Project name:
"System for bushing monitoring with a view to preventing ecological disasters caused by high power transformer damaging"

Contract no. 155/20.07.2006

Stage: III Achievement of functional models and implementation of the system for monitoring the bushings which fit out the high power transformers.

Objectives:
- achieving the functional models for transducers, acquisition and adapting unit for the reference quantities;
- achieving the functional model of the central unit for data processing, storage and data base creation with the monitored quantities;
- verifying the acquisition, processing and monitoring software;
- verifying the software for communication with the PC unit from the control room;
- implementing the system for monitoring the bushings which fit out the high power transformers.

Activities:
Activity AIII.1 Achievement of functional models for transducers, acquisition and adapting unit for the reference quantities;

Starting from the basic structure of digital configurable equipment, the microprocessor-based acquisition and adapting unit for the reference quantities was achieved.

It contains the following groups

- protection and amplification of analogue quantities (capacitive current, reference voltage);
- multiplexer;
- analogue-digital converter;
- interface for connection with data processing unit UCV 02;
- microprocessor-based processing unit;
- oscillator + multiplexer;
- power supply +12V,-12V,+5V;
- fiber optic adapter.

Activity AIII.2 Achievement of functional model for the central unit for processing, storage and creation of a data base with the monitored quantities;

Starting from the basic structure of the digital configurable equipment, the microprocessor-based unit for the monitored quantities processing and storage was achieved

It contains the following blocks:

- fiber optic adapter;
- central unit CPU , type PC/104;
- keyboard + LCD interface;
- PC or operator board;
- keyboard, LCD display;
- relay output block

The central processing unit of a data acquisition system should perform the following functions:

- Selecting the analogue channel on which the acquisition is presumed to be done;
- Controlling the sampling;
- Controlling the analogue-digital conversion;
- Sensing the conversion end and reading the binary code resulted;
- Loading the code in memory;
- Correcting the errors entered by different component blocks;
- Processing and displaying the data;
- Testing the component blocks with a view to identifying the faulty ones.

Facilities:

- Calculating the phase difference and effective value for the 6 phases;
- Determining tan delta for each of the 6 phases;
- Activating digital outputs corresponding to the exceeding of the 2 alarm thresholds associated to the calculated values of tan delta;
- Activating digital outputs corresponding to the exceeding of some alarm thresholds associated to the sampled current values;
- Storing in an archive the calculation results for allowing them to be subsequently consulted (by downloading them by means of a program from PC)

Activity III.3 Verification of the acquisition, processing and monitoring software;

The program operation is done according to a state automaton, and program function accessing is done from some menus activated from the keyboard (some of them by means of a password). The available menus are:

- Survey
- Configure
- Simulate
- Calibrate

Activity AIII.4 Verification of the software for communication with the PC unit from the control room;

The program from PC allows communicating with the master device for visualizing the current values of calculated tangents, the level of leakage currents, for transferring the content of the stored archive, also for editing its functional parameters.

Activity AIII.5 Implementation of the system for monitoring the bushings which fit out the high power transformers

The main functional modules of the system are:

-current and voltage adapters;

-primary data acquisition and processing unit, UAA;

-central unit for processing, local storage, displaying, remote communication and parametrization;

-PC monitoring unit or operator board.

Each of these modules has a dedicated SW component associated.