

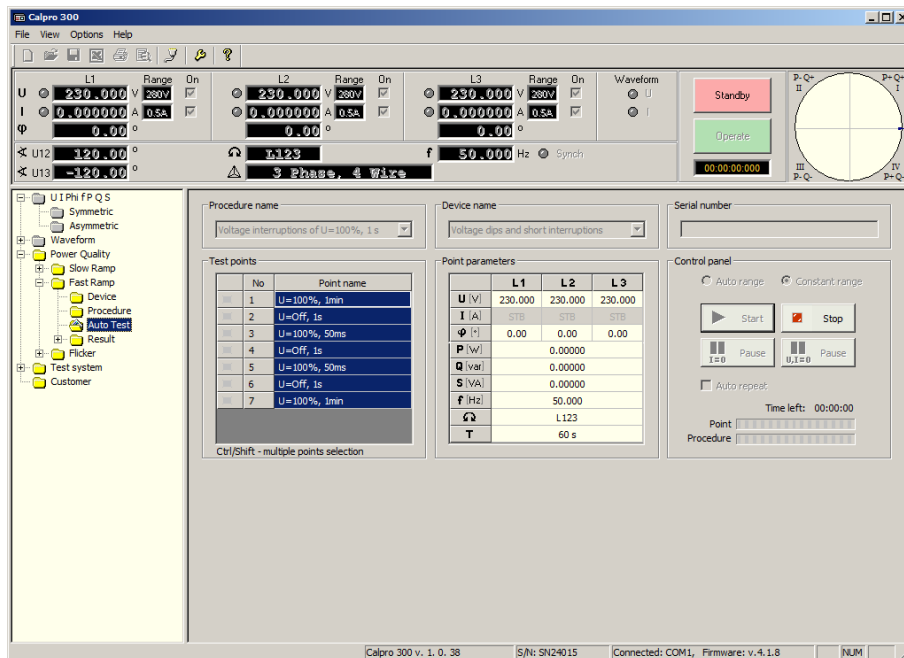
# The Calmet C300 Voltage Dips & Interruptions generation according to the IEC62052-11

## Application note no 13

The C300 Calibrator with the Calpro300 PQ PC Program can be used to generate voltage dips and short interruptions according to IEC/EN-62052-11. The Calpro300 PQ PC Program has the Fast Ramp function for that purpose.

Application note presents the following tests of a Device Under Test (DUT):

- Voltage interruptions of  $\Delta U = 100\%$ , 1s (chapter 1),
- Voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency (chapter 2),
- Voltage dips of  $\Delta U = 50\%$  (chapter 3).



To test the DUT the user have to:

- create a *Device* file with parameters of the DUT (chapter 1.1),
- create a *Procedure* file with procedure test points (chapter 1.2),
- perform an automatic test (chapter 1.3),
- edit and save to a file test parameters (chapter 1.4).

Example of realization of a *voltage interruptions of  $\Delta U = 100\%$ , 1s* is presented in chapter 1.5.

### 1.1. Device FUNCTION

Configuration of the *Device* file for the DUT is presented in Fig.1.1 and consists of:

- nominal voltage  $U = 230V$  value of a power supply of the DUT,
- nominal frequency  $f = 50Hz$  value of a power supply of the DUT,

To create a *Type* file (Fig.1.1) the user have to:

- a) press the *Device* of the *Power Quality / Fast Ramp* function (pos.1) and specify the DUT name (pos.2),
- b) set the nominal parameters of the DUT (pos.3) and *Comment* of the *Device* file (pos.4),
- c) save the *Device* file (pos.5).

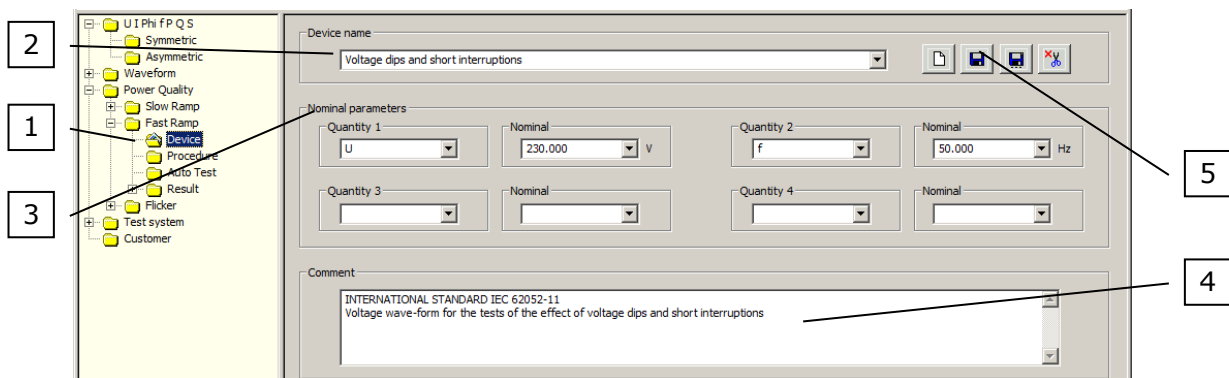


Fig.1.1. Configuration of a *device* function for *voltage dips and short interruption* tests

### 1.2. Procedure FUNCTION

Configuration of the procedure for a *voltage interruptions of  $\Delta U = 100\%$ , 1s* test is presented in Fig.1.2. This procedure contains from 7 points:

- $U=100\%$ , 1min,
- $U=Off$ , 1s,
- $U=100\%$ , 50ms,
- $U=Off$ , 1s,
- $U=100\%$ , 50ms,
- $U=Off$ , 1s,
- $U=100\%$ , 1min.

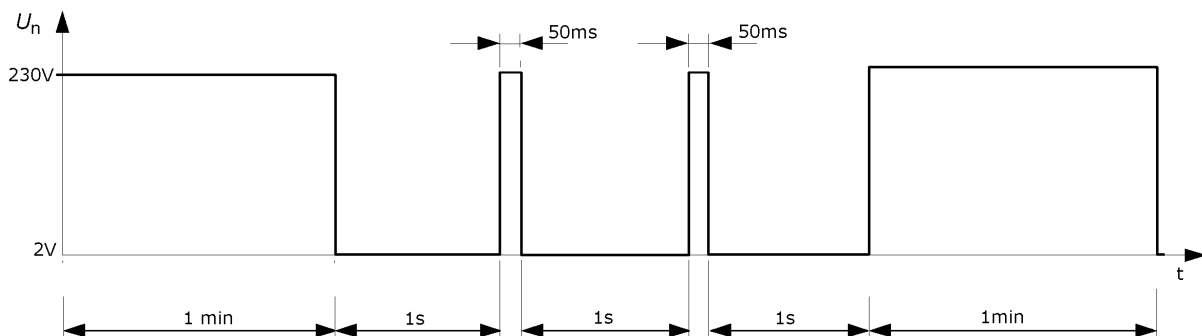


Fig.1.2. Voltage interruptions of  $\Delta U = 100\%$ , 1s

To create a *Procedure* file (Fig.1.3) the user have to:

- press the *Procedure* of the *Power Quality / Fast Ramp* function (pos.1) and specify the *Procedure name* (pos.2),
- set the *Test point's* parameters (pos.3):
  - point name to U=100%, 1min,
  - voltage U to 230V,
  - frequency f to 50Hz,
  - current I to STB (currents off),
  - phase angle  $\phi$  to  $0^\circ$ ,
  - angle between voltages  $\angle U_{12}$  to  $120^\circ$  and  $\angle U_{31}$  to  $-120^\circ$ ,
  - rotation to L123,
- set the *Change setting's Duration* time (pos.4) to 60 s (seconds),
  - $U_P=230V$  (nominal power supply of the DUT),
- add configured point to the procedure (pos.5),
- repeat points from b) to d) to add rest of test points (according to Fig.1.2) – change will be required only in:
  - point name,
  - voltage U: 230V for U=100% and 2V for U=Off,
  - Duration* time,
- save the procedure file (pos.6).

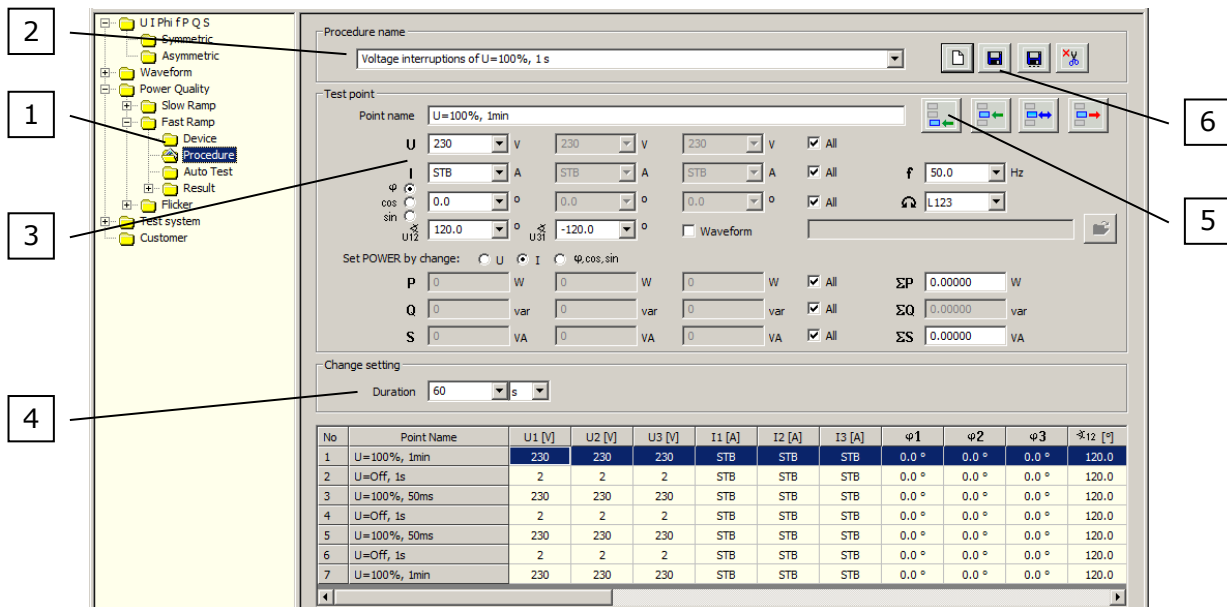


Fig.1.3. Configuration of a *Procedure* function for *voltage interruptions of  $\Delta U = 100\%$ , 1s* test

### 1.3. Autotest FUNCTION

In Fig.1.4, 1.5 and 1.6 are presented *Autotest* function with selected procedure points, procedure in progress and finished procedure.

To perform a test the user have to:

- press the *Autotest* of the *Power Quality / Fast Ramp* function (pos.1 Fig.1.4),
- choose a correct *Procedure name* (pos.2 Fig.1.4) and *Device name* (pos.3 Fig.1.4),
- select all *Test points* (pos.4 Fig.1.4) and press the *Start* button (pos.5 Fig.1.4).
- wait until procedure is not finished (Fig.1.6).

When the procedure is in progress the user can abort a procedure (in any time) by the *Stop* button (pos.1 Fig.1.5).

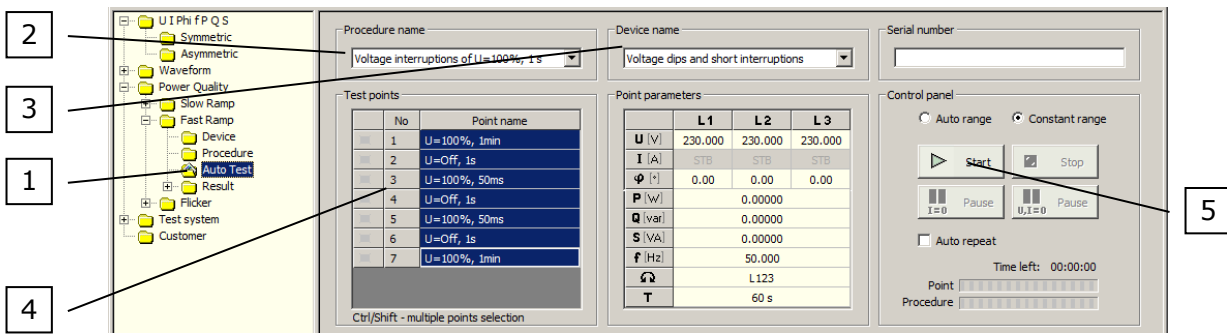


Fig.1.4. Autotest function with selected procedure points

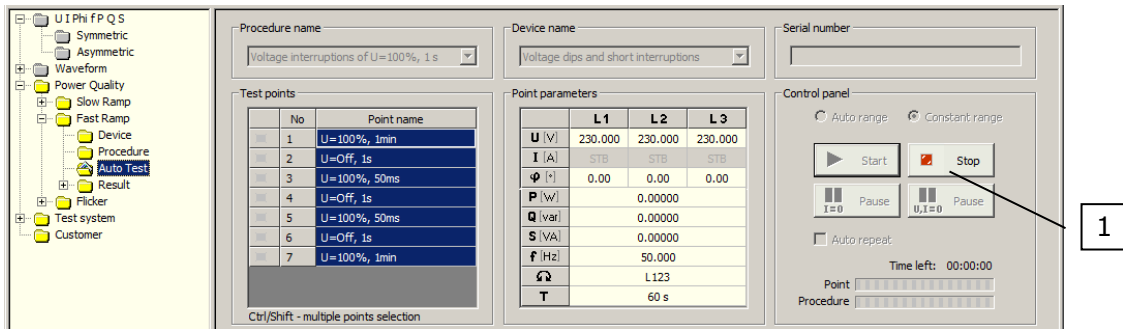


Fig.1.5. Autotest function with procedure in progress

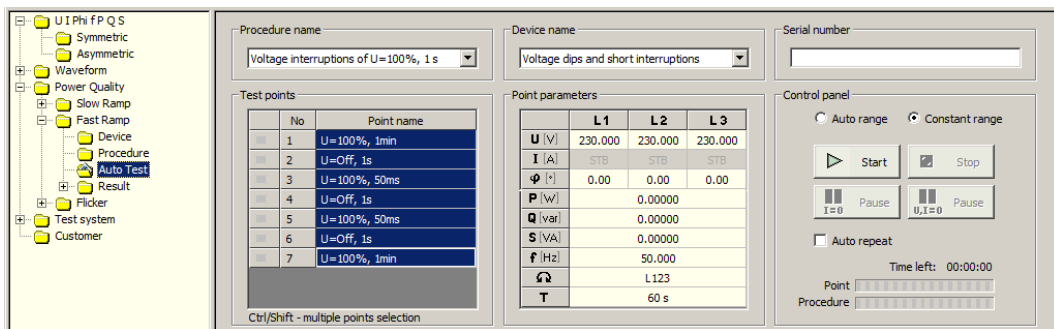


Fig.1.6. Autotest function with finished procedure

#### 1.4. Result FUNCTION

To view a table with parameters of measurement points (Fig.1.7) the user have to press the *Table* of the *Power Quality / Fast Ramp / Result* function (pos.1). After that the user can save to the file (pos.2), print (pos.3) or export to the *MS Excel* test parameters (pos.4).

The *Result* table consists of parameters of measurement points and all information about settings (pos.5), including: point name, date, time, all parameters of the Calibrator and Duration.

To export data to *MS Excel* program the user have to press the *Export to Excel* button (pos.4 Fig.1.7). After that appear *Export to Excel* window (pos.1 Fig.1.8) with fields to set the parameters of a data to export (pos.2 Fig.1.8). When the user confirm changes by the *OK* button (pos.3 Fig.1.8) then a *MS Excel* program run with exported test parameters (Fig.1.9).

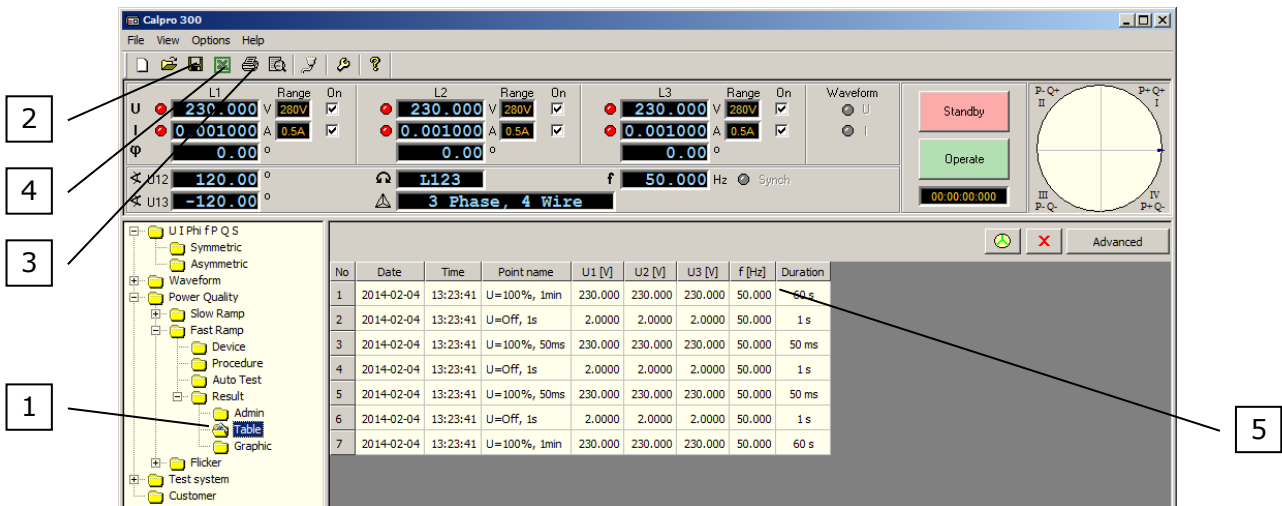


Fig.1.7. Table function with parameters of measurement points

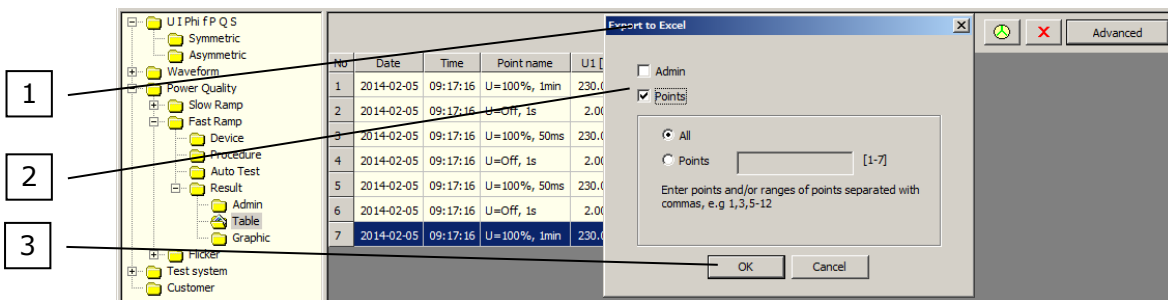


Fig.1.8. Table function with *Export to Excel* window

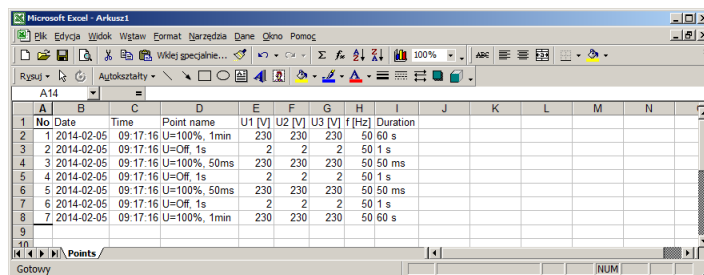


Fig.1.9. MS Excel program with exported parameters of measurement points

1.5. Example of realization of a voltage interruptions of  $\Delta U = 100\%$ , 1s.

Example (Fig.1.10) shows realization of a *voltage interruptions of  $\Delta U = 100\%$ , 1s* with C300 calibrator. Interruptions are recorded by Caltest 300 Analyser connected to the voltage output U1 of C300 calibrator.

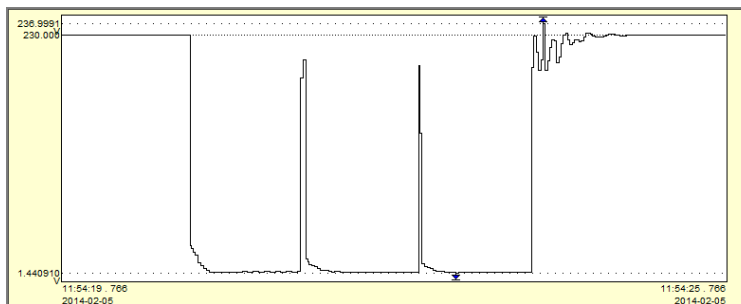


Fig.1.10. Realization of a *voltage interruptions of  $\Delta U = 100\%$ , 1s* with C300 calibrator

To test the DUT the user have to:

- create a *Device* file with parameters of the DUT (chapter 2.1),
- create a *Procedure* file with procedure test points (chapter 2.2),
- perform an automatic test (chapter 2.3),
- edit and save to a file test parameters (chapter 2.4).

Example of realization of a *voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency* is presented in chapter 2.5.

2.1. Device FUNCTION

Configuration of the *Device* file for the DUT is presented in Fig.2.1 and consists of:

- nominal voltage  $U = 230V$  value of a power supply of the DUT,
- nominal frequency  $f = 50Hz$  value of a power supply of the DUT,

To create a *Type* file (Fig.2.1) the user have to:

- press the *Device* of the *Power Quality / Fast Ramp* function (pos.1) and specify the DUT name (pos.2),
- set the nominal parameters of the DUT (pos.3) and *Comment* of the *Device* file (pos.4),
- save the *Device* file (pos.5).

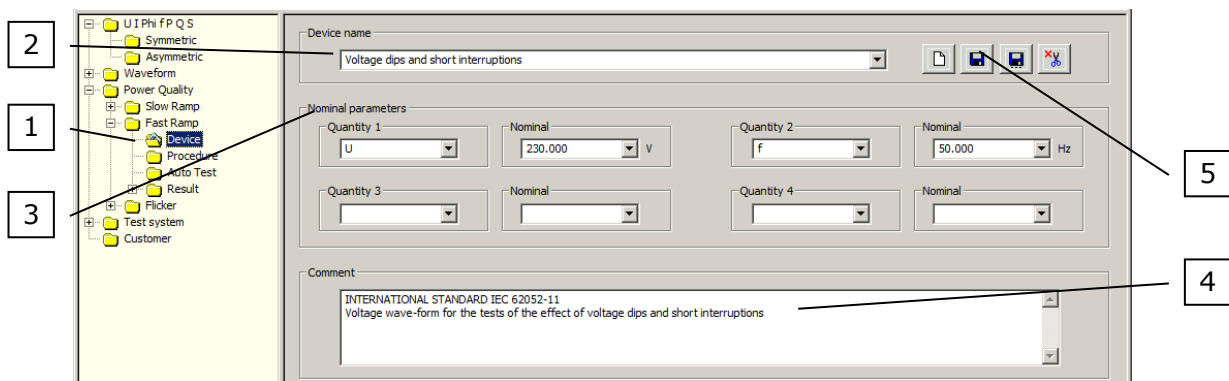


Fig.2.1. Configuration of a *device* function for *voltage dips and short interruption* tests

2.2. Procedure FUNCTION

Configuration of the procedure for a *voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency* test is presented in Fig.2.2. This procedure contains from 3 points:

- $U=100\%$ , 1min,
- $U=Off$ , 40ms (two cycles),
- $U=100\%$ , 1min.

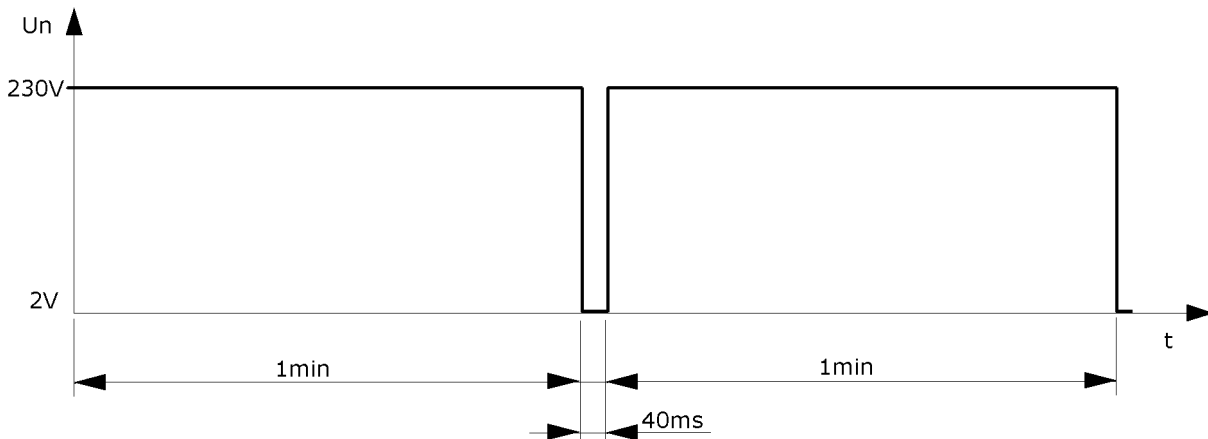


Fig.2.2. *Voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency*

To create a *Procedure* file (Fig.2.3) the user have to:

- press the *Procedure* of the *Power Quality / Fast Ramp* function (pos.1) and specify the *Procedure name* (pos.2),
- set the *Test point's* parameters (pos.3):
  - point name to U=100%, 1min,
  - voltage U to 230V,
  - frequency f to 50Hz,
  - current I to STB (currents off),
  - phase angle  $\varphi$  to  $0^\circ$ ,
  - angle between voltages  $\angle U_{12}$  to  $120^\circ$  and  $\angle U_{31}$  to  $-120^\circ$ ,
  - rotation to L123,
- set the *Change setting's Duration* time (pos.4) to 60 s (seconds),
  - $U_P=230V$  (nominal power supply of the DUT),
- add configured point to the procedure (pos.5),
- repeat points from b) to d) to add rest of test points (according to Fig.2.2) – change will be required only in:
  - point name,
  - voltage U: 230V for U=100% and 2V for U=Off,
  - Duration* time,
- save the procedure file (pos.6).

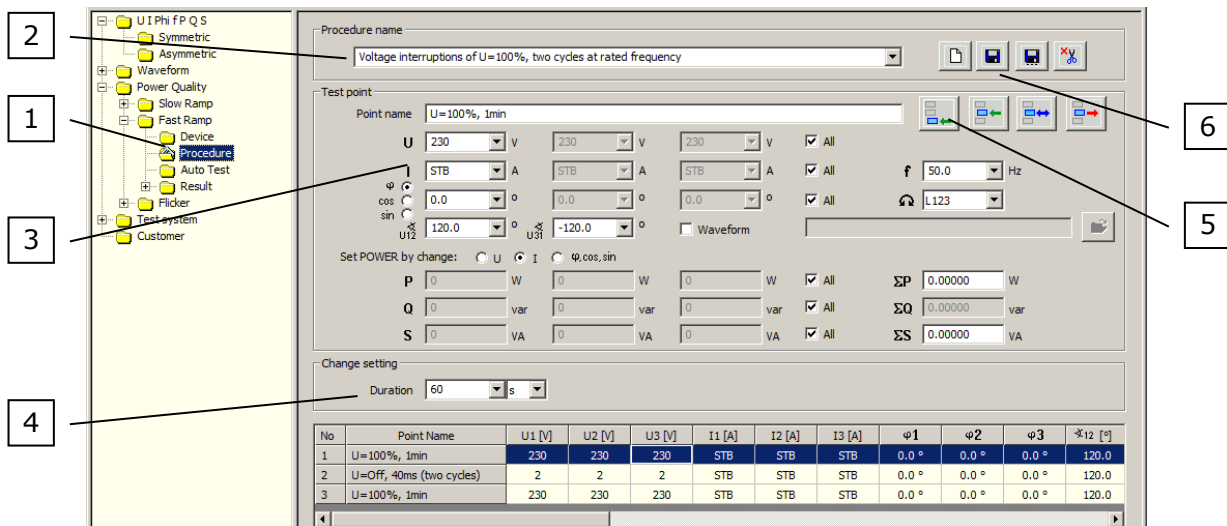


Fig.2.3. Configuration of a voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency test

### 2.3. Autotest FUNCTION

In Fig.2.4, 2.5 and 2.6 are presented *Autotest* function with selected procedure points, procedure in progress and finished procedure.

To perform a test the user have to:

- press the *Autotest* of the *Power Quality / Fast Ramp* function (pos.1 Fig.2.4),
- choose a correct *Procedure name* (pos.2 Fig.2.4) and *Device name* (pos.3 Fig.2.4),
- select all *Test points* (pos.4 Fig.2.4) and press the *Start* button (pos.5 Fig.2.4).
- wait until procedure is not finished (Fig.2.6).

When the procedure is in progress the user can abort a procedure (in any time) by the *Stop* button (pos.1 Fig.2.5).

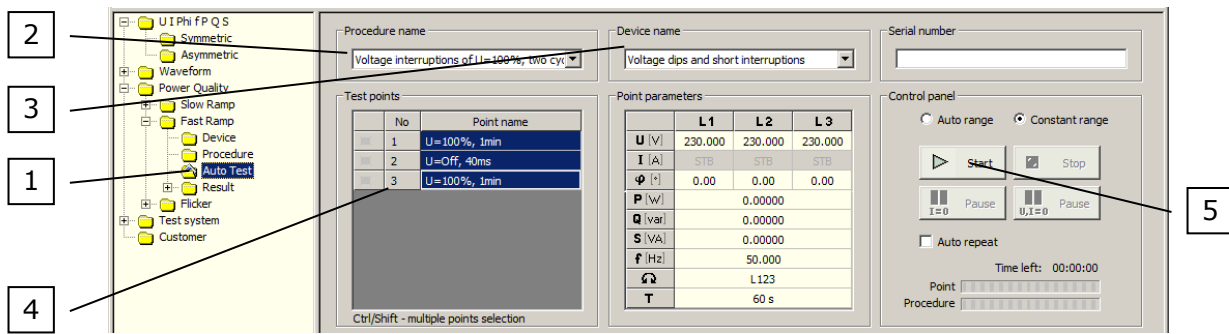


Fig.2.4. Autotest function with selected procedure points

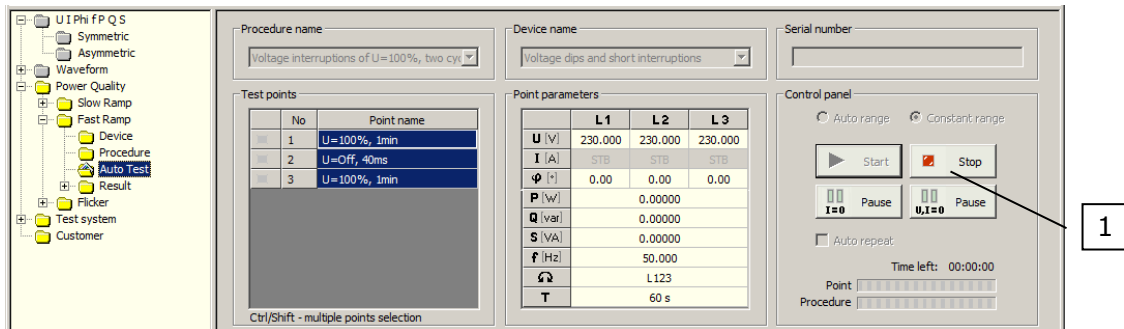


Fig.2.5. Autotest function with procedure in progress

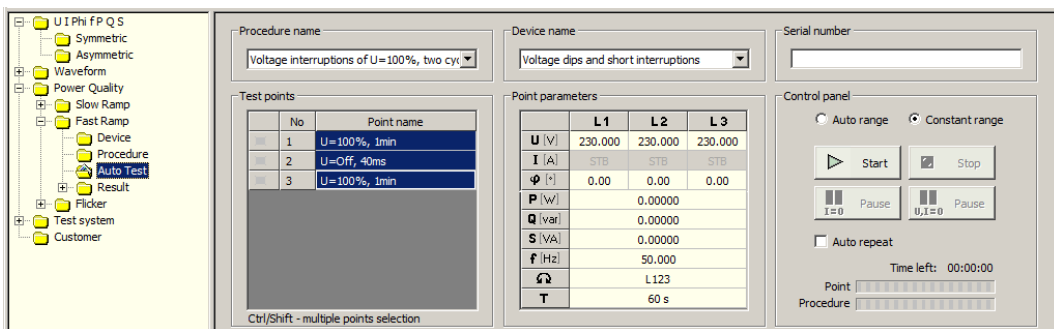


Fig.2.6. Autotest function with finished procedure

## 2.4. Result FUNCTION

To view a table with parameters of measurement points (Fig.2.7) the user have to press the *Table* of the *Power Quality / Fast Ramp / Result* function (pos.1). After that the user can save to the file (pos.2), print (pos.3) or export to the *MS Excel* test parameters (pos.4).

The *Result* table consists of parameters of measurement points and all information about settings (pos.5), including: point name, date, time, all parameters of the Calibrator and Duration.

To export data to *MS Excel* program the user have to press the *Export to Excel* button (pos.4 Fig.2.7). After that appear *Export to Excel* window (pos.1 Fig.2.8) with fields to set the parameters of a data to export (pos.2 Fig.2.8). When the user confirm changes by the *OK* button (pos.3 Fig.2.8) then a *MS Excel* program run with exported test parameters (Fig.2.9).



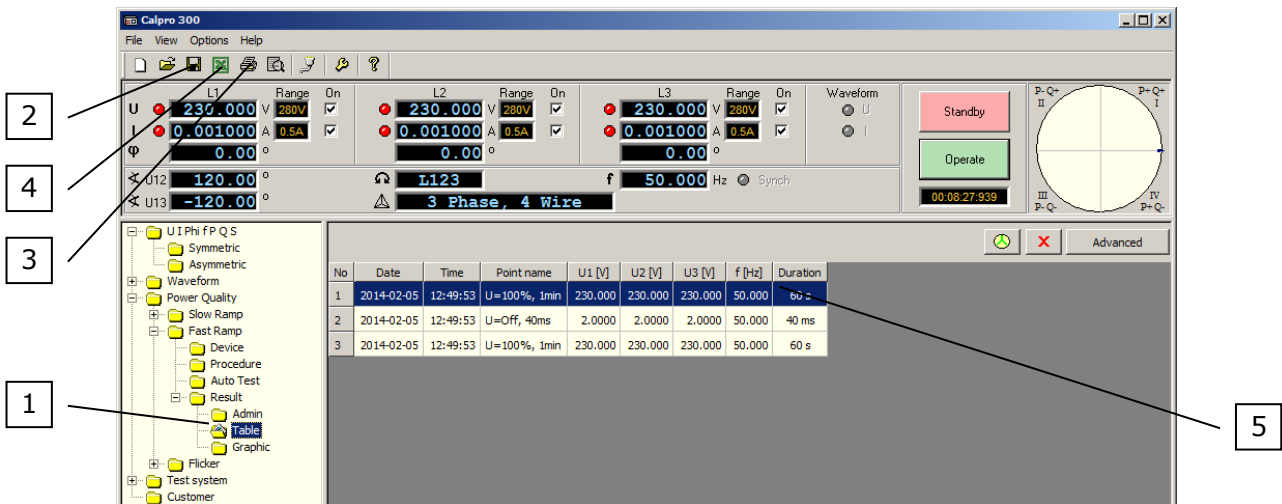


Fig.2.7. Table function with parameters of measurement points

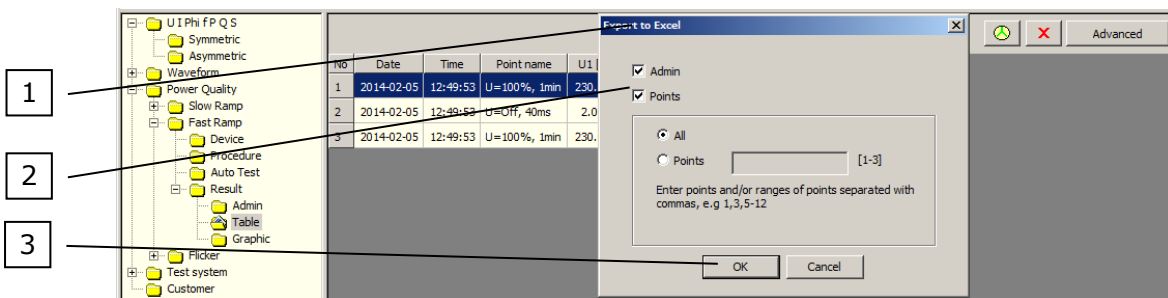


Fig.2.8. Table function with *Export to Excel* window

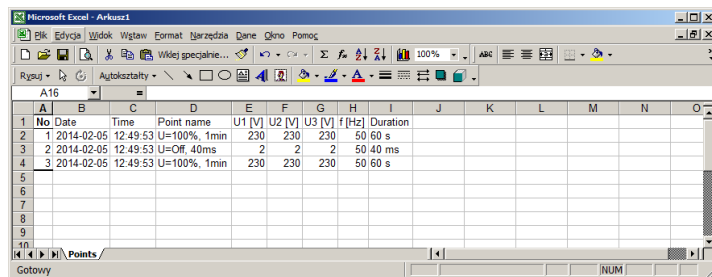


Fig.2.9. MS Excel program with exported parameters of measurement points

2.5. Example of realization of a *voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency.*

Example (Fig.2.10) shows realization of a *voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency* with C300 calibrator. Interruptions are recorded by Caltest 300 Analyser connected to the voltage output U1 of C300 calibrator.

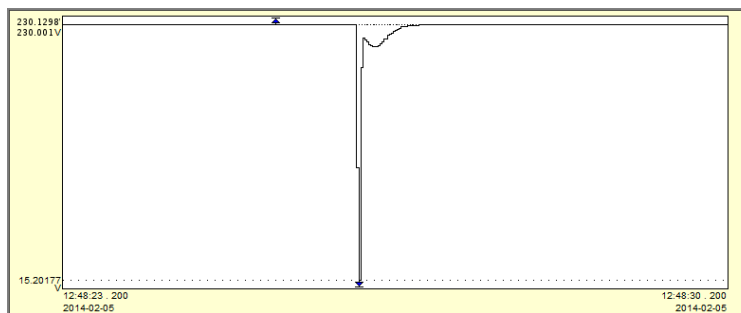


Fig.2.10. Realization of a *voltage interruptions of  $\Delta U = 100\%$ , two cycles at rated frequency* with C300 calibrator

To test the DUT the user have to:

- create a *Device* file with parameters of the DUT (chapter 3.1),
- create a *Procedure* file with procedure test points (chapter 3.2),
- perform an automatic test (chapter 3.3),
- edit and save to a file test parameters (chapter 3.4).

Example of realization of a *voltage dips of  $\Delta U = 50\%$*  is presented in chapter 3.5.

### 3.1. Device FUNCTION

Configuration of the *Device* file for the DUT is presented in Fig.3.1 and consists of:

- nominal voltage  $U = 230V$  value of a power supply of the DUT,
- nominal frequency  $f = 50Hz$  value of a power supply of the DUT,

To create a *Type* file (Fig.3.1) the user have to:

- a) press the *Device* of the *Power Quality / Fast Ramp* function (pos.1) and specify the DUT name (pos.2),
- b) set the nominal parameters of the DUT (pos.3) and *Comment* of the *Device* file (pos.4),
- c) save the *Device* file (pos.5).

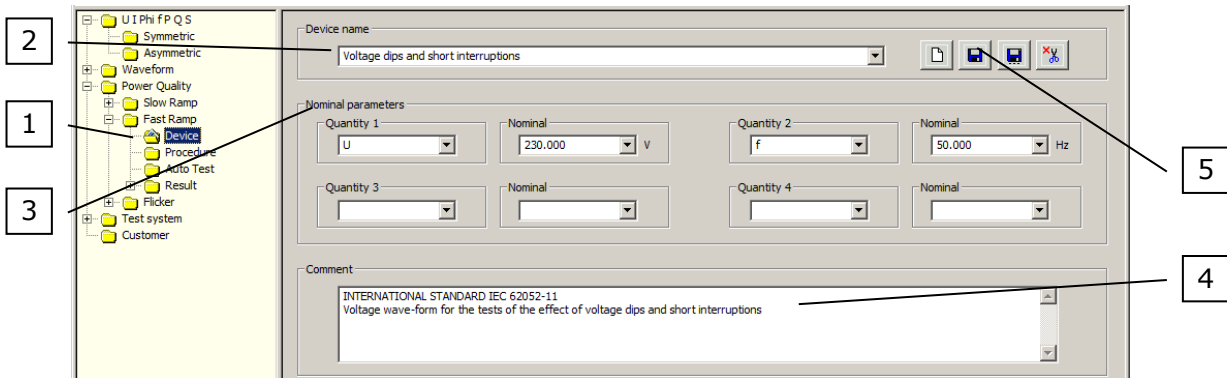


Fig.3.1. Configuration of the *device* function for *voltage dips and short interruption* tests

### 3.2. Procedure FUNCTION

Configuration of the procedure for a *voltage dips of  $\Delta U = 50\%$*  test is presented in Fig.3.2.

This procedure contains from 3 points:

- $U=100\%$ , 1min,
- $U=50\%$ , 1min,
- $U=100\%$ , 1min.

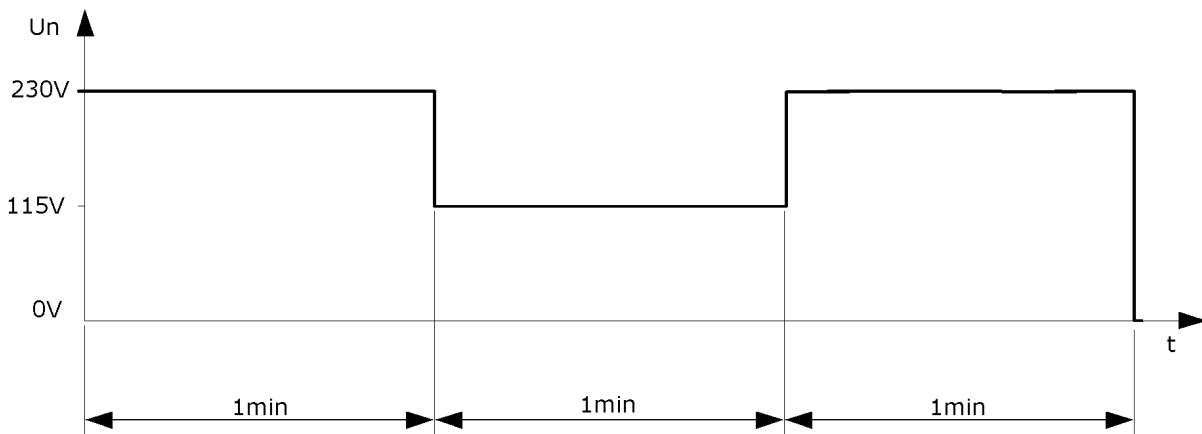


Fig.3.2. *Voltage dips of  $\Delta U = 50\%$*

To create a *Procedure* file (Fig.3.3) the user have to:

- a) press the *Procedure* of the *Power Quality / Fast Ramp* function (pos.1) and specify the *Procedure name* (pos.2),
- b) set the *Test point's* parameters (pos.3):
  - point name to U=100%, 1min,
  - voltage U to 230V,
  - frequency f to 50Hz,
  - current I to STB (currents off),
  - phase angle  $\varphi$  to  $0^\circ$ ,
  - angle between voltages  $\angle U_{12}$  to  $120^\circ$  and  $\angle U_{31}$  to  $-120^\circ$ ,
  - rotation to L123,
- c) set the *Change setting's Duration* time (pos.4) to 60 s (seconds),
- $U_P=230V$  (nominal power supply of the DUT),
- d) add configured point to the procedure (pos.5),
- e) repeat points from b) to d) to add rest of test points (according to Fig.3.2) – change will be required only in:
  - point name,
  - voltage U: 230V for U=100% and 115V for U=50%,
- f) save the procedure file (pos.6).

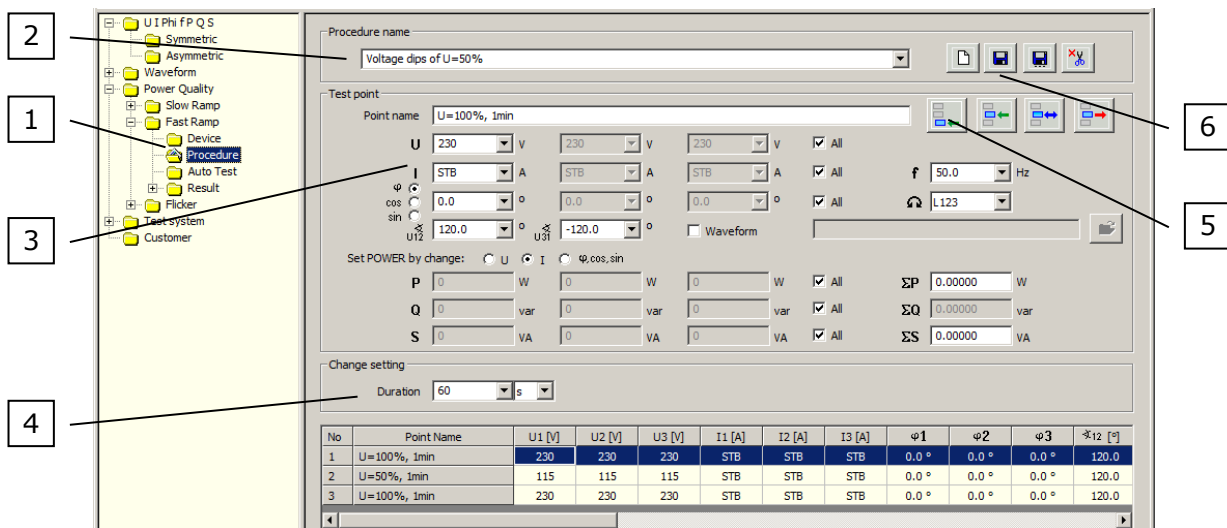


Fig.3.3. Configuration of the *voltage dips of  $\Delta U = 50\%$*  test

### 3.3. Autotest FUNCTION

In Fig.3.4, 3.5 and 3.6 are presented *Autotest* function with selected procedure points, procedure in progress and finished procedure.

To perform a test the user have to:

- a) press the *Autotest* of the *Power Quality / Fast Ramp* function (pos.1 Fig.3.4),
- b) choose a correct *Procedure name* (pos.2 Fig.2.4) and *Device name* (pos.3 Fig.3.4),
- c) select all *Test points* (pos.4 Fig.3.4) and press the *Start* button (pos.5 Fig.3.4).
- d) wait until procedure is not finished (Fig.3.6).

When the procedure is in progress the user can abort a procedure (in any time) by the *Stop* button (pos.1 Fig.3.5).

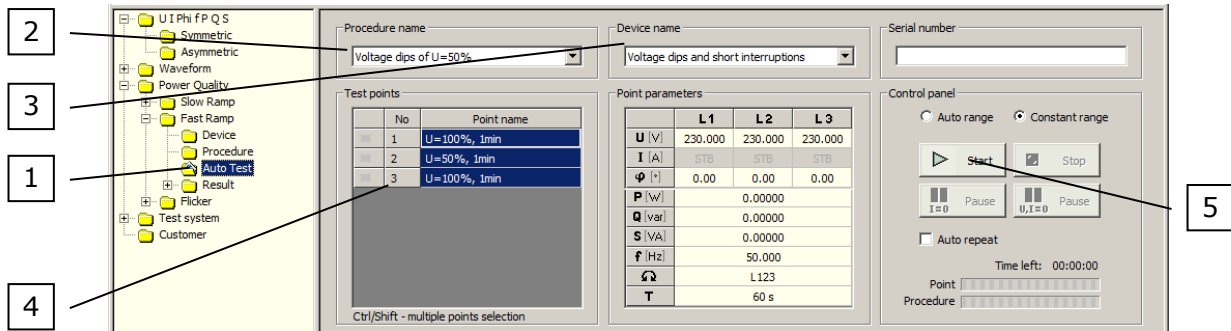


Fig.3.4. Autotest function with selected procedure points

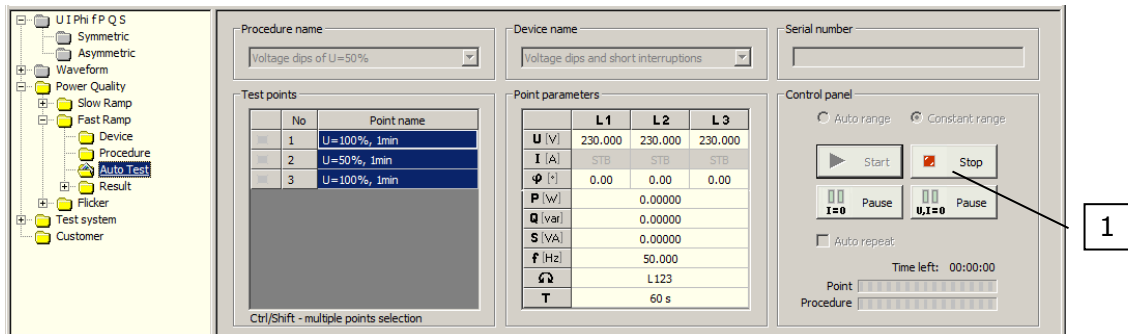


Fig.3.5. Autotest function with procedure in progress

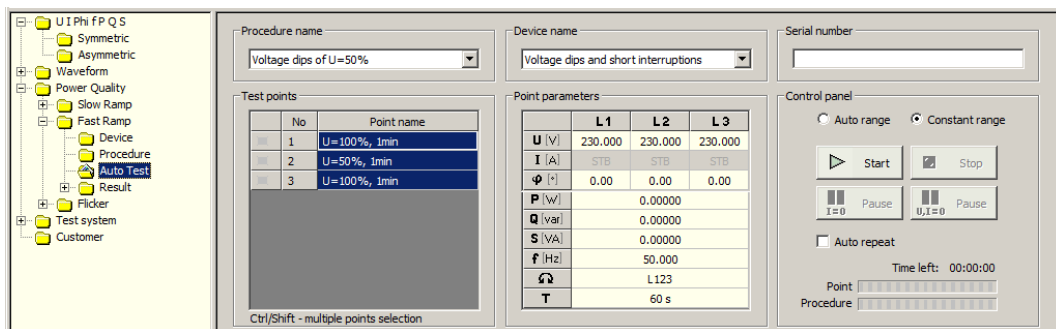


Fig.3.6. Autotest function with finished procedure

### 3.4. Result FUNCTION

To view a table with parameters of measurement points (Fig.3.7) the user have to press the *Table* of the *Power Quality* / *Fast Ramp* / *Result* function (pos.1). After that the user can save to the file (pos.2), print (pos.3) or export to the *MS Excel* test parameters (pos.4).

The *Result* table consists of parameters of measurement points and all information about settings (pos.5), including: point name, date, time, all parameters of the Calibrator and Duration.

To export data to *MS Excel* program the user have to press the *Export to Excel* button (pos.4 Fig.3.7). After that appear *Export to Excel* window (pos.1 Fig.3.8) with fields to set the parameters of a data to export (pos.2 Fig.3.8). When the user confirm changes by the *OK* button (pos.3 Fig.3.8) then a *MS Excel* program run with exported test parameters (Fig.3.9).

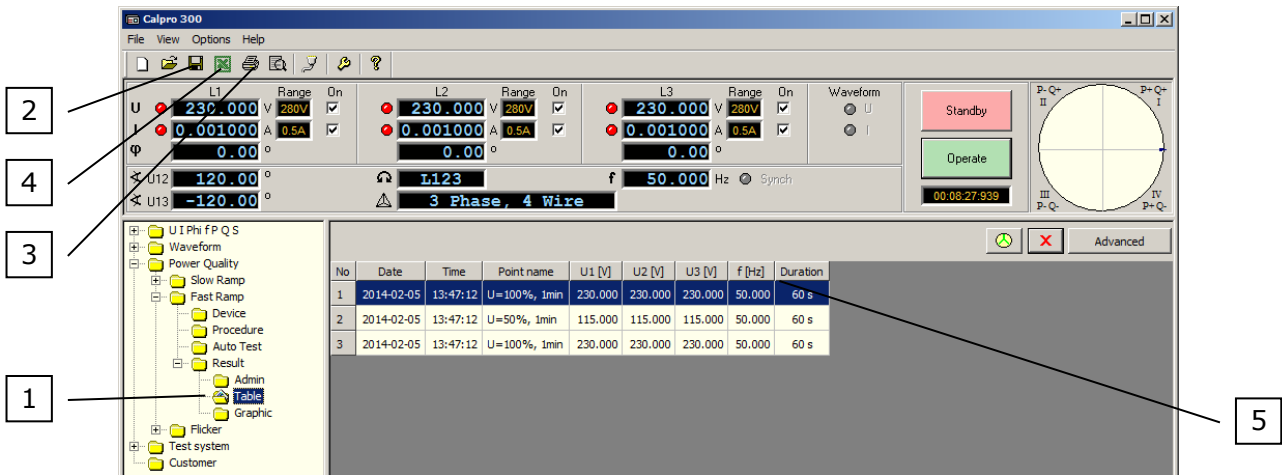


Fig.3.7. Table function with parameters of measurement points

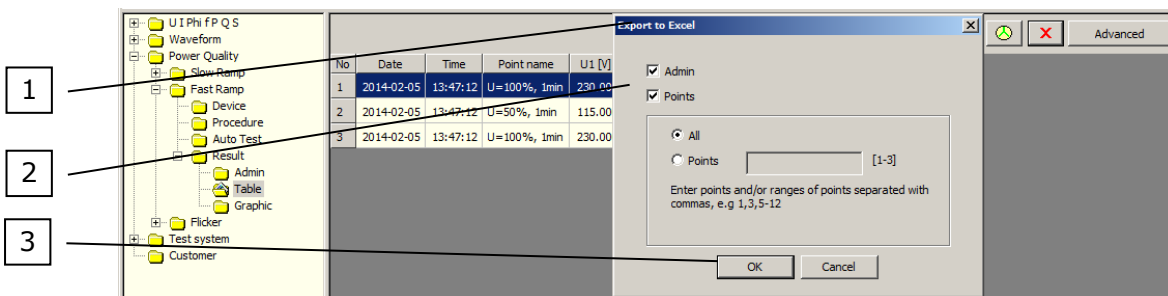


Fig.3.8. Table function with *Export to Excel* window

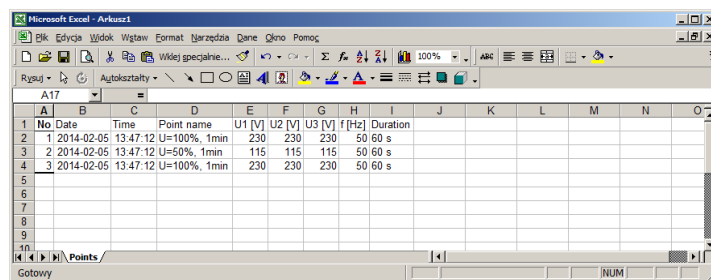


Fig.3.9. MS Excel program with exported parameters of measurement points

3.5. Example of realization of a *voltage dips* of  $\Delta U = 50\%$ .

Example (Fig.3.10) shows realization of a *voltage dips* of  $\Delta U = 50\%$  with C300 calibrator. Dips are recorded by Caltest 300 Analyser connected to the voltage output U1 of C300 calibrator.



Fig.3.10. Realization of a *voltage dips* of  $\Delta U = 50\%$  with C300 calibrator

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