

italtec

Technical Training Systems

Extra-Low Voltage (ELV) Dissectible AC&DC Machines Training System MOD.1002



DIDACTICAL PURPOSE

MOD.1002 includes all rotors and stators and required components for mounting AC&DC machines, measuring instruments and all accessories to develop a wide range of experiments.

The system provides a hands-on approach for the understanding of electrical machines principles, suitable for training of technicians and undergraduate engineers.

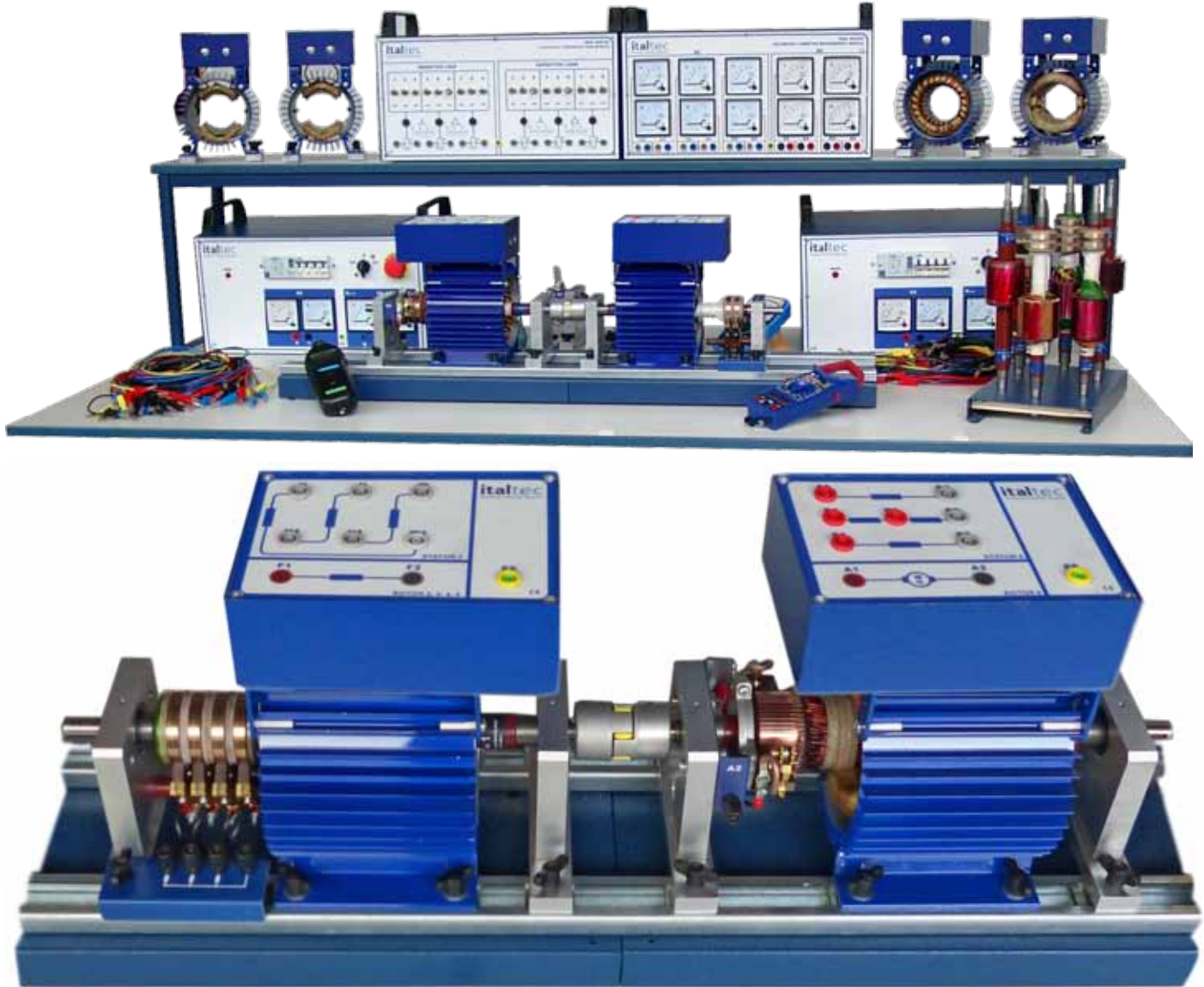
FEATURES

- Rugged, high-quality components designed for hands-on training purposes
- Complete assembly view for each machine
- No tools required for machine assembly
- Two machines can be assembled at the same time
- Fifteen different machines can be constructed

LIST OF EQUIPMENT

- 1- DC Generators
- 2- DC Motors
- 3- Single Phase Alternators
- 4- Single Phase Motors 2 & 4 pole
- 5- Single Phase Commutator Motors
- 6- Single Phase Synchronous Motors 2&4 pole
- 7- Three Phase Alternators
- 8a- 3-Ph Induction Motor Sq.Cage 2&4 pole
- 8b- 3-Ph Induction Motor Slip Ring 2&4 pole
- 9- Three Phase Synchronous Motors
- 10- Variable AC/DC Power Supply
- 11 -Analog AC/DC instruments
- 12- RLC Loads
- 13- Full set of instruments & accessory

MOD.1002 DISSECTIBLE AC&DC MACHINES TRAINER



The complete Dissectible Machines System includes all the equipment required to perform the full range of student assignments. **MOD.1002** includes all rotors and stators and required components for mounting AC&DC machines, measuring instruments and all accessories to develop a wide range of experiments. The system provides a hands-on approach for the understanding of electrical machines principles suitable for training of technicians and undergraduate engineers. A wide range of options available allow users to customize the system exactly as per their own needs.

Model **MOD.1002** dissectible machines is an electromechanical trainer that provides hands-on instruction in the construction and operation of DC and AC rotating machines. It employs training equipment that has characteristics similar to industrial ones. The dissectible machines are assembled from a complete set of components, including stators, rotors, armatures, rheostats, and capacitors. The components allow students to carry on different machines at the same time; many different machines can be carried out with the supplied components.

Machine windings are connected to the faceplate of the module with safety bushes, allowing for the correct interconnection of different types of machines.

Schematic of connections are silkscreened on the educational panel supplied with each stator. Once assembled and plugged to the power supply or measuring instruments, machines can be coupled together to demonstrate electrical and mechanical characteristics. Laboratory procedures in the correlated courseware guide students through assembly and disassembly operation of the various machines. Each component is clearly identified, and a complete assembly drawings are supplied for each machine.

The trainer **MOD.1002** allows to understand the electrical machines, separate into its main parts and assembling them for getting a full functional machine.

The complete system includes a wide range of equipment, tools and accessories to perform many experiments and to investigate in a wide range of concepts.

Security

Extra-low voltage (ELV) is an electricity supply voltage in a range which carries a low risk of dangerous electrical shock. There are various standards that define extra-low voltage. The International Electrotechnical Commission member organizations and the UK IET (BS 7671:2008) define an ELV device or circuit as one in which the electrical potential between conductor or electrical conductor and earth (ground) does not exceed 50 V a.c. or 120 V d.c.

Mod.1002-F is a full configuration enough for two group of students, working at the same time.

Mod.1002-B is a basic configuration with AC and DC machine.

It is possible to upgrade from basic to full thank to Mod.1002-C.

For more details about configurations see **last page**.

1) "RT" ROTOR SERIES

- RT-1 : 3 Rings Fixed Centre Rotor



RT-2 : 2 Rings Winding Rotor



- RT-3 : 2 Salient-Pole Rotor



RT-4 : 2 Pole Permanent Magnet Rotor



- RT-5 : Squirrel Cage Rotor



- RT-6 : AC Commutator Winding Rotor



- RT-7 : 4 Salient-Pole Rotor



- RT-8 : D.C. Winding Rotor



- RT-9 : 2 Pole Reluctance Rotor



- RT-10 : 4 Pole Reluctance Rotor

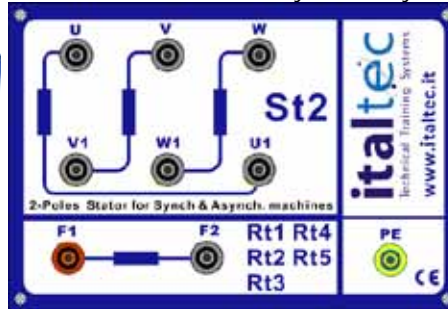


2) "ST" STATOR SERIES

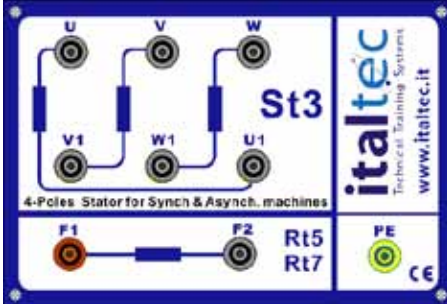
- ST-1 : Alternator/Motor 1Ph Stator



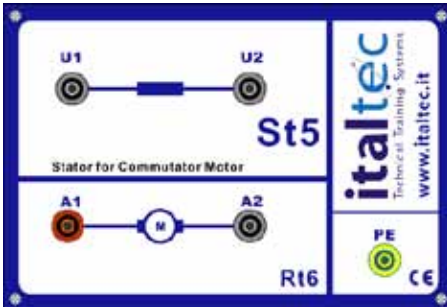
ST-2 : 2-Poles Stator for Synch & Asynch. machines



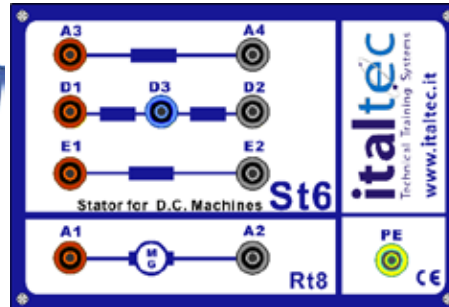
- ST-3 : 4-Poles Stator for Synch & Asynch. machines



- ST-5 : Stator for Commutator Motor



- ST-6 : Stator for all D.C. Machines



3) "SZ" BRUSHES SERIES with support

- SZ1: Brushes for DC Machines (RT-08)



- SZ2: Brushes AC Generators (RT-02/03/07)



- SZ3: Brushes for AC Wound Rotor Machines (RT-01)



- SZ4: Brushes for AC Commutating Motor (RT-06)

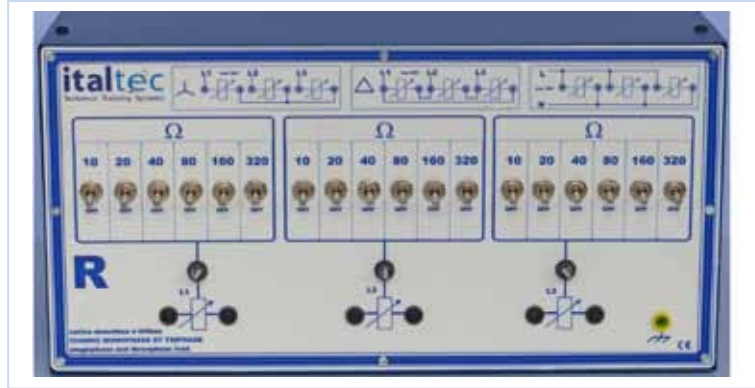


4) ACCESSORIES

4.1a- Mod.0020-R

-Variable Resistor Load

(3&1Ph, DC, 15/45 steps/values)
3x 10-20-40-80-160-320 Ω



4.1b- Mod.0020-LC

-Variable Inductive Load

(3/1PH 15/45 values)
3x 10-20-40-80mF



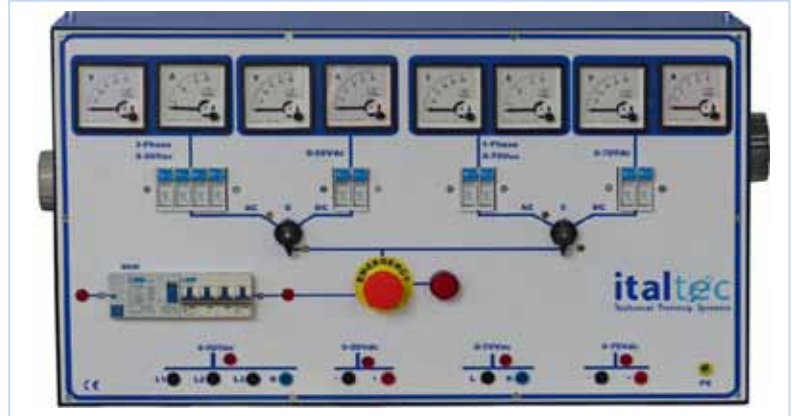
-Variable Capacitor Load

(3&1Ph 15/45 steps/values)
Outputs on 4mm safety sockets
3x 1-0,5-0,25-0,125Henry

4.2- Mod.0000-AL02

Power supply 1&3-Phase AC/DC with two variable output

- Desk top metallic case container
- Two independent manual knob for voltage variation
- Variable 3-phase output 0-50V/15A
- or- Variable DC output 0-70V/10A selectable by switch
- Variable 1-phase output 0-60V/15A
- or- Variable DC output 0-60V/10A selectable by switch
- Analog V/A instruments for each output
- Electrical protections; - Emergency push button
- Outputs on 4mm safety bushes
- Differential and magneto-thermal protections
- 3phase 380/400Volt 50/60Hz input



4.3- Mod.0032-AV

Set of Modular Analogue Instruments

- N. 2 DC Voltmeters 0-50, 0-100V
- N. 2 DC Ammeters 0-10A
- N. 3 AC Voltmeters 0-100V
- N. 3 AC Ammeters 0-5A, 0-10A, 0-20A
- Outputs on 4mm safety sockets



4.4- Mod.1002-SY

Starting & synchronization system for 3-phase synchronous motor



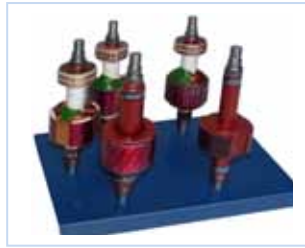
4.5- Mod.1002-CND

Set of 30 Safety Leads 4mm in different colors
n.10 x 25cm, n.10 x 50cm, n.10 x 100cm



4.6- Mod.1002-KIT01

Stand for six rotors



4.7- Mod.1002-KIT02

Four support for bearing and rotor

4.8- Mod.6030-BL-2

Mechanical Machines Coupling Base & Guide



4.9- Mod.CM301

Hand Digital clamp ammeter

- DC Voltage: 2V ÷ 1000V
- AC Voltage: 200V ÷ 750V
- AC Current: 200A ÷ 1000A
- Resistance: 200Ohm ÷ 200MOhm



4.10- Mod.DT26

Hand Digital Tachometer

- range: 2.5 ÷ 99,999r/min (photo)
- range: 2.5 ÷ 19,999r/min (touch)
- resolution: 0.1/t - accuracy: ±(0.05%n+1d)
- memory: max/min/last value
- power supply: 4 x 1.5v aa battery

4.11- Mod.DMM39 - Digital Multimeter

- DC Voltage: 200mV ÷ 1000V ±(0.5%+ 1dgt) -- AC Voltage: 200mV ÷ 750V ±(0.8%+3dgt)
- DC Current: 20uA ÷ 10A ±(0.8%+1dgt) -- AC Current: 20uA ÷ 10A ±(1.0%+3dgt)
- Resistance: 200 Ohm ÷ 200MOhm ±(0.8%+1dgt)
- Diode Test /- Transistor Test
- Continuity Buzzer



4.12- Mod.DMM805

Digital Multimeter

- DC Voltage: 200mV ÷ 1000V ±(0.5%+ 1dgt)
- AC Voltage: 200mV ÷ 750V ±(0.8%+3dgt)
- DC Current: 20uA ÷ 20A ±(0.8%+1dgt)
- AC Current: 20uA ÷ 20A ±(1.0%+3dgt)
- Resistance: 200 Ohm ÷ 200MOhm ±(0.8%+1dgt)
- Diode Test /- Transistor Test
- Continuity Buzzer
- Capacity: 20nF ÷ 200nF
- Inductance: 2mH ÷ 20H
- Temperature: -20 °C ÷ 1000 °C
(thermocouple included)



COMPOSITION & CONFIGURATIONS AVAILABLE

1) Full 2) Basic 3) C

STATOR / ROTOR /BRUSH COMPOSITION TABLE	Stator	Rotor	Brush	Full	Bas	C
1-DC Generators: - Shunt wound - Separately excited - Series wound - Compound wound	ST-6 ST-6 ST-6 ST-6	RT-8 RT-8 RT-8 RT-8	SZ-1 SZ-1 SZ-1 SZ-1	x x x x	x x x x	
2-DC Motors: - Shunt wound - Separately excited - Series wound - Compound wound	ST-6 ST-6 ST-6 ST-6	RT-8 RT-8 RT-8 RT-8	SZ-1 SZ-1 SZ-1 SZ-1	x x x x	x x x x	
3-Single Phase Alternators: - Salient-pole rotor, brushless - Rotating field, 4 rings rotor - Rotating armature, 4 rings rotor - Rotating field, 2 rings rotor - Rotating armature, 2 rings rotor - Rotating field, Salient-Pole rotor	ST-1 ST-1 ST-1 ST-1 ST-1 ST-1	RT-4 RT-1 RT-1 RT-2 RT-2 RT-3	- SZ-3 SZ-3 SZ-2 SZ-2 SZ-2	x x x x x x	x x x x	 x x x
4-Single Phase Motors: - 2-pole, squirrel cage, split phase capacitor start / run - 2-pole, squirrel cage, split phase resistor start / run	ST-1 ST-1	RT-5 RT-5		x x	x x	
5-Single Phase Commutator Motors: - Repulsion, variable brush angle	ST-5	RT-6	SZ-4	x		x
6-Single Phase Synchronous Motors: - 4-pole, rotating field, salient-pole rotor - 2-pole, rotating field - 2-pole, rotating field, salient-pole rotor	ST-3 ST-2 ST-2	RT-7 RT-2 RT-3	SZ-2 SZ-2 SZ-2	x x x	 x x	 x x
7-Three Phase Alternators: - 2-pole, rotating field, star - 2-pole, rotating field, delta - 2 pole rotating field, star, salient-pole rotor - 2 pole rotating field, delta, salient-poles rotor - 2 pole rotating field, star, permanent magnet rotor - 4-Poles star, salient-poles rotor	ST-2 ST-2 ST-2 ST-2 ST-2 ST-3	RT-2 RT-2 RT-3 RT-3 RT-4 RT-7	SZ-2 SZ-2 SZ-2 SZ-2 - SZ-2	x x x x x x	x x x x x	 x
8-Three Phase Induction Motors: - 2-pole squirrel cage, star - 2-pole squirrel cage, delta - 4-pole squirrel cage, star - 4-pole squirrel cage, delta - 2-pole slip-ring, star - 2-pole slip-ring, delta - 4-pole slip-ring, star - 4-pole slip-ring, delta	ST-2 ST-2 ST-3 ST-3 ST-2 ST-2 ST-3 ST-3	RT-5 RT-5 RT-5 RT-5 RT-1 RT-1 RT-1 RT-1	 SZ-3 SZ-3 SZ-3 SZ-3	x x x x x x x x	x x 	 x x x x x
9-Three Phase Synchronous Motors: - 2-pole, rotating field, star - 2-pole, rotating field, delta - 2-pole, rotating field, salient-pole rotor, star - 4-poles stator, salient-pole rotor	ST-2 ST-2 ST-2 ST-3	RT-2 RT-2 RT-3 RT-7	SZ-2 SZ-2 SZ-2 SZ-2	x x x x	x x x	 x
10-Three Phase Reluctance Synchronized Motors: - 2-poles, star - 2-poles, delta - 4-poles, star - 4-poles, delta	ST-2 ST-2 ST-3 ST-3	RT-9 RT-9 RT-10 RT-10	SZ-2 SZ-2 SZ-2 SZ-2	x x x x	 	x x x x
MOD.1002-F 1) <u>F</u>ull	5	10	4			
MOD.1002-B 2) <u>B</u>asic	3 (1,2,6)	5 (2...5,8)	3			
MOD.1002-C 3) <u>C</u> (upgrade Basic to Full)	2 (3,5)	5 (1,6,7,9,10)	1			

COMPOSITION & CONFIGURATIONS AVAILABLE

1)Full 2)Basic 3)C

ACCESSORY COMPOSITION TABLE		Full	Bas	C
Mod.0000-AL02	Power supply 1&3-Phase AC/DC with two variable output	2	1	1
Mod.0032-AV	Module with 10 analog instruments	2	1	1
Mod.0020-LC	Inductive, Capacitive loads	2	1	1
Mod.0020-R	Resistive loads	2	1	1
Mod.1002-SY	Starting & synchronization for 3-ph sync. motor	1	1	0
Mod.1002-CND	Set of 30 safety leads 4mm - different colors (25, 50, 100cm)	2	1	1
Mod.6030-BL-2	Mechanical machines coupling base & guide for two stators/rotors	2	1	1
Mod.1002-KIT01	Four support for bearing and rotor	2	1	1
Mod.1002-KIT02	Stand for six rotors	2	1	1
Mod.CM301	Hand digital clamp ammeter	2	1	1
Mod.DT26	Hand digital tachometer	2	1	1
Mod.DMM39	Digital multimeter	2	1	1
Mod.DMM805	Digital multimeter	1	0	1

Mod.1002-F is a full configuration enough for two group of students, working at the same time.

Mod.1002-B is a basic configuration with AC and DC machine.

It is possible to upgrade from basic to full thank to Mod.1002-C.