



# ELECTRIC MACHINES – UNILAB – 1 kW



## SOFTWARE FOR THE ELECTRICAL MACHINES LABORATORY - DL 8330SW



This software covers all the study subjects and the experiment activities that are performed in a computer controlled electrical machines laboratory. It works with the following types of machines:

- **Single-phase and three-phase transformers**
- **Direct current machines**
- **Synchronous machines**
- **Asynchronous machines**

It is divided in 2 sections hereunder described:

- ***Educational section:***

In this section we illustrate, through pdf pages, the test to be performed by providing all the relevant information:

- General diagram of the test
- Insertion of the instruments
- Operation modes
- Quantities to be acquired by the instruments and quantities to be calculated
- Characteristic graphs for the test

- ***Operation section:***

In this section we illustrate how the instruments must be connected and how to start the program for controlling the execution of the test.

The above program provides:

- a Control Window, that allows to insert the name of the student and the characteristic data of the machine; moreover it contains the controls to operate during the automatic and semi—automatic tests;
- a Window with the diagram of the measurement system, that contains the block diagram of the measurement system, with the indications of the quantities coming from the instruments, updated in real time;
- a Spreadsheet Window that contains an electronic sheet where the values of the measurements taken during the execution of the tests are collected;
- once the test is completed, it is possible to open several Graph Windows, where it is possible to visualize in graphical form the data that have been gathered.

During the AUTOMATIC execution of the test the user controls the start of the test and the program automatically varies the conditions of the system and acquired the interesting quantities. In this case it is necessary to use an interface module (DL 1893) and motor driven modules that are controlled through computer; it is also necessary, of course, to have digital measurement modules for the experiment data acquisition and transfer.

During the SEMI-AUTOMATIC execution of the test the user manually sets up the value of the quantities of the system (through non motor driven power supplies, variac , etc.) and controls the acquisition of the interesting variables through the program. The software allows a complete graphic processing of the results that have been obtained. It is possible to open at the same time several different graphs. These graphs can be of two types: time graphs (showing the behaviour with time of the interesting quantities) or XY type graphs where it is possible to select the quantities to show in the X and Y axes. Moreover, the software allows printing all the data of the test for what concerns: data of the student and of the machine under test, data from the electronic spreadsheet, graphs.



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On the static and rotating electrical machines it is possible to perform the following tests:

## TRANSFORMERS

- No load-test
- Short circuit-test
- Measurement of the winding resistance
- Measurement of the transformation ratio
- Direct test
- Calculation of the conventional efficiency

## DIRECT CURRENT MACHINES

- Measurement of the internal resistance
- Calculation of the conventional efficiency of a dc generator
- Magnetization characteristic of a dc generator
- External characteristic of a dc generator
- Regulation characteristic of a dc generator
- No load test of a dc motor
- Direct test of a dc motor with an electromagnetic brake
- Direct test of a dc motor with a dynamometer

## SYNCHRONOUS MACHINES

- Short-circuit characteristics
- Magnetization characteristics
- Measurement of the winding resistance
- External characteristics
- Regulation characteristics
- No-load test of a synchronous machine as a motor
- Parallel of a synchronous machine with the mains
- Diagram of the “V” curve of a synchronous motor

## ASYNCHRONOUS MACHINES

- No-load test of a three-phase asynchronous motor
- Short-circuit test of a three-phase asynchronous motor
- Measurement of the internal Resistance of a three-phase asynchronous motor
- Measurement or the transformation ratio of a three-phase asynchronous motor
- Direct test of a three-phase asynchronous motor with an electromagnetic brake
- Direct test of a three-phase asynchronous motor with a dynamometer

### *Required PC configuration:*

- Operating system: Windows
- USB Port for the connection to the Interface Unit DL 1893
- CD-ROM driver

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## DATA ACQUISITION / CONTROL

### UNIT



DL 1893

- Power supply from USB, < 100mA
  - 2 relay outputs
  - 2 analogue outputs, serial 8 bit D/A converter
- Output: -10/+10 V
- 8 analogue inputs, 12 bit A/D converter
- Input: -10/+10 V
- Max speed of conversion: 10 kHz