

Wind Power Application with Permanent Magnets Synchronous Generator

AEL-WPT

Engineering and Technical Teaching Equipment



① Unit: AEL-WPT. Wind Power Application with Permanent Magnets Synchronous Generator

Key features:

- > Advanced Real-Time SCADA.
- > Open Control + Multicontrol + Real-Time Control.
- > Specialized EDIBON Control Software based on LabVIEW.
- > Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.
- > Capable of doing applied research, real industrial simulation, training courses,
- > Remote operation and control by the user and remote control for EDIBON technical support, are always included.
- > Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).
- > Designed and manufactured under several quality standards.
- > Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc.
 - Apart from monitoring user's knowwledge and progress reached.
- > This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.

OPEN CONTROL
MULTICONTROL
REAL TIME CONTROL



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PRODUCTS

4.- ELECTRICITY

For more information about Key Features, click here













GENERAL DESCRIPTION

Energy saving and environmental pollution reduction are crucial global issues. Using renewable energies as alternative sources to fossil fuels can address both issues, with great benefits especially in countries where traditional energy sources are scarce.

Considering the above, this Applicationenables experimental investigation on the conversion of wind energy into electricity by means of a wind power generator. The system configuration is stand-alone (isolated from the grid). The equipment is manufactured using real components available on the market.

The AEL-WPT Wind Power Application with Permanent Magnets Synchronous Generator is an application designed by Edibon to train the students in the main operations of wind turbines.

Using a driver motor that controls on AC Permanent Magnets Synchronous Generator, the student can simulate an actual medium wind turbine with a voltage regulator, inverter and batteries. In order to carry out electric parameters measurements, a network analyzer is included too.

The AEL-WPT includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- EMT6/B. Permanent magnets synchronous three-phase generator.
- EMT7C. Asynchronous three-phase motor of squirrel cage.
- N-WCA/M. AC Motors Speed Controller (Intermediate option).
- BAT. Battery.
- N-REG02. Voltage Electronic Regulator (300W).
- N-EAL. Network Analyzer Unit.
- N-INV01. Power Inverter (300W).
- N-REV/500. Variable Resistor of 500W.
- N-LAM16. Halogen Lamp Module.
- N-ES20. 12 VDC Load Module.

Optional SCADA software:

• AEL-WPT/CCSOF. Computer Control +Data Acquisition + Data Management Software.

Optional module:

• PMSWG. Permanent Magnet Small Wind Turbine.

Optional learning software:

In addition, Edibon provides optional software (AEL-WPT/ICAI) to reinforce knowledge about this field. This software is formed by:

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).
- ESL-SOF. EDIBON Student Labsoft (Student Software).

The application AEL-WPT can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

• N-RACK-M (2 units).

Optionally the AEL-WBR. Electrical Workbench (Rack) can be supplied to place the rack/s.

Option B:

This application can be mounted on rail.

Optionally the AEL-WBC. Electrical Workbench (Rail) can be supplied to mount the modules.

Optionally this unit is supplied with the EDIBON Computer Control System (SCADA), and includes: The unit itself + Computer Control, Data Acquisition and Data Management Software Packages, for controlling the process and all parameters involved in the process.

With this unit there are several options and possibilities:

- Main items: 1, 3 and 4.

- Optional items: 2, 5, 6 and 7.

Let us describe first the main items (1 to 4):

① AEL-WPT. Unit.

The application includes the following modules:

• N-ALI01. Industrial Main Power Supply.

Supply voltage: 400 VAC, 3PH+N+G

ON-OFF removable key Output voltage connections:

Three-Phase + Neutral: 400 VAC.

Single-Phase: 230 VAC.

Three-Phase supply hose with IP44 3PN+E 32A 400V connecting plug.

Differential magnetothermal, 4 poles, 25A, 300mA AC 6KA.

• EMT6B. Permanent magnets synchronous three-phase generator.

Nominal Power: 0,6 kVA. Nominal voltage: 24 V.

8 poles

Synchronous speed: 850 r.p.m.

• EMT7C. Asynchronous Three-Phase Motor of Squirrel Cage.

Nominal power: 370 W.

Nominal voltage: $3x 230/400 \text{ VAC } \Delta/Y$.

Frequency: 50/60 Hz. Number of poles: 2. RPM: 2730 r.p.m.

Nominal current: 1,67/0,97 A.

• N-WCA/M. AC Motor Speed Controller (Intermediate option).

Supply voltage: 230 VAC Nominal power: 0,4 kW.

PWM output voltage connections: Three-Phases: 230 VAC.

10K, potentiometer for the induction motor control speed. Setting and visualization display of the machine parameters.

• BAT. Battery.

Battery voltage: 12V. Battery capacity: 5Ah.

• N-REG02. Voltage Electronic Regulator (300W).

Automatic detection of operating voltage of 12V or 24V.

Monitoring of parameters:

Voltage.

Current.

Charge level of the battery.

Charging current.

State.

Devices to protect itself, battery and loads.

• N-EAL. Network Analyzer Unit.

ON-OFF switch.

Supply voltage: 230 VAC.

Input terminals: Input connection with the measurement point.

Output terminals: Output connection with the measurement point.

Digital outputs: Three digital outputs are used for pulses or alarms, or for combining both.

Fuses: 3x10 A.

Network Analyzer Display. It shows:

Active, reactive and apparent power.

Active, reactive and apparent energies.

Lines and phase currents.

Line and phase voltages.

Frequencies.
Power Factor.



N-ALI01



EMT6B



EMT7C



N-WCA/M



BAT



N-REG02



N-EAL

• N-INV01. Power Inverter (300W).

ON/OFF switch. Power: 300 W.

Output voltage: 230 VAC.

Efficiency: 90% Safety functions:

Cut out for excess battery voltage.

Over temperature and overload protection.

Short-circuit protection. Pole reversal protection.

• N-REV/500. Variable Resistor of 500W.

Variable resistor of 1 kOhm Maximum power: 500 W.

Potentiometer. Terminals:

Three terminals to choose all resistance or variable resistance.

Fuse: 3 A.

• N-LAM16. Halogen Lamp Module.

Nominal voltage: 230 VAC (PH+N).

Halogen lamp. Power: 60 W.

• N-ES20. 12 VDC Load Module.

Supply voltage: 12 VDC.

Two Lamps.
Two switches.

Optional module:

• PMSWG. Permanent Magnet Small Wind Turbine.

Power output: 200 W.

Nominal wind speed 11,5m/s.

Rotor diameter 1m.

• All necessary cables to realize the practical exercises are included.

The complete unit includes as well:

Advanced Real-Time SCADA.

Open Control + Multicontrol + Real-Time Control.

Specialized EDIBON Control Software based on LabVIEW.

Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.

Capable of doing applied research, real industrial simulation, training courses, etc.

Remote operation and control by the user and remote control for EDIBON technical support, are always included.

Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).

Designed and manufactured under several quality standards.

Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc.

Apart from monitoring user's knowwledge and progress reached.

This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.



N-INV01



N-REV/500



N-LAM16



N-ES20



PWSWG

② AEL-WPT/CCSOF. Computer Control + Data Acquisition + Data Management Software:

The three softwares are part of the SCADA system.

Compatible with 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 simultaneous 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.

It allows the registration of the alarms state and the graphic representation in real time.

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

Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels

This unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whitehouse

3 Cables and Accessories, for normal operation.

4 Manuals:

This unit is **supplied with 7 manuals**: Required Services, Assembly and Installation, Control Software, Starting-up, Safety, Maintenance & Practices Manuals.

*References 1 to 4 are the main items: AEL-WPT + AEL-WPT/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.



AEL-WPT/CCSOF

EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

- 1.- Voltage-Speed Characteristics of a Wind Turbine Generator.
- 2.- Checking the lamps.
- 3.- Power vs Wind Turbine Speed.
- 4.- Storing Energy from a Wind Turbine into Batteries.
- 5.- Battery charging fundamentals.
- 6.- Drop voltage in the wind generator.
- 7.- Feeding from the wind generator.
- 8.- Feeding from the battery.

Some practical exercises possibilities with the Optional SCADA System:

- 9.- Monitoring and Data Acquisition wind turbine curves.
- Measurement of energy generation in function of the wind speed.
- 11.- Remote control of the wind turbine.

Other possibilities to be done with this Unit:

- 12.- Many students view results simultaneously.
 To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
- 13.- The Computer Control System with SCADA allow a real industrial simulation.
- 14.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
- 15.- This unit can be used for doing applied research.
- 16.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
- Several other exercises can be done and designed by the user.

- REQUIRED SERVICES -

- Electrical supply: three-phase, 380V./50 Hz. or 208V./60 Hz., 20 kW.
- Computer (PC).

DIMENSIONS AND WEIGHTS

AEL-WPT:

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-Dimensions: 1600 x 550 x 2000 mm. approx.

(62.99 x 21.65 x 78.74 inches approx.)

-Weight: 180 Kg. approx.

(397 pounds approx.)

COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

Additionally to the main items (1, 3, 4) described, we can offer, as optional, other items 2 and from 5 to 7.

All these items try to give more possibilities for:

- a) Technical and Vocational Education configuration. (ICAI)
- b) Multipost Expansions options. (Mini ESN and ESN)

a) Technical and Vocational Education configuration

(5) AEL-WPT/ICAI. Interactive Computer Aided Instruction Software System.

This complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

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This software is optional and can be used additionally to items (1 to 4).

-ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

User Data Base Management.

Administration and assignment of Workgroup, Task and Training sessions.

Creation and Integration of Practical Exercises and Multimedia Resources.

Custom Design of Evaluation Methods.

Creation and assignment of Formulas & Equations.

Equation System Solver Engine.

Updatable Contents.

Report generation, User Progression Monitoring and Statistics.

-ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

Student Log-In & Self-Registration.

Existing Tasks checking & Monitoring.

Default contents & scheduled tasks available to be used from the first session.

Practical Exercises accomplishment by following the Manual provided by EDIBON.

Evaluation Methods to prove your knowledge and progression.

Test self-correction.

Calculations computing and plotting.

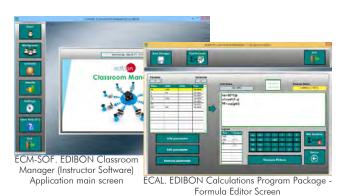
Equation System Solver Engine.

User Monitoring Learning & Printable Reports.

Multimedia-Supported auxiliary resources.

For more information see **ICAI** catalogue. Click on the following link: www.edibon.com/es/files/expansion/ICAI/catalog

Instructor Software



ERS. EDIBON Results & Statistics
Program Package - Student
Scores Histogram

ETTE. EDIBON Training Test & Exam Program
Package - Main Screen with Numeric Result
Question

Student Software



Main Screen EPE. EDIBON Practical Exercise Program
Package Main Screen



b) Multipost Expansions options

6 Mini ESN. EDIBON Mini Scada-Net System.

Mini ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously.

It is useful for both, Higher Education and/or Technical and Vocational Education.

The Mini ESN system consists of the adaptation of any EDIBON computer controlled unit with SCADA integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main 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).

Main characteristics:

- -It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- -Open Control + Multicontrol + Real Time Control + Multi Student Post
- -Instructor controls and explains to all students at the same time.
- -Any user/student can work doing "real time" control/multicontrol and visualisation.
- -Instructor can see in the computer what any user/student is doing in the unit.
- -Continuous communication between the instructor and all the users/students connected.

Main advantages:

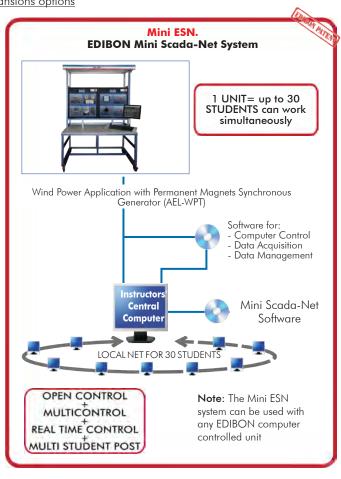
- -It allows an easier and quicker understanding.
- -This system allows you can save time and cost.
- -Future expansions with more EDIBON Units.

For more information see $\mbox{\bf Mini}\ \mbox{\bf ESN}$ catalogue. Click on the following link:

www.edibon.com/es/files/expansion/MINI-ESN/catalog

⑦ESN. EDIBON Scada-Net System.

This unit can be integrated, in the future, into a Complete Laboratory with many Units and many Students.



Main items (always included in the supply)

Minimum supply always includes:

- ① Unit: AEL-WPT. Wind Power Application with Permanent Magnets Synchronous Generator.
- 3 Cables and Accessories, for normal operation.
- 4 Manuals.

*IMPORTANT: Under AEL-WPT we always supply all the elements for immediate running as 1, 3 and 4.

Optional items (supplied under specific order)

- **2** AEL-WPT/CCSOF. Computer Control + Data Acquisition + Data Management Software.
 - a) Technical and Vocational configuration
- **⑤** AEL-WPT/ICAl. Interactive Computer Aided Instruction Software System.
 - b) Multipost Expansions options
- Mini ESN. EDIBON Mini Scada-Net System.
- **7** ESN. EDIBON Scada-Net System.

1 AEL-WPT. Unit.

The application includes the following modules:

N-ALI01. Industrial Main Power Supply.
Supply voltage: 400 VAC, 3PH+N+G
ON-OFF removable key

Output voltage connections: Three-Phase + Neutral: 400 VAC.

Single-Phase: 230 VAC

Three-Phase supply hose with IP44 3PN+E 32A 400V connecting plug.

Differential magnetothermal, 4 poles, 25A, 300mA AC 6KA.

• EMT6B. Permanent magnets synchronous three-phase generator.

Nominal Power: 0,6 kVA. Nominal voltage: 24 V.

8 poles.

Synchronous speed: 850 r.p.m.

• EMT7C. Asynchronous Three-Phase Motor of Squirrel Cage.

Nominal power: 370 W.

Nominal voltage: 3x 230/400 VAC Δ/Y. Frequency: 50/60 Hz. Number of poles: 2.

RPM: 2730 r.p.m. Nominal current: 1,67/ 0,97 A

N-VVCA/M. AC Motor Speed Controller (Intermediate option). Supply voltage: 230 VAC.

Nominal power: 0,4 kW. PWM output voltage connections:

Three-Phases: 230 VAC

10K, potentiometer for the induction motor control speed. Setting and visualization display of the machine parameters.

BAT. Battery.
Battery voltage: 12V.

Battery capacity: 5Ah.

N-REG02. Voltage Electronic Regulator (300W).

Automatic detection of operating voltage of 12V or 24V.

Monitoring of parameters:

Voltage.

Current.

Charge level of the battery.

Charging current.

State.

Devices to protect itself, battery and loads.

• N-EAL. Network Analyzer Unit.

ON-OFF switch.
Supply voltage: 230 VAC.

Input terminals: Input connection with the measurement point. Output terminals: Output connection with the measurement point.

Digital outputs: Three digital outputs are used for pulses or alarms, or for combining both.

Fuses: 3x10 A.

Network Analyzer Display. It shows:

Active, reactive and apparent power.

Active, reactive and apparent energies.

Lines and phase currents. Line and phase voltages.

Frequencies.
Power Factor.

N-INV01. Power Inverter (300W).
ON/OFF switch.
Power: 300 W.

Output voltage: 230 VAC.

Efficiency: 90% Safety functions:

Cut out for excess battery voltage.

Over temperature and overload protection. Short-circuit protection.

Pole reversal protection.
N-REV/500. Variable Resistor of 500W.

Variable resistor of 1 kOhm Maximum power: 500 W.

Potentiometer. Terminals:

Three terminals to choose all resistance or variable resistance.

Fuse: 3 A.

• N-LAM16. Incandescent lamp

Nominal voltage: 230 VAC (PH+N).

Halogen lamp.

Power: 60 W.
• N-ES20. 12 VDC Load Module.

Supply voltage: 12 VDC.

Two Lamps.

Two switches Optional module:

• PMSWG. Permanent Magnet Small Wind Turbine.

Power output: 200 W. Nominal wind speed 11,5m/s.

Rotor diameter 1m.

• All necessary cables to realize the practical exercises are included.

Tender Specifications (for main items)

The complete unit includes as well:

Advanced Real-Time SCADA.

Open Control + Multicontrol + Real-Time Control.

Specialized EDIBON Control Software based on LabVIEW.

Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.

Capable of doing applied research, real industrial simulation, training courses, etc.

Remote operation and control by the user and remote control for EDIBON technical support, are always included.

Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).

Designed and manufactured under several quality standards.

Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc.

Apart from monitoring user's knowwledge and progress reached.

This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.

② AEL-WPT/CCSOF. Computer Control +Data Acquisition+Data Management Software:

The three softwares are part of the SCADA system.

Compatible with the industry standards.

Flexible, open and multiconfrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.

Management, processing, comparison and storage of data.

It allows the registration of the alarms state and the graphic representation in real time.

Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels.

This unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.

3 Cables and Accessories, for normal operation.

4 Manuals:

This unit is supplied with 7 manuals: Required Services, Assembly and Installation, Control Software, Starting-up, Safety, Maintenance & Practices Manuals.

Exercises and Practical Possibilities to be done with the Main Items

- 1.- Voltage-Speed Characteristics of a Wind Turbine Generator.
- 2.- Checking the lamps.
- 3.- Power vs Wind Turbine Speed.
- 4.- Storing Energy from a Wind Turbine into Batteries.
- 5.- Battery charging fundamentals.
- 6.- Drop voltage in the wind generator.
- 7.- Feeding from the wind generator.
- 8.- Feeding from the battery.

Some practical exercises possibilities with the Optional SCADA System:

- 9.- Monitoring and Data Acquisition wind turbine curves.
- 10.- Measurement of energy generation in function of the wind speed.
- 11.- Remote control of the wind turbine.

Other possibilities to be done with this Unit:

12.- Many students view results simultaneously.

To view all results in real time in the classroom by means of a projector or an electronic whiteboard.

- 13.- The Computer Control System with SCADA allow a real industrial simulation.
- 14.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
- 15.- This unit can be used for doing applied research.
- 16. This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
- Several other exercises can be done and designed by the user.

TENDER SPECIFICATIONS (for optional items)

a) Technical and Vocational Education configuration

⑤ AEL-WPT/ICAI. Interactive Computer Aided Instruction Software System.

This complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

-ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc...so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

User Data Base Management.

Administration and assignment of Workgroup, Task and Training sessions.

Creation and Integration of Practical Exercises and Multimedia Resources.

Custom Design of Evaluation Methods.

Creation and assignment of Formulas & Equations.

Equation System Solver Engine.

Updatable Contents.

Report generation, User Progression Monitoring and Statistics.

-ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

Student Log-In & Self-Registration.

Existing Tasks checking & Monitoring.

Default contents & scheduled tasks available to be used from the first session.

Practical Exercises accomplishment by following the Manual provided by EDIBON.

Evaluation Methods to prove your knowledge and progression.

Test self-correction.

Calculations computing and plotting.

Equation System Solver Engine.

User Monitoring Learning & Printable Reports.

Multimedia-Supported auxiliary resources.

b) Multipost Expansions options

6 Mini ESN. EDIBON Mini Scada-Net System.

EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously.

The Mini ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit.

Main characteristics:

- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work doing "real time" control/multicontrol and visualisation.
- Instructor can see in the computer what any user/student is doing in the unit.
- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.
- This system allows you can save time and cost.
- Future expansions with more EDIBON Units.

The system basically will consist of:

This system is used with a Computer Controlled Unit.

- Instructor's computer.
- Students' computers.
- Local Network.
- Unit-Control Interface adaptation.
- Unit Software adaptation.
- Webcam.
- Mini ESN Software to control the whole system.
- Cables and accessories required for a normal operation.
- *Specifications subject to change without previous notice, due to the convenience of improvement of the product.



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