

### What is SCADA-NET ?

Let us explain first what is a SCADA and what is a net.

• **SCADA:**

This is a common expression used for Supervision, Control and Acquisition system.

The SCADA is a control system including as main part the PID control (P= Proportional, I= Integral, D= Derivative). This PID control is the most common control used in many unitary processes in most industrial applications when you produce different kind of products.

• **NET:**

Everybody knows what is a local net, where you have a main computer and several computers linked together with the main computer.

• **SCADA-NET:**

This is the connection between any SCADA's (many unitary processes) with a local net with many computers.

So, Computer Controlled Units or units with SCADA are the key of the system. EDIBON has designed several SCADA's using of Open Control , Multicontrol and Real Time Control make the system very powerful in terms of teaching.

• **INTEGRATED LABORATORIES:**

These are what EDIBON has designed, allowing to integrate the classroom and the laboratory in ONLY ONE PLACE.

This new way to teach will increase drastically the teachers and students efficiency.

Having classroom and labs in the same place when you are doing industrial simulation (PC and PLC control) will allow to do everything more easily and the students will get "CLEAR CONCEPTS", with Real Industrial Systems, as industrial systems used in Mechanics (units), Electronics (interfaces), Data Acquisition Boards (National Instruments is very well know), Software (Lab View is very well know), Computer (any computer) and PLC (any PLC available in the market).

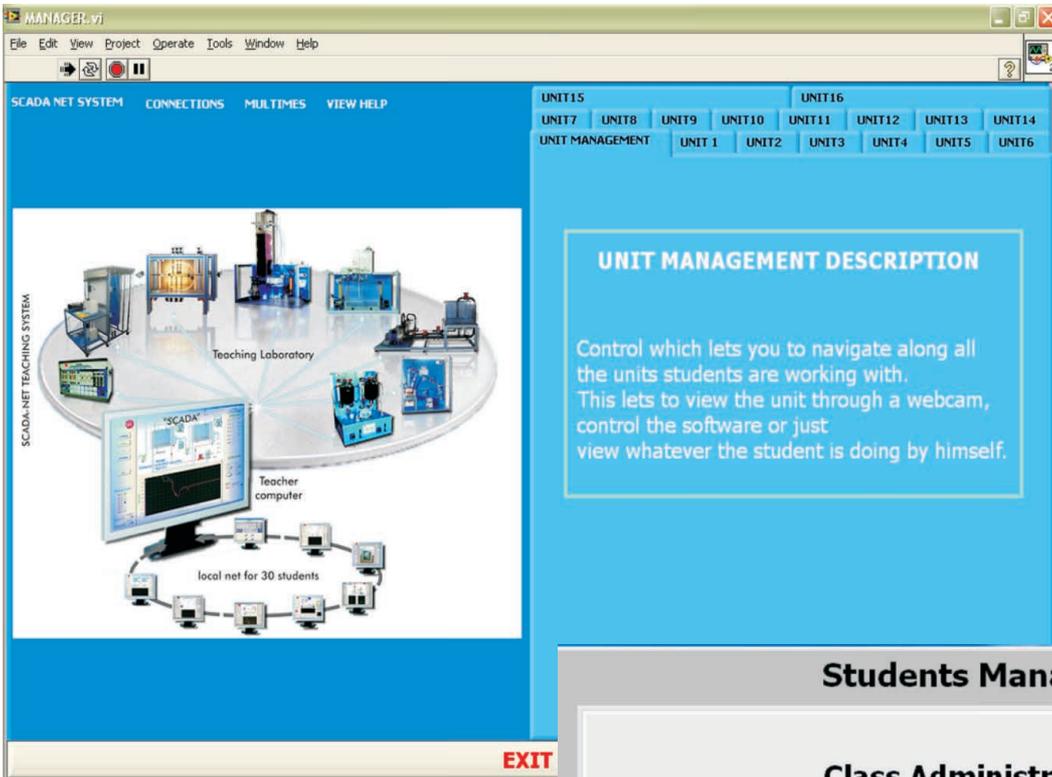
### All available SCADA-NET Systems:

We can offer Scada-Net for:

- Physics.
- Electronics and Communications. (Basic).
- Electronics and Communications. (Advanced).
- Electricity. (Basic).
- Electrical Machines.
- Energy.
- Renewable Energies.
- Fluid Mechanics.
- Thermodynamics.
- Process Control.
- Chemical Engineering.
- Food Technology.
- Environment.
- MIX. (Units from different areas).

**General description:**

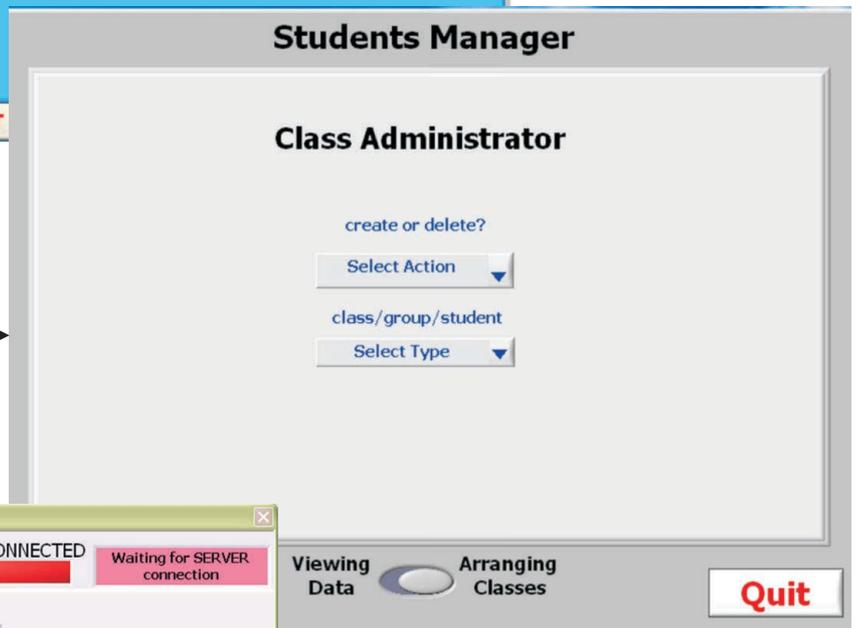
The ESN (EDIBON SCADA-NET) system consists on the adaptation of EDIBON units controlling from computers integrated in a local network. This system allows to view/control some different units remotely, from any computer integrated in the local net, through the computer connected to the unit. Then, the number of possible users who can work with the same unit is higher than in an usual way of working (usually only one). Thanks to a computer, the Manager/Instructor Computer located "between" the units and the local net, the manager can manage the access to the different units, and the permissions to control/view all the units. The user/student can visualise the unit in his own PC during the experiment. The communication between the users and the units are managed by the manager/instructor. There is no possibility of communication between them if the manager does not allow it.



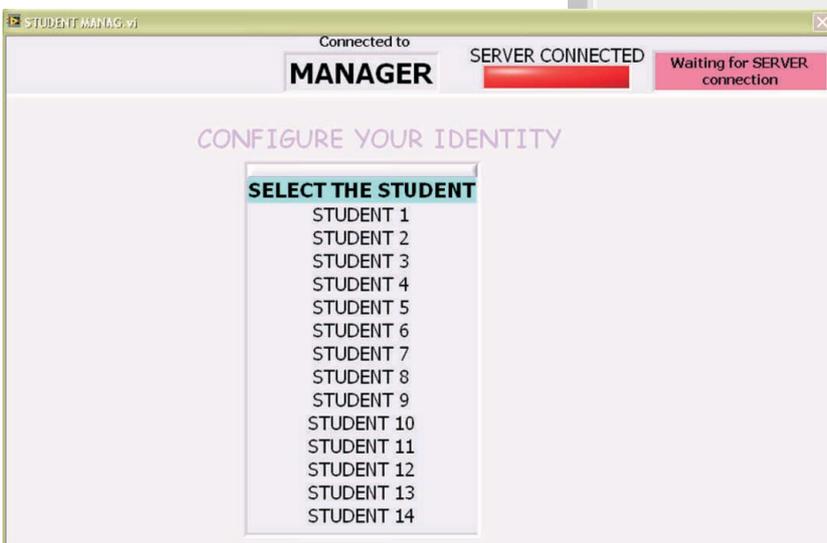
← Manager Software Main Screen:  
 - Right Side: Units management.  
 - Left Side: Connections management.

Students Manager: →

Software which is used by manager to organize the students into groups/classes.



← Student Software Main Screen



**ESN-System, main actions:**

The manager can set **two working levels** for users:

**a) Visualisation:**

The manager/instructor controls the unit meanwhile the users/students view the manager actions, in their screens. This would be a good first stage to learn how to work with the system. This could help to the users know how, to control the system from their own computer.

**b) Control:**

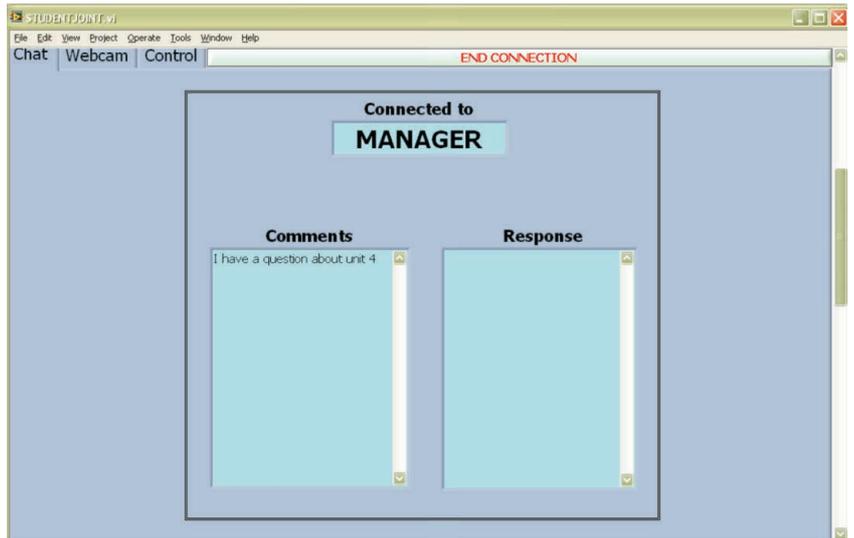
The manager/instructor lets the control of the unit to one of his users/students, who will be able to obtain his own results. These results will be sent to the manager computer, to be checked by him. The rest of the users will visualise the actions of their mate, or maybe control another different unit.

The manager has the possibility of dividing his class on work groups. Each group can work with a different unit, and, within a group, one of the users can assume the control of the unit and the rest just visualise his actions.

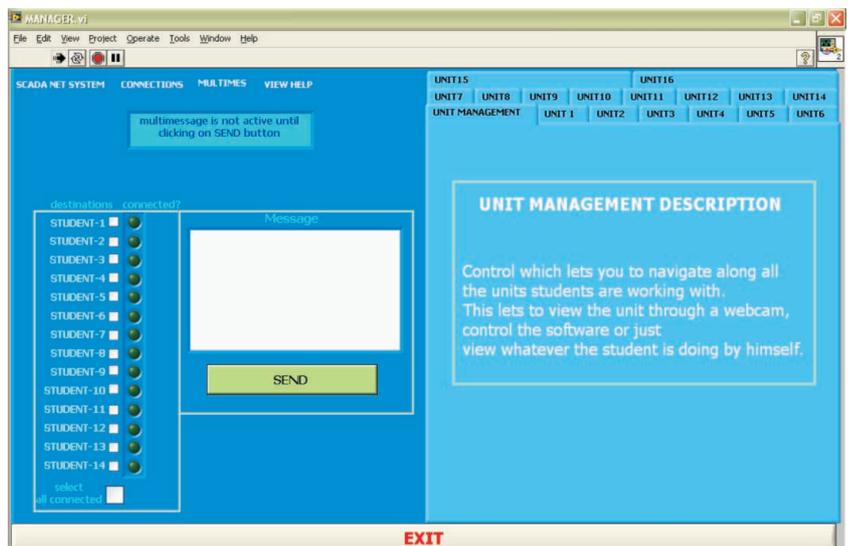
If any of the users has a question or a doubt about the practice, he just has to start a computerised conversation with the manager through a window in the software.

The manager can keep as conversations as he wants at the same time. Also, this window can be used by instructor to send some suggestions or questions to the students in a group.

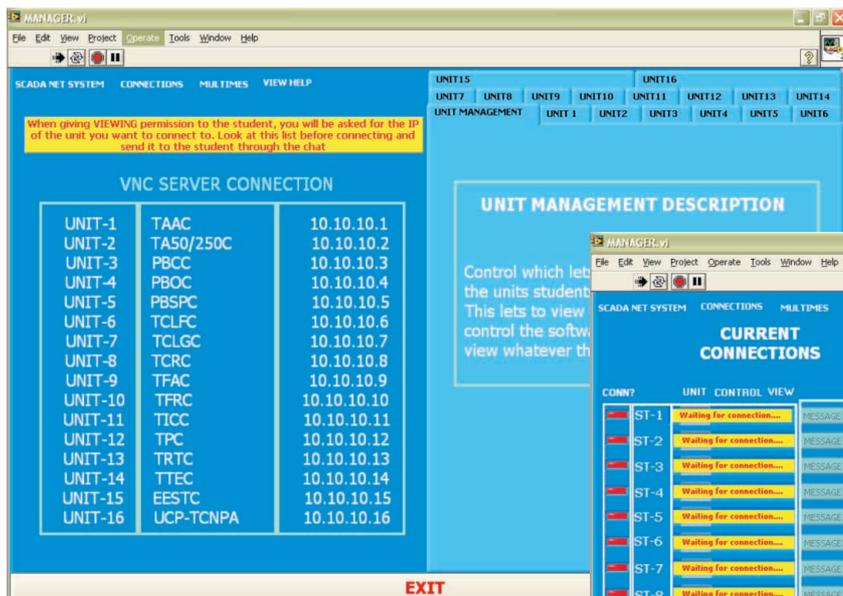
The manager has also the possibility of sending the same message to all the users, or maybe just to some of them, by using the "multimessage" option.



Student Communicator lets the student send/receive some questions/comments to from manager.

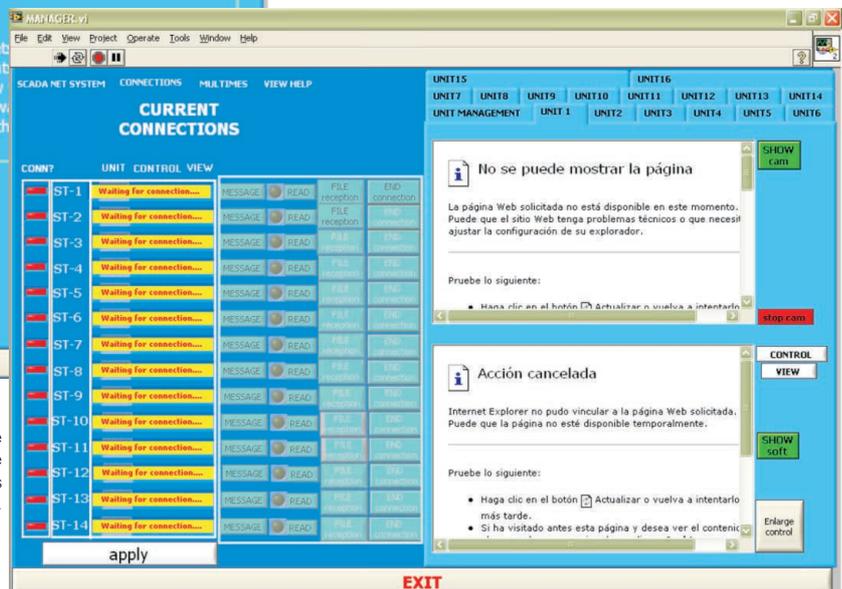


Multimessage Tool lets the manager to send the same message to different users.



Help window for manager

Connections Control Panel lets the manager to set which connections are active, to give any kind of permissions to students.



**Technical Description:**

The ESN system is constituted by several EDIBON unitary processes or units (UPU), each one with their own computer and webcam. Another computer for the manager and other several computers for the users. Each computer has its own software:

- in the unit computer the **UNIT software** should be installed;
- in the users computers the **STUDENT (USER) software** must be installed and
- in the manager computer the **INSTRUCTOR (MANAGER) software** must installed too.

In order to communicate all the computers a switch is also provided. This switch lets the communications between all he computers in the network.

Regarding to big laboratories in which it is difficult to see the unit while working from all the worksets, each user will be able to see the unit which they are working with through a camera previously installed in the unit. This will be used just to have an idea of what the unit looks like and how it changes when some action is sent to any unit from any user computer.

To make easy the visualisation by the manager computer to the users, when this takes the control, a projector with its screen is provided. In this way, the manager computer can be published for all the users on a common screen.

The number of units or users/students can be modified depending on the customer requirements. A typical ESN system is constituted by 20 units and 30 students, for example.

The ESN Software is an acquisition and control software developed entirely by EDIBON engineers. In this development, we have been taken into account the experience accumulated in more than 20 years developing teaching equipment at very high level and technology.

The system is **prepared to communicate to an undefined number of computers**. It will depend on the net features.

All the communications are made through a TCP/IP connection, which provides a high security and speed data transfer. The access to a PC will be made through the name of the machine into the network.

The network lets to transfer video data, binary data, files...

In this system, there are **different configuration levels** that allow the Manager/Instructor to design in the fair measure the execution of the different practical exercises.

The basic level is prepared for the capture and storage of data that the student will process and will work with later.

The medium level allows the student the use of the graphic tools that allows, in real time, the visualisation of the data experiment.

Finally, it has an advance level specially designed for the capture configuration and the sensors device calibration. This system is subject to a key provided by EDIBON.

Interconnection elements and units software adaptation:

- Each unit requires a PC for working individually.
- Each unitary process requires the proper hardware adaptation.
- Each unit will have all software for allowing interconnections.
- Each unit requires its own unitary process softwares. (Acquisition, Control and Management Software).
- Each user/student should have a software.
- The manager will have his own software.

**MAIN POSSIBILITIES OF THE SYSTEM**

- Any amount of units working at the same time.
- Any number of users/students working simultaneously. Normally one controlling each unit. (Technically depending of the actions more than one can work with only one (UPU)).
- One computer (manager) management of all the system.
- Possibility of dividing the classroom into groups, working each group with a different unit.
- Any user/student can work doing "real time" control/visualisation.
- The manager/teacher can see in his computer what any user/student is doing in any unit.
- Continuous communication between the manager and all the users/students connected.
- The ESN System is MODULAR, OPEN and EXPANDIBLE.
- The system is supplied with "all necessary accessories", computers...etc.
- The system has its own manual.

The system includes the following group of elements:

1) **Units with SCADA:**

- Unitary Process Units (UPU).
  - Electronic Interface (EI) for getting the sensors (parameters) signals.
  - Data Acquisition Board (DAB), getting data at 250 KS/second (kilo samples per second).
  - Software:
    - One software for understanding the unit with the computer through the electronic interface.
    - One software for understanding the unit with the computer through the DAS (data acquisition board).
    - One software to manage and manipulate the data you to get from UPU.
- All the three we name "software".

IMPORTANT!: Detailed specifications in any reference EDIBON unit.

2) **Computers (PC):**

Any computer in the market can be used.  
Any UPU in the ESN system requires a computer.

3) **Units Adaptation (UA):**

All the computer controlled units (one per unitary process) require some modifications in the EI (electronic interface) in order to allow manipulating and managing all the signals given by the sensors. Each unit uses more or less different number of sensors, depending of the parameters involved in the process and we are interested to measure.

4) **Software Adaptation (SA):**

All the computer controlled units requires its complex software adaptation in order to be connected to the other parts of the ESN.  
This software will allow, among others, the unit to be controlled separately.

5) **Webcam (WC):**

Any unit will have a web cam in order to see, in the user/student computer, how is working.  
The webcam delivers clear, colorful images and compatibility with major video calling applications. It uses a VGA sensor (640 x 480 pixels) to provide solid image quality, including 1.3-megapixel (software enhanced) photos. The webcam allows you to easily capture, e-mail and upload video or photos with a single click; universal monitor clip/base which installs securely on LCD monitors and ultrathin notebooks, or can be used on flat surfaces. Plus, it's compatible with all leading instant messaging applications.

6) **Manager/Instructor Software (MIS):**

- This MIS or teacher software will allow to handle all the signals coming from all sensors of all (UPU), in order to suit to the users/students computers working with any particular unit (UPU).
- It will allow the users/students organisation and managing by the manager/teacher.
- It will allow to managing the users/students passwords and how to work and to use the ESN.
- It will allow to get "access" to the (UPU) and its UPU Software.
- It will allow the interconnection, at any time, between the Manager and User for:
  - Receiving the manager questions from the user.
  - Guiding the user for using the UPU, PC, UA, SA and WC.
  - Asking questions, technical o theoretical, related with any unit, as: unit itself, unit operation, unit results, etc.
  - Evaluating the user, in real time o during the complete process, in order to know the level of understanding.
  - "Chat" between manager and user at any time.
  - Sending and receiving results and files at any time between the manager and user, and vice-versa.

7) **User/Student Software (US):**

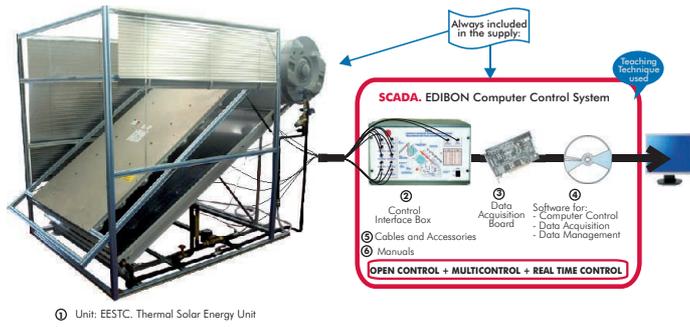
- This software package will allow the user to handle all the signals coming from UPU, PC, UA, SA, but with the limitations decided by the manager and its MIS, in order to give the user (student) the proper and adequate information for a better knowledge and proper understanding.
- It will include the "password access".
- To ask the manager the unit (UPU) he will work with.
- To see any unit working but with previous manager acceptance.
- To work and control any UPU, with previous manager acceptance.
- To chat with the manager.
- To send the files and questions to the manager, in real time.

8) **Classroom accessories and complements:**

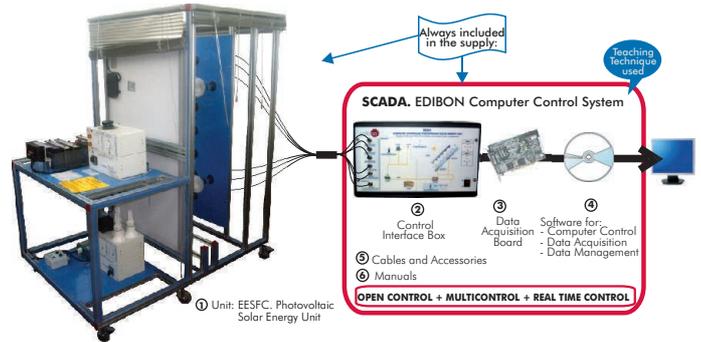
- Projector.
- Red Extra Plane Laser Pointer.
- Tripod Projection Screen.
- Shelf.



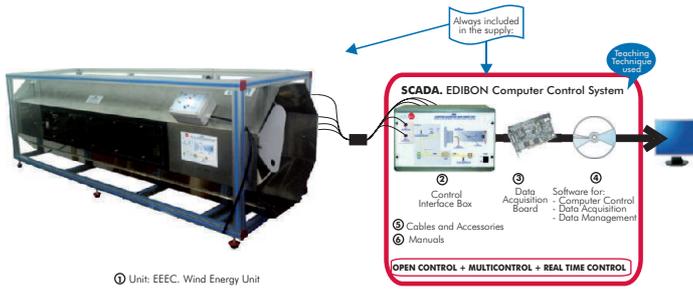
EESTC. Computer Controlled **Thermal Solar Energy Unit**



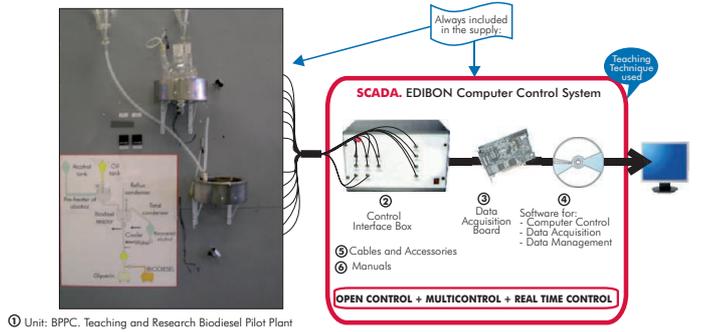
EESFC. Computer Controlled **Photovoltaic Solar Energy Unit**



EEEC. Computer Controlled **Wind Energy Unit**



BPPC. Computer Controlled **Teaching and Research Biodiesel Pilot Plant**



Note: Units detailed information in:

[www.edibon.com/products/index.php?area=energy&subarea=alternativeenergies&lang=en](http://www.edibon.com/products/index.php?area=energy&subarea=alternativeenergies&lang=en)

More information on request.

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



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