Making energy visible

EnergoEtalon™ software

Metrology for Smart Grids

"EnergoEtalon" software is a base solution to built multifunctional reference measurement system. "EnergoEtalon" may be used to conduct measurements of voltage, current, power, parameters of harmonics and interharmonics as well as impedance and ratio measurements.

One of the key features of "EnergoEtalon" software is a support of top level calibration for Digital Substation equipment and reference measurement systems with output according 61850-9-2LE.

Operating principle

EnergoEtalon utilizes sophisticated digital signal processing techniques that make it possible to correct signal imperfections of all kinds and to calculate active/reactive power as well as electrical power quality and energy signals with very high accuracy.

Who needs EnergoEtalon

• National Measurement Institutes and standard laboratories may use it as a multifunctional software tool for electrical energy and power quality measurements;

• Metrological service departments of power industry enterprises;

• Research and design departments and laboratories that conduct products testing.
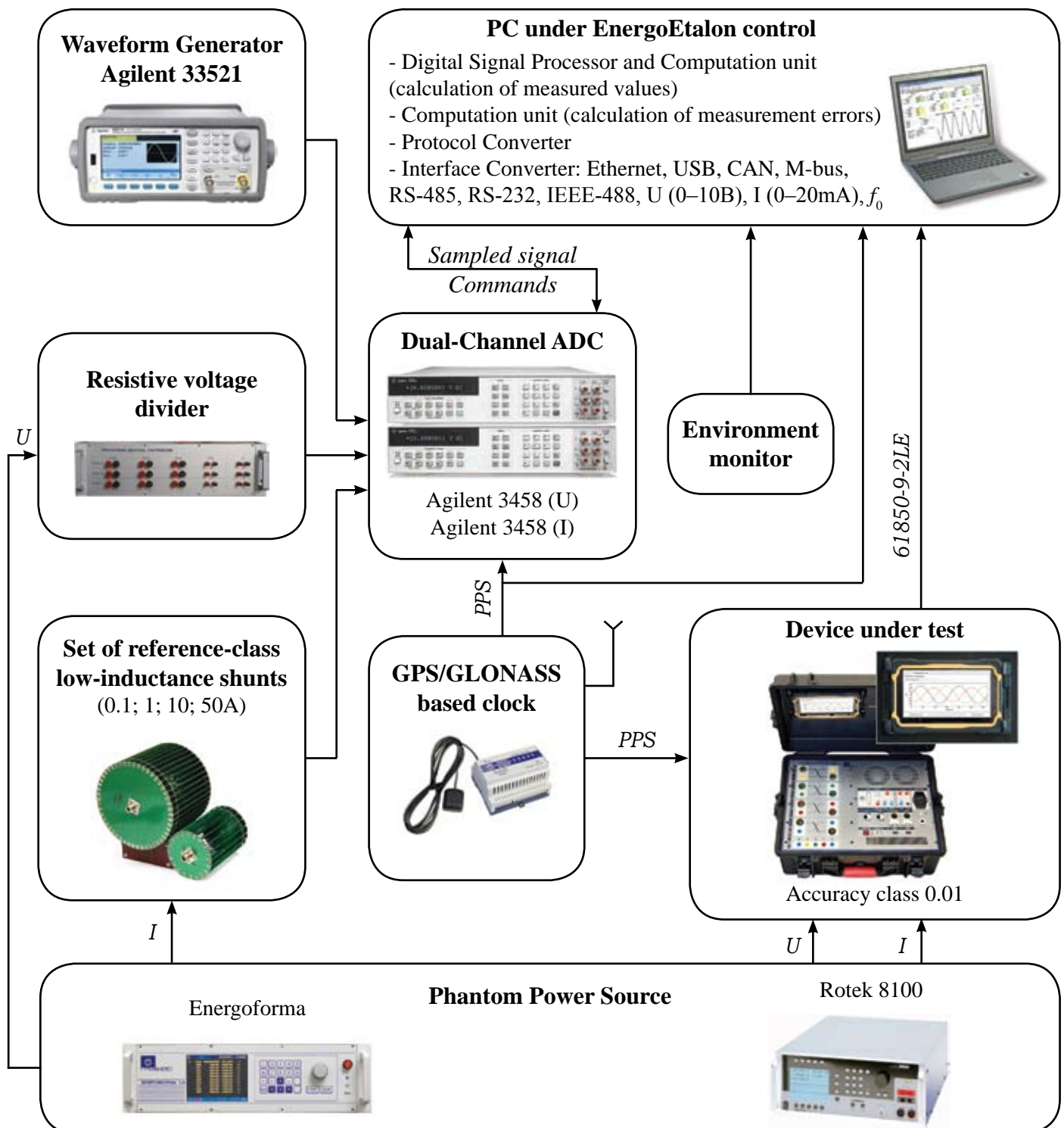
Extra functionality

• "EnergoEtalon" operates with devices supporting digital communication interface (IEC 61850-9-2LE), e.g. merging units, non-conventional instrument current/voltage transformers or power quality analyzers;

• New module for calibration of the Phasor Measurement Units will be incorporated in the software at Q2/2015.

Create the standard that you need

We offer an opportunity to get either the entire calibration setup or any part of it (that can be easily integrated in the equipment already installed in your lab). Considering that most of its blocks are typical "on-the-shelf" equipment you may purchase just EnegoEtalon software as a key component of the system. The software can be adapted for your specific needs like as report generation, automation of test sequence etc.

Feel free to ask a trial version of "EnergoEtalon" software.

Block diagram and operating principle

Waveform Generator Agilent 33521

PC under EnergoEtalon control
- Digital Signal Processor and Computation unit (calculation of measured values)
- Computation unit (calculation of measurement errors)
- Protocol Converter
- Interface Converter: Ethernet, USB, CAN, M-bus, RS-485, RS-232, IEEE-488, U (0–10B), I (0–20mA), f_0

Sampled signal
Commands

Resistive voltage divider

U

Dual-Channel ADC
Agilent 3458 (U)
Agilent 3458 (I)

Environment monitor

61850-9-2LE

Set of reference-class low-inductance shunts
(0.1; 1; 10; 50A)

PPS

GPS/GLONASS based clock

PPS

Device under test
Accuracy class 0.01

I

U   *I*

Phantom Power Source
Energoforma

Rotek 8100

Typical equipment and structure of the system

- AC Voltage/Current or Phantom power source
- Dual-Channel ADC Agilent 3458A multimeters
- Voltage divider
- Arbitrary waveform generator Agilent 33521
- Set of reference-class low-inductive shunts
- PC (Workstation)
- "EnergoEtalon" software.
- GPS/GLONASS based clock
- Environment monitor (pressure, humidity, temperature)

EnergoEtalon™ software

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EnergoEtalon™ software

Estimation of signal parameters & tuning of ADC parameters

Synthesis of equalizer, special weighting window, phase correction filers

U_U → ADC$_I$

U_I → ADC$_U$

Control & Data Acquisition

Phase-shift compensation

Equalization of analog filters and sin(x/x) effect

×
×
×

Signals weighting and calculation in time domain:
P, Q, S, Urms, Irms

GPS/ GLONASS

FFT with specialized windows and optional: equalization of analog filters & sin(x/x) effects, phase-shift compensation

Calculation of signals parameters and PQP:
U_1, I_1, P_1, Q_1, φ, THD, K_{harm}, etc.

Ratio measurements:
- phase displacement ($\Delta\varphi$)
- magnitude error

Voltage vector, Current vector, Time stamp

Traceability to digital substation equipment: calculation of Merging unit and non-conventional transformers parameters

U
I → Merging unit or non-conventional transformer

61850-9-2LE

Signal processing in time- and frequency domains

Signal processing flow chart