

2.1 - Experiments and studies with EMMS

D.C. Motors & Generators

- Connection and study of industrial type of d.c. machines operation, used as motors and generators;
- Operation with starter and field regulator;
- Reversing rotation and speed regulation;
- Measure of armature and excitation voltage and current;
- Speed and torque detection;
- Characteristic with variable R-load;
- Load characteristics with mechanical or magnetic brake;
- Adsorbed power, mechanical losses, iron losses, copper losses, efficiency;
- Comparison between shunt, series and compound connections;
- Shunt connection of two generators;
- Operation with electronic speed control;

A.C. 3-phase Machines

- Operation with connection to power;
- Starting techniques: star-delta circuits, series resistance auto-transformer starter;
- Reversing rotation and speed adjustment;
- Measure of current and voltage values;
- Load characteristics (recording with an electromagnetic brake or magnetic powder brake or DC brake generator);
- Draw of circular diagram and its practical use;
- Real and reactive power, mechanical power;
- Power factor ($\cos \varphi$) efficiency and slip;
- Adsorbed power;
- Output power regulation;
- Shunt connection and synchronisation between two three-phase synchronous generators;
- Main synchronisation techniques;
- "V" characteristics: stability – limits;
- Operation as rotating capacitor / inductor;
- Three-phase shifter operation;
- Operation with electronic speed control;
- Fault finding:
 - Winding break in a coil;
 - Winding to winding short;
 - Coil to coil short;
 - Insulation fault.

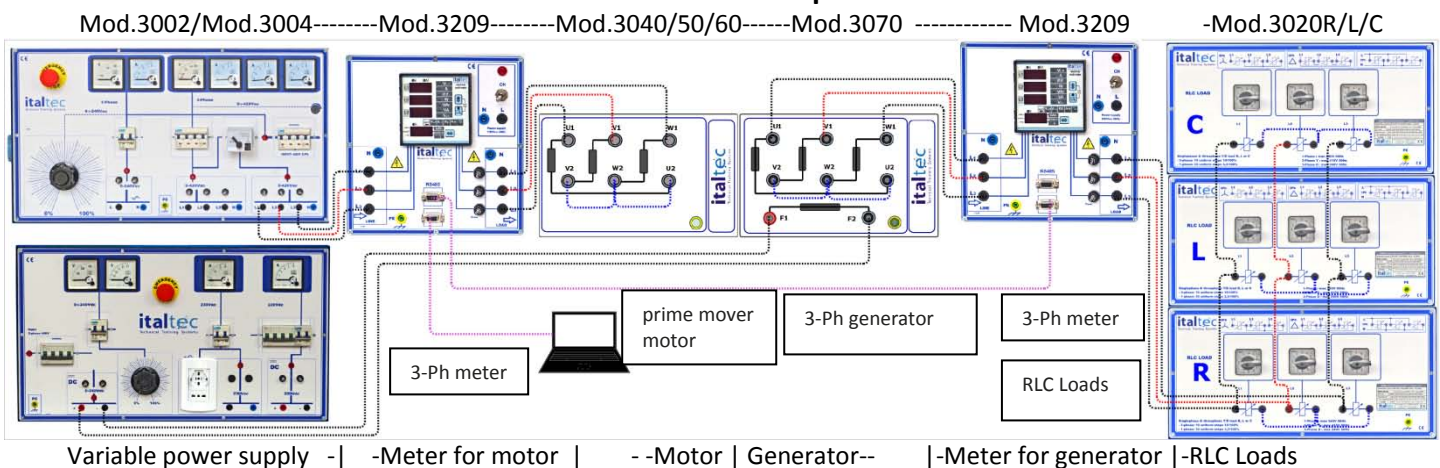
A.C. Single Phase Motors

- Operation with connection to power
- Starting techniques according to the machine type
- Reversing rotation and speed adjustment
- Influence of brush position on the speed;
- Measure of current and voltage values;
- Load characteristics (recording with an electromagnetic brake or magnetic powder brake).

1-PH / 3-PH Transformers

- Operation with connection to power
- Star-Delta, Zig-Zag and Scott connections
- Current and voltage measure at open circuit
- Current and voltage measure at full load and short circuit conditions;
- Shunt connection between two transformers;
- Load distribution.

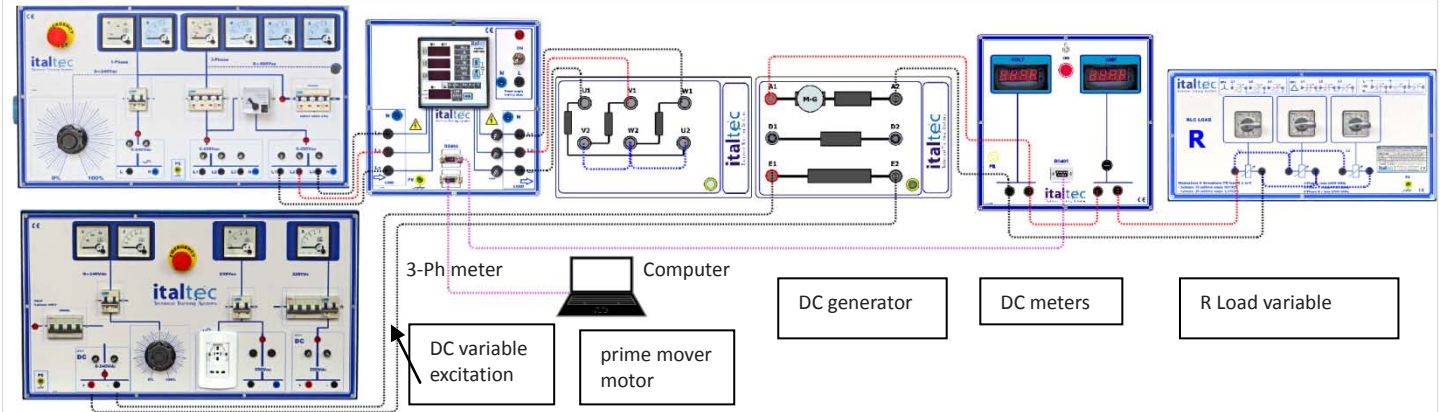
Connection example 1



2.2 - Experiments and studies with EMMS

Connection example 2

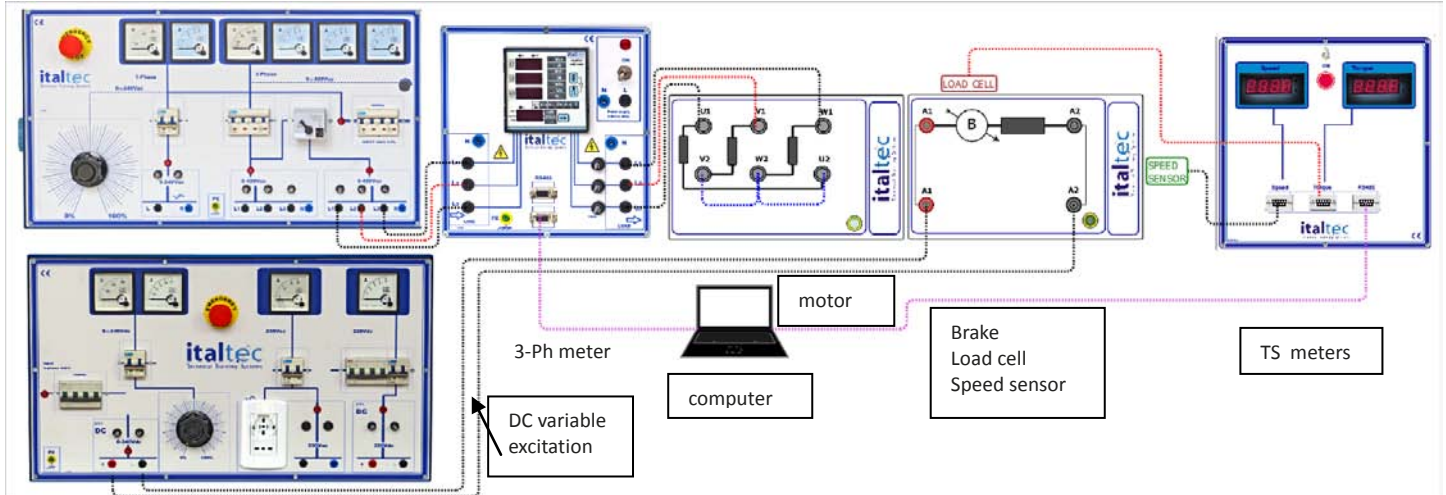
Mod.3002/Mod.3004-----Mod.3209-----Mod.3040/50/60----- Mod.3140/50/60---- Mod.3203-02 -Mod.3020-10R



Variable power supply - | -Meter for motor | - -motor | generator-- | -Meter for generator | -RLC Loads

Connection example 3

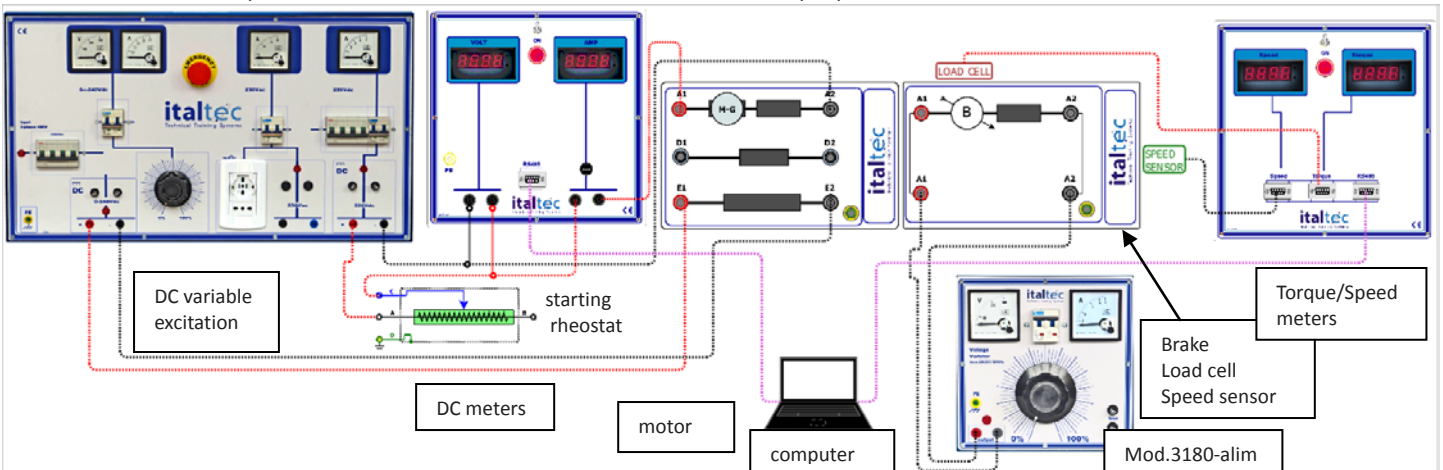
Mod.3002/Mod.3004----- -Mod.3209-- ----- --Mod.3040/50/60----- -Mod.3180 ----- Mod.3203-07



Variable power supply - | -Meter for motor | - -motor | brake-- | -Torque & speed meter

Connection example 4

Mod.3002/Mod.3004----- -Mod.3203-02-- --Mod.3140/50/60----- -Mod.3180 ----- Mod.3203-07



Variable power supply - | -Meter for motor | - -motor | brake-- | -Torque & speed meters