The static machines are sized for a standard power with low operating voltage, while the windings are splitted in more sections to allow the maximum number of possible combinations.
For special requirements, the transformers can be also realized with different sizing powers and operating collages. An educational terminal board. to which the inside windings are connected, shows a clear synoptical diagram with industrial conventional indications.

DL 2080 THREE-PHASE TRANSFORMER
Core-type transformer with split windings.
It can be also used with single-phase supply.

Technical Characteristics:
- Rated power: 2.8 kV A
- Primary voltages: 2 x 190 V (phase)
- Secondary voltages: 2 x 70 V (phase)
- Frequency: 50/60 Hz

DL 2093 SINGLE-PHASE TRANSFORMER

Shell-type transformer with split windings.

Technical Characteristics:
- Transformer Rated power: 2 kV A
- Primary voltage: 220 V
- Secondary voltages: 2 x 26 V
- Frequency: 50/60 Hz

Accessories
Used to perform the practical tests described in the manual:
- Power supply DL 1059
- Basic bench DL 1001-1
- Connecting leads DL 1155A
- Electric measurements DL 10065N
- Computer interfacing and software (DL 1893 – DL 8330SW)

Educational objectives
Among the main practical tests that can be performed, we remind:
- ohmic resistance of windings
- transformation ratio
- polarity and connection group
- no-load test
- short-circuit test
- external characteristics
- conventional efficiency

THREE-PHASE ASYNCHRONOUS MOTORS

Uniplan

DL 2050 SQUIRREL CAGE THREE-PHASE ASYNCHRONOUS MOTOR

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

Technical Characteristics:
- Power: 3.5 kW
- Voltage: 220/380 V
- Current: 14/18 A
- Speed: 1450 rpm, 50 Hz

Accessories:
DL 2035 STAR/DELTA STARTER
Starter for three-phase squirrel-cage induction motor DL 2050.

DL 2051 THREE-PHASE SQUIRREL CAGE 2-SPEED ASYNCHRONOUS MOTOR

Induction motor with Dahlander type three-phase stator winding to realize either 2 or 4 poles and squirrel cage rotor.
Technical Characteristics:
- Power: 1.8/3 kW
- Voltage: 220 V
- Current: 9/11 A
- Speed: 720/1450 rpm, 50 Hz

Accessories:
DL 2036 POLE SWITCHING UNIT
Device suitable to change the number of poles in Dahlander motor DL 2051.

DL 2053A SLIP RING THREE-PHASE ASYNCHRONOUS MOTOR

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

Technical Characteristics:
- Power: 3 kW
- Voltage: 220/380 V
- Speed: 1500 rpm, 50 Hz
- Current: 10, 4/6 A

Accessories:
DL 2053RHD3 STARTING AND SYNCHRONIZATION MODULE
Starting rheostat for DL 2053A and synchronization device with mains frequency.
Possibility to use the motor as synchronous generator if driven by a motor.

DL 2037 STARTING RHEOSTAT
Starting rheostat for three-phase slip-ring induction motor.

DL 2054 SCHRAGE MOTOR

Variable speed three-phase motor, rotor supply, shunt excitation and movable brushes.
Technical Characteristics:
- Power: 0.4 ÷ 2.2 kW
- Voltage: 380 V
- Current: 6.2 A
- Speed: 400 + 2200 rpm, 50 Hz

Educational objectives

Among the main practical test that can be performed, we remind:

- measurement of the ohmic resistance of the windings
- measurement of the transformation ratio with slip-ring motor
- no-load test
- short-circuit test with locked rotor
- construction of Heyland circular diagram
- conventional efficiency
- real efficiency and electromechanical characteristics through direct tests with either electromagnetic brake or braking dc generator
- slip measurement

Accessories

Used to perform the practical tests described in the manual:

- Power supply DL 1059
- Universal base DL 1158
- Basic bench DL 1001-1
- Connecting leads DL 1155A
- Electric measurements 10065N
- Mechanical measurements:
  Braking device: see relevant page
  Speed measurement: DL 2025DN with DL 2031M, alternatively DL 2026 or DL 2026R
  Direct torque measurement: DL 2006CN with DL 2006F
  Direct speed, torque and mechanical power measurement: DL 10055 with DL 2006F
- Computer interfacing and software (DL 1893 – DL 8330SW)

DL 2057 DIRECT CURRENT MOTOR COMPOUND EXCITATION

It can also operate as generator.

Technical Characteristics:
- Power: 3 kW
- Voltage: 220 V
- Speed: 1500 rpm
- Excitation: 140V/0.7 A

Accessories:
DL 2040 STARTING RHEOSTAT
DL 2041 EXCITATION RHEOSTAT

DL 2058 DIRECT CURRENT MOTOR SERIES EXCITATION

It can also operate as generator.

Technical Characteristics:
- Power: 1.2 kW
- Voltage: 220 V
- Speed: 1000 rpm

Accessories:
DL 2042 STARTING RHEOSTAT
DL 2044 EXCITATION RHEOSTAT

DL 2055 DIRECT CURRENT MOTOR SHUNT EXCITATION

It can also operate as generator.

Technical Characteristics:
- Power: 3 kW
- Voltage: 220 V
- Speed: 1500 rpm
- Excitation: 200 V/1.4 A

Accessories:
DL 2040 STARTING RHEOSTAT
DL 2041 EXCITATION RHEOSTAT

DL 2059 DIRECT CURRENT GENERATOR COMPOUND EXCITATION

It can also operate as motor.

Technical Characteristics:
- Power: 2.4 kW
- Voltage: 220 V
- Current: 11 A
- Speed: 1420 rpm
- Excitation: 200 V/1.2 A

Accessories:
DL 2043 EXCITATION RHEOSTAT

DL 2061 DIRECT CURRENT GENERATOR SERIES EXCITATION

It can also operate as motor.

Technical Characteristics::

- Power: 2.4 kW
- Voltage: 220 V
- Current: 11 A
- Speed: 1420 rpm

Accessories:

DL 2044 EXCITATION RHEOSTAT

DL 2060 DIRECT CURRENT GENERATOR SHUNT EXCITATION

It can also operate as motor.

Technical Characteristics:

- Power: 2.4 kW
- Voltage: 220 V
- Current: 11 A
- Speed: 1420 rpm
- Excitation: 200 V/1.4 A

Accessories:

DL 2043 EXCITATION RHEOSTAT

DL 2064 POLYEXCITATION DIRECT CURRENT MACHINE

Suitable for operating as motor or as generator with compound, series or shunt excitation.

Technical Characteristics:

Generator

- Power: 2,4 kW
- Voltage: 190 V
- Current: 13A
- Speed: 1500 rpm

Motor

- Power: 3kW
- Voltage: 220 V
- Current: 15A
- Speed: 1700 rpm

Accessories:

DL 2040 STARTING RHEOSTAT
DL 2041 EXCITATION RHEOSTAT
DL 2044 EXCITATION RHEOSTAT

Educational objectives:

Among the main practical test that can be performed, we remind:

- resistance of windings
- mechanical and iron losses
- conventional efficiency
- magnetization, external and regulation characteristics of the generators
- electromechanical characteristics of the motors through direct method
- electronic speed control of motors

Accessories

Used to perform the practical tests described in the manual:

- Power supply DL 1059
- Universal base DL 1158
- Basic bench DL 1001-1
- Connecting leads DL 1155A
- Load DL 2090 and driving motor DL 2055 (only for the generators)
- Electric measurements DL 10065N
- Mechanical measurements: see three-phase synchronous machines

DL 2066A THREE-PHASE SYNCHRONOUS MACHINE

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

Technical Characteristics:

- Alternator: 2.4 Kv A
- Motor: 2 kW
- Voltage: 220/380 V Delta/Y
- Current: 6.3/3.6 A
- Speed: 1500 rpm, 50 Hz
- Excitation: 190V/0.6A

Accessories:
DL 2066 RHE EXCITATION RHEOSTAT
Cursor linear rheostat suitable for the
excitation of the synchronous machine.
DL 1030 PARALLEL BOARD

Educational objectives:
Among the main practical test that can be performed, we remind:

- measurement of the ohmic resistance of windings
- magnetization characteristic
- no-load losses through the auxiliary motor method
- short-circuit characteristic
- conventional efficiency
- external and regulation characteristics of the alternator through direct and indirect methods in accordance with Behn-Eschemburg or Potier
- mains parallel and regulation of the active and reactive power exchange
- Mordey "V" curve of synchronous motor
- electromechanical characteristics of the synchronous motor through direct method

Accessories
Used to perform the practical tests described in the manual:

- Power supply DL 1059
- Universal base DL 1158
- Basic bench DL 1001-1
- Connecting leads DL 1155A
- Driving motor DL 2053A with DL 2053RHD3, or motor DL 2055
- Load DL 2090
- Electric measurements DL10065N
- Mechanical measurements
  - Braking device
  - Speed measurement: DL 2025D with DL 2031M, alternatively DL 2026 or DL 2026R
  - Direct torque measurement: DL 2006C with DL 2006F
  - Direct speed, torque and mechanical power measurement: DL 10055 with DL 2006F
- Computer interfacing and software (DL 1893 – DL 8330SW)

DL 1059 MOBILE POWER SUPPLY

D.C. outputs obtained by means of a double three-phase bridge with ripple 4.2% max. Magneto-thermic protection. Provided with start push button with remote control switch, key-unlocked emergency pushbutton.

Technical Characteristics:

Fixed and variable outputs are obtained from one three-phase variator:

- DC fixed: 220V, 4.5A
- AC fixed: 3 x 380V, 20A
- DC variable: 0-250V, 28A
- AC variable: 3 x 0-260V, 17A

switchable with:

- DC fixed: 220V, 28A
- AC fixed: 3 x 220V, 17A
- DC variable: 0-250V, 4.5A
- AC variable: 3 x 0-440V, 13A

Input supply: 3-phase 380V + N + H

The brakes are designed for a braking power greater than the overload power of all the electric motors of the laboratory. An educational terminal hoard, to which the inside windings are connected, shows a clear synoptical diagram with industrial conventional indications.

DL 2006Um EDDY CURRENT BRAKE

Smooth cylinder rotor and salient poles stator. Complete with water level, arms, weights and balance weights for measuring the output torque of the motor.
Possibility of mounting a load cell.

Technical Characteristics:
•Power: 3 kW at 1500 rpm.
•Maximum speed: 4000 rpm.

Complete with:

DL 2006AL POWER SUPPLY
Variable power supply for brake DL 2006Um.
Supply: 220 V, 50 Hz.

DL 2062 DC DYNAMOMETER

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 Characteristics:
•Power: 2.4 kW
•Voltage: 220 V
•Current: 11 A
•Speed: 1420 rpm
•Excitation: 200 V /1.4 A

Accessories:
DL 2090 RESISTIVE LOAD
Suitable for realizing the electric load for the dynamometer DL 2062.

DL 2043 EXCITATION RHEOSTAT
Excitation rheostat for the dynamometer

Accessories
Used to perform the braking tests:
- Power supply DL 1059
- Universal base DL 1158
- Connecting leads DL 1155A
- Mechanical measurements
  Speed measurement: DL 2025DN with DL 2031M, alternatively DL 2026 or DL 2026R
  Direct torque measurement: DL 2006CN with DL 2006F
  Direct speed, torque and mechanical power measurement: DL 10055 with DL 2006F
- Computer interfacing and software (DL 1893 – DL 8330SW)

DL 10055 MECHANICAL POWER DIGITAL MEASURING UNIT

Suitable 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 braking systems. Digital readout of measured quantities and conditioning to voltage levels directly compatible with plotters. Interfaceable for data acquisition and automatic plotting of the electromechanical characteristics of the machines.
Connector for overspeed protection of motors for connection to power supply unit.

Technical features:
- Torque: 9.99 - 50.0 Nm (1 mV/dgt)
- Speed: 6000 rpm (1 mV/rpm)
- Power: 9990 W (1 mV/W)
- DC output: 0-220 V, 2 A
- Power supply: 220 V, 50/60 Hz

DL 10065N ELECTRIC POWER DIGITAL MEASURING UNIT

Measurement in direct current of: voltage, current, power and energy.
Measurement in alternate current of: voltage, current, power, active energy, reactive energy, apparent energy, cosphi and frequency.

Main technical features:
- DC voltage: 300 Vdc
- DC current: 20 Adc
- AC voltage: 450 Vac
- AC current: 20 Aac
- Power: 9000 W

Power supply: single-phase, 90-260 V, 50/60 Hz
Communication: RS485 with MODBUS RTU protocol

DL 2006CN TORQUE MEASURING UNIT

Suitable for measuring the motor output torque through load cell arranged on brake unit.

- Digital readout and analog output proportional to the measured value
- Power supply: 220 V, 50/60 Hz.

DL 2006F LOAD CELL

Resistance electronic strain gauge with 500 N range, to be arranged on the brake unit to detect the mechanical torque.

DL 2025DN ELECTRONIC TACHOMETER

Suitable for measuring the revolving speed through optical transducer DL 2031M fixed to the machine.
Digital read out and analog output proportional to the measured value. Complete with connector for protection against overspeed to be connected to the power supply unit.
Power supply: 220 V, 50 Hz.

DL 2031M OPTICAL TRANSDUCER

Suitable to point out the revolving speed through a slotted optical switch with encoder disc, used also for stroboscope measurements.
Complete with built-in signal transmission socket to DL 2025D.

DL 2026 CONTACT TACHOMETER

Suitable for measuring the revolving speed with digital readout.
Measuring range: 0 to 19,999 rpm.
Power supply: 4 x 1.5 V batteries (UM 3), included.

DL 2026R OPTICAL TACHOMETER

Suitable for measuring the revolving speed with digital readout.
Measuring range: 50 to 19,999 rpm. P
power supply: 4 x 1.5 V batteries (UM 3), included.
Complete with 5 reflectors.

DL 2091 INDUCTIVE LOAD

Inductive single-three phase load, step variable by means of three switches. In metal case with synoptical diagram on the front panel.

Suitable for series, parallel, star and delta connections

•Max power: 3x900 V Ar
•Voltage: 220/380 VΔ/Y

DL 2090 RESISTIVE LOAD

Resistive single-three phase load, step variable by means of three switches. In metal case with synoptical diagram on the front panel.

Suitable for series, parallel, star and delta connections.
•Max power: 3 x 1.2 kW
•Voltage: 220/380 V

DL 2021 CAPACITIVE LOAD

Capacitive single-three phase load, step variable by means of three switches. In metal case with synoptical diagram on the front panel.
Suitable for series, parallel, star and delta connections.

•Max power: 3 x 900 V Ar
•Voltage: 220/380 V Δ/Y

DL 2037 STARTING RHEOSTAT

Starting rheostat for three-phase slip ring asynchronous motor DL 2052.

DL 2040 STARTING RHEOSTAT

Step-variable rheostat for 50% torque starting the 3 kW dc motors.

DL 2042 STARTING RHEOSTAT

Step-variable rheostat for 50% torque starting the 1.2 kW DC motors, series excitation.

DL 2053RHD3 STARTING AND SYNCHRONIZATION MODULE

Starting rheostat for DL 2053A and synchronization device with mains frequency. Possibility to use the motor as synchronous generator if driven by a motor.

DL 2041 EXCITATION RHEOSTAT

Suitable for the shunt excitation of direct current motors.

DL 2043 EXCITATION RHEOSTAT

Suitable for the shunt excitation of direct current generators.

DL 2044 EXCITATION RHEOSTAT

Suitable for the series excitation of the direct current machines.

DL 2066RHE EXCITATION RHEOSTAT

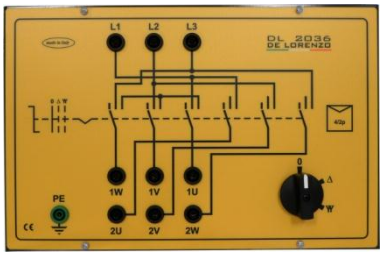
Cursor linear rheostat for the excitation of the synchronous machine.

DL 2035 STAR/DELTA STARTER

Star/delta starter for three-phase squirrel cage induction motor.

DL 2036 POLE SWITCHING UNIT

Device suitable to change the number of poles in Dahlander motor.



DL 1030 PARALLEL BOARD

Rotating light synchronoscope to perform the parallel connection between the alternator and mains.

DL 2070 ELECTROMAGNETIC JOINT

The joint, inserted between two machines, allows the coupling and the decoupling of two rotating machines.

Electric power at the electromagnet: 35 W
Max. speed: 3000 rpm
Nominal torque: 75 Nm
Supply voltage: 24 Vac

DL 1158 UNIVERSAL BASE

Realized with 20/10 steel tubular structure. It is provided with: self-orienting wheels with locking device, slides for easy coupling, locking system for locked rotor test and coupling accessories.

DL 1158M UNIVERSAL BASE FOR THREE MACHINES

It allows the coupling and the decoupling of three electric machines.

DL 8330SW SOFTWARE FOR AUTOMATIC DATA ACQUISITION

Software able to modify the parameter under control through motor driven devices and to record the test data through measuring units arranged for interfacing, with data post processing for graph or table display.

DL 1893 INTERFACE UNIT

Used to interconnect real world signals to a data acquisition system.
Input/output 2 mm terminals.
Technical features:
• 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

DL 1059A MOBILE AUTOMATIC POWER SUPPLY

The outputs are provided with magnetothermic protection and are of unloseable connecting terminals type.
General protection with differential magneto thermal switch, key-unlocked emergency pushbutton.
Power: 380 V + H + N.

Technical features
Mains outputs:
-single-phase 10/16 A
-three-phase 16A
DC variable output: 0-250V, 2 A
Possibility to be driven in manual or automatic mode through software.
Fixed and variable outputs are obtained from a three-phase variator:
-AC variable 0-240 V, 22 A switchable in:
-AC variable 0-440 V, 13 A
-DC variable 0-300 V, 30 A
Max. ripple 4.2%

DL 2094 SINGLE THREE- PHASE MOTOR DRIVEN VARIABLE RESISTIVE LOAD

Within the automatic system it is used as a load for the dynamometer and the alternator. It is able to dissipate a maximum power of 3.3 kW, 220/380 V. It is possible to vary the resistance by means of a motor driven system that can be controlled either manually, through knobs placed on the front panel, or automatically, when interfaced to the DL 1893.

DL 1067S MOTOR-DRIVEN POWER SUPPLY UNIT WITH AUTOMATIC REGULATION

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

DL 10055 MECHANICAL POWER DIGITAL MEASURING UNIT

Suitable 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 braking systems. Digital readout of measured quantities and conditioning to voltage levels directly compatible with plotters. Interfaceable for data acquisition and automatic plotting of the electromechanical characteristics of the machines.
Connector for overspeed protection of motors for connection to power supply unit.

Technical features:
- Torque: 9.99 - 50.0 Nm (1 mV/dgt)
- Speed: 6000 rpm (1 mV/rpm)
- Power: 9990 W (1 mV/W)
- DC output: 0-220 V, 2 A
- Power supply: 220 V, 50/60 Hz

DL 10065N ELECTRIC POWER DIGITAL MEASURING UNIT

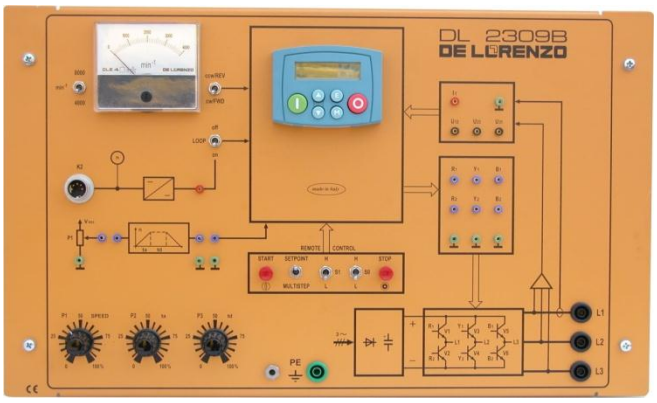
Measurement in direct current of: voltage, current, power and energy.
Measurement in alternate current of: voltage, current, power, active energy, reactive energy, apparent energy, cosphi and frequency.

Main technical features:
- DC voltage: 300 Vdc
- DC current: 20 Adc
- AC voltage: 450 Vac
- AC current: 20 Aac
- Power: 9000 W

Power supply: single-phase, 90-260 V, 50/60 Hz
Communication: RS485 with MODBUS RTU protocol

DL 2309B SPEED CONTROL OF AC MOTORS

Electronic frequency converter for the open and closed loop speed regulation of a three-phase induction motor.
Potentiometers for speed setting and acceleration and deceleration ramps.
Reversal in the direction of rotation.



Technical features:
- Power: 4 kW
- Nominal current: 9 A
- Output frequency: 0 to 240 Hz
- Dynamic braking
- Complete with analogue meter for rotating speed and with electronic protections against overvoltage, maximum current and over temperature.

DL 2308B SPEED CONTROL OF DC MOTORS

System for the speed control of DC motors with a separate excitation through a totally controlled thyristors bridge.
Max. power 3 kW.

Composed of:
- a totally controlled single-phase bridge, for the open and closed loop control
- three control loops (speed, current and armature voltage)
- analogue meters of current, speed and voltage

Technical features:
- Power: 3 kW
- Fixed excitation voltage: 220V/1A
- Variable excitation voltage: 0 -^ 220V/1.5A
- Armature current: 20 A max.
- Power supply: 220V, 50Hz.

DL 2315B SPEED CONTROL OF DC MOTORS

This unit is suitable for the speed control of the dc motors with independent excitation. The control is made by regulating the conduction period of a thyristor bridge of the semi-controlled single-phase type, both in open and in closed loop.
The control loops are three: speed, current and armature voltage.

Technical features:
- Power of the motor: 3 kW max.
- Power of the converter: 3.6 kW
- Armature voltage: 0 + 180V
- Armature current: 20 A max.
- Excitation voltage: 200V - 2A