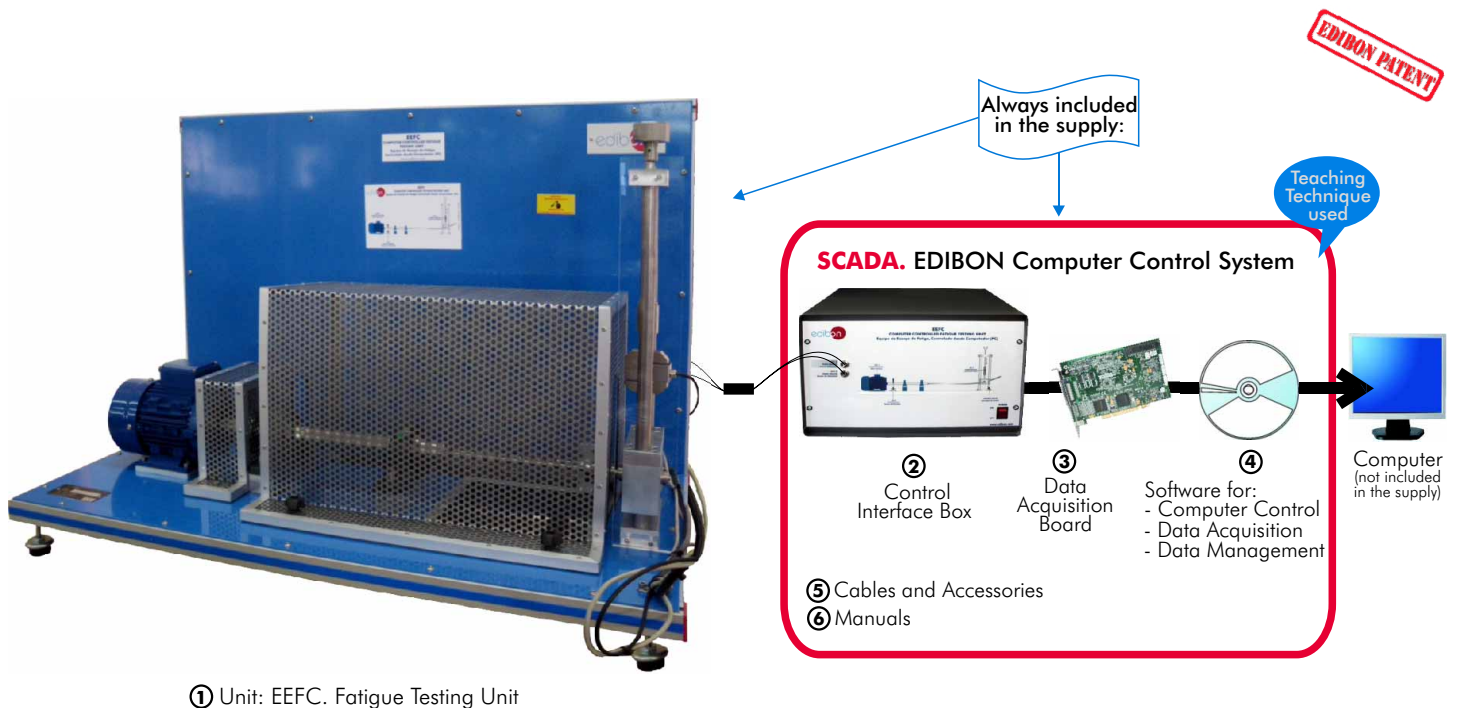
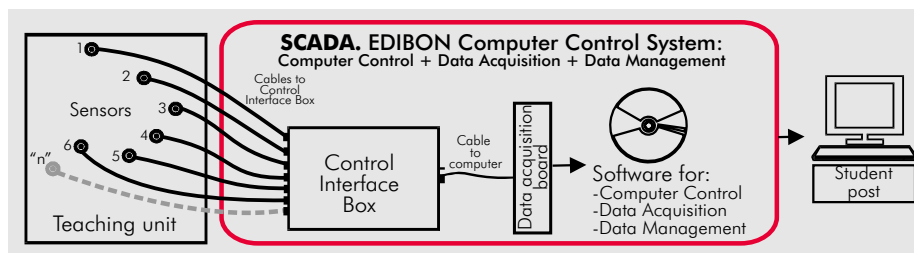




**OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL**



www.edibon.com

Products
Products range
Units
7.-Mechanics & Materials

DESCRIPTION

With this unit it is possible to determine the basic principles of the fatigue strength testing.

On the lower panel of the unit, it is fixed an electric motor which axis is joined to the end of the test specimen (test bar) by means of a coupling. As well, this axis has a coupled disc, which by means a device will count the number of turns of the motor.

On the panel's right side, it is placed the system with which the test specimen is loaded. This system, with a load cell, is joined to a threaded spindle by its upper end, while on its lower side, it is joined to an articulated guided system, in which it is held the right side of the test specimen. When turning the threaded spindle clockwise, we transmit a vertical force upwards to the test specimen. The applied force can be measured with the load cell (force sensor).

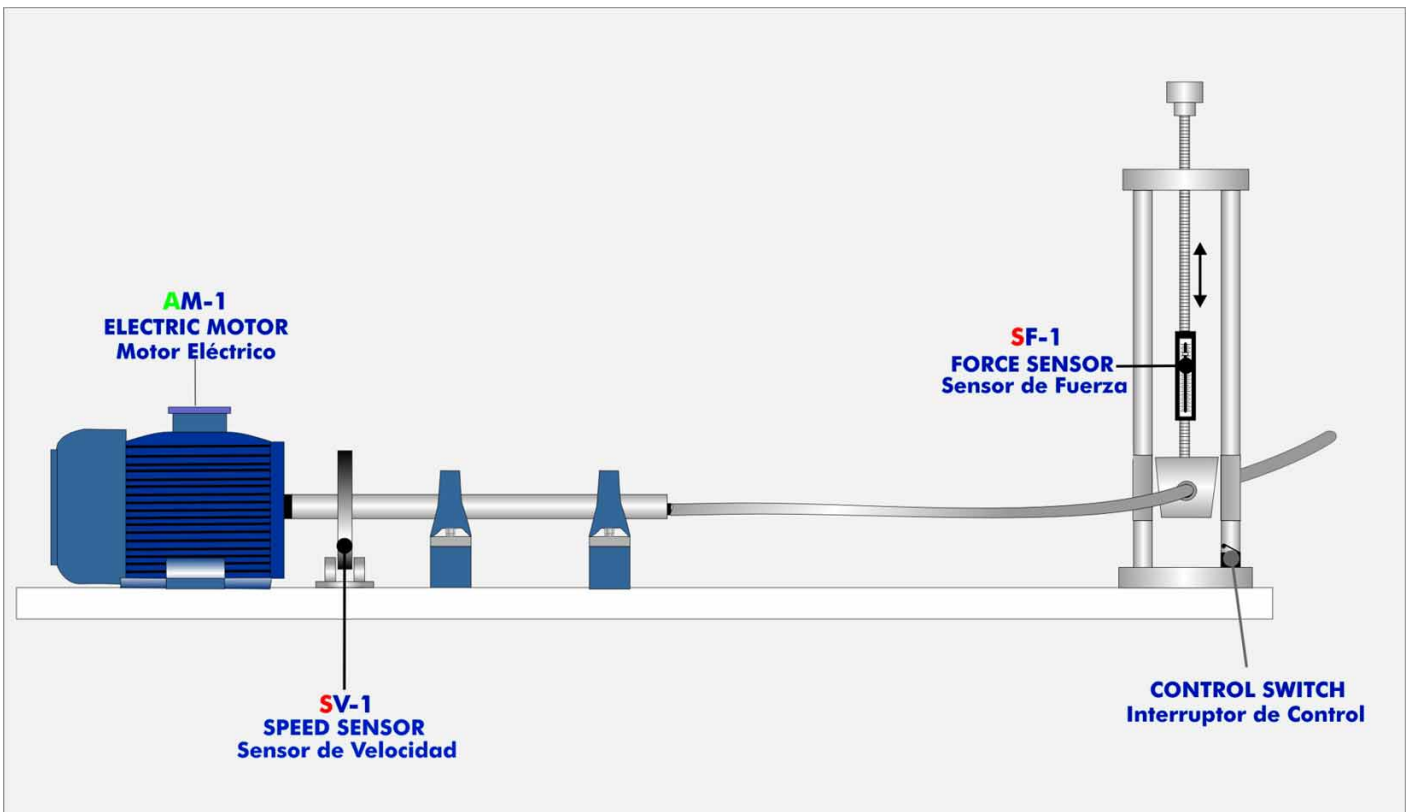
In order to guarantee the force verticality, the system has two guides to avoid horizontal displacements during the transmission of stress. Likewise, in order to assure the constant application of the load, besides of allowing the test specimen rotation on its axial axis, the system also permits the alignment of the coupling with the test specimen, due to the deformity suffered by bending.

Both the area where the test specimen is located and the motor axis outcome are covered with a protection cover, without it the unit does not work, since it is provided with a safety system to avoid accidents.

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 different parameters involved.

PROCESS DIAGRAM AND ELEMENTS ALLOCATION

OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL



Items always included in the supply

① EEFC. Unit:

Bench-top unit for fatigue strength testing.

Anodized aluminium structure and panels in painted steel (epoxy paint).

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

Electrical motor of 0.37 kW, maximum speed: 1500 rpm.

Motor speed control by a frequency regulator, controlled by the control software (from the computer (PC)).

Metallic protective covers, one for the motor axis zone, and other for the test specimen zone, with safety protection system to avoid accidents.

Safety switch that stops the motor when the metallic protection is removed.

Test specimens (test bars):

2 Stainless steel AISI 304L cylindrical test specimens.

6 Stainless steel AISI 304L cylindrical test specimens, with different notches.

2 Carbon steel F-1 cylindrical test specimens.

6 Carbon steel F-1 cylindrical test specimens, with different notches.

2 Steel F-212 cylindrical test specimens.

6 Steel F-212 cylindrical test specimens, with different notches.

Loading device with load cell. Adjustment using threaded spindle with hand wheel. Force sensor, range: 0-30 kg.

Automatic shut down on specimen fracture controlled from the control software (from the computer (PC)).

Speed sensor and cycle counter. Range: from 0 to 5000 rpm.

Speed and force measurement.



EEFC. Unit

② EEFC/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.

Simultaneously 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 placed in only one computer screen.

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 time and in a real time, of parameters involved in the process simultaneously.

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



EEFC/CIB

Continue...

Items always included in the supply (continuation)

③ DAB. Data Acquisition Board:

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

Bus PCI.

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)= $\pm 10V$.

Data transfers=DMA, interrupts, programmed I/O.

Number of DMA channels=6.

Analog output:

Number of **channels=2**.

Resolution= 16 bits, 1 in 65536.

Maximum output rate up to: 833 KS/s.

Output range(V)= $\pm 10V$.

Data transfers=DMA, interrupts, programmed I/O.

Digital Input/Output:

Number of **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 EEFC/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 simultaneously 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 guaranteed.

Calibration system for the sensors involved in the process.

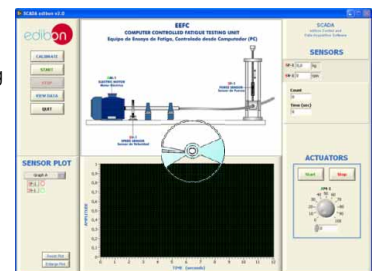
It allows the registration of the alarms state and the graphic representation in real time.

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 passwords to facilitate the teacher's control on the student, and allowing the access at different work levels.

This unit allows that the 30 students of the classroom can visualize simultaneously all results and manipulation of the unit, during the process, by using a projector.



EEFC/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: EEFC + EEFC/CIB + DAB + EEFC/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 SCSl connector) with 14 LEDs for message (green).

Analog inputs block:

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

Analog outputs block:

4 Analog outputs (-10V. to + 10V.) (through SCSl 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 μ sec. for a basic instruction.

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

Free input AC voltage(100 to 240 V AC).

DC input: 16 (24 VDC).

Relay output: 14 (250 VA AC/2 A).

High-speed counter.

Multi-point PID control.

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

Communication RS232 wire, to computer (PC).

⑧ EEFC/PLC-SOF. PLC Control Software:

For this particular unit, always included with PLC supply.



PLC-PI

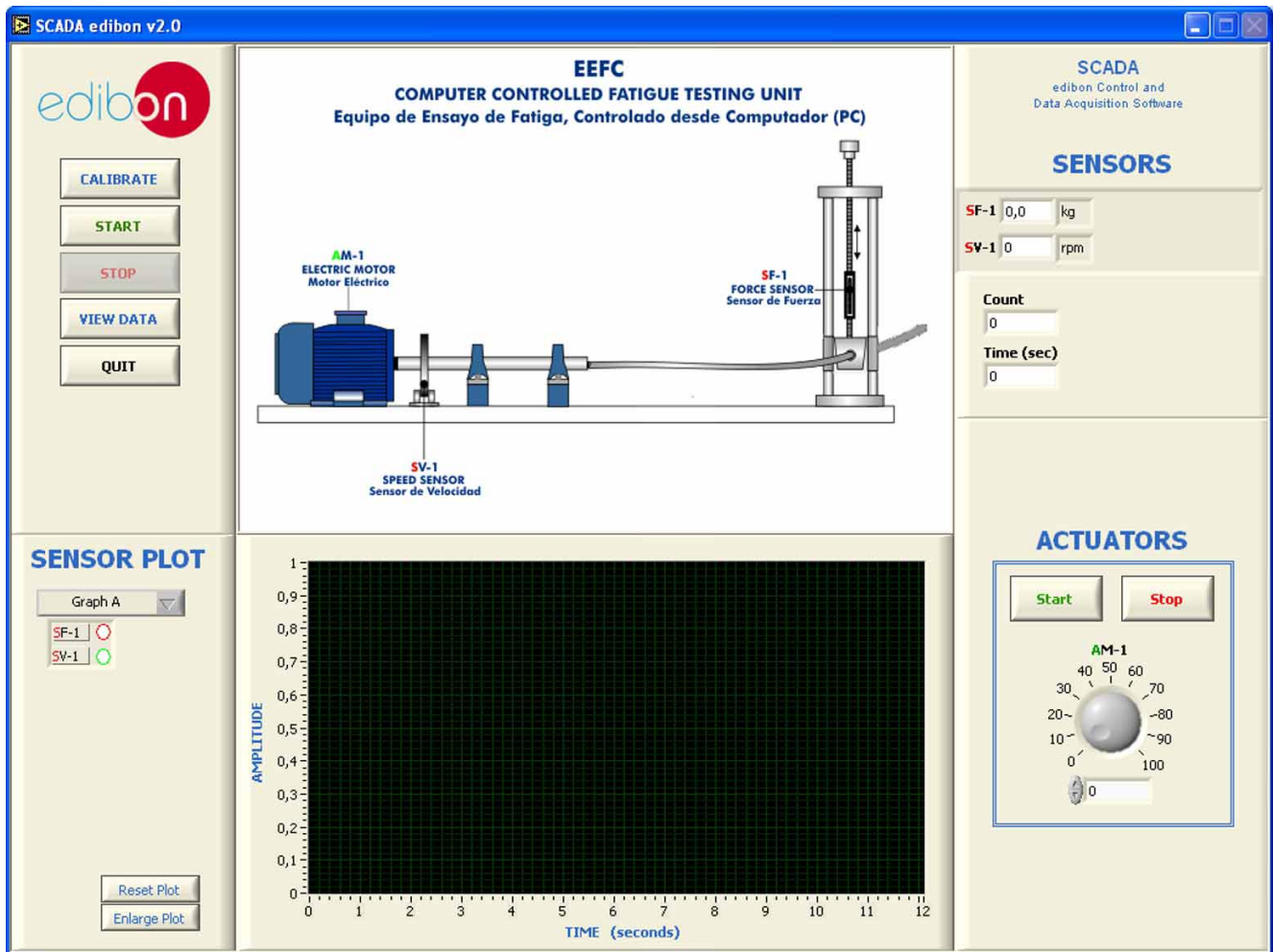
Items available on request

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

⑩ EEFC/FSS. Faults Simulation System.

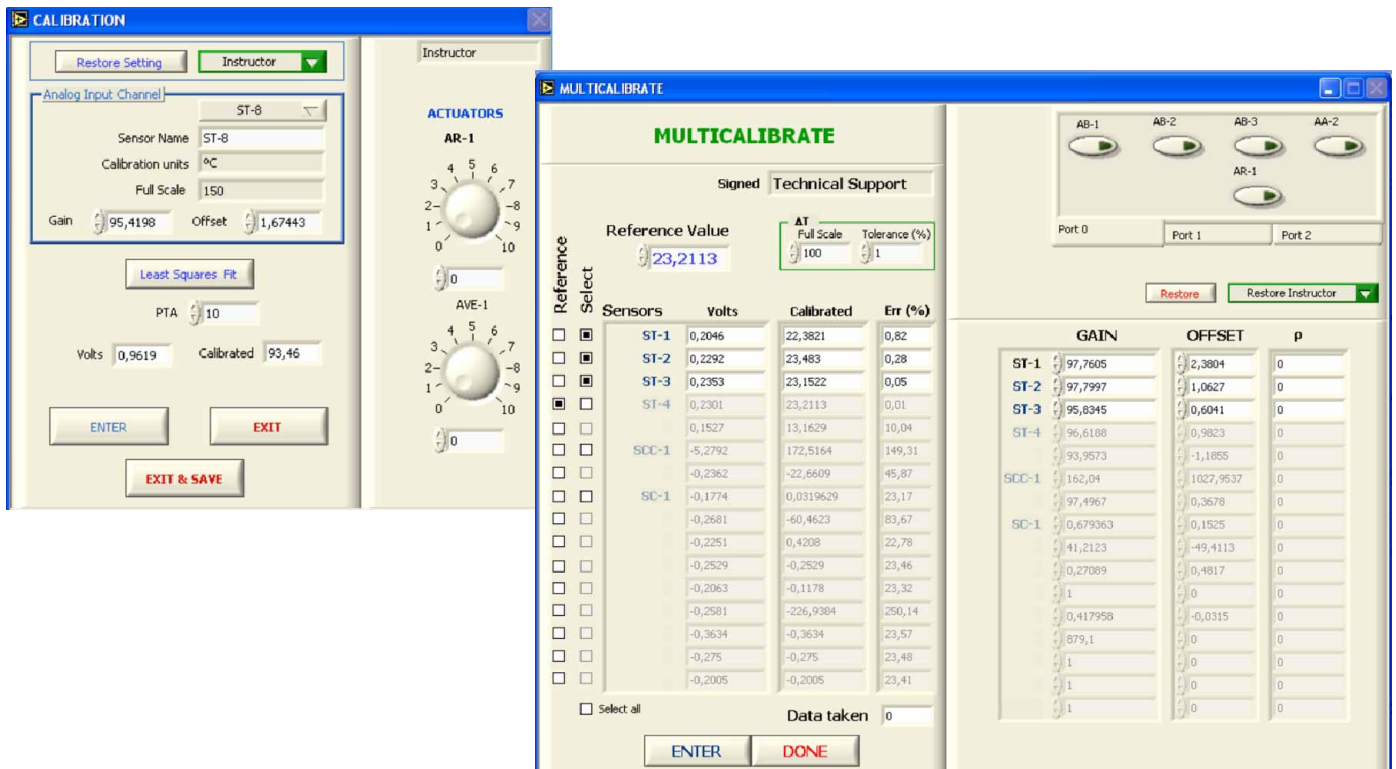
Software Main Screens

Main screen



Nota: AM= Motor. SF= Force sensor. SV= Speed sensor.

Examples of Sensors Calibration screens



EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- 1.- Determination of the basic principles of fatigue strength testing.
- 2.- Influence of the type of material on fatigue strength.
- 3.- Determination of the influence of notching and surface finish on fatigue strength.
- 4.- Influence of different curvature radio and surface finish on fatigue strength.
- 5.- Influence of the section on fatigue strength.
- 6.- Fatigue strength of specimens (bars) subject to cyclic bending load.
- 7.- Preparation of a stress-number (S-N) diagram.
- 8.- Obtaining of S-N curves.

Other possible practices:

- 9.- Sensors calibration.

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

- 10.- Control of the EEFC unit process through the control interface box without the computer.
- 11.- Visualization of all the sensors values used in the EEFC unit process.
- 12.- Calibration of all the sensors included in the EEFC unit process.
- 13.- Hand on of all the actuators involved in the EEFC unit process.
- 14.- Realization of different experiments, in automatic way, without having in front the unit. (This experiment can be decided previously).
- 15.- Simulation of outside actions, in the cases do not exist hardware elements. (Example: test of complementary tanks, complementary industrial environment to process to be studied, etc).
- 16.- PLC hardware general use and manipulation.
- 17.- PLC process application for EEFC unit.
- 18.- PLC structure.

- 19.- PLC inputs and outputs configuration.
- 20.- PLC configuration possibilities.
- 21.- PLC program languages.
- 22.- PLC different programming standard languages.
- 23.- New configuration and development of new process.
- 24.- Hand on an established process.
- 25.- To visualize and see the results and to make comparisons with the EEFC unit process.
- 26.- Possibility of creating new process in relation with the EEFC unit.
- 27.- PLC Programming Exercises.
- 28.- Own PLC applications in accordance with teacher and student requirements.

ORDER INFORMATION

Items always included in the supply

Minimum configuration for normal operation includes:

- ① Unit: EEFC. Fatigue Testing Unit.
- ② EEFC/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ EEFC/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ⑤ Cables and Accessories, for normal operation.
- ⑥ Manuals.

*** IMPORTANT: Under EEFC 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 EEFC/PLC-SOF. PLC Control Software.
- ⑨ EEFC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).
- ⑩ EEFC/FSS. Faults Simulation System. (Available on request).

REQUIRED SERVICES

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

DIMENSIONS & WEIGHTS

- | | |
|------------------------|---|
| EEFC Unit: | -Dimensions: 1000 x 600 x 600 mm. approx. |
| | -Weight: 50 Kg. approx. |
| Control Interface Box: | -Dimensions: 490 x 330 x 310 mm. approx. |
| | -Weight: 10 Kg. approx. |

AVAILABLE VERSIONS

Offered in this catalogue:

- EEFC. **Computer Controlled Fatigue Testing Unit.**

Offered in other catalogue:

- EEF . **Fatigue Testing Unit.**

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



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