [V]	I1 [A]	f [Hz]	Phi1	⚠	Limit [%]	ε [%]	εs [%]	OK
1	2013-03-19	14:25:07	138.000	1.00000	50.000	0.00 °		2.000	1.557	0.025	✔
2	2013-03-19	14:46:07	138.000	1.00000	50.000	0.00 °		2.000	1.670	0.000	✔
3	2013-03-19	14:49:41	230.000	1.00000	50.000	0.00 °		2.000	0.567	0.000	✔
4	2013-03-19	14:51:46	230.000	10.0000	50.000	0.00 °		2.000	0.383	0.000	✔
5	2013-03-19	14:52:09	230.000	10.0000	50.000	Cos 0.50 L		2.000	0.718	0.000	✔
6	2013-03-19	14:53:46	230.000	60.000	50.000	0.00 °		2.000	-0.735	0.000	✔

Error test | Counting | Counter test

No	Point name	Date	Time	U1 [V]	I1 [A]	f [Hz]	Phi1	N	Limit N	OK
1	No load 80%Un (Counting)	2013-03-19	13:18:10	184.000	0.000000	50.000	0.00 °	0	1 (Max)	✔
2	No load 115%Un (Counting)	2013-03-19	13:28:23	264.500	0.000000	50.000	0.00 °	0	1 (Max)	✔
3	Starting condition (Counting)	2013-03-19	14:59:36	230.000	0.040000	50.000	0.00 °	2	2 (Min)	✔

Error test | Counting | Counter test

No	Point name	Date	Time	U1 [V]	I1 [A]	f [Hz]	Phi1	E1	E2	E	Limit [%]	ε [%]	OK
1	Meter constant (Counter test)	2013-03-19	14:08:48	230.000	60.000	50.000	0.00 °	865.2000 kWh	866.2000 kWh	1.001577 kWh	2.000	-0.159	✔

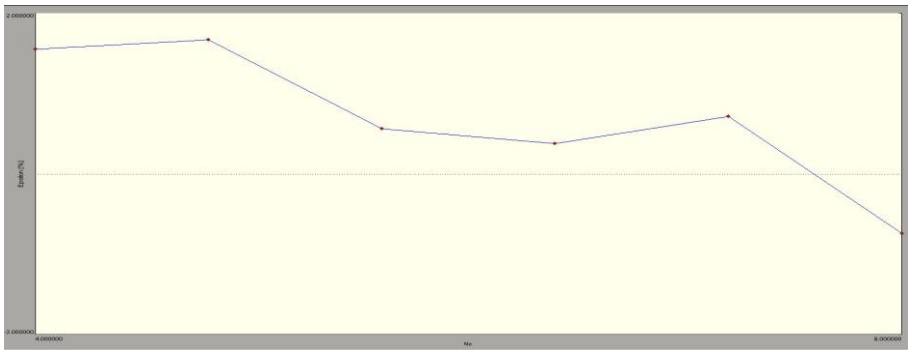


Fig.8 Examples of presented results

The results can be printed out according to printer parameters settings as seen in Fig.9.

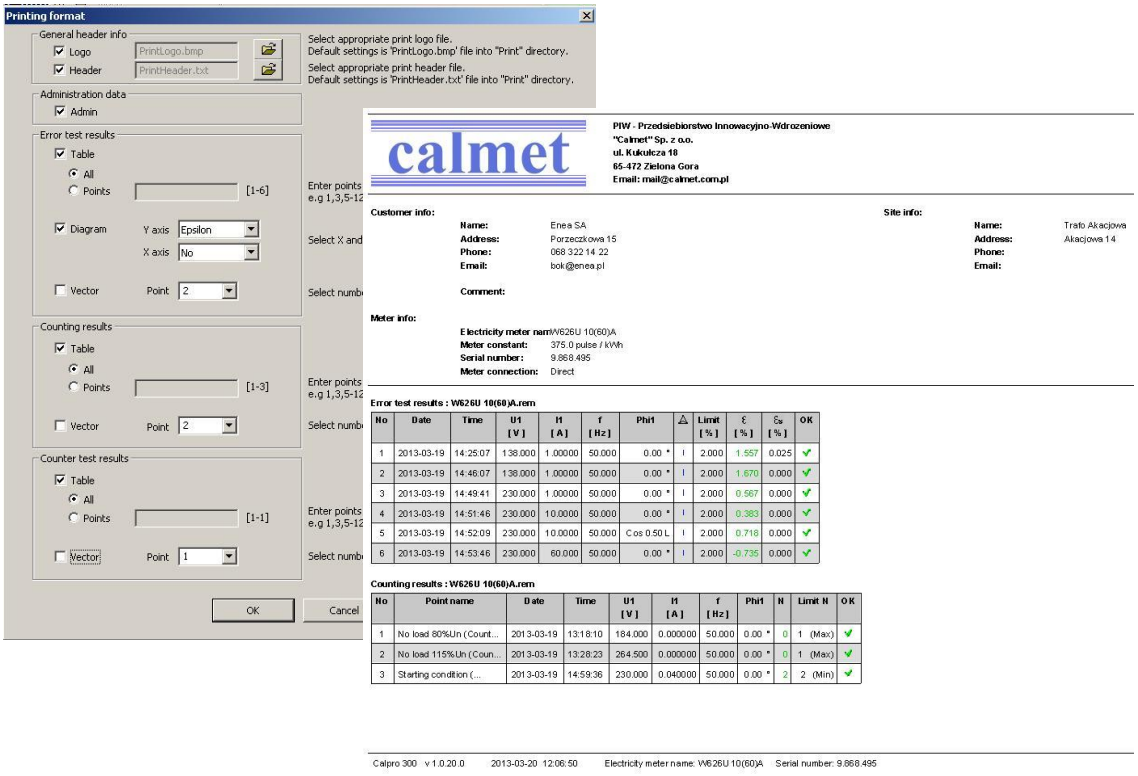


Fig.9 View of the Printing format window and an example printout