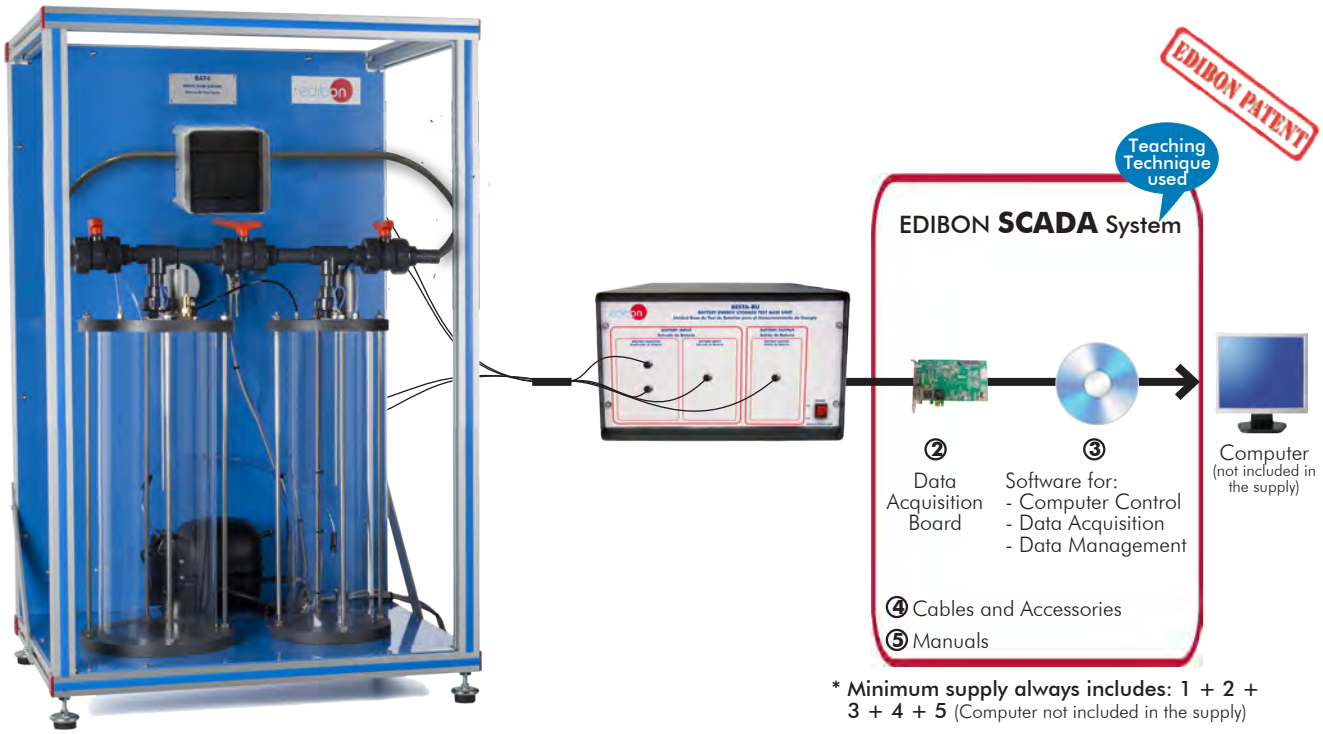
Engineering and Technical Teaching Equipment

Battery Energy Storage Test Application, with SCADA

AEL-BESTA



Configuration example of AEL-BESTA with BAT4

Key features:

- **Advanced Real-Time SCADA.**
- **Open Control + Multicontrol + Real-Time Control.**
- **Specialized EDIBON Control Software based on LabVIEW.**
- **National Instruments Data Acquisition board (250 KS/s, kilo samples per second).**
- **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 knowledge 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

POWERED BY NATIONAL INSTRUMENTS LabVIEW

www.edibon.com
PRODUCTS
4.- ELECTRICITY

For more information about Key Features, click here

ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate (total safety)

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

"Worlddidac Quality Charter" and Platinum Member of Worlddidac

INTRODUCTION

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

In the last two decades, renewable energies have evolved from small scale applications towards becoming the mainstream electricity sources. One of the main issues in renewable energies is the lack of coincidence in time between the energy generation and consumption, so this energy has to be stored. So, the problem is the difficulty in storing this energy.

GENERAL DESCRIPTION

There are different systems to store energy; one of the most usual ways is the rechargeable electric batteries. There are many different types of batteries: lithium-ion, lithium-ion polymer, lead-acid, solid-state, redox flow battery, etc. Every battery has different characteristics that make them appropriate for different applications.

The Battery Energy Storage Test Application, AEL-BESTA, has been designed by EDIBON to perform a complete characterization of the most common types of batteries. The AEL-BESTA is a computerized unit that allows the student to perform all battery tests in an automatic way and manage and save the obtained curves and charts for further analysis and comparisons.

The AEL-BESTA is designed to perform battery discharge curves with the selected output current, analyze the depth of discharge, measure the different voltage values in open-circuit and when the battery is under operation, analyze the real battery capacity for different batteries and compare the capacity of the same battery with different number of charge-discharge cycles to obtain the life cycle curve.

The AEL-BESTA application includes the following elements:

- BESTA-BU. Battery Energy Storage Test Base Unit

Required element:

- AEL-PC. Touch screen and computer.

Required elements (at least one):

- BAT3. Lithium-Iron-Phosphate Battery.
- BAT4. Redox Flow Battery.
- BAT5. Lead-Acid Battery.

This Computer Controlled Unit is supplied with the EDIBON Computer Control System (SCADA), and includes: The unit itself + a Control Interface Box + a Data Acquisition Board + 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, 2, 3, 4 and 5.
- Optional items: 6, 7, 8 and 9.

Let us describe first the main items (1 to 5):

① AEL-BESTA. Application.

The AEL-BESTA application includes the following elements:

- BESTA-BU. **Battery Energy Storage Test Base Unit:**

  Battery discharge control: performs the steps to carry out the procedure selected in the computer for the different battery tests.

  Voltmeter and ammeter: measure the electric voltage and current from the tested battery. The values are visualized with the computer.

  Load selector: different electric heating elements can be connected to the tested battery. The element is selected through the computer.

  Cable for connection with the computer.

BESTA-BU

Required element:

- AEL-PC. **Touch Screen and Computer.**

  Touch Screen:

  Energy efficiency class: A.

  Screen diagonal: 68.6 cm (27 inches).

  Power consumption (operating): 26 watts.

  Annual energy consumption: 38 kWh.

  Power consumption (standby / off) 0.49 watts.

  Screen resolution: 1920 x 1080 pixels.

  Computer:

  Processor Number: Intel Core i7-6600U Processor (4M Cache, up to 3,40 GHz).

  Cache: 4 MB Intel Smart Cache.

  Clock speed: 2.6 GHz.

  # Of Cores/# of Threads: 2/4.

  Max. TDP/Power: 15 W.

  Memory Types: DDR4-2133, LPDDDR3-1866, DDR3L-1600.

  Graphics: Intel HD Graphics 530.

  Slot for PCI Express.

The "AEL-BESTA" required at least one of the following elements: (NOT included in the minimum supply)

- BAT3. **Lithium-Iron-Phosphate Battery.**

  Long life battery.

  Battery capacity: 2000 Wh.

- BAT4. **Redox Flow Battery.**

  Redox flow battery (RFB)

  Two separated electrolyte circuits with two tanks and pumps

  Battery flow stack with membrane separator that only allows the electrons flow.

- BAT5. **Lead-Acid Battery.**

  Sealed lead-acid battery.

The complete unit includes as well:

Advanced Real-Time SCADA.

Open Control + Multicontrol + Real-Time Control.

Specialized EDIBON Control Software based on LabVIEW.

National Instruments Data Acquisition board (250 KS/s, kilo samples per second).

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 knowledge 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 DAB. Data Acquisition Board:

The Data Acquisition board is part of the SCADA system.

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

Analog input:

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

Sampling rate up to: 250 KS/s (kilo samples per second).

Input range (V)=±10 V. Data transfers=DMA, interrupts, programmed I/0. DMA channels=6.

Analog output:

Number of **channels=2**. **Resolution=16 bits**, 1 in 65536.

Maximum output rate up to: 900 KS/s.

Output range(V)=±10 V. Data transfers=DMA, interrupts, programmed I/0.

Digital Input/Output:

Number of **channels=24 inputs/outputs**. D0 or DI Sample Clock frequency: 0 to 100 MHz.

Timing: Number of **Counter/timers=4**. Resolution: Counter/timers: 32 bits.

DAB

③ AEL-BESTA/CCSOF. Computer Control + Data Acquisition + Data Management Software:

The three softwares are part of the SCADA system.

Compatible with actual Windows operating systems.

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.

Sampling velocity up to 250 KS/s (kilo samples per second).

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 whiteboard.

AEL-BESTA/CCSOF

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.

∗References 1 to 5 are the main items: AEL-BESTA + DAB + AEL-BESTA/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

1.-Life-cycle battery tests.
2.-Verification of the battery durability.
3.-External load connection for higher load currents on discharge.
4.-Identification of possible faults in the battery during the tests.
5.-Comparison of different life cycles with different battery models.
6.-Verification of the battery life-cycle.
7.-Verification of the Lithium-Iron-Phosphate battery durability.
8.-Load connection in the Lithium-Iron-Phosphate battery to analyze the discharge.
9.-Load connection in the Redox Flow battery to analyze the discharge.
10.-Verification of the Redox Flow battery durability.
11.-Load connection in the Lead-Acid battery to analyze the discharge.
12.-Verification of the Lead-Acid battery durability.

Other possibilities to be done with this Unit:

13.-Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
14.-Open Control, Multicontrol and Real Time Control.
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
15.-The Computer Control System with SCADA allow a real industrial simulation.
16.-This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
17.-This unit can be used for doing applied research.
18.-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: single-phase 220V/50Hz or 110V/60Hz, 1 kW.
- Computer.

DIMENSIONS AND WEIGHTS

BESTA-BU:
- Dimensions: 490 x 330 x 310 mm approx.
(19.29 x 12.99 x 12.20 inches approx.)
- Weight: 10 Kg approx.
(22 pounds approx.)

REQUIRED ELEMENTS (At least one, not included)

- BAT3. Lithium-Iron-Phosphate Battery.
- BAT4. Redox Flow Battery.
- BAT5. Lead-Acid Battery.

RECOMMENDED ELEMENT (Not included)

- BAT3. Lithium-Iron-Phosphate Battery.
- BAT4. Redox Flow Battery.
- BAT5. Lead-Acid Battery.

Additionally to the main items (1 to 5) described, we can offer, as optional, other items from 6 to 9.
All these items try to give more possibilities for:

a) Technical and Vocational Education configuration. (ICAI and FSS)
b) Multipost Expansions options. (MINI ESN and ESN)

a) Technical and Vocational Education configuration

⑥ AEL-BESTA/ICAI. Interactive Computer Aided Instruction Software System.

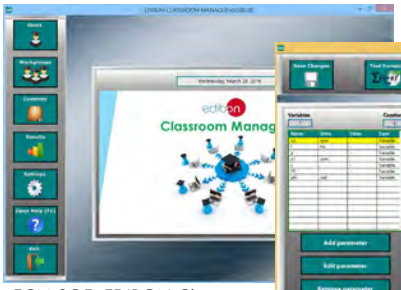
This complete software package consists of an Instructor Software (EDIBON Classroom Manager - ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft - ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the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

This software is optional and can be used additionally to items (1 to 5).

Instructor Software

- 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.



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen

ECAL. EDIBON Calculations Program Package - Formula Editor Screen

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.**

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

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

- 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.

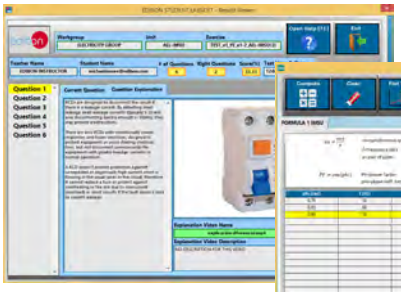
Student Software

ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

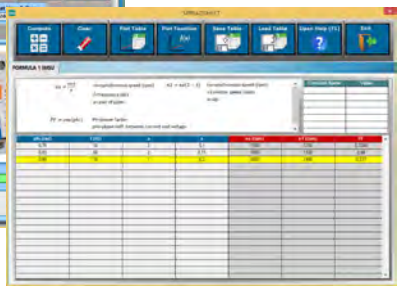
EPE. EDIBON Practical Exercise Program Package Main Screen

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.**



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

For more information see **ICAI** catalogue. Click on the following link:

www.edibon.com/en/files/expansion/ICAI/catalog

⑦ AEL-BESTA/FSS. Faults Simulation System.

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit. It is useful for Technical and Vocational level.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them. There are several kinds of faults that can be grouped in the following sections:

Faults affecting the sensors measurement:

- **An incorrect calibration is applied to them.**
- **Non-linearity.**

Faults affecting the actuators:

- **Actuators channels interchange at any time during the program execution.**
- **Response reduction of an actuator.**

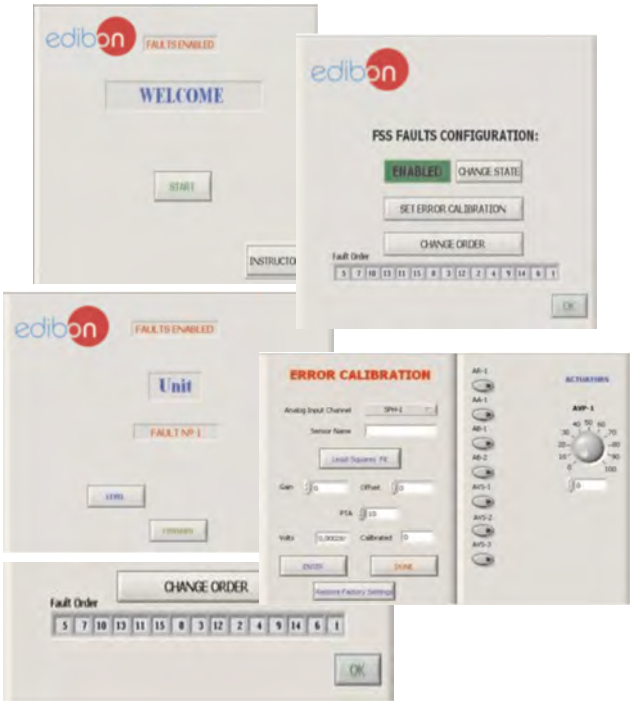
Faults in the controls execution:

- **Inversion of the performance in ON/OFF controls.**
- **Reduction or increase of the calculated total response.**
- **The action of some controls is annulled.**

On/off faults:

- **Several on/off faults can be included.**

Example of some screens



For more information see **FSS** catalogue. Click on the following link:

www.edibon.com/en/files/expansion/FSS/catalog

b) Multipost Expansions options

⑧ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

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.

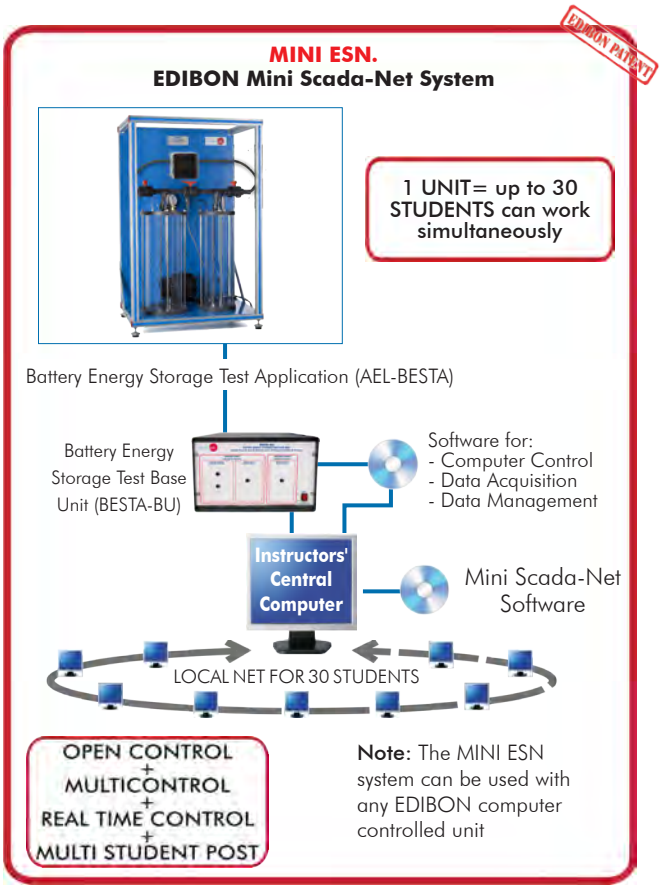
This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit. Then, the number of possible users who can work with the same unit is higher than in an usual way of working (usually only one).

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 **MINI ESN** catalogue. Click on the following link:

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

⑨ ESN. EDIBON Scada-Net Systems.

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

For more information see **ESN** catalogue. Click on the following link:

www.edibon.com/en/files/expansion/ESN/catalog

ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

① **Unit: AEL-BESTA. Battery Energy Storage Test Application.**

② **DAB. Data Acquisition Board.**

③ **AEL-BESTA/CCSOF. Computer Control + Data Acquisition + Data Management Software.**

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

⑤ **Manuals.**

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

Optional items (supplied under specific order)

a) Technical and Vocational Education configuration

⑥ AEL-BESTA/ICAI. Interactive Computer Aided Instruction Software System.

⑦ AEL-BESTA/FSS. Faults Simulation System.

b) Multipost Expansions options

⑧ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

⑨ ESN. EDIBON Scada-Net Systems.

①AEL-BESTA. Application.

The AEL-BESTA application includes the following elements:

- BESTA-BU. Battery Energy Storage Analyzer:
  - Battery discharge control: performs the steps to carry out procedure selected in the computer for the different battery tests.
  - Voltmeter and ammeter: measures the electric voltages and currents from the tested battery, the values are visualized with the computer.
  - Load selector: different electric resistances to be connected to the tested battery, the resistance is selected through the computer.
  - Cable to connect with the computer.

Required element:

- AEL-PC. Touch Screen and Computer.
  - Touch Screen:
    - Energy efficiency class: A.
    - Screen diagonal: 68.6 cm (27 inch (s)).
    - Power consumption (operating): 26 watts.
    - Annual energy consumption: 38 kWh.
    - Power consumption (standby / off) 0.49 watts.
    - Screen resolution: 1920 x 1080 pixels.
  - Computer:
    - Processor Number: Intel Core i7-6600U Processor (4M Cache, up to 3,40 GHz).
    - Cache: 4 MB Intel Smart Cache.
    - Clock speed: 2.6 GHz.
    - # Of Cores/# of Threads: 2/4.
    - Max. TDP/Power: 15 W.
    - Memory Types: DDR4-2133, LPDDDR3-1866, DDR3L-1600.
    - Graphics: Intel HD Graphics 530.
  - Slot for PCI Express.

The "AEL-BESTA" required at least one of the following elements: (NOT included in the minimum supply)

- BAT3. Lithium-Iron-Phosphate Battery.
  - Long life battery.
  - Battery capacity: 2000 Wh.
- BAT4. Redox Flow Battery.
  - Redox flow battery (RFB)
  - Two separated electrolyte circuits with two tanks and pumps
  - Battery flow stack with membrane separator that only allows the electrons flow.
- BAT5. Lead-Acid Battery.
  - Sealed lead-acid battery.

The complete unit includes as well:

- Advanced Real-Time SCADA.
- Open Control + Multicontrol + Real-Time Control.
- Specialized EDIBON Control Software based on LabVIEW.
- National Instruments Data Acquisition board (10 KS/s, kilo samples per second).
- 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.
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②DAB. Data Acquisition Board:

The Data Acquisition board is part of the SCADA system.
PCI Express Data acquisition board (National Instruments) to be placed in a computer slot.
Analog input: Channels= 16 single-ended or 8 differential. Resolution=16 bits, 1 in 65536. Sampling rate up to: 250 KS/s (kilo samples per second).
Analog output: Channels=2. Resolution=16 bits, 1 in 65536.
Digital Input/Output: Channels=24 inputs/outputs.

③AEL-BESTA/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 multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.
Management, processing, comparison and storage of data.
Sampling velocity up to 150 KS/s (kilo samples per second).
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.

④Cables and Accessories, for normal operation.

⑤Manuals:

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

Exercises and Practical Possibilities to be done with the Main Items

1.- Life-cycle battery tests.
2.- Verification of the battery durability.
3.- External load connection for higher load currents on discharge.
4.- Identification of possible faults in the battery during the tests.
5.- Comparison of different life cycles with different battery models.
6.- Verification of the battery life-cycle.
7.- Verification of the Lithium-Iron-Phosphate battery durability.
8.- Load connection in the Lithium-Iron-Phosphate battery to analyze the discharge.
9.- Load connection in the Redox Flow battery to analyze the discharge.
10.- Verification of the Redox Flow battery durability.
11.- Load connection in the Lead-Acid battery to analyze the discharge.
12.- Verification of the Lead-Acid battery durability.

Other possibilities to be done with this Unit:

13.- Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
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This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
15.- The Computer Control System with SCADA allow a real industrial simulation.
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- Several other exercises can be done and designed by the user.

a) Technical and Vocational Education configuration

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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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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.

⑦AEL-BESTA/FSS. Faults Simulation System.

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them.

There are several kinds of faults that can be grouped in the following sections:

Faults affecting the sensors measurement:

- An incorrect calibration is applied to them.
- Non-linearity.

Faults affecting the actuators:

- Actuators channels interchange at any time during the program execution.
- Response reduction of an actuator.

Faults in the controls execution:

- Inversion of the performance in ON/OFF controls.
- Reduction or increase of the calculated total response.
- The action of some controls is annulled.

On/off faults:

- Several on/off faults can be included.

b) Multipost Expansions options

⑧ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

MINI ESN. 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.

edibon INTERNATIONAL

C/ Julio Cervera, 10-12-14. Móstoles Tecnológico.
28935 MÓSTOLES. (Madrid). ESPAÑA - SPAIN.
Tel.: 34-91-6199363 Fax: 34-91-6198647
E-mail: edibon@edibon.com Web: **www.edibon.com**

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REPRESENTATIVE: