



# ELECTRIC MACHINES – EUROLAB – 0.3 kW

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## SINGLE-PHASE MOTORS

### SPLIT-PHASE MOTOR



#### DL 30130

Single-phase squirrel cage asynchronous motor; possible operation with either permanent or only for starting external capacitor.

##### Technical features:

- Power: 220 W (370 W)
- Voltage: 220 V
- Current: 3.6 A (3 A)
- Speed: 2720 rpm, 50 Hz

##### Accessories:

DL 30135 STARTING CAPACITOR UNIT

DL 30135R STARTING RESISTOR UNIT

DL 30135L STARTING INDUCTOR UNIT

### CAPACITOR MOTOR



#### DL 30140

Single-phase squirrel cage asynchronous motor with split phases and running capacitor.

##### Technical features:

- Power: 370 W
- Voltage: 220 V
- Current: 3 A
- Speed: 2720 rpm, 50 Hz

### UNIVERSAL MOTOR



#### DL 30150

Single-phase collector motor with inductor winding in series to the winding of the rotor; able to operate either with ac or dc power supply.

##### Technical features:

- Power: 260 W ac / 260 W dc
- Voltage: 220 Vac / 220 V dc
- Current: 3.5 A ac / 3 A dc
- Speed: 3000 rpm, 50 Hz

### REPULSION MOTOR



#### DL 30170

Single-phase collector motor with short-circuited rotor.

##### Technical features:

- Power: 250 W Voltage: 220 V Current: 3.8 A
- Speed: 3000 rpm, 50 Hz



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## THREE-PHASE ASYNCHRONOUS MOTORS

### SQUIRREL CAGE THREE-PHASE ASYNCHRONOUS MOTOR



#### DL 30115

Induction motor with three-phase stator winding and squirrel cage buried in the rotor.

#### Technical features:

- Power: 370 W
- Voltage: 220/380 V  $\Delta/Y$
- Current: 2/1.1 A  $\Delta/Y$
- Speed: 2650 rpm, 50 Hz

#### Accessories:

DL 2035 STAR/DELTA STARTER

### SLIP RING THREE-PHASE ASYNCHRONOUS MOTOR



#### DL 30120

Induction motor with both stator and rotor three-phase windings.

#### Technical features:

- Power: 370 W
- Voltage: 220/380 V  $\Delta/Y$
- Current: 2.7/1.6 A
- Speed: 2800 rpm, 50 Hz

#### Accessories

DL 30120RHD3 STARTING UNIT

DL 30125 STARTING AND SYNCHRONIZATION UNIT

### THREE-PHASE 2-SPEED SQUIRREL CAGE ASYNCHRONOUS MOTOR



#### DL 30180

2 or 4 pole induction motor with Dahlander-type three-phase stator winding and squirrel cage rotor.

#### Technical features:

- Power: 300/450 W
- Voltage: 380 V
- Current: 1.1/1.35 A
- Speed: 1350/2650 rpm, 50 Hz

#### Accessories:

DL 2036 POLE SWITCHING UNIT

### THREE-PHASE 2-SPEED SQUIRREL CAGE ASYNCHRONOUS MOTOR



#### DL 30270D

2 or 8 pole induction motor with three-phase split stator windings and squirrel cage rotor.

#### Technical features:

- Power: 150/370 W
- Voltage: 380 V
- Current: 0.75/1.15 A
- Speed: 680/2800 rpm, 50 Hz

#### Accessories

DL 30275 POLE SWITCHING UNIT



## DIRECT CURRENT MACHINES

### DIRECT CURRENT MOTOR COMPOUND EXCITATION



#### DL 30220

It can be also used as a generator.

#### Technical features:

- Power: 300 W
- Voltage: 220 V
- Speed: 3000 rpm
- Excitation: 140 V / 0.12 A

#### Accessories

DL 30200RHD STARTING RHEOSTAT  
DL 30205 EXCITATION RHEOSTAT

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### DIRECT CURRENT MOTOR SERIES EXCITATION



#### DL 30210

It can be also used as a generator.

#### Technical features:

- Power: 300 W
- Voltage: 220 V
- Speed: 2800 rpm

#### Accessories

DL 30200RHD STARTING RHEOSTAT  
DL 30206 EXCITATION RHEOSTAT

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### DIRECT CURRENT MOTOR SHUNT EXCITATION



#### DL 30200

It can be also used as a generator.

#### Technical features:

- Power: 300 W
- Voltage: 220 V
- Speed: 3000 rpm
- Excitation: 160 V / 0.25 A

#### Accessories

DL 30200RHD STARTING RHEOSTAT  
DL 30205 EXCITATION RHEOSTAT



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## DIRECT CURRENT GENERATOR COMPOUND EXCITATION



### DL 30240

It can be also used as a motor.

#### Technical features:

- Power: 260 W
- Voltage: 220 V
- Current: 1.18 A
- Speed: 2800 rpm
- Excitation: 190 V / 0.1 A

#### Accessories

DL 30205 EXCITATION RHEOSTAT

## DIRECT CURRENT GENERATOR SERIES EXCITATION



### DL 30230

It can be also used as a motor.

#### Technical features:

- Power: 260 W
- Voltage: 220 V
- Current: 1.18 A
- Speed: 3000 rpm

#### Accessories:

DL 30206 EXCITATION RHEOSTAT

## DIRECT CURRENT GENERATOR SHUNT EXCITATION



### DL 30250

It can be also used as a motor.

#### Technical features:

- Power: 260 W
- Voltage: 220 V
- Current: 1.18 A
- Speed: 2800 rpm
- Excitation: 190 V / 0.2 A

#### Accessories:

DL 30205 EXCITATION RHEOSTAT

## DIRECT CURRENT POLIEXCITATION MACHINE



### DL 30220P

Suitable for series, shunt or compound excitation motor or generator.

#### Accessories

DL 30200RHD STARTING RHEOSTAT

DL 30205 STARTING RHEOSTAT FOR THE SHUNT OR COMPOUND CONFIGURATION

DL 30206 STARTING RHEOSTAT FOR THE SERIES CONFIGURATION





## THREE-PHASE SYNCHRONOUS MACHINE

### THREE-PHASE SYNCHRONOUS MACHINE



#### DL 30190

Machine with smooth inductor and three-phase stator armature winding for operation either as an alternator or as a synchronous motor.

#### Technical features:

- As alternator: Power: 300 VA
- As motor: Power: 300 W
- Voltage: 220/380 V  $\Delta/Y$
- Current: 0.8/0.46 A  $\Delta/Y$
- Speed: 3000 rpm
- Excitation: 190 V / 0.26 A

#### Accessories:

DL 30195 STARTING AND SYNCHRONIZATION RHEOSTAT  
DL 1030 PARALLEL BOARD

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### RELUCTANCE MOTOR



#### DL 30270

Three-phase synchronous motor with squirrel cage rotor without dc excitation.

#### Technical features:

- Power: 100 W
- Voltage: 220/380 V  $\Delta/Y$
- Current: 1.1/0.6 A  $\Delta/Y$
- Speed: 3000 rpm , 50 Hz



## TRANSFORMERS

### SINGLE-PHASE TRANSFORMER



#### DL 30103

Core-type transformer with split windings. It can also be used as an auto-transformer.

##### Technical features:

- As a transformer:
- Rated power: 300 VA
- Primary voltages: 127/220/380 V
- Secondary voltages: 2 x 110 V
- As an auto-transformer:
- Rated power: 300 VA
- Voltage: 127/220/380 V
- Frequency: 50/60 Hz

### THREE-PHASE TRANSFORMER



#### DL 30100

Column-type transformer with split windings. It can also be used with a single-phase supply.

##### Technical features:

- Power: 300 VA
- Primary voltage: 2 x 110V (phase)
- Secondary voltage: 2 x 110 (phase)
- Frequency: 50/60 Hz



## BRAKING SYSTEMS

### EDDY-CURRENT BRAKE



#### DL 30300

Smooth roll rotor and salient pole stator.  
Provided with water level, arms, weight and balance weight for measuring the output torque of the motor.  
Possibility of assembling a load cell.

##### Technical features:

- Maximum supply voltage: 250 Vdc
- Maximum speed: 5000 rpm
- Maximum power: 450 W

### POWDER BRAKE



#### DL 30300P

Electromagnetic brake.  
Provided with water level, arms, weight and balance weight for measuring the output torque of the motor.  
Possibility of assembling a load cell.  
The brake includes an axial cooling fan that is supplied by the mains voltage.

##### Technical features:

- Maximum supply voltage: 20 Vdc
- Maximum speed: 4000 rpm
- Maximum power: 400 W

### DC DYNAMOMETER



#### DL 30260

Direct current generator in which the frame is free to swing around its axis.

Provided with water level, arms, weight and balance weight for measuring the output torque of the motor.

Possibility of assembling a load cell.

##### Technical Features (as a brake):

- Maximum power: 450 W
- Voltage: 190 Vdc
- Current: 2.4 A
- Maximum speed: 3000 rpm

Accessories:

DL 30040R RESISTIVE LOAD





## POWER SUPPLY MODULES

Suitable for supplying fixed and variable alternating current and fixed and variable rectified direct current, in order to easily carry out all the tests on the electrical machines of the laboratory and in general in an electric measurement laboratory.

Provided with start push-button with remote control switch, stop push-button, key-unlocked emergency mushroom head pushbutton and differential magneto-thermal protection on the main sockets.

Connector for the overspeed protection of the motors and thermal protection.

The control devices and the safety connecting terminals, according to the IEC standards, are arranged on the front panel, clearly interconnected through a silk-screened synoptical diagram.



### DL 30016

Output voltages

Variable ac:  $3 \times 0 \div 380$  V, 2 A /  $3 \times 0 \div 240$  V, 3 A

Fixed ac:  $3 \times 380$  V + N, 10 A /  $3 \times 220$  V, 3 A

Standard fixed ac: 220 V, 3 A

Variable dc: 0-240 V, 4 A / 0-225 V, 1 A

Fixed dc: 220 V, 4 A

Power supply:  $3 \times 380$  V + N, 50/60 Hz

### DL 30018

Output voltages

Variable ac:  $3 \times 0 \div 380$  V, 2 A /  $3 \times 0 \div 240$  V, 3 A

Fixed ac:  $3 \times 380$  V, 2 A /  $3 \times 220$  V + N, 10 A

Standard fixed ac: 127 or 220 V, 10 A

Variable dc: 0-240 V, 4 A / 0-225 V, 1 A

Fixed dc: 220 V, 4 A

Power supply:  $3 \times 220$  V + N, 50/60 Hz



### DL 30017 (motor driven)

Output voltages

Variable ac:  $3 \times 0 \div 380$  V, 2 A (programmable) /  $3 \times 0 \div 240$  V, 3 A (programmable)

Fixed ac:  $3 \times 0$ -240 V, 10 A

Standard fixed ac: 220 V, 10 A

Variable dc: 0-240 V, 4 A (programmable) / 0-225 V, 1 A

Power supply:  $3 \times 380$  V + N, 50/60 Hz

### DL 30019 (motor driven)

Output voltages

Variable ac:  $3 \times 0 \div 380$  V, 2 A (programmable) /  $3 \times 0 \div 240$  V, 3 A (programmable)

Fixed ac:  $3 \times 220$  V + N, 10 A

Standard fixed ac: 127 or 220 V, 10 A

Variable dc: 0-240 V, 4 A (programmable) / 0-225 V, 1 A

Power supply:  $3 \times 220$  V + N, 50/60 Hz



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## MOTOR-DRIVEN POWER SUPPLY UNIT WITH AUTOMATIC REGULATION



### DL 1067S

Suitable for power supplying with variable voltage the braking systems and the excitation of the machines through manual or automatic operation.

#### Technical features:

- DC output: 0 to 210 V, 2 A
- Automatic regulation of excitation to keep a constant voltage
- Power supply: 220 V, 50/60 Hz

## RECTIFIED POWER SUPPLY UNIT



### DL 1054

Suitable for power supplying with variable voltage the braking systems and the excitation of the machines.

#### Technical features:

- Output: 0÷120 V, 2 A or 0÷220 V, 1 A.
- Power supply: single-phase from mains

## POWER SUPPLY FOR THE POWDER BRAKE



### DL 1030S

Suitable for power supplying with variable voltage the powder brake.

#### Technical features:

- Output: 0÷10 V, 2 A or 0÷20 V, 2 A
- Power supply: single-phase from mains



## MEASURING UNITS

### ELECTRICAL POWER DIGITAL MEASURING UNIT



#### DL 10065N

Measurement of dc voltage, current, power and energy.

Measurement of AC voltage, current, power, active energy, reactive energy, apparent energy, power factor and frequency.

##### Technical features:

- Direct voltage: 300 V
  - Direct current: 20 A
  - Alternate voltage: 450 V
  - Alternate current: 20 A
  - Power: 9000 W
  - Single phase power supply: 90-260 V, 50/60 Hz
- Communication: RS485 with protocol MODBUS RTU

### TORQUE MEASURING UNIT



#### DL 2006CN

Suitable to measure the motor output torque through a load cell arranged on the braking system.

Digital readout and analogue output proportional to the measured value.

Power supply: 220 V, 50/60 Hz

### MECHANICAL POWER DIGITAL MEASURING UNIT



#### DL 10055N

For direct measurement of motor output torque through load cell and of rotating speed through optical transducer, with mechanical power display; provided with direct current variable power supply for the excitation of the brakes or of the dynamometer.

Digital readout of the measured quantities.

Connector for overspeed protection of the motors through the connection to the power supply module.

Ambient temperature sensor and probe for measuring the temperature of the motor.

Communication: RS485 with MODBUS RTU protocol.

##### Technical features:

- Torque: suitable for measuring the maximum torque of the laboratory through the load cell
- Speed: suitable for measuring the maximum speed of the machines of the laboratory
- Power: suitable for measuring the maximum power of the machines of the laboratory
- Dc output: 0-220 V, 2 A
- Power supply: single-phase from mains



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## LOAD CELL



### DL 2006E

Resistance electronic strain-gauge with 150 N range, to be mounted on the braking system to measure the mechanical torque.

## ELECTRONIC TACHOMETER



### DL 2025DN

Suitable to measure the revolving speed through tachometric or optical transducer mounted on the machine. Digital readout and analogue output proportional to the measured value. Complete with built-in connector for over speed protection to be connected to the power supply unit. Power supply: 220 V, 50/60 Hz

## OPTICAL TRANSDUCER



### DL 2031M

Suitable to measure the revolving speed through a slotted optical switch with encoder disc, that can be also used for stroboscopic measurements. Connector for the transfer of the signal to the electronic tachometer DL 2025D. Prearranged for its assembling on the machines of the laboratory.

## CONTACT TACHOMETER



### DL 2026

Suitable for measuring the revolving speed with digital readout.

#### Technical features:

Measuring range: 0 to 19,999 rpm.

Power supply: 4 x 1.5 V batteries (UM 3), included

## OPTICAL TACHOMETER



### DL 2026R

Suitable for measuring the revolving speed with digital readout.

#### Technical features:

Measure range: 50 to 19,999 RPM

Power supply: 4 x 1.5 V batteries (UM3), included

Completed with 5 reflector sensors



# ELECTRIC MACHINES – EUROLAB – 0.3 kW

## CONTROL UNITS



### SPEED CONTROL OF AC MOTORS



#### DL 3309

The objective of this unit is to demonstrate the PWM technique for piloting a three-phase inverter used for the variable frequency control of the speed in a three-phase asynchronous motor.

Digital control inverter programmable from keyboard with on screen guide.

The speed control can be realized through manual control of a potentiometer or through closed loop tachometric control.

The acceleration and deceleration ramps can be separately regulated from 5 to 15 seconds approx.

Inversion of the sense of rotation. Instrument for the rotation speed.

#### Technical features:

- Power: 550 W
- Maximum output voltage: 3 x 220 V
- Rated current: 3 A
- Output frequency: 0 to 240 Hz
- V/F ratio: constant/squared.
- Direct current braking.
- Protections against minimum/maximum supply voltage,
- thermal protection and limitation of the output current.
- Power supply: 1 x 220 V + N, 50/60 Hz

#### Accessories:

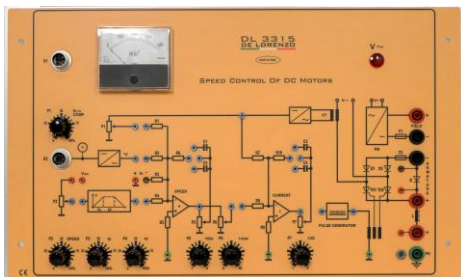
DL 30115 SQUIRREL CAGE THREE-PHASE ASYNCHRONOUS MOTOR

DL 30300 EDDY-CURRENT BRAKE

DL 1054 POWER SUPPLY FOR THE BRAKE

DL 1013A BASE

### SPEED CONTROL OF DC MOTORS



#### DL 3315

Semi-controlled single phase bridge. Suitable for the control of the speed of independently excited dc motors. The control is performed by regulating the conduction period of a single-phase semi-controlled thyristor bridge both in open and closed loop.

The controller consists of three control loops: speed, current and armature voltage.

#### Technical features:

- Power of the motor: 550 W max.
- Power of the converter: 900 W max.
- Armature voltage: 0 ÷ 180 V
- Armature current: 5 A max.
- Excitation voltage: 200 V, 0.5 A
- Power supply: 220 V, 50 Hz.

#### Accessories:

DL 30200 DIRECT CURRENT MOTOR SHUNT EXCITATION

DL 30300 EDDY CURRENT BRAKE

DL 1054 POWER SUPPLY FOR THE BRAKE

DL 1013A BASE

Suggested

DL 2315T ISOLATING TRANSFORMER





# ELECTRIC MACHINES – EUROLAB – 0.3 kW

## ACCESSORIES



### STARTING RHEOSTAT



#### DL 30200RHD

Step-variable rheostat for the half torque starting of the dc motors of the laboratory

### STARTING RHEOSTAT



#### DL 30120RHD3

Step-variable three-phase rheostat for the half torque starting of the slip ring motors of the laboratory

### EXCITATION RHEOSTAT



#### DL 30205

Suitable for the shunt excitation of the dc machines and of the synchronous machines of the laboratory

### EXCITATION RHEOSTAT



#### DL 30206

Suitable for the series excitation of the dc machines of the laboratory



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## STARTING AND SYNCHRONIZATION UNIT



### DL 30125

Starting rheostat for the three-phase slip ring induction motors and excitation device for the synchronization of the motor with the mains.

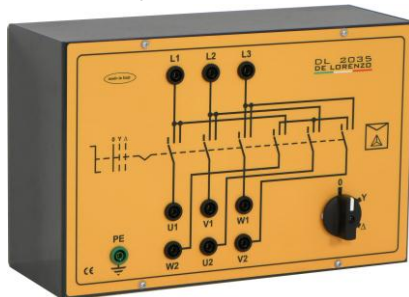
## STARTING AND SYNCHRONIZATION UNIT



### DL 30195

Starting rheostat for the three-phase synchronous machines and excitation device for the synchronization with the mains.

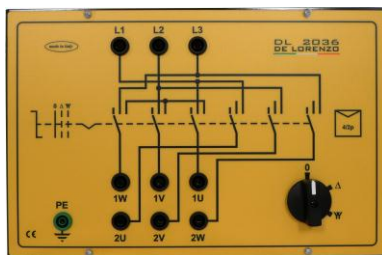
## STAR/DELTA STARTER



### DL 2035

Star/delta starter for the three-phase squirrel-cage induction motors

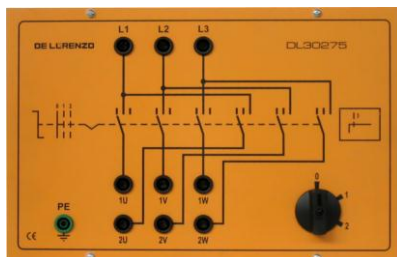
## POLE CHANGING UNIT



### DL 2036

Switch to change the number of poles in Dahlander type motors

## POLE CHANGING UNIT



### DL 30275

Switch to change the number of poles in motors with two separate windings



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## CAPACITOR UNIT



### DL 30135

Set of capacitors for either starting or steady-state running of the split-phase motor.

## RESISTOR UNIT



### DL 30135R

Auxiliary resistor for the starting of the split-phase motor.

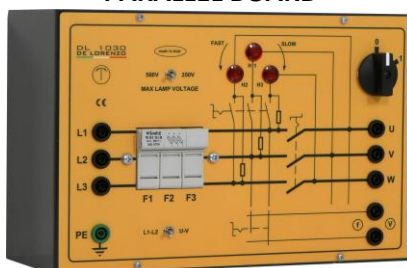
## INDUCTOR UNIT



### DL 30135L

Auxiliary inductor for the starting of the split-phase motor.

## PARALLEL BOARD



### DL 1030

Rotating light synchronoscope, complete with the accessories that are required to perform the parallel connection between synchronous generators or between the alternator and the mains

## FLYWHEEL



### DL 1041

Used in the deceleration tests on rotating machines for the calculation of the mechanical iron and copper losses at different excitations.



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## THREE-PHASE TRANSFORMER



### DL 1020

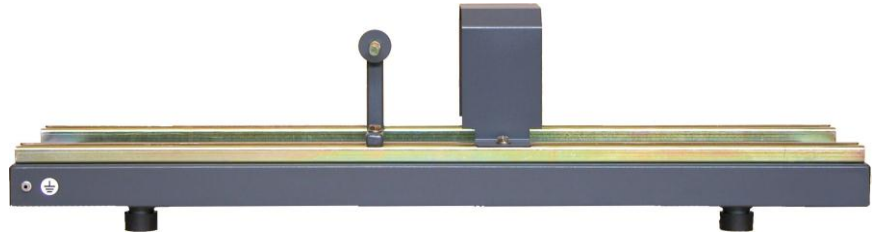
Used for the fine regulation of the voltage in the short circuit test of an induction motor.

## UNIVERSAL BASE

### DL 1013A

Duralumin alloy varnished structure mounted on anti-vibration rubber feet, provided with slide guides for the fixing of one or two machines and with a coupling guard.

Complete with a device for the locking of the rotor of the slip ring asynchronous machines in the short circuit test.



## UNIVERSAL BASE

### DL 1013B

Duralumin alloy varnished structure mounted on anti-vibration rubber feet, provided with slide guides for the fixing of up to three machines, and in particular of the Schrage motor, and with a coupling guard.

Complete with a device for the locking of the rotor of the slip ring asynchronous machines in the short circuit test.

## CONNECTING LEADS



### DL 1155A-SC

With safety plugs.

- 5 red leads, diameter 4 mm., length 25 cm., section  $0.75 \text{ mm}^2$
- 5 black leads, diameter 4 mm., length 25 cm., section  $0.75 \text{ mm}^2$
- 5 red leads, diameter 4 mm., length 200 cm., section  $0.75 \text{ mm}^2$
- 5 black leads, diameter 4 mm., length 200 cm., section  $0.75 \text{ mm}^2$
- 5 red leads, diameter 4 mm., length 50 cm., section  $2.5 \text{ mm}^2$
- 5 black leads, diameter 4 mm., length 50 cm., section  $2.5 \text{ mm}^2$
- 4 red leads, diameter 4 mm., length 100 cm., section  $2.5 \text{ mm}^2$
- 4 black leads, diameter 4 mm., length 100 cm., section  $2.5 \text{ mm}^2$
- 4 red leads, diameter 4 mm., length 200 cm., section  $2.5 \text{ mm}^2$
- 4 black leads, diameter 4 mm., length 200 cm., section  $2.5 \text{ mm}^2$
- 2 yellow-green leads, diameter 4 mm., length 50 cm., section  $2.5 \text{ mm}^2$
- 2 yellow-green leads, diameter 4 mm., length 100 cm., section  $2.5 \text{ mm}^2$
- 2 yellow-green leads, diameter 4 mm., length 200 cm., section  $2.5 \text{ mm}^2$



## LOADS AND RHEOSTATS

### CAPACITIVE LOAD



#### DL 30040C

- Single or three-phase capacitive step-variable load.
- Max. power: 3 x 105 VA
- Max. voltage: 220/380 V Δ/Y

### RESISTIVE LOAD



#### DL 30040R

- Single or three-phase resistive step-variable load.
- Max power: 3 x 110 W
- Max. voltage: 220/380 V Δ/Y

### INDUCTIVE LOAD



#### DL 30040L

- Single or three-phase inductive step-variable load.
- Max. power: 3 x 100 VA
- Max. voltage: 220/380 V Δ/Y

### MOTOR-DRIVEN RESISTIVE LOAD



#### DL 30045

Suitable for realizing resistive single or three-phase resistive loads through manual or automatic operation.

- Resistance: 3 x (3300÷480) Ω
- Current: 3 x 0.46 A
- Power supply: 220 V, 50/60 Hz

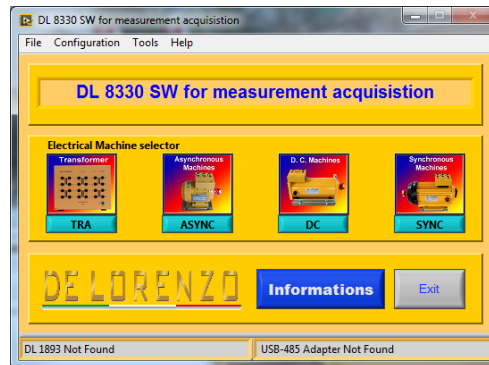




# ELECTRIC MACHINES – EUROLAB – 0.3 kW



## 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.



# ELECTRIC MACHINES – EUROLAB – 0.3 kW



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

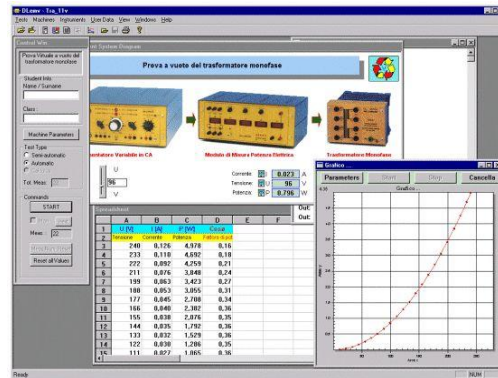


# ELECTRIC MACHINES – EUROLAB – 0.3 kW



SOFTWARE FOR THE ELECTRICAL MACHINES VIRTUAL LABORATORY

DL EMV



This e-Training Package transforms the Computer to an Electrical Machines Laboratory, where it is possible to perform all the educational activities which are related to the study and the experiments on the machines, without the need to have any hardware: everything is virtually simulated by PC.

It covers the following types of machines:

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

It is divided in 3 sections as follows:

- **Study:**

In the section relevant to the study of the electrical machines the following subjects are illustrated by means of the Internet World Wide Web hyper textual technique:

- their operating principle
- their basic structure
- their characteristics

In this section multimedia tools (drawings, images, photos) and hypertextual techniques are widely used to illustrate the various components of the electrical machines and to provide, every time, the simplest path for the use of the information.

- **Design:**

In the section relevant to the design, we simulate, virtually by PC, the process of designing and manufacturing the electrical machine.

Once inserted the main design parameters (e.g., rated power, rated current, frequency, etc.), the computer proceeds step by step to dimensioning the machine. Drawings of the electrical and mechanical details and cross-sections of the inside complete this section to illustrate in detail the construction process.

All the data (set up parameters and calculated results) can be saved in a personal file that forms an electrical database. The data can then be used for the practical realization of the machines.

For each machine it is necessary to input the design parameters while the manufacturing parameters are consequently calculated. All these parameters are used for the performance of the tests and for the actual realization of the electrical machine, if so required.

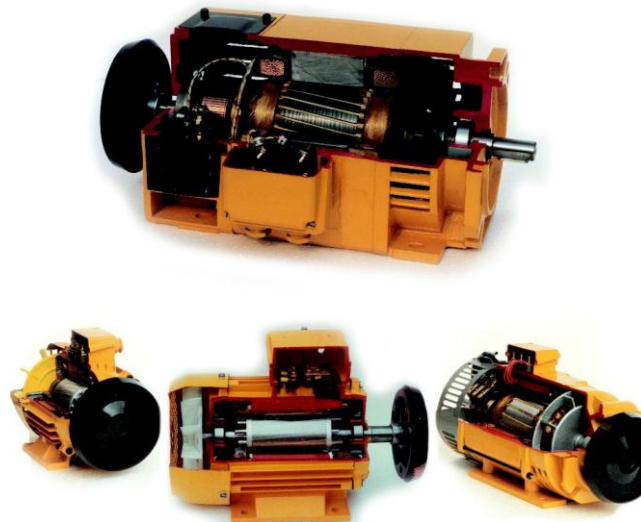
- **Operating tests:**

In the section relevant to the operating tests the program simulates, on the computer, the performance of the typical tests on the designed machine: no-load test, short-circuit test load test etc.

This allows an immediate check on the design targets of the machine, without actually constructing the machine.

In this phase the machine can be virtually coupled to other machines in the database (for instance for the load test). Each test is complete with the relevant description that illustrates the purpose of the test and the relevant operating mode.

During the execution of the test it is possible to check on the monitor the values of the quantities which are acquired by means of virtual instrumentation and it is possible to draw the typical graphs, by selecting the interesting quantities.



## CUT-AWAY MACHINES

De Lorenzo is able to provide the machines of the laboratory also in a cut-away version.  
To order them, just add to the code of the machine the suffix SEZ (for example: if DL 30115 is the code of the machine, DL 30115SEZ is the code of the same machine in the cutaway version).