Power Systems SCADA Viewer

PSV-SCADA

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.

For more information about Key Features, click here
The PSV-SCADA “Power Systems SCADA Viewer” is a Supervision, Control and Data Acquisition software developed by Edibon for control and monitoring of Power Systems teaching equipments.

The PSV-SCADA allows the user the following functions:

- Visualization electrical parameter values and operating states in real time.
- Graphical visualization of measured values over time.
- Data process, tests and exporting of diagrams.

The PSV-SCADA includes the following elements:

- SCADA monitoring components parts, such as USB Network Adapter RJ45, 5-Port Ethernet Switch.
- SCADA Processing unit: PCI Express Data acquisition board (National Instruments). It will be supplied according to the application with which the PSV-SCADA is required.

The PSV-SCADA “Power Systems SCADA Viewer” is designed to work with the following trainers:

- AEL-TI-03. Arc Suppression Coil.
- AEL-TPT-03. Overvoltage and Undervoltage Protection
- AEL-TPT-07. High Speed Distance Protection Relay.
- AEL-EECFP. Advanced Power Factor Compensation.
- AEL-VTFP. Voltage Transformer Fundaments for Protections Devices.
With this unit there are several options and possibilities:
- Main items: 1, 2, 3 and 4.
- Optional items: 5, 6 and 7.

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

1. **PSV-SCADA. Software.**
   - 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/O. 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/O.
   - **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.**

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. **PSV-SCADA/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.
   - Sampling velocity up to **250 KS/s (kilo samples per second).**
   - Calibration system for the sensors involved in the process.
   - 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 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.

References 1 to 4 are the main items: PSV-SCADA + PSV-SCADA/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.
Some practical exercises possibilities of AEL-TI-01:

1.- Checking the variable power supply.
2.- Study of voltage increases on transmission lines without load.
3.- Study of voltage drop in transmission lines with different length.
4.- Study of voltage drop in transmission lines with different power factors.
5.- Reactive power losses in transmission lines as a function of U and I.
6.- Study of phase shift on transmission lines.
7.- Resistive, inductive and resistive-inductive mixed loads.
8.- Power factors Compensation for a resistive-inductive load.
9.- Earth fault on a line with an isolated star point.
10.- Response to earth faults.
11.- Earth-fault compensation.

Some practical exercises possibilities of AEL-TI-07:

12.- Power distribution in a line network fed by a generator.
13.- Parallel operation of a generator and line via the network.
14.- Control of active power feed.
15.- Control of reactive power feed.
16.- Manual synchronization operations.
18.- Manual current excitation of synchronous generator.

Additional practical exercises possibilities with the optional module “N-ERP-POC-01”:

This module allows the students to make operations carried out in the large electrical generators:

19.- Island grid operations.
20.- Parallel grid operations.
21.- Manual voltage regulation operations.
22.- Manual frequency regulation operations.
23.- Transference of manual to automatic voltage regulation operations.
24.- Transference of manual to automatic frequency regulation operations.
25.- Studying of the power factor regulation of synchronous generator in parallel grid operation.
26.- Studying of turbine regulation (frequency control) in island mode.
27.- Studying of turbine regulation (frequency control) in parallel grid mode.
28.- Studying of Excitation/voltage regulation in island mode.
29.- Studying of excitation/voltage regulation in parallel grid mode.
30.- Analysis of active and reactive power.
31.- Automatic control of active power.
32.- Automatic control of reactive power.
33.- Studying of the micro-grids.
34.- Setting of Overcurrent protection.
35.- Setting of Overvoltage and undervoltage protection of the synchronous generator.
36.- Setting of Reverser power protection.

Some practical exercises possibilities of AEL-TI-05:

37.- Configuration of overcurrent time protection relay.
38.- Parameterization of overcurrent time protection relay.
39.- Commissioning of overcurrent time protection relay.
40.- Configuration of different protection thresholds.
41.- Generation of different current levels for tripping operations.
42.- Analysis of different wave forms in real time.
43.- Determining rise and fall time.
44.- Determining the reset ratio.
45.- Setting and testing various characteristics.
46.- Checking circuit breaker’s release behavior in the event of a failure.

Some practical exercises possibilities of AEL-TI-02:

47.- Designing and parametrizing overcurrent time protection relay.
48.- Determining the reset ratio in the case of single-, double and triple-pole short circuit.
49.- Forward and reverse protection.

Some practical exercises possibilities of AEL-TI-03:

50.- Setting of over/under voltage protection relay.
51.- Parameterization of over/under voltage protection relay.
52.- Commissioning of over/under voltage protection relay.
53.- Testing the over/under voltage relay against overvoltage situations.

Some practical exercises possibilities of AEL-TI-04:

54.- Configuration of directional power protection relay.
55.- Parameterization of directional power protection relay.
56.- Commissioning of directional power protection relay.
57.- Configuration of directional power protection relay thresholds.

Some practical exercises possibilities of AEL-TI-05:

58.- Measuring voltages before a earth fault.
59.- Measuring voltages in a three-phase network experiencing earth faults.
60.- Determining rise and fall times during a fault.
61.- Determining the inherent time.

Some practical exercises possibilities of AEL-TI-07:

62.- Configuration of distance protection relay.
63.- Parameterization of distance protection relay.
64.- Commissioning of distance protection relay.
65.- Configuration of distance protection relay thresholds.
66.- Setting and testing Distance protection characteristic.
67.- Setting and testing Overcurrent time protection characteristic.
68.- Setting and testing Voltage protection characteristic.

Some practical exercises possibilities of AEL-MRPC:

69.- Wiring star and delta connection with resistive, capacitive and inductive load.
70.- Calculating of necessary capacitive load in order to carry out the adequate power factor correction.
71.- Studying different classes of reactive compensation methods: general compensation, local compensation, etc.
72.- Measurement of active power consumed by a receiver (resistive circuit).
73.- Measurement of the inductance of a coil.
74.- Measurement of the reactance XL considering RL.
75.- Measurement of reactive power consumed by a receiver (inductive circuit).
76.- Measurement of reactive power consumed by a receiver (capacitive circuit).
77.- Measurement of apparent power consumed by a receiver.
78.- Measurement of power factor of a receiver.
79.- Measurement of active energy consumed by a receiver.
80.- Measurement of reactive energy consumed by a receiver.
81.- Compensation of reactive energy (improvement of the power factor).
82.- Comparison of the active energy consumed after the compensation.
83.- Comparison of the reactive energy consumed after the compensation.
84.- Measurement of power factor after the compensation.
Exercises and Practical Possibilities to be done with the Main Items

85.- Determination of the first and second power maxima.
86.- Determination of the power maximum in the event of an asymmetric load.

Some practical exercises possibilities of AEL-ARPC:
87.- Automatic compensation of reactive energy (improvement of the power factor).
88.- Comparison of the active energy consumed after the automatic compensation.
89.- Comparison of the reactive energy consumed after the automatic compensation.
90.- Measurement of power factor after the automatic compensation.
91.- Results comparison between manual and automatic compensation.
92.- Setting of the automatic power factor controller.

Some practical exercises possibilities of AEL-EECFP:
93.- Measuring the maximum and minimum reactive power levels of the grid.
94.- Studying the manual reactive power compensation for dynamic loads: induction motor coupled to servomotor.
95.- Measuring the reactive power consumed by a capacitive receptor.
96.- Comparison of the reactive energy before and after of manual power factor compensation.
97.- Optimum configuration of the reactive power controller.
98.- Checking the compensation control unit applying different reactive power levels.

Some practical exercises possibilities with the AEL-ARPC modules:
99.- Automatic compensation of reactive energy (improvement of the power factor).
100.- Comparison of the active energy consumed after the automatic compensation.
101.- Comparison of the reactive energy consumed after the automatic compensation.
102.- Measurement of power factor after the automatic compensation.
103.- Results comparison between manual and automatic compensation.

Some practical exercises possibilities of AEL-VTFP:
104.- Voltage transformer characteristics.
105.- Calculation of class of accuracy.
106.- Effects of load on the transformation ratio.
107.- Three-Phase voltage transformer in healthy grid.
108.- Three-Phase voltage transformer in a grid with earth-fault on the primary side.

- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: single-phase, 220 V./50Hz. or 110V./60Hz.
- Computer.

AVAILABLE APPLICATIONS

- AEL-TI-03. Arc Suppression Coil.
- AEL-TPT-03. Overvoltage and Undervoltage Protection
- AEL-TPT-07. High Speed Distance Protection Relay.
- AEL-EECFP. Advanced Power Factor Compensation.
- AEL-VTFP. Voltage Transformer Fundaments for Protections Devices.
Additionally to the main items (1 to 4) described, we can offer, as optional, other items from 5 to 7.
All these items try to give more possibilities for:
  a) Technical and Vocational Education configuration.
  b) Multipost Expansions options. (Mini ESN and ESN)
    a) Technical and Vocational Education configuration

**5. PSV-SCADA/ICAI. Interactive Computer Aided Instruction Software System.**

This complete software package consists of an Instructor Software (EDIBON Classroom Manager - ECM) totally integrated with the Student Software (EDIBON Student Labsoft - ESL). 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 4).

**ECM. EDIBON Classroom Manager (Instructor Software).**

ECM 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 Workgroups, Tasks 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. EDIBON Student Labsoft (Student Software).**

ESL 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/products/catalogues/en/ICAI.pdf
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 Mini ESN catalogue. Click on the following link: www.edibon.com/products/catalogues/en/Mini-ESN.pdf

ESN. EDIBON Scada-Net System.

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

**Main items** (always included in the supply)
Minimum supply always includes:
1. **PSV-SCADA.** Power Systems SCADA Viewer.
2. **PSV-SCADA/CCSOF.** Computer Control + Data Acquisition + Data Management Software.
3. **Cables and Accessories,** for normal operation.
4. **Manuals.**

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

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1. **PSV-SCADA. Software.**

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

   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).

   Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.

   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. **PSV-SCADA/CCSOF. Computer Control + Data Acquisition + Data Management Software:**

   The three softwares are part of the SCADA system.

   Compatible with the industry standards.

   Flexible software, 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).

   Calibration system for the sensors involved in the process.

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

   Open software, allowing the teacher to modify tests, 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.

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**Exercises and Practical Possibilities to be done with the Main Items**

Some practical exercises possibilities of AELTI-01:

1. - Checking the variable power supply.
2. - Study of voltage increases on transmission lines without load.
3. - Study of voltage drop in transmission lines with different length.
4. - Study of voltage drop in transmission lines with different power factors.
5. - Reactive power losses in transmission lines as a function of U and I.
6. - Study of phase shift on transmission lines.
7. - Resistive, inductive and resistive-inductive mixed loads.
8. - Power factors Compensation for a resistive-inductive load.
9. - Earth fault on a line with an isolated star point.
10. - Response to earth faults.
11. - Earth-fault compensation.

Some practical exercises possibilities of AELTI-07:

12. - Power distribution in a line network fed by a generator.
13. - Parallel operation of a generator and line via the network.
14. - Control of active power feed.
15. - Control of reactive power feed.

Additional practical exercises possibilities with the optional module “N-ERP-PGC-01”:

This module allows the students to make operations carried out in the large electrical generators:

19. - Island grid operations.
20. - Parallel grid operations.
23. - Transference of manual to automatic voltage regulation operations.
24. - Transference of manual to automatic frequency regulation operations.
25. - Studying of the power factor regulation of synchronous generator in parallel grid operation.
26. - Studying of turbine regulation (frequency control) in island mode.
27. - Studying of turbine regulation (frequency control) in parallel grid mode.
28. - Studying of excitation/voltage regulation in island mode.
29. - Studying of excitation/voltage regulation in parallel grid mode.
30. - Analysis of active and reactive power.
31. - Automatic control of active power.
32. - Automatic control of reactive power.
33. - Studying of the micro-grids.
34. - Setting of Overcurrent protection.
35. - Setting of Overvoltage and undervoltage protection of the synchronous generator.
36. - Setting of Reverser power protection.

Some practical exercises possibilities of AEL-TPT-01:

37. - Configuration of overcurrent time protection relay.
38. - Parameterization of overcurrent time protection relay.
39. - Commissioning of overcurrent time protection relay.
Several other exercises can be done and designed by the user.

108.- Three-Phase voltage transformer in a grid with earth-fault on the primary side.
107.- Three-Phase voltage transformer in healthy grid.
106.- Effects of load on the transformation ratio.
105.- Calculation of class of accuracy.
104.- Voltage transformer characteristics.
Some practical exercises possibilities of AEL-VTFP:
99.- Results comparison between manual and automatic compensation.
98.- Measurement of power factor after the automatic compensation.
97.- Comparison of the reactive energy consumed after the automatic compensation.
96.- Comparison of the active energy consumed after the automatic compensation.
95.- Automatic compensation of reactive energy (improvement of the power factor).
94.- Studying the manual reactive power compensation for dynamic loads: induction motor coupled to servomotor.
93.- Calculating of necessary capacitive load in order to carry out the adequate power factor correction.
92.- Determining rise and fall times during a fault.
91.- Measurement of the inductance of a coil.
90.- Measurement of reactive energy consumed by a receiver (capacitive circuit).
89.- Measurement of apparent power consumed by a receiver.
88.- Setting and testing Voltage protection characteristic.
87.- Determination of the power maximum in the event of an asymmetric load.
86.- Setting and testing Overcurrent time protection characteristic.
85.- Setting and testing Distance protection characteristic.
84.- Measurement of power factor after the compensation.
83.- Comparison of the reactive energy consumed after the compensation.
82.- Comparison of the active energy consumed after the compensation.
81.- Measurement of reactive energy consumed by a receiver (inductive circuit).
80.- Measurement of active energy consumed by a receiver.
79.- Measurement of active energy consumed by a receiver.
78.- Measurement of reactive energy consumed by a receiver.
77.- Measurement of power factor after the automatic compensation.
76.- Results comparison between manual and automatic compensation.
75.- Setting of the automatic power factor controller.
74.- Configuration of reactive compensation methods: general compensation, local compensation, etc.
73.- Measurement of the reactance XL considering RL.
72.- Measurement of active power consumed by a receiver (resistive circuit).
71.- Calculation of reactive power consumed by a receiver.
70.- Wiring star and delta connection with resistive, capacitive and inductive load.
69.- Setting and testing Overcurrent time protection characteristic.
68.- Setting and testing Distance protection characteristic.
67.- Configuration of directional power protection relay thresholds.
66.- Setting and testing Distance protection characteristic.
65.- Configuration of distance protection relay thresholds.
64.- Commissioning of distance protection relay.
63.- Parameterization of distance protection relay.
62.- Configuration of distance protection relay.
61.- Determining the inherent time.
Some practical exercises possibilities of AEL-VTFP:
60.- Determining rise and fall times during a fault.
59.- Measuring voltages in a three-phase network experiencing earth faults.
58.- Measuring voltages before a earth fault.
57.- Measuring voltages in a three-phase network experiencing earth faults.
56.- Measuring voltages before a earth fault.
55.- Parameterization of directional power protection relay.
54.- Configuration of directional power protection relay.
53.- Calculating of necessary capacitive load in order to carry out the adequate power factor correction.
52.- Studying different classes of reactive compensation methods: general compensation, local compensation, etc.
51.- Parameterization of over/under voltage protection relay.
50.- Setting of over/under voltage protection relay.
49.- Forward and reverse protection.
Some practical exercises possibilities of AEL-VTFP:
48.- Determining the reset ratio in the case of single-, double and triple-pole short circuit.
47.- Designing and parametrizing overcurrent time protection.
46.- Checking circuit breaker’s release behavior in the event of a failure.
Some practical exercises possibilities of AEL-VTFP:
45.- Setting and testing various characteristics.
44.- Determining the reset ratio.
43.- Determining rise and fall time.
42.- Analysis of different wave forms in real time.
41.- Generation of different current levels for tripping operations.
40.- Configuration of different protection thresholds.

Some practical exercises possibilities of AEL-MRPC:
39.- Measuring the maximum and minimum reactive power levels of the grid.
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a) Technical and Vocational Education configuration

b) Multipost Expansions options

**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.