edib**on**

Technical Teaching Equipment

EDIBON **SCADA** System

Teaching Technique used

EDIBON PATENT

① ECMC. Submarine Currents Energy Unit

② Control Interface Box

③ Data Acquisition Board

④ Software for:
- Computer Control
- Data Acquisition
- Data Management

Computer (not included in the supply)

⑤ Cables and Accessories

⑥ Manuals
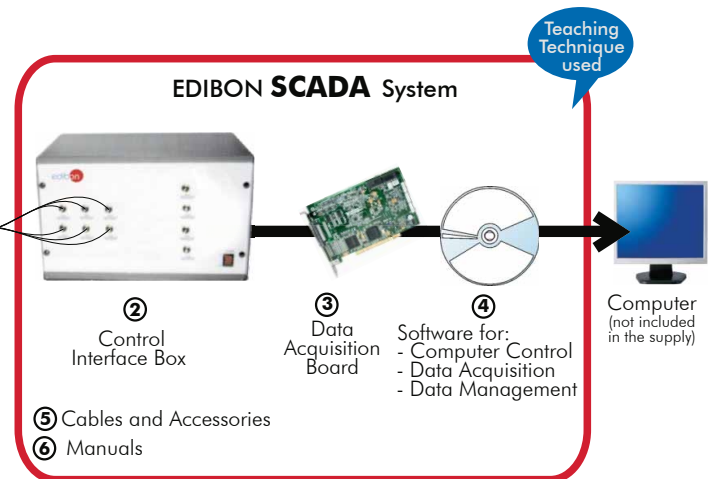
*Minimum supply always includes: 1 + 2 + 3 + 4 + 5 + 6
(Computer not included in the supply)

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).**

➤ **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 CAL software helps the user perform calculations and comprehend the results.**

➤ **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
  ⇨Products range
    ⇨Units
      ⇨5.-Energy

For more information about Key Features, click here:

An interesting technology for harnessing the energy from the ocean currents is the use of turbine-driven generators anchored in place in the current stream. The blades of the turbine are driven by the moving water. These blades are used to turn the generators and to harness the energy of the water flow.

The ECMC unit is designed for simulating this energy generation system, allowing the study and tests of the operation and performance of a turbine (ocean turbine) for energy generation.

This Computer Controlled Unit is supplied with the EDIBON Computer Control System (SCADA), including: Control Interface Box + Data Acquisition Board + Computer Control and Data Acquisition Software, for controlling the process and the parameters involved.

SPECIFICATIONS

Items supplied as standard

① **ECMC. Unit:**

Unit designed for simulating an energy generation system from the ocean currents, using the technolgy of turbine-driven generators anchored in place into the current stream.

This unit is mounted in an anodized aluminium structure with painted steel panels.

Diagram in the front panel with similar distribution to the elements in the real unit.

Main metallic elements are made in stainless steel.

The unit is formed by the following main elements:

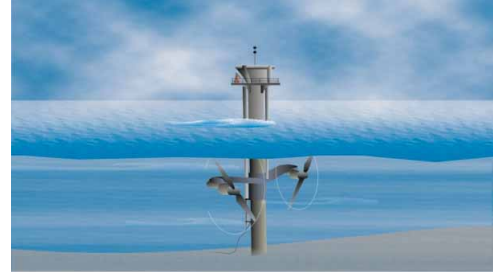Transparent working section to be filled with water.

Water pump, computer controlled.

Turbine-generator.

Orifice plate with two pressure sensors for measuring the flow.

DC loads module.

Power measurement from the computer (PC).

ECMC. Unit

② **ECMC/CIB**. **Control Interface Box:**

Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student.

All sensors, with their respective signals, are properly manipulated from -10V. to +10V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16), to avoid connection errors.

Single cable between the control interface box and computer.

The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure.

Simultaneous visualization in the computer of all parameters involved in the process.

Calibration of all sensors involved in the process.

Real time curves representation about system responses.

Storage of all the process data and results in a file.

Graphic representation, in real time, of all the process/system responses.

All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process.

All the actuators and sensors values and their responses are displayed on only one screen in the computer.

Shield and filtered signals to avoid external interferences.

Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.

Real time computer control for pumps, compressors, resistances, control valves, etc.

Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously.

Three safety levels, one mechanical in the unit, other electronic in the control interface and the third one in the control software.

ECMC/CIB

③ **DAB. Data Acquisition Board:**

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

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).

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

Analog output: **Channels=2**. **Resolution=16 bits**, 1 in 65536. Max. output rate up to: 833 KS/s.

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

Digital Input/Output: **Channels=24 inputs/outputs**. D0 or DI Sample Clock frequency: 0 to 1 MHz.

Timing: **Counter/timers=2**. Resolution: Counter/timers: 32 bits.

DAB

④ **ECMC/CCSOF**. **Computer Control+Data Acquisition+Data Management Software:**

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 250,000 data 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 to the teacher to modify texts, instructions. **Teacher's and student's password's** 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 results and manipulation of the unit, during the process, by using a projector or an electronic whiteboard.
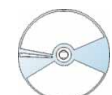
ECMC/CCSOF

⑤ **Cables and Accessories**, for normal operation.

⑥ **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 6: ECMC + ECMC/CIB + DAB + ECMC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.**

Additional and optional items to the standard supply

PLC. Industrial Control using PLC (7 and 8):

⑦ **PLC-PI. PLC Module:**

Circuit diagram in the front panel.

Front panel:

Digital inputs(X) and Digital outputs (Y) block:

16 Digital inputs, activated by switches and 16 LEDs for confirmation (red).

14 Digital outputs (through SCSI connector) with 14 LEDs for message (green).

Analog inputs block:

16 Analog inputs (-10V. to + 10V.) (through SCSI connector).

Analog outputs block:

4 Analog outputs (-10V. to + 10V.) (through SCSI connector).

Touch screen:

High visibility and multiple functions.

Display of a highly visible status.

Recipe function.

Bar graph function.

Flow display function.

Alarm list.

Multi language function.

True type fonts.

Back panel:

Power supply connector.

Fuse 2A.

RS-232 connector to PC.

USB 2.0 connector to PC.

Inside:

Power supply outputs: 24 Vdc, 12 Vdc, -12 Vdc, 12 Vdc variable.

Panasonic PLC:

High-speed scan of 0.32 μsec. for a basic instruction.

Program capacity of 32 Ksteps, with a sufficient comment area.

Power supply input (100 to 240 V AC).

DC input:16 (24 V DC).

Relay output: 14.

High-speed counter.

Multi-point PID control.

Digital inputs/outputs and analog inputs/outputs Panasonic modules.

Communication RS232 wire, to computer (PC).

⑧ **ECMC/PLC-SOF. PLC Control Software:**

For this particular unit, always included with PLC supply.

PLC-PI

Items available on request

⑨ **ECMC/CAL. Computer Aided Learning Software (Results Calculation and Analysis)**.

⑩ **ECMC/FSS. Faults Simulation System.**

Some Practical Possibilities of the Unit:

1.- Study of the energy available from a water stream.
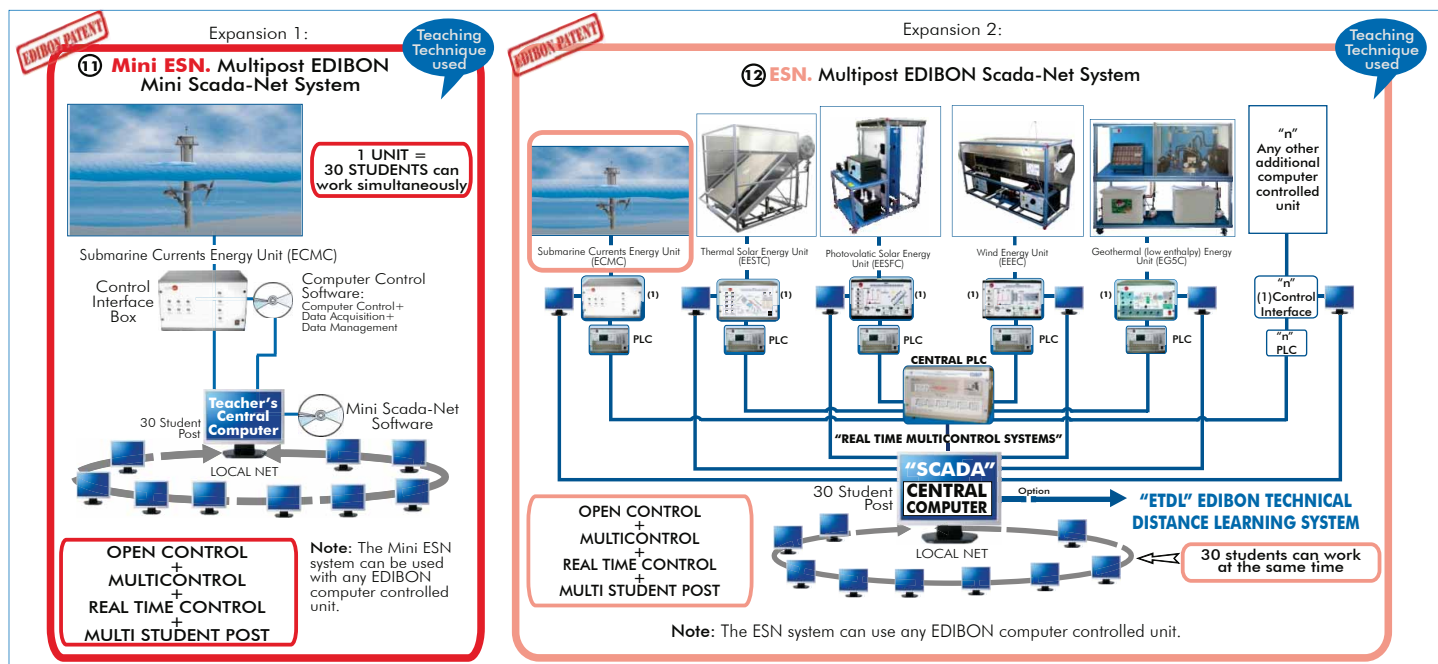
2.- Potential energy of water.

3.- Measures and controls.

Other possible practices:

4.- Sensors calibration.

Practices to be done by PLC Module (PLC-PI)+PLC Control Software:

5.- Control of the ECMC unit process through the control interface box without the computer.

6.- Visualization of all the sensors values used in the ECMC unit process.

7.- Calibration of all sensors included in the ECMC unit process.

8.- Hand on of all the actuators involved in the ECMC unit process.

9.- Realization of different experiments, in automatic way, without having in front the unit. (This experiment can be decided previously).

10.- Simulation of outside actions, in the cases do not exist hardware elements.(Example: test of complementary tanks, complementary industrial environment to the process to be studied, etc).

11.- PLC hardware general use and manipulation.

12.- PLC process application for ECMC unit.

13.- PLC structure.

14.- PLC inputs and outputs configuration.

15.- PLC configuration possibilities.

16.- PLC program languages.

17.- PLC different programming standard languages.

18.- New configuration and development of new process.

19.- Hand on an established process.

20.- To visualize and see the results and to make comparisons with the ECMC unit process.

21.- Possibility of creating new process in relation with the ECMC unit.

22.- PLC Programming Exercises.

23.- Own PLC applications in accordance with teacher and student requirements.

POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS

Expansion 1:

⑪ Mini ESN. Multipost EDIBON Mini Scada-Net System

Teaching Technique used

1 UNIT = 30 STUDENTS can work simultaneously

Submarine Currents Energy Unit (ECMC)

Control Interface Box

Computer Control Software: Computer Control+ Data Acquisition+ Data Management

Teacher's Central Computer

Mini Scada-Net Software

30 Student Post

LOCAL NET

OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL + MULTI STUDENT POST

Note: The Mini ESN system can be used with any EDIBON computer controlled unit.

Expansion 2:

⑫ ESN. Multipost EDIBON Scada-Net System

Teaching Technique used

Submarine Currents Energy Unit (ECMC)

Thermal Solar Energy Unit (EESTC)

Photovoltaic Solar Energy Unit (EESFC)

Wind Energy Unit (EEEC)

Geothermal (low enthalpy) Energy Unit (EG5C)

"n" Any other additional computer controlled unit

(1) PLC

(1) PLC

(1) PLC

(1) PLC

(1) PLC

"n" (1)Control Interface

"n" PLC

CENTRAL PLC

"REAL TIME MULTICONTROL SYSTEMS"

"SCADA" CENTRAL COMPUTER

Option

30 Student Post

LOCAL NET

OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL + MULTI STUDENT POST

"ETDL" EDIBON TECHNICAL DISTANCE LEARNING SYSTEM

30 students can work at the same time

Note: The ESN system can use any EDIBON computer controlled unit.

ORDER INFORMATION

Items supplied as standard:

Minimum configuration for normal operation includes:

① Unit: ECMC. Submarine Currents Energy Unit.

② ECMC/CIB. Control Interface Box.

③ DAB. Data Acquisition Board.

④ ECMC/CCSOF. Computer Control + Data Acquisition + Data Management Software.

⑤ Cables and Accessories, for normal operation.

⑥ Manuals.

*IMPORTANT: Under ECMC we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.

Additional and optional items to the standard supply:

PLC. Industrial Control using PLC (7 and 8):

⑦ PCL-PI.PLC Module.

⑧ ECMC/PLC-SOF. PLC Control Software.

⑨ ECMC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).

⑩ ECMC/FSS. Faults Simulation System. (Available on request).

Expansions

⑪ Mini ESN. Multipost EDIBON Mini Scada-Net System.

⑫ ESN. Multipost EDIBON Scada-Net System.

-Electrical supply: single-phase, 220V./150Hz or 110V./60Hz.

-Water supply.

-Computer (PC).

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

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