Multichannel Meter Error Calculator

The MPX8 Multichannel Meter Error Calculator (Multiplexer) together with a C300 Power Calibrator is used for calibration and testing simultaneously up to eight electrical energy meters (single and three phase electromechanical and electronic active and reactive energy meters and portable test equipment) with frequency of pulses up to 200kHz.

The MPX8 Multiplexer with *Mpx8 PC software* calculates the percentage error expressed by the following formula

$$E\% = \frac{E_M - E_R}{E_R} \cdot 100\%$$

where:
E_M = value of the energy measured by the meter,
E_R = internal or external reference value of the energy.

The MPX8 Multiplexer is a flexible solution for creating the following systems:

- Basic System:
  - for simultaneously testing up to eight energy meters with accuracy referenced to an internal reference of the C300 Calibrator. This system employs a modern power source without need to use additional external reference meter and additional cables. By this conception system, may be achieved extremely compact size, light weight, high metrological properties at reasonable price,

- System with External Reference Meter:
  - for simultaneously testing up to seven energy meters with accuracy referenced to an external reference meter or
  - for simultaneously testing up to six energy meters and source monitoring with accuracy referenced to an external reference meter,

- Updating of Older Systems:
  - replacement and upgrade of existing hardware and software.

  Such systems perform the following tests:

- measure the basic error characteristics and repeatability,

- checking the starting current and no-load run,

- measure the influence of frequency, voltage, self-heating, distortion and special shapes of currents and voltages, reversed phase sequence,

- checking the impulse output and energy meter counter,

- checking the maximum power indicator.

MPX8   Eight inputs Multiplexer

- For reasonably price systems with accuracy referenced to the C300 Calibrator
- For extremely high accuracy systems with additional external reference meter
- For updating of Older Meter Test Stations
- Automatic test procedures
- Manual mode execution of single test steps
- Calculate the standard deviation of the error
- Eight impulse inputs up to 200kHz

All systems are controlled by means of a personal computer with installed *Mpx8 PC software* in Windows operating system.

Mpx8 PC software features:

- using a modern concept, which allows the operator to create own test procedures - this is very important because new requirements for new meter generations can be realized easily without changing the complete software,

- the automated mode - direct execution of the complete test procedure automatically and requires no more additional handling by operator unless it will not be defined in the test procedure, for example manual input of register value by operator,

- the manual mode - direct execution of single test step. It offers an ideal solution for tests and evaluation of entire specifications for meter under test without generating the complete test procedure. The manual mode is very useful in the Old Systems, which has been modernized with the use of the MPX8 Multiplexer and *MPX8 PC software* - without need to replace an old voltage and current source may be used a modern concept of testing energy meters with using computer database,

- computer database of customers, meters, measurement procedures and results, diagrams, tables of results and reports edition.

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*Basic System
with internal reference*

Eight Inputs Multiplexer
MPX8

Scanning Heads
CF102

Device Under Test
DUT

External
Reference
Meter

Voltage and current
source with
internal reference
C300

U_{L1}-U_{L2}-U_{L3}

I_{L1}-I_{L2}-I_{L3}

USB / RS232
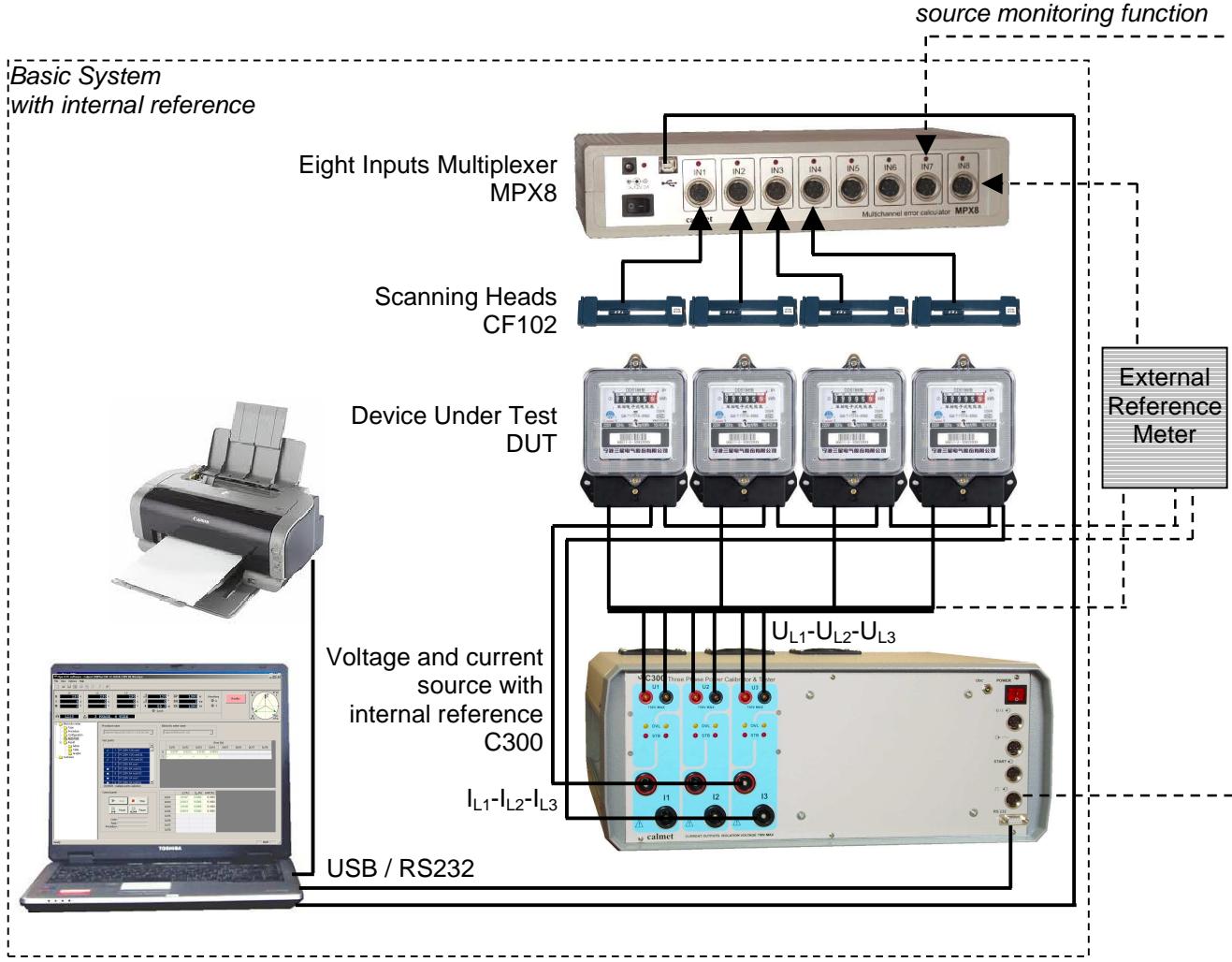
Configurations of the Meter Test Systems with Multiplexer MPX8
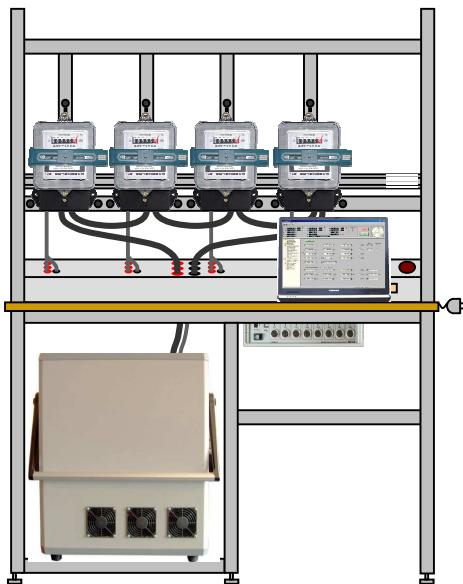
**MPX8 applications:
fully automated four position 0.05 accuracy
class system MTS4**
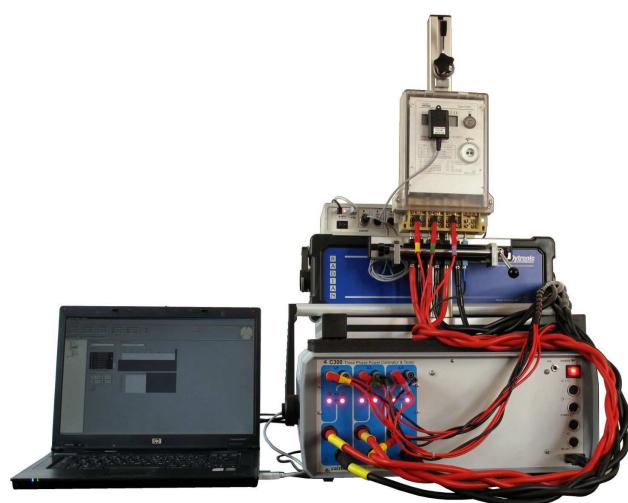
**MPX8 applications:
fully automated single position 0.005 accuracy
class system with Radian RD31 as an external
reference meter**

Technical parameters of the MPX8 Multiplexer

Parameter	Description
Impulse input	Eight impulse inputs (LO/HI) 0…2V/4…30V or 0…2mA/10…27mA up to 200kHz
Power supply	230V/50Hz or 12V/1A DC
Dimensions and weight	(width 290 x height 70 x depth 200)mm and 1,3kg with cables

Mpx8 PC software package for Windows

Advantages of *Mpx8 PC software*

- user-friendly operation,
- database for meters and test procedures,
- fully-automatic test procedures for meter testing,
- continuous monitoring of the test,
- tables and graphics for presentation of results,
- operator interface available in several languages,
- automatic measurements report generation.

Meter type window

The meter type window for entering data to tested devices database, contains the electrical and functional definitions of the device under test – DUT (base voltage and current values, maximal current value, accuracy class of the DUT, meter constant, meter connection,…).
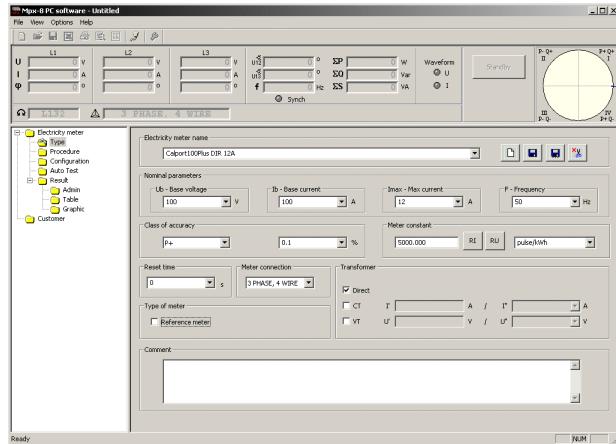
Procedure window

The procedure window for entering data to measuring procedures database, describes the order and content of the various test steps in a sequence. For each test step are specified following data:

- parameters of test point (point name, percentage value of the base voltage and current, phase angle or power factor, frequency, waveform of the voltages and currents,…),
- test type (error test, counting test, counter test),
- test method (impulses counting or time counting for error test) and percentage error limit of the DUT,
- test duration for calculate the standard deviation of error (number of cycles, time of the test point, energy dosage to counting),
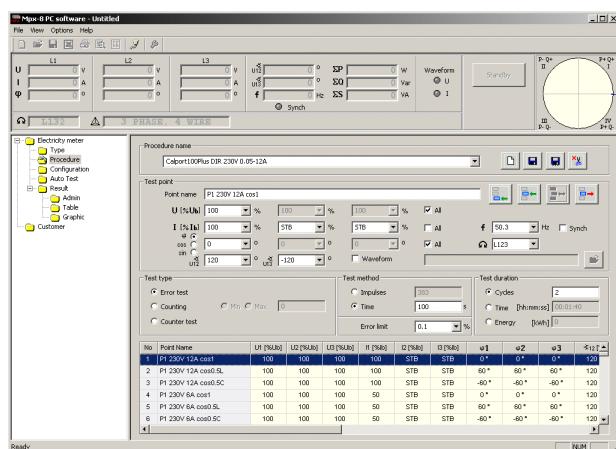
Configuration window

The configuration window describes configuration of the MPX8 Multiplexer inputs (active / not active) and description of connected DUT (name, serial number and other necessary information).

Additionally the configuration window allows to set the external reference meter (option) connected to the 8th of the MPX8 input.
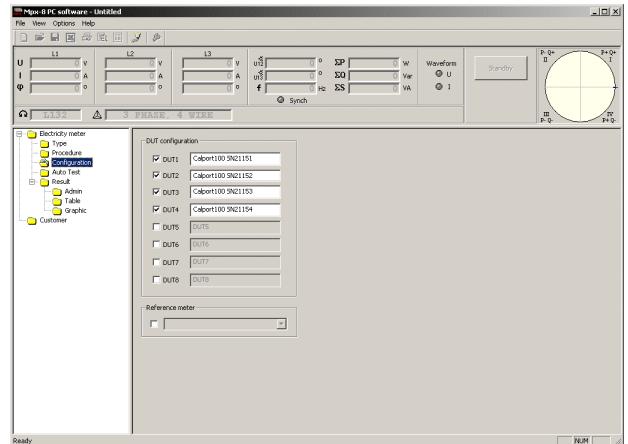
Autotest window

The autotest window for performing test of the DUT (tests of accuracy at reference conditions, repeatability, meter constant, starting and no-load condition, effect of influence quantities and tests of long duration disturbances effect as reversed phase sequence, voltage unbalance, self-heating, odd harmonics, even harmonics, sub-harmonics,…) according to the measuring procedure in the manual mode or in the automated mode. The autotest function allows to allocate to a measurement procedure a meter type and selects a test sequence.

During the test, the operator will be informed about:

- point status (passed / not passed, active point),
- progress indicator (cycle, point and procedure)
- error values for all DUTs in consecutive cycles,
- values of average error, standard deviation and error limit for all DUTs,

Additionally, in any time, the operator can pause or stop a procedure and repeat selected point.
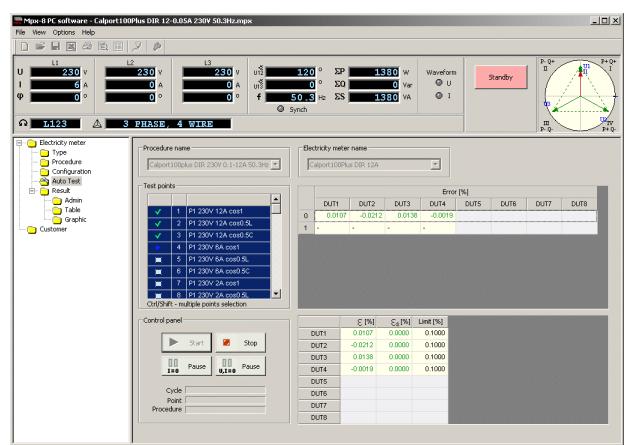
Table result window

The table result window makes possible visualization and edition measured results in form of table and consists of measured results of DUTs in two kinds of table: table of individual DUTs results and table of all DUTs results.

The table result is fully customizable. The operator can change:

- number of columns and add or hide them in the table,
- resolution of any value,
- the order of columns.

During an automatic test sequence it is possible to view test results and after executing an automatic test sequence all saved results are available for further data processing (printing and exporting data to MS Excel).

Table of individual DUTs results
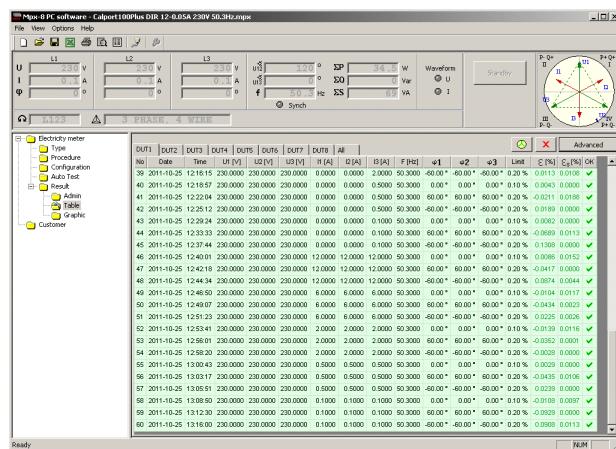
Table of all DUTs results
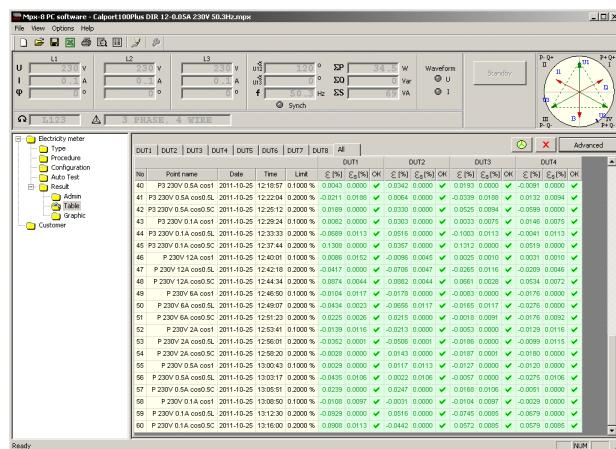
Graphic result window

The graphic result window makes possible visualization of measured results in form of diagram of error function with error limits.

The graphic result is fully customizable. The operator can:

- add or hide graph of selected DUT to diagram,
- change color of any graph,
- change quantity of X axis (no, time, current, voltage,…),
- change zoom in and out of diagram.
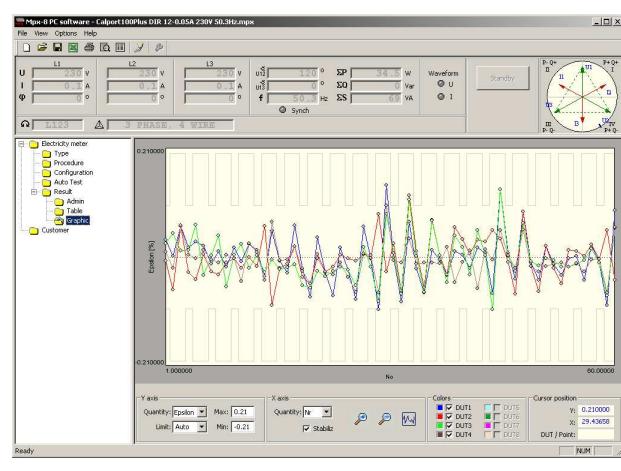
Additional standard functions

Mpx8 PC Soft software meets the following requirements:

- demonstration programme software allow training to be given before delivery of the test system,
- standardized meter type and test sequence definitions considerably reduce the need for extensive training and familiarization,
- the operator interface is available in many different languages,
- generation of harmonics,
- generation of special test signals and wave forms according to the IEC 62052-11 and EN 50470-1, 2, 3,
- with customers window the operator can in simply and fast way build a customers database, which will be used to reports.