Technical Teaching Equipment

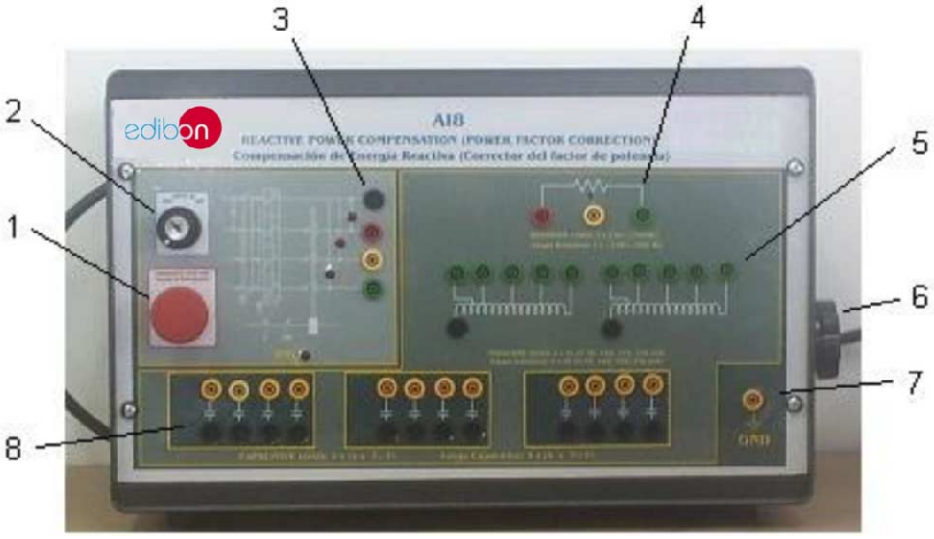
Reactive Power Compensation (Power Factor Correction)

LIELBA - AI8

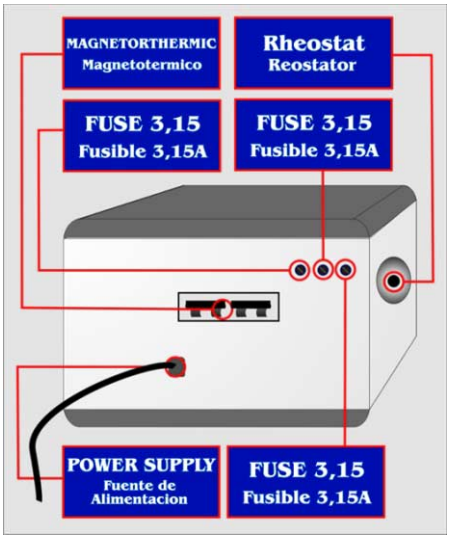
www.edibon.com
Products
Products range
Units
4.-Electricity

ELEMENTS ALLOCATION

Front Panel



Back Panel



1= Mushroom security button.
2= ON/OFF contact by removable key.
3= Three-phase power supply.
4= Variable resistive load.
5= Two coils with inductive loads.
6= Rheostat for variable resistive load.
7= Ground connection.
8= Three banks of capacitive load.

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

SPECIFICATIONS

This application includes:

AI8 unit, in metallic box, including:

Three-phase AC power supply:

Neutral (black) + R phase (red) + S phase (yellow) + T phase (green) connectors.

Magneto-thermal protection.

Differential protecion.

Mushroom security button.

ON/OFF contact by removable key.

Variable resistive load (variable resistance), 500 W, variable up to 150Ω by a rheostat.

Two coils with inductive loads of 33, 78, 140, 193 and 236 mH, each one.

Three banks of of 4 capacitors of 7 μF, each one.

Ground connection.

Protection fuses (3.15A).

EAL. Network Analyzer Unit.

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

Metallic 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 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%.

Operating temperature 0 to +50°C.

Cables and Accessories, for normal operation.

Manuals: This application is supplied **with the following manuals:** Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities:

1.- Measurement of active power consumed by a receiver (resistive circuit).
2.- Measurement of the inductance of a coil.
3.- Measurement of the reactance X_L considering R_L.
4.- Measurement of reactive power consumed by a receiver (inductive circuit).
5.- Measurement of reactive power consumed by a receiver (capacitive circuit).
6.- Measurement of apparent power consumed by a receiver.
7.- Measurement of power factor of a receiver.
8.- Measurement of active energy consumed by a receiver.
9.- Measurement of reactive energy consumed by a receiver.
10.- Compensation of reactive energy (improvement of the power factor).
11.- Comparison of the active energy consumed after the compensation.
12.- Comparison of the reactive energy consumed after the compensation.
13.- Measurement of power factor after the compensation.

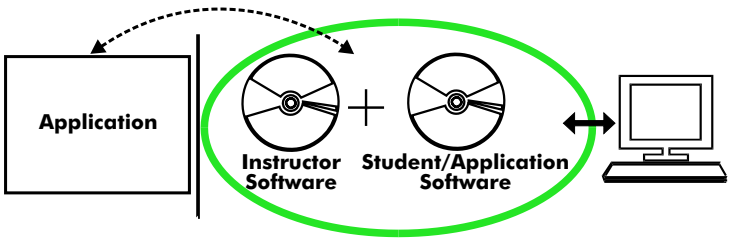
REQUIRED SERVICES

-Electrical supply for AI8= three-phase, 380V./220V.
-Electrical supply for EAL= single-phase, 220 - 110V.

DIMENSIONS & WEIGHTS

-AI8. Unit: -Dimensions: 490 x 330 x 310 mm. approx.
-Weight: 30 Kg. approx.
-EAL. Unit: -Dimensions: 300 x 180 x 120 mm. approx.
-Weight: 3 Kg. approx.

CAI. Computer Aided Instruction Software System



With no physical connection between applicacion and computer, this complete package consists on an Instructor Software (INS/SOF) totally integrated with the Student/Application Software. Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students. These, on the other hand, get a virtual instructor who helps them to deal with all the information on the subject of study.

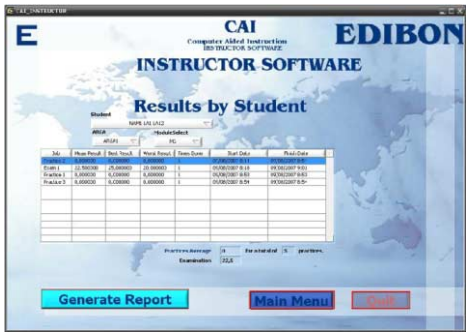
With the **INS/SOF. Classroom Management Software Package (Instructor Software)**, the Teacher has a whole range of options, among them:

- Organize Students by Classes and Groups.
- Create easily new entries or delete them.
- Create data bases with student information.
- Analyze results and make statistical comparisons.
- Print reports.
- Develop own examinations.
- Detect student's progress and difficulties.

...and many other facilities.

The Instructor Software is the same for all the applications, and working in network configuration, allows controlling all the students in the classroom.

Examples of the Software screens



A.../SOF Computer Aided Instruction Software Packages (Student/Application Software).

It explains how to use the application, run the experiments and what to do at any moment.

Each application has its own Student Software package.

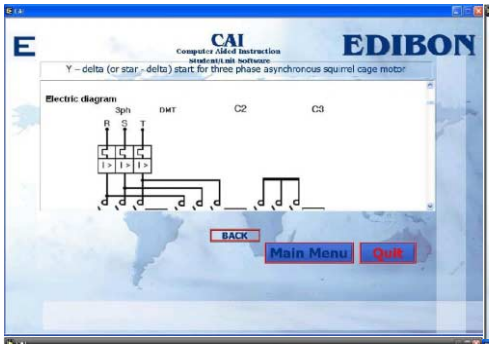
- The options are presented by pull-down menus and pop-up windows.
- Each Software Package contains:

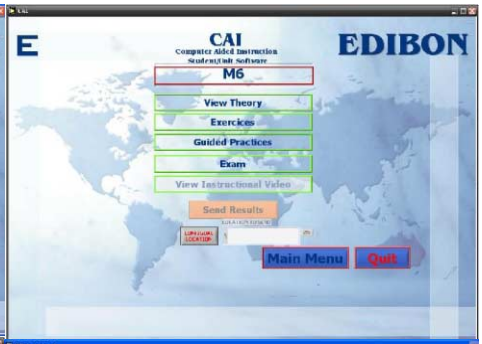
  Theory: that gives the student the theoretical background for a total understanding of the studied subject.

  Exercises: divided by thematic areas and chapters to check out that the theory has been understood.

  Guided Practices: presents several practices to be done, alongside the applications/modules, showing how to complete the exercises and practices.

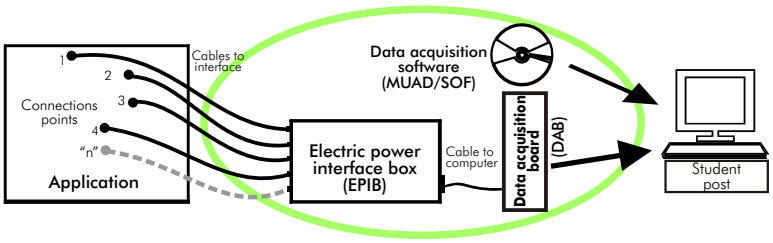
  Exams: set of questions presented to test the obtained knowledge.





∗ Software is available in English and Spanish. Any other language available on request.

MUAD. Power Data Acquisition System



MUAD is the perfect link between the application and the PC. MUAD is a continuous data acquisition system with virtual instrumentation, that measures, analyzes and represents the parameters involved in the process.
MUAD allows voltage and current acquisition and measurement, data processing, frequency spectrum and all the functions of a digital oscilloscope.
We easily connect the Electric Power Interface Box (EPIB) to the application/module with the supplied cables (there are several connection points placed for it). The EPIB is connected to the PC through the Data Acquisition Board (DAB), and by using the Data Acquisition with Virtual Instrumentation Software, the student can get results from the undertaken experiment/practice, see them on the screen and work with them.

The MUAD system allows voltage and current measurement and acquisition, data processing, frequency spectrum and the functions of a digital oscilloscope.

This MUAD System includes EPIB + DAB + MUAD/SOF:

1)Hardware :

1.1) EPIB. **Electric power interface box** (dimensions: 300 x 120 x 180 mm. approx.):
Interface that carries out the conditioning of the diverse signals that can be acquired in a process, for their later treatment and visualisation.
In the front panel, the elements are separated in two parts: left-hand part to VOLTAGE sensors, and right-hand part corresponds with CURRENT sensors.
Analog Input Channels:
8 analog input channels. Sampling range: 250 KSPS (Kilo samples per second).
4 Tension sensors AC/DC, 400V. 4 Current sensors.

EPIB

+

1.2) 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)= ±10V.
Data transfers=DMA, interrupts, programmed I/0.
Number of DMA channels=6.

Analog output:
Number of **channels=2.**
Resolution=16 bits, 1 in 65536.
Maximum output rate up to: 833 KSPS.
Output range(V)=±10.
Data transfers=DMA, interrupts, programmed I/0.
Digital Input/Output:
Number **channels=24inputs/outputs.**
D0 or DI Sample Clock frequency: 0 to 1 MHz.
Timing: **Counter/timers=2.**
Resolution: Counter/timers: 32 bits.

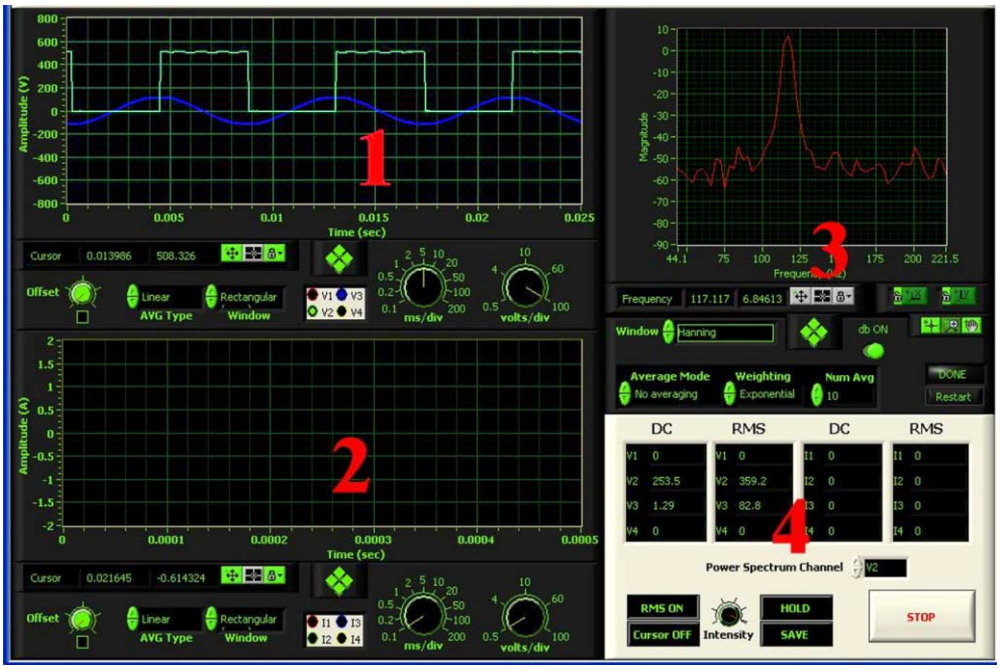
DAB

+

MUAD/SOF

2) MUAD/SOF. **Data acquisition software** :
Data Acquisition Software with Graphic Representation:
Amicable graphical frame.
Compatible with actual Windows operating systems.
Configurable software allowing the representation of temporal evolution of the different signals.
Visualization of a tension of the circuits on the computer screen.
Sampling velocity up to 250 KSPS (Kilo samples per second) guaranteed.

Software Main Screen



1.- Voltage channels section

2.- Current channels section

3.- Power spectrum section

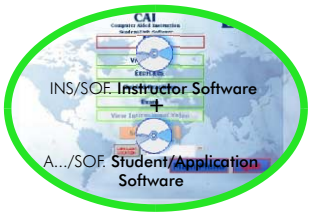
4.- General control panel section

Working possibilities:

1) Working possibility CAI + MUAD (EDIBON complete system)

Application

+



CAI.
Computer Aided Instruction
Software System

+

MUAD
Power Data Acquisition System

+ Manuals

2) Working possibility MUAD

Application

+

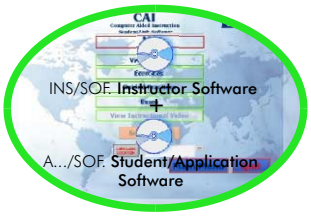
MUAD
Power Data Acquisition System

+ Manuals

3) Working possibility CAI

Application

+



CAI.
Computer Aided Instruction
Software System

+ Manuals

4) Simplest Working possibility

Application

+ Manuals

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

edibon INTERNATIONAL

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

REPRESENTATIVE:

Issue: ED01/08
Date: December/2008