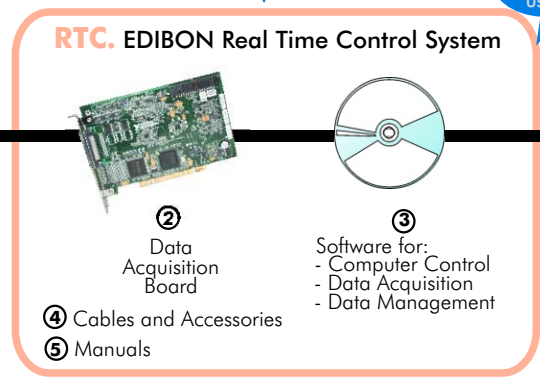


Always included in the supply:

EDIBON PATENT

Teaching Technique used

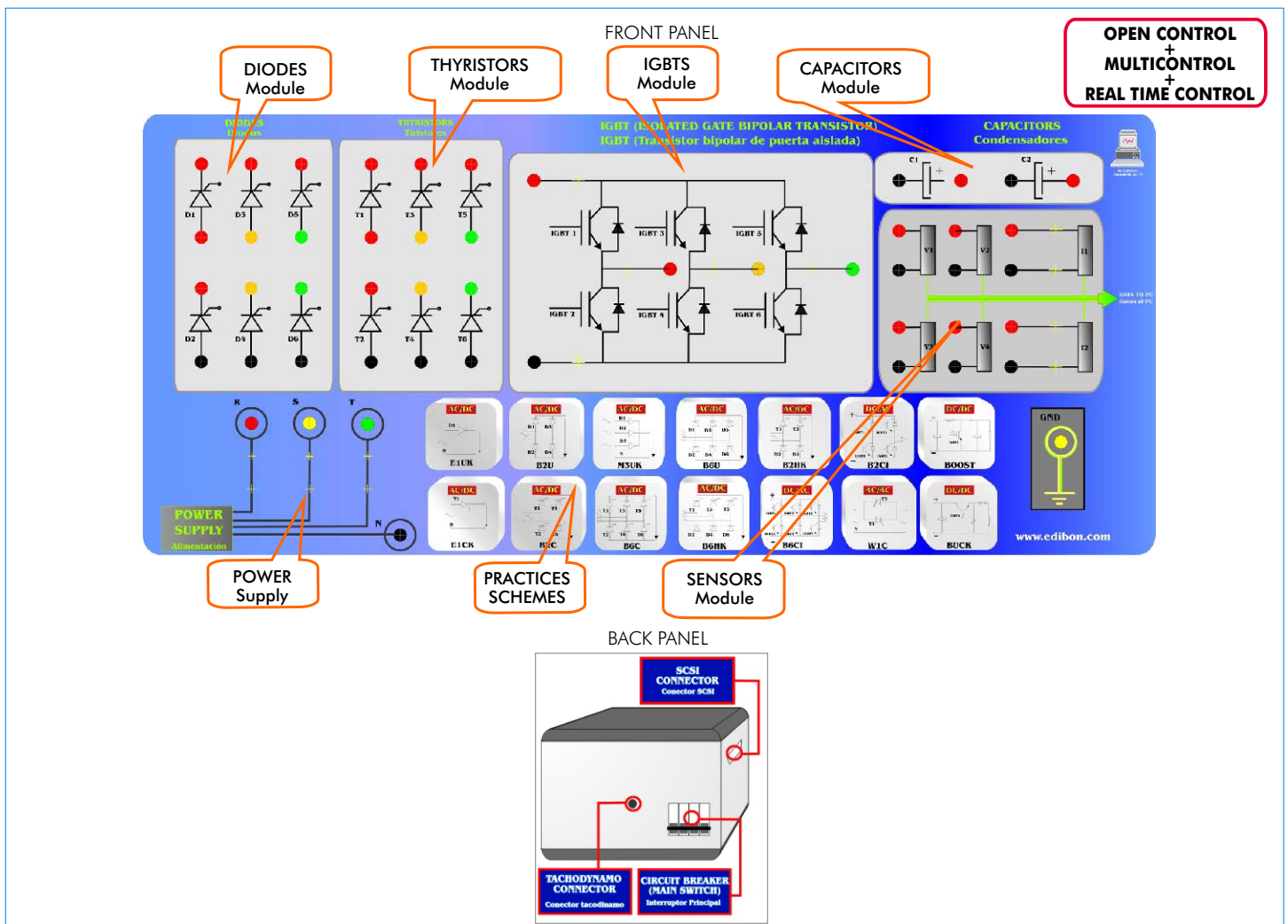


① Unit: TECNEL. Teaching Unit for the Study of Power Electronics, including Control Interface. (Converters: DC/AC+ AC/DC+DC/DC+AC/AC).

www.edibon.com

- Products
- Products range
- Units
- 2.-Electronics

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



ISO:9001-2000 Certificate of Approval. Reg. No. E204034



European Union Certificate



Certificates ISO 14001: 2004 and ECO-Management and Audit Scheme (environmental management)



Worlddidac Quality Charter Certificate Worlddidac Member

DESCRIPTION

TECNEL is a Unit with Computer Control and Data Acquisition System designed to study the basis of Power Electronics. It allows students to study AC/DC, DC/AC, DC/DC, AC/AC converters.

Basically, it consists of three modules of power electronics elements: diodes, thyristors and IGBTs.

SPECIFICATIONS

Items always included in the supply:

① **TECNEL. Unit:**

Diagram in the front panel with similar distribution that the elements in the real unit.

Steel box.

Front panel:

Diodes module: 6 diodes.

Thyristors module: 6 thyristors.

IGBTs Module: 6 IGBTs.

Snubber net.

Sensors module:

4 Voltage sensors.

2 Current sensors.

Power supply connections for Vr, Vs, Vt, Neutral and Ground.

Practices schemes.

Back panel:

Data Acquisition Board Connector (SCSI connector).

Tachodynamo connector.

Main fuses (Vr, Vs, Vt) and LEDs.

Circuit breaker (main switch).

Single-phase driver.

Three-phase driver.

IGBT driver.

TSI board.

PIC board.

SKHI61 board.

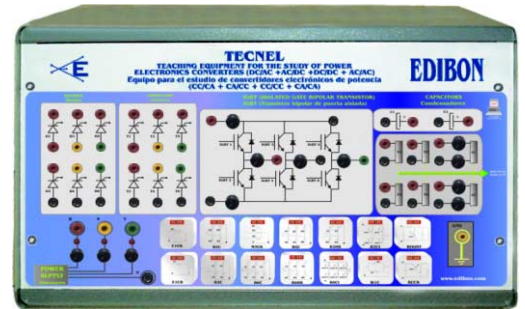
Four relays board.

2 Three-phase relays.

Commutated power supply.

Three-phase magnetothermal.

Control Interface.



TECNEL Unit

② **DAB. Data Acquisition Board:**

PCI Data acquisition board (National Instruments) to be placed in a computer slot.

Bus PCI.

Analog input:

Number of channels= 16 single-ended or 8 differential. Resolution=16 bits, 1 in 65536.

Sampling rate up to: 250 KSPS (Kilo samples per second).

Input range (V) = $\pm 10V$. Data transfers=DMA, interrupts, programmed I/O. Number of DMA channels=6.

Analog output:

Number of channels=2. Resolution=16 bits, 1 in 65536. Maximum output rate up to: 833 KS/s.

Output range(V) = $\pm 10V$. Data transfers=DMA, interrupts, programmed I/O.

Digital Input/Output:

Number of channels=24 inputs/outputs. D0 or DI Sample Clock frequency: 0 to 1 MHz.

Timing: Counter/timers=2. Resolution: Counter/timers: 32 bits.



DAB

③ **TECNEL/CCSOF. Computer Control+Data Acquisition+Data Management Software:**

Compatible with all actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards.

Registration and visualization of all process variables in an automatic and simultaneously way. Flexible open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.

Management, processing, comparison and storage of data.

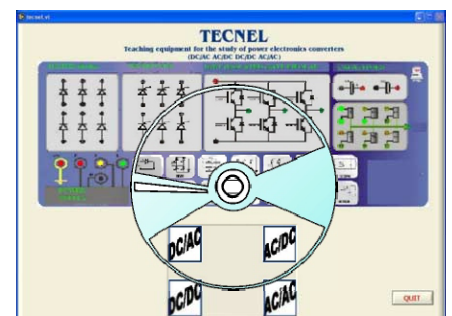
Sampling rate up to 250,000 data per second.

Comparative analysis of the obtained data, after to the process and modification of the conditions during the process.

④ **Cables and Accessories**, for normal operation.

⑤ **Manuals:**

This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.



TECNEL/CCSOF

*** References 1 to 5: TECNEL + DAB + TECNEL/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.**

Complementary items:

Simulation Software:

- ⑥ **PECADS. Power Electronics Computer Aided Design and Simulation Software.**(Converters: DC/AC, AC/DC, DC/DC, AC/AC).
(See PECADS Catalogue).



PECADS

Digital Measurement Unit:

⑦ **EAL. Network Analyzer Unit:**

This unit shows the main electric parameters on the electric network through the interface and an easy parameter selection.

Steel box.

Diagram in the front panel.

3 current inputs, for series intensity.

3 voltage terminals for each phase (R,S,T) measure and another one for the neutral connection.

Control and visualization digital display.

Voltage: Range 20 - 500 Vrms. Prec.:± 0.5%. Phase to phase - Phase to neutral.

Current: Range 0.02 - 5 Arms. Prec.:± 0.5%.

Frequency: Range 48 to 62 Hz.± 0.1Hz.

Power: Active, Reactive and Apparent. Range 0.01 to 9900 kW. Prec.:± 1%.

Power Factor: Power Factor for each phase and average. Range -0.1 to + 0.1. Prec.: ± 1%.

Temperature: Operating temperature 0 to +50°C.

*It has to be complemented with a digital multimeter when working with DC.

Required services: power supply: 220 V/50 Hz. - 110 V/60Hz.

Dimensions: 300 x 180 x 120 mm. approx. Weight: 3 Kg. Approx.



EAL

Analog Measurement Unit:

⑧ **EAM-VA. Analog Measurement Unit:**

This unit allows to analyze the different voltages and currents involved in a circuit through a simple frontal panel that includes analog measurement instruments.

Steel box.

4 Voltmeters.

- A.C. Measuring Instruments with moving iron.
- Voltmeter with measuring range from 0 to 500Vac.
- Horizontal scale with precision grade of 1.5 (following norm BS89/IEC51).

2 Ammeters.

- A.C. Measuring Instruments with moving iron.
- Ammeter with measuring range of 0 to 5A.
- Horizontal scale with precision grade of 1.5 (following norm BS89/IEC51).

2 Analog inputs for each meter.

Dimensions: 490 x 330 x 310 mm. approx. Weight: 10 Kg. approx.



EAM-VA

Loads:

IND. Inductance: (2 units)

- From 33 to 236 mH, or similar.

+

REV. Variable Resistance: (2 units)

-0-150W (500W), or similar.

OR



IND



REV

RCL3R. Resistive, Inductive and Capacitive Loads Module:

Our Resistive, Capacitive and Inductive Loads Module (RCL3R) offers:

Single and Three-phase resistances.

Single and Three-phase inductances.

Single and Three-phase capacitors.

Steel box. Diagram in the front panel.

Variable resistive loads: 3 x [150 Ω (500 W)].

Fixed resistive loads: 3 x [150 Ω (500 W) + 150 Ω (500 W)].

Inductive loads: 3 x [0, 33, 78, 140, 193, 236 mH].(230V /2 A)

Capacitive loads: 3 x [4 x 7 μF]. (400V)

Dimensions: 490 x 450 x 470 mm. approx. Weight: 30 Kg. approx.



RCL3R

Motors:

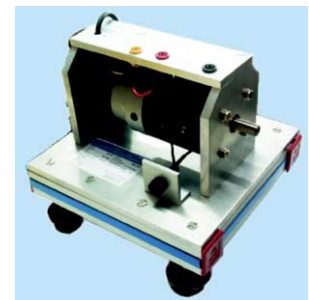
EMT15. D.C. Permanent magnet motor:

Power: 100W.

Speed:4000 r.p.m.

Maximum terminal voltage: 100V.

This motor is supplied with connectors, couplings and standard motor support.



EMT15

EMT17. Three-phase motor of squirrel cage with "Y" connection:

Power: 250 W.

Speed: 2760 r.p.m.

Frequency: 50 Hz. V. Armature: 3 x 380 Vac.

I. Armature nominal: 2.3-1.3A.

This motor is supplied with connectors, couplings and standard motor support.



EMT17

Tachodynamo:

TECNEL/T. Tachodynamo:

The TECNEL/T is an automatic unit, that could be permanently connected to the main rotor.

Output voltage gradient: 30 +/- 3%V /1000 r.p.m.

Electrical supply: continuous d.c. output 0-100V.

Dimensions: 200 x 150 x 50 mm. approx. Weight: 1 Kg. approx.



TECNEL/T

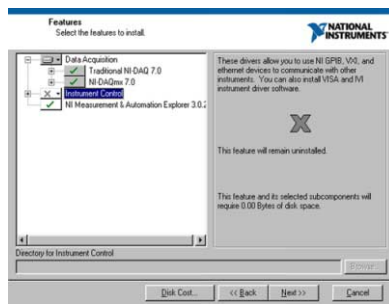
Software Main Screens

Installation and Configuration Screens

Main installation menu



Data Acquisition Board Drivers Installation

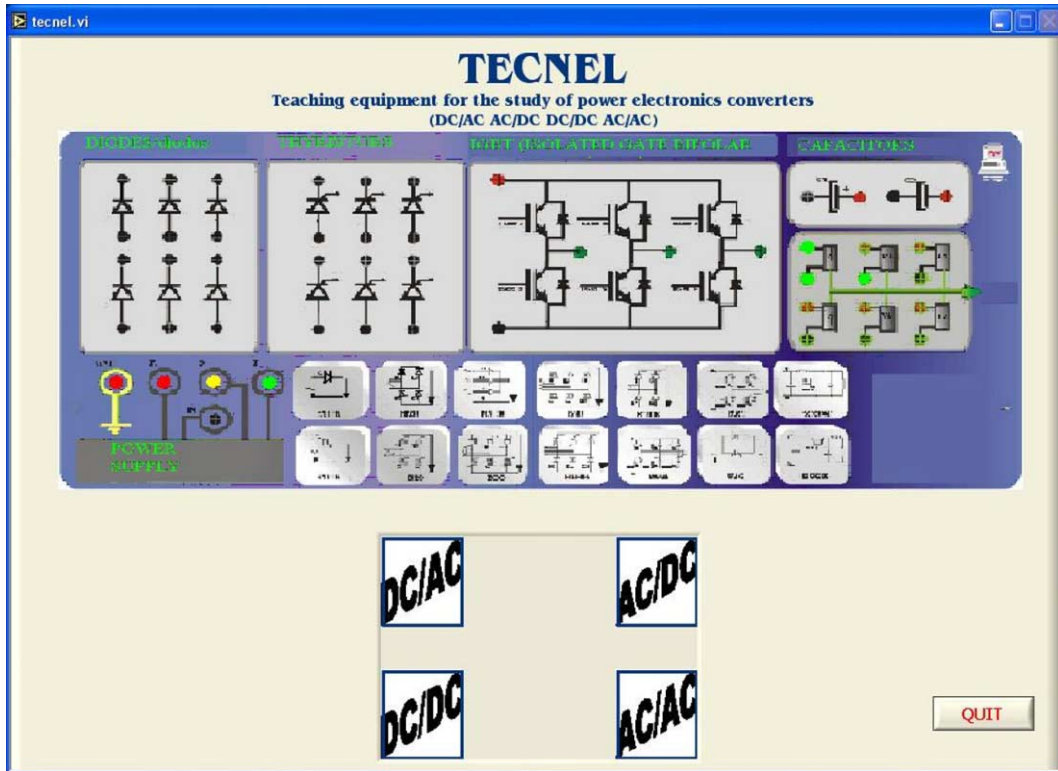


Control Software Installation

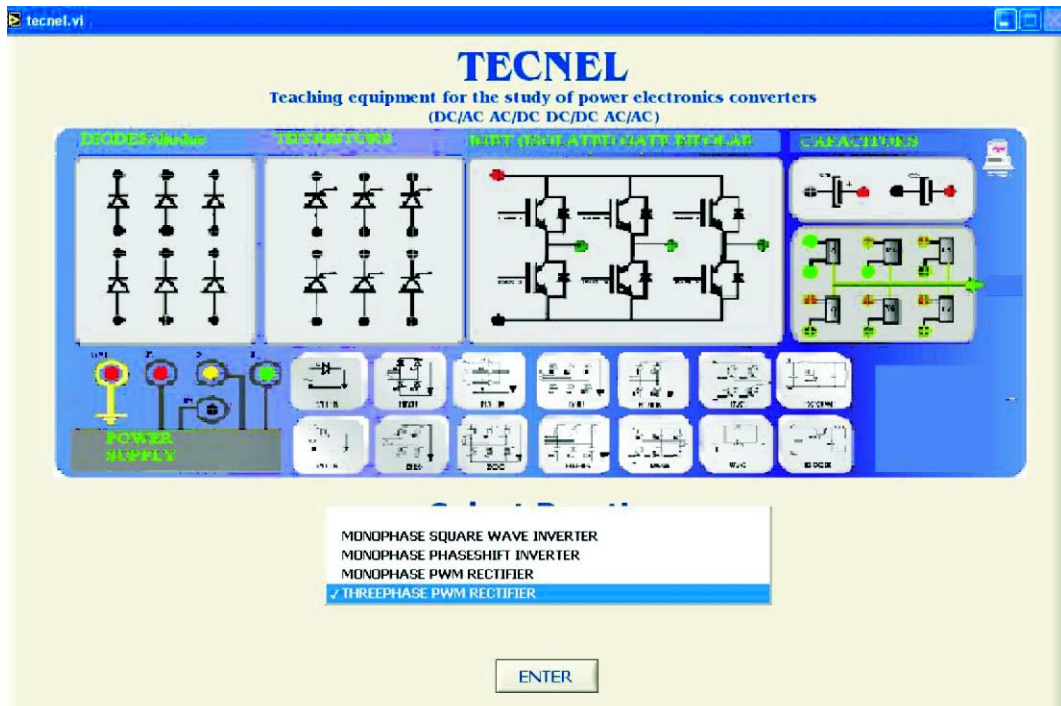


Main screen

Main Menu screen



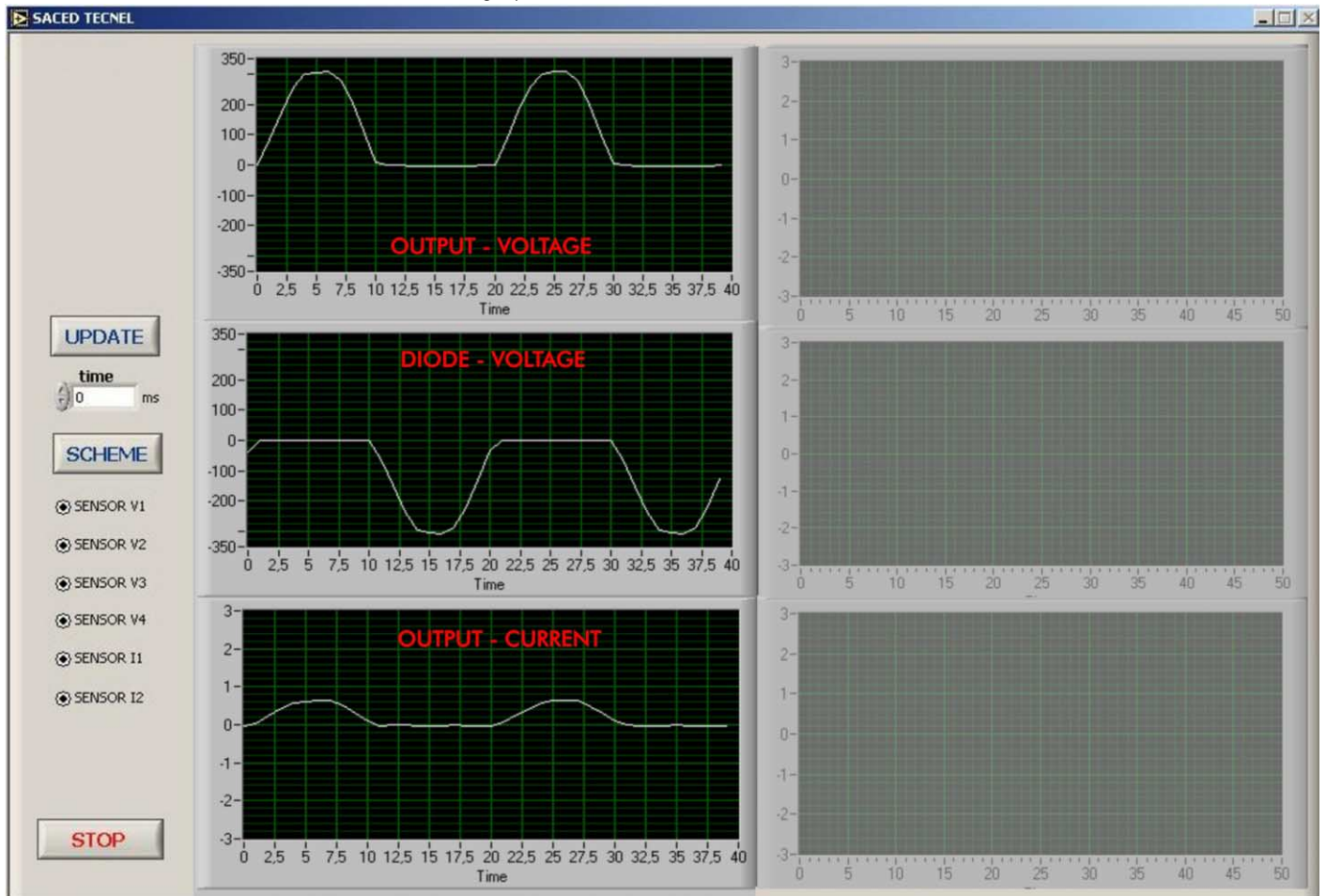
Practices Selection screen



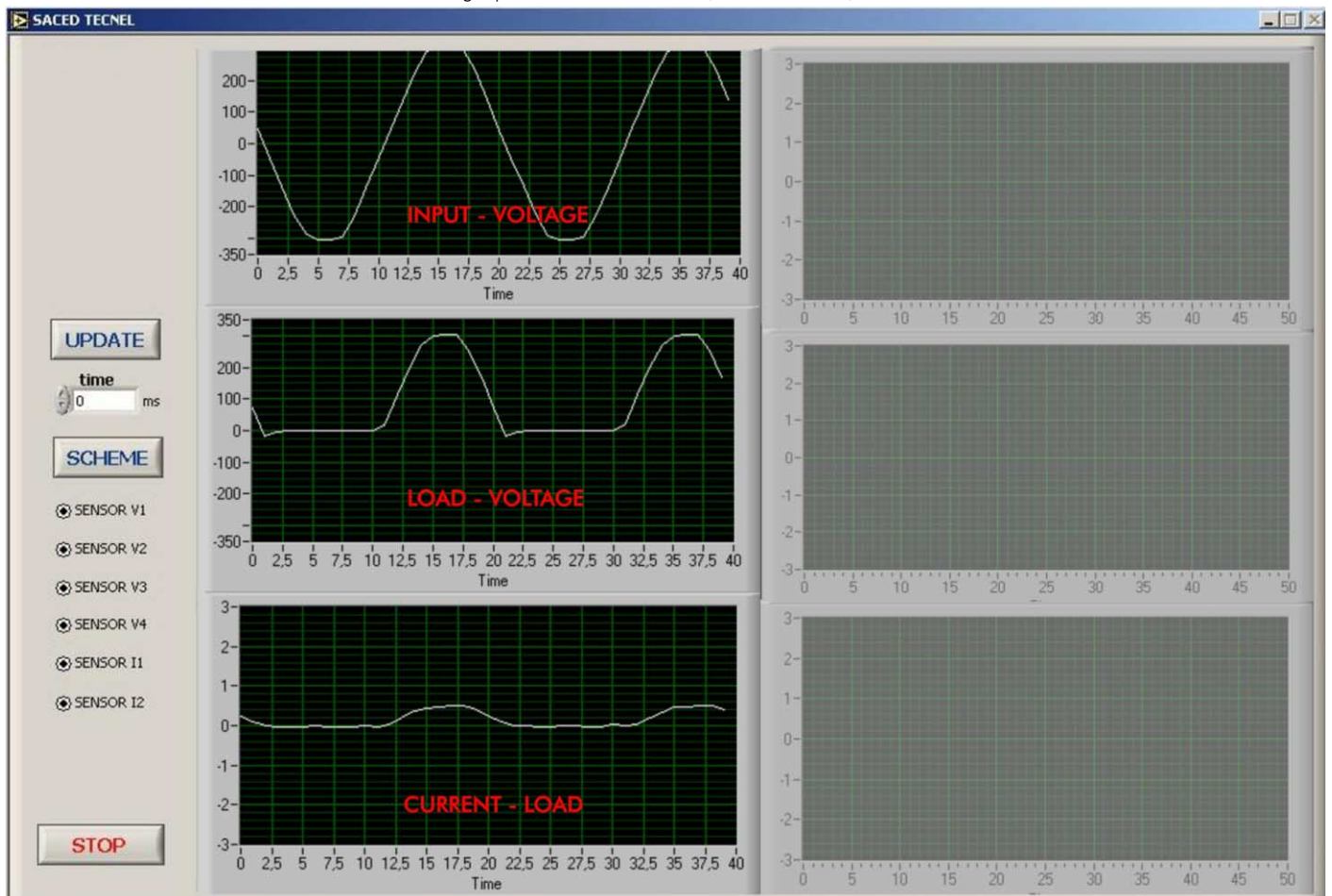
Continue...

Some typical exercises results

Single-phase Rectifier Half Wave Non-controlled:



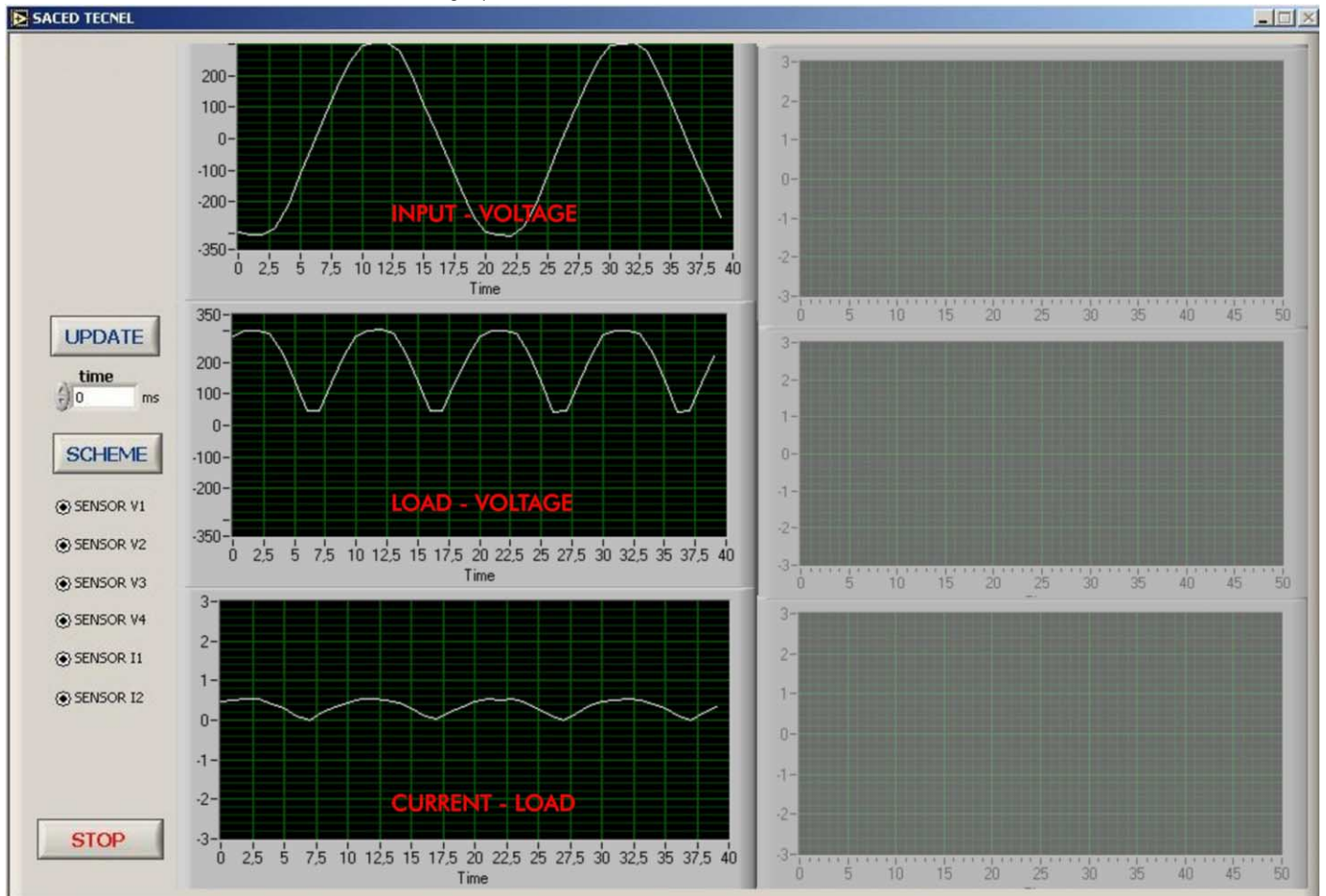
Single-phase Rectifier Half Wave, Non-controlled, RL load:



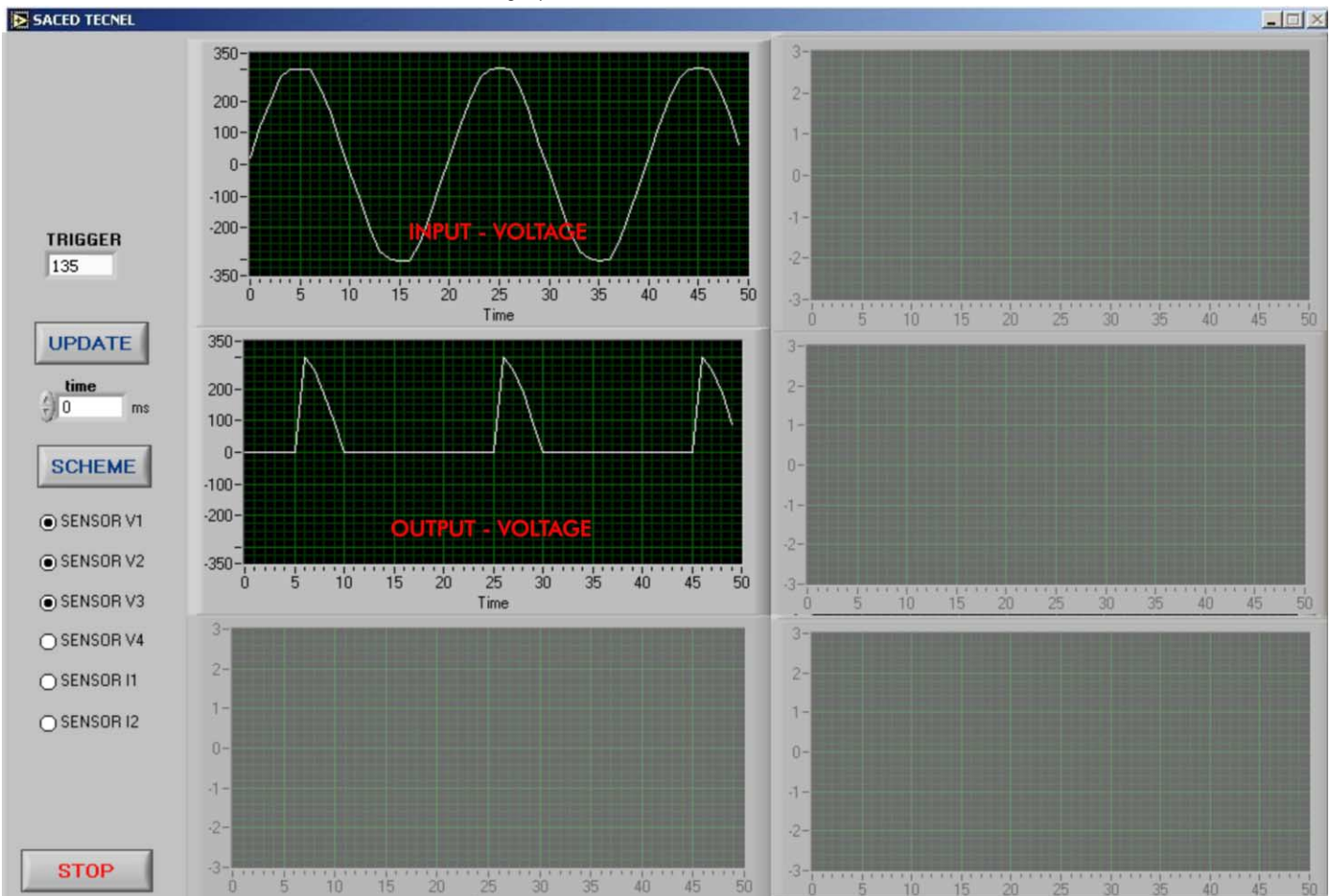
Continue...

Some typical exercises results

Single-phase Rectifier Full Wave, Non-controlled, R load:



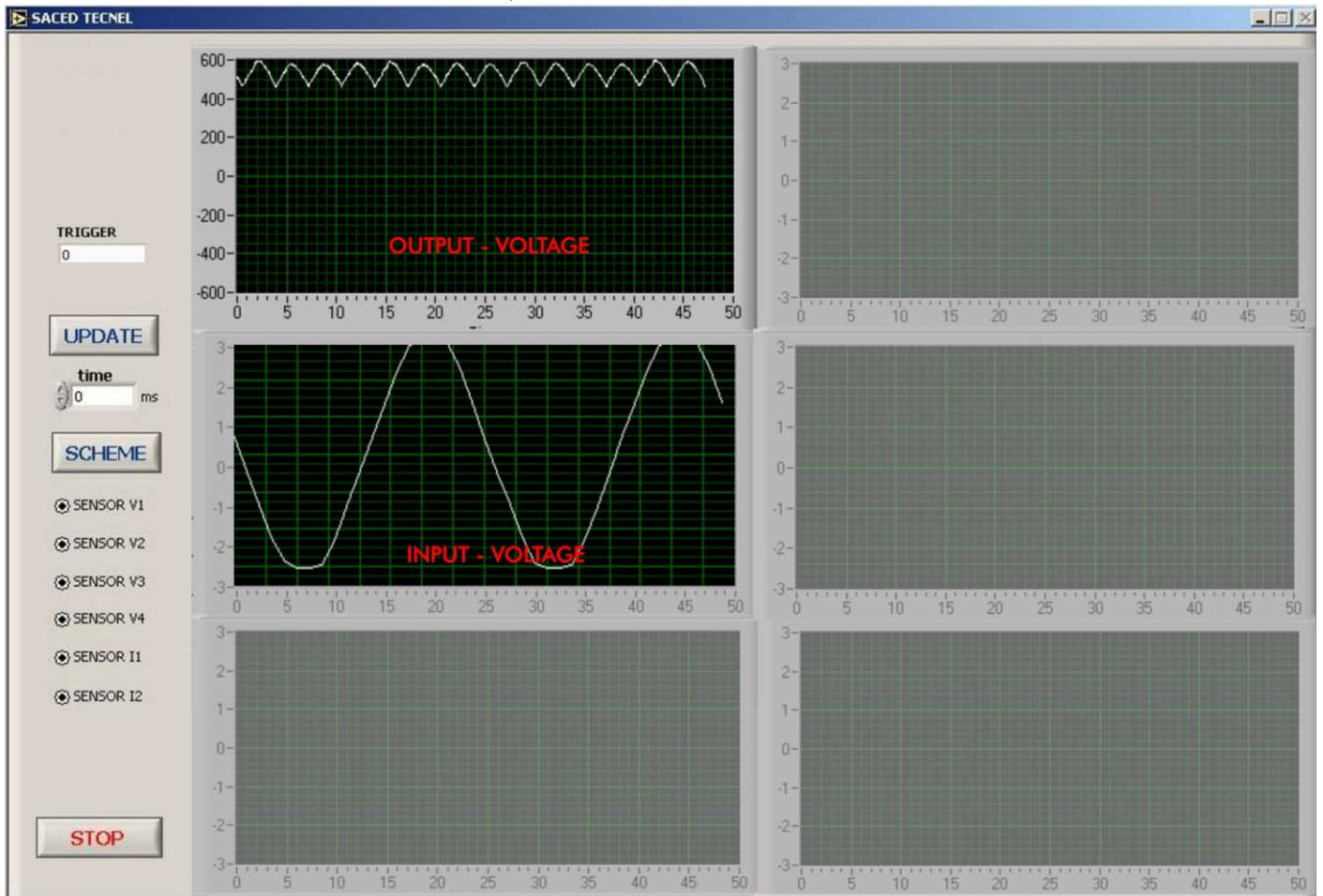
Single-phase Rectifier Half Wave Controlled:



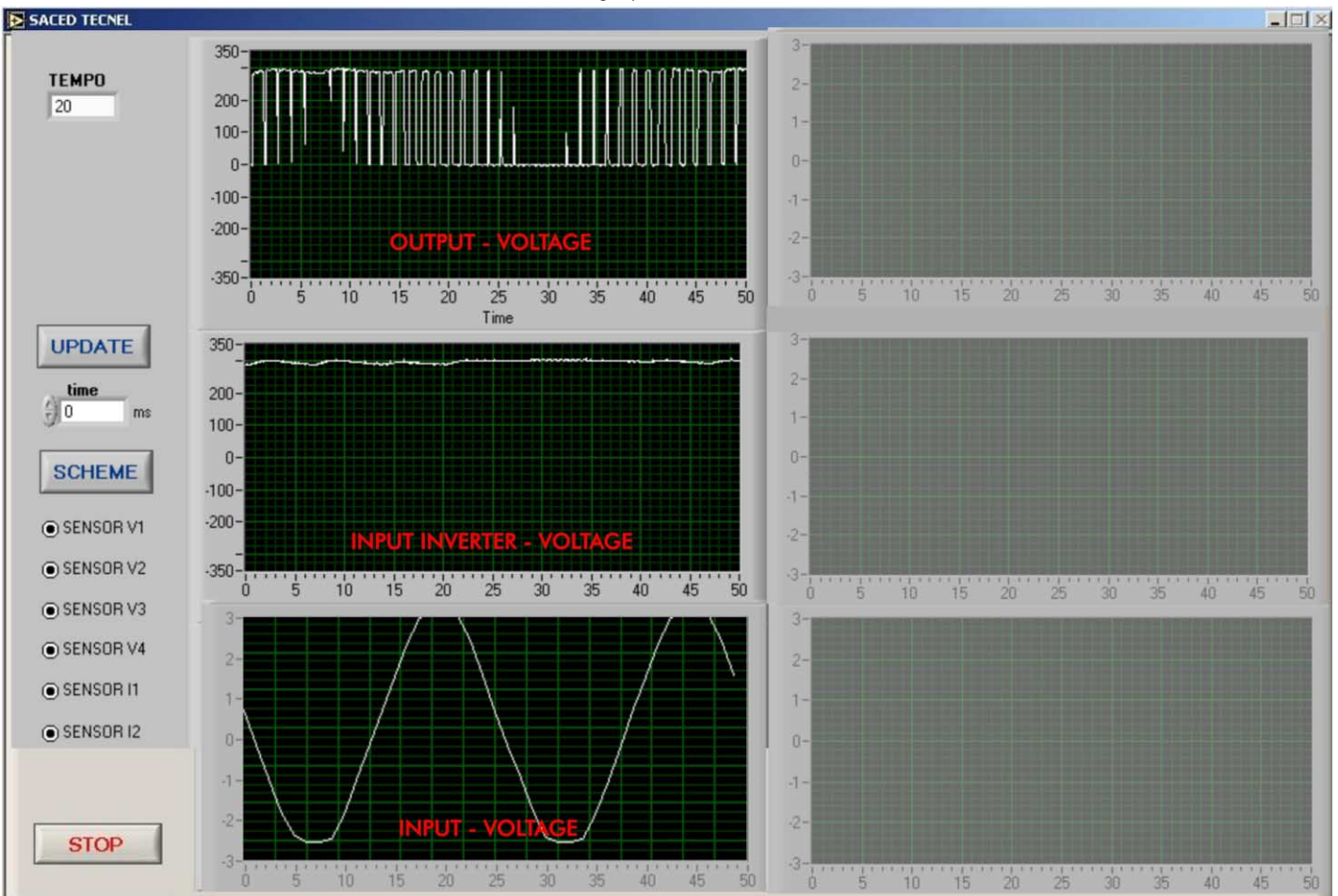
Continue...

Some typical exercises results

Three-phase Rectifier, Full Wave, Non-controlled:



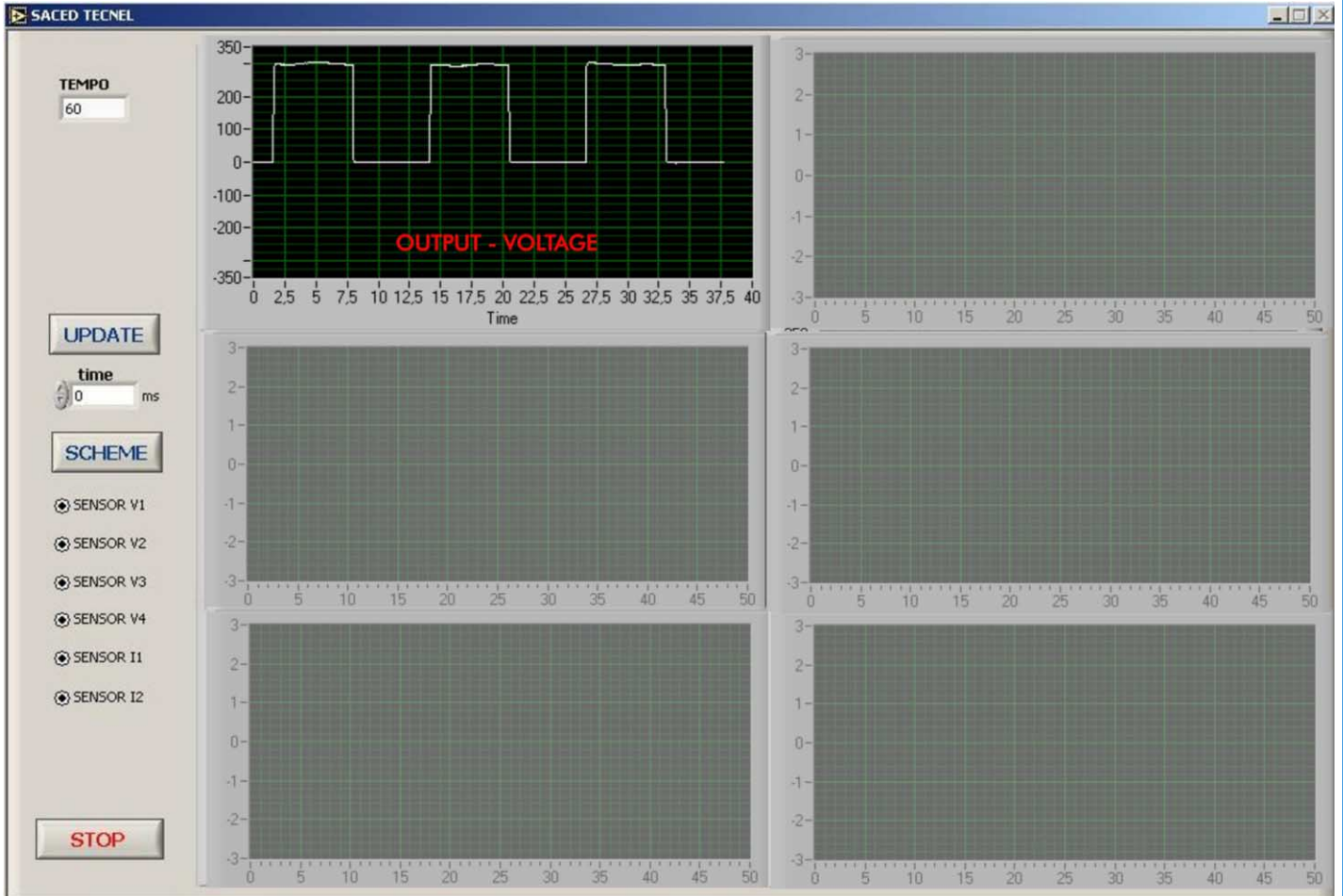
Single-phase PWM Control:



Continue...

Some typical exercises results

Single-phase Square Inverter:

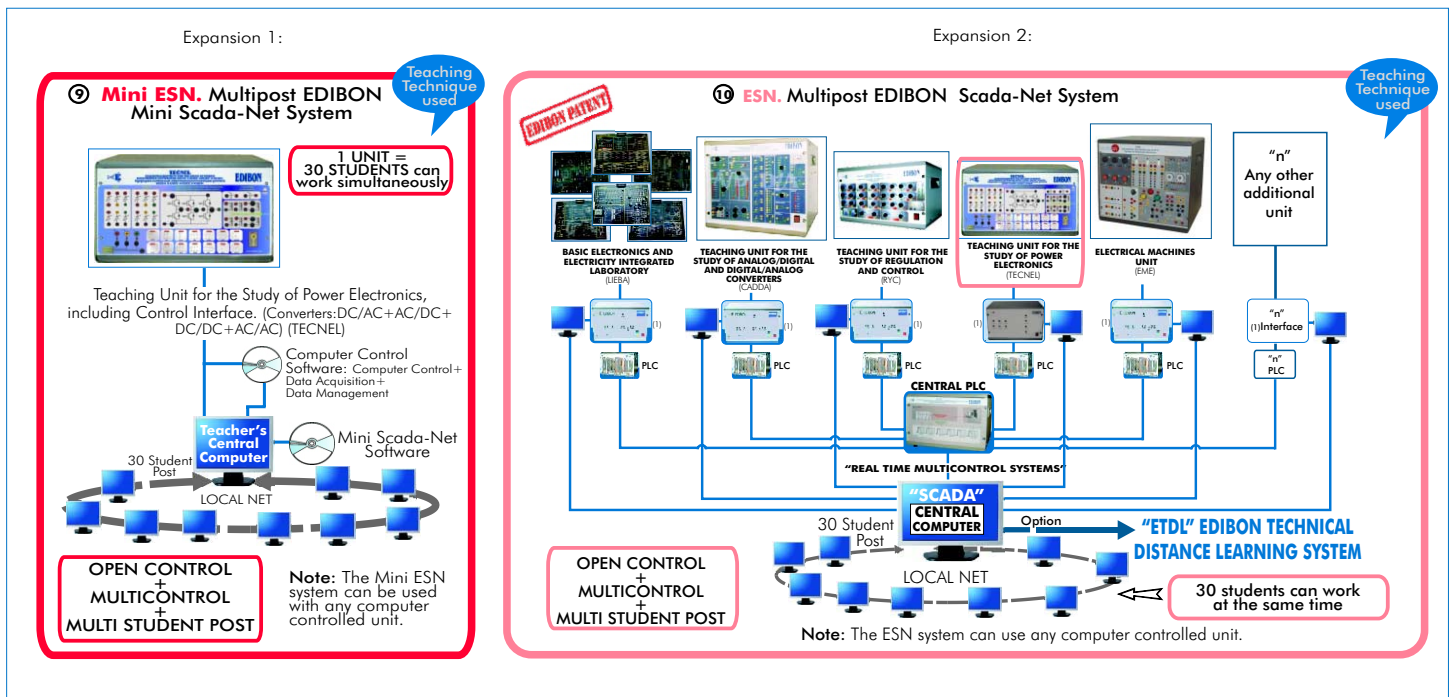


EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- 1.- Single phase half-wave rectifier with load R.
- 2.- Single phase half-wave rectifier with load R-L.
- 3.- Single-phase half-wave rectifier with R-L load with free wheeling diode (FWD).
- 4.- Single-phase full-wave rectifier.
- 5.- Three-phase half-wave uncontrolled rectifier.
- 6.- Three-phase full-wave uncontrolled rectifier.
- 7.- Single-phase half-wave controlled rectifier.
- 8.- Single-phase full-wave controlled rectifier.
- 9.- Single-phase full-wave controlled rectifier with a DC motor.
- 10.- Three-phase full-wave completely controlled.
- 11.- Single-phase semi-controlled rectifier.
- 12.- Three-phase full-wave semi-controlled rectifier.
- 13.- Chopper.
- 14.- Single-phase square-wave inverter.
- 15.- Single-phase displaced-phase inverter.
- 16.- Single-phase inverter. PWM control.
- 17.- Three-phase inverter. PWM control with R load and R-L load.
- 18.- Three-phase inverter. PWM control with AC motor.
- 19.- Alternating regulators: R and R-L load.
- 20.- Asynchronous three-motor with rotor in short circuit (squirrel cage).

POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS



ORDER INFORMATION

Items always included in the supply

Minimum configuration for normal operation includes:

- ① Unit: TECNEL. Teaching Unit for the Study of Power Electronics, including Control Interface. (Converters: DC/AC + AC/DC + DC/DC + AC/AC).
- ② DAB. Data Acquisition Board.
- ③ TECNEL/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ④ Cables and Accessories.
- ⑤ Manuals.

Complementary items to the standard supply

Simulation Software:

- ⑥ PECADS. Power Electronics Computer Aided Design and Simulation Software. (Converters: DC/AC, AC/DC, DC/DC, AC/AC).

Measurement Units:

- ⑦ EAL. Network Analyzer Unit.
- ⑧ EAM-VA. Analog Measurement Unit.

Expansions:

- ⑨ Mini ESN. Multipost EDIBON Mini Scada-Net System.
- ⑩ ESN. Multipost EDIBON Scada-Net System.

* **IMPORTANT:** Under TECNEL we always supply all the elements for immediate running as 1, 2, 3, 4 and 5.

REQUIRED SERVICES

- Electrical supply: Three-phase with neutral and ground, 380V/50Hz or 220V/60Hz.
- Computer (PC).
- Loads (see recommended accessories).

DIMENSIONS & WEIGHTS

- Dimensions: 490 x 330 x 310 mm. approx.
- Weight: 40 Kg. approx.

RECOMMENDED ACCESSORIES

Loads:

- IND. Inductance + REV. Variable Resistance. (2 units of each one)
OR
- RCL3R. Resistive, Inductive and Capacitive Loads Module.

Motors:

- EMT15. DC Permanent magnets motor.
- EMT17. Three-phase motor of squirrel cage with "Y" connection.

Tachodynamo:

- TECNEL/T. Tachodynamo.

AVAILABLE VERSIONS

Offered in this catalogue:

- **TECNEL. Computer Controlled Teaching Unit for the Study of Power Electronics** (Converters: DC/AC + AC/DC + DC/DC + AC/AC).

Offered in other catalogue:

- **TECNEL/B. Computer Controlled Basic Teaching Unit for the Study of Power Electronics** (Converters: AC/DC + AC/AC).

* Specifications subject to change without previous notice, due to the convenience of improvements of the product.



C/ Del Agua, 14. Polígono San José de Valderas. 28918 LEGANES. (Madrid). SPAIN.
Phone: 34-91-6199363 FAX: 34-91-6198647
E-mail: edibon@edibon.com WEB site: www.edibon.com

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