12.- FOOD & WATER TECHNOLOGY

SISTEMA PATENTADO EDIBON PATENT PATENTED SYSTEM

EDIBON **SCADA** System with PID Control

Supervisory

Computer
(not included in the minimum supply)

(Example of some available units in this catalog)

- **Research units, modular and expandable.**
- **Custom designs and own manufacture.**
- **Food grade materials.**
- **Possibility of production for commercialization.**

EXPANSIONS

The main reference could be expanded adding:

ESN
EDIBON Scada-Net Systems

ECL
EDIBON Cloud Learning

INNOVATE SYSTEMS

- **Advanced Real-Time SCADA and PID Control.**
- **Open Control + Multicontrol + Real-Time Control.**
- **Specialized EDIBON Control Software based on LabVIEW.**
- **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.**
- **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.**

WARRANTIES

CERTIFIED ISO 9001   CERTIFIED ISO 14001   CERTIFIED OHSAS 18001   CE   UL   CSA

SPARE PARTS AVAILABILITY **15-YEAR** edibon

WARRANTY **5-YEAR** edibon

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For detailed product information, visit:

www.edibon.com

INTRODUCTION

Olive oil is a vegetable oil usually used with a culinary purpose which is obtained from the fruit of the olive tree.

Almost a third part of the olive is oleaginous, therefore, the extraction of oil from this fruit is relatively easy by performing a pressing process.

Traditionally, the largest producers of olive oil are from Mediterranean countries, although the cultivation of the olive tree is spreading to other parts of the world with compatible climates such as the United States or Argentina, and the production increases year after year.

The olive is not consumed raw due to its bitterness, consequently, most of the production is dedicated to the elaboration of oil.

For the elaboration of oil, a process that is common in most parts of the world is carried out, beginning with the harvesting and washing of the olives. Subsequently, the clean olives are pressed in a mill to extract the oil. The next step is the churning of the mixture and finally, the separation of the aqueous part from the oleaginous part.

The described process is used in the production of virgin olive oil.

This denomination refers to the fact that no chemical treatments or refining processes have been required to obtain it, and it must also meet certain quality standards in order to receive the denomination of virgin olive oil or extra virgin olive oil.

GENERAL DESCRIPTION

The Computer Controlled and Touch Screen Pilot Plant for the Production of Oil , "AC00", is a pilot plant able to carry out the main processes present in the elaboration of virgin olive oil.

The "AC00" pilot plant incorporates a production line analogous to the large oil mills that produce olive oil industrially.

- **OWLR/CTS. Computer Controlled and Touch Screen Olive Washing Machine and Leaf Remover:** The first step in the treatment of the olives is the washing and removing of leaves, dust and other impurities.

- **PACC. Computer Controlled Continuous Cycle Oil Production Plant:** From the washer, the olives are fed to the knife mill, where the olives are milled to extract a paste from which, later on, the oily phase will be extracted.

- **OCPF/CTS. Computer Controlled and Touch Screen Oil Collector with Plate Filter:** From the mill, the paste produced is taken to the malaxer in which the emulsion is broken and the drops of oil are grouped together thanks to the constant temperature and the slight stirring.

- Finally, the phases formed in the malaxer are separated due to their different density using a decanter (centrifugal separator), in which the pomace and the water are obtained on the one hand, and the oil on the other.

- **EDLC. Computer Controlled Liquid Packaging Teaching Unit:** It is a liquid and semi-dense products dosing machine based on dose delivery through a pneumatically-operated cylinder.

These units are supplied with EDIBON's own designed SCADA + PLCHMI (system composed by an interface including PLC modules such as CPU, digital I/O module, analog I/O module, communication module, etc. and a control box with HMI display) to control the whole process and all the parameters that are involved in the process.

INCLUDED UNITS

PILOT PLANT FOR THE PRODUCTION OF OIL

- OPEN CONTROL
  +
- MULTICONTROL
  +
- REAL TIME CONTROL

AC00. Computer Controlled and Touch Screen Pilot Plant for the Production of Oil

Olives ▶▶▶

OWLR/CTS
Computer Controlled and Touch Screen Olive Washing Machine and Leaf Remover

PACC
Computer Controlled Continuous Cycle Oil Production Plant

OCPF/CTS
Computer Controlled and Touch Screen Oil Collector with Plate Filter

▶▶▶ *Extra Virgin Olive Oil* ▶▶▶

EDLC
Computer Controlled Liquid Packaging Teaching Unit

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EXERCISES AND PRACTICAL POSSIBILITIES

</div>

Guided practical exercises included in this pilot plant:

1.- Study of the washing flow.

2.- Study of the leaf-removing and washing efficiency.

3.- Milling speed study.

4.- Study of the temperature at the malaxer.

5.- Study of the agitation in the malaxer.

6.- Study of the speed of rotation in the decanter.

7.- Study of the pressure loss in the plate filter.

8.- Study of the efficiency of the filtration.

9.- Analysis of all phases of the product transformation, from reception to packaging.

10.-Qualitative evaluation of the finished product as function of the productive operations performed.

11.-Experimentation on the efficiency of the different chemical products used for the preservation process.

12.-Organization of procedures for continuous quality control of the production operations.

13.-Execution of procedures for disinfection and sanification of the equipment.

14.-Evaluation of technical, legal and administrative aspects concerning food adulteration.

15.-Manual and computer control operation.

Additional practical possibilities:

16.- Sensors calibration.

Other possibilities to be done with this pilot plant:

17.- Many students view results simultaneously.

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

18.- Open Control, Multicontrol and Real Time Control.

Each unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters, etc. in real time.

19.- Each unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.

20.-Each unit can be used for doing applied research.

21.- Each unit can be used for giving training courses to Industries even to other Technical Education Institutions.

22.- Visualization of all the sensors values used in the AC00 pilot plant process.

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

Additional practical possibilities with the expansions:

ESN. EDIBON Scada-Net Systems

24.- Control any unit from any post located in the laboratory.

25.- Supervise different experiments about data acquisition and representation, from the units, in real time.

26.- Visualize any experiment from any laboratory post.

27.- Supervise as many experiments as desired, performed in different units at the same time.

28.- Generate reports with the results obtained with the units.

29.- Perform different experiments at the same time.

30.- Show to the laboratory members the appropriate manual or automatic operations to perform with each laboratory unit.

31.- Create more elaborate practical exercises using more than one unit from the laboratory.

32.- Suggest multidisciplinary experiments, in other words, mix in the same experiment units from different study fields.

33.- Modify any parameter of any unit included in the system from any workstation in the laboratory.

34.- Cause an abnormal functioning in a unit for the students to practice fault finding exercises.

35.- Assess the knowledge of a student or group of students about a particular unit (any unit included in the "ESN" system).

36.- Develop guided practical exercises for a better understanding of each unit.

37.- Individual training practical exercises.

38.- Group exams or practical exercises.

39.- Perform interactive exercises (using the chat between manager-users).

40.- Exchange of obtained results among the members of the "ESN" system.

41.- Any exercise directly related to the SCADA software of each unit.

42.- Some of the practical possibilities may be done only with the "ESN" complete system.
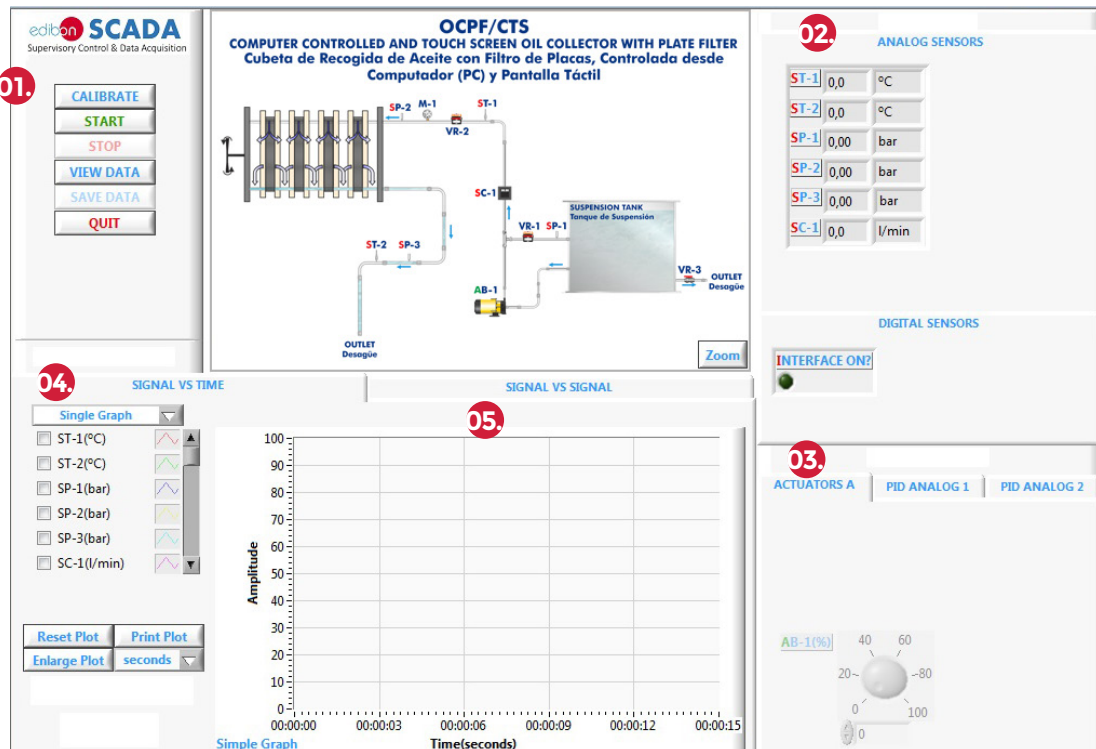
ECL. EDIBON Cloud Learning

Ask us for information about the practices that you could perform remotely with each of our units.

RESULTS

SOFTWARE MAIN SCREEN (Example of one of the unit belonging to AC00)

1. Main software operation possibilities.
2. **Sensors displays, real time values, and extra output parameters. Sensors:** ST=Temperature sensor. SC=Flow sensor. SP=Pressure sensor.
3. **Actuators controls. Actuators:** AB=Pump.
4. Channel selection and other plot parameters.
5. Real time graphics displays.

### SOFTWARE FOR SENSORS CALIBRATION (Example of screens)
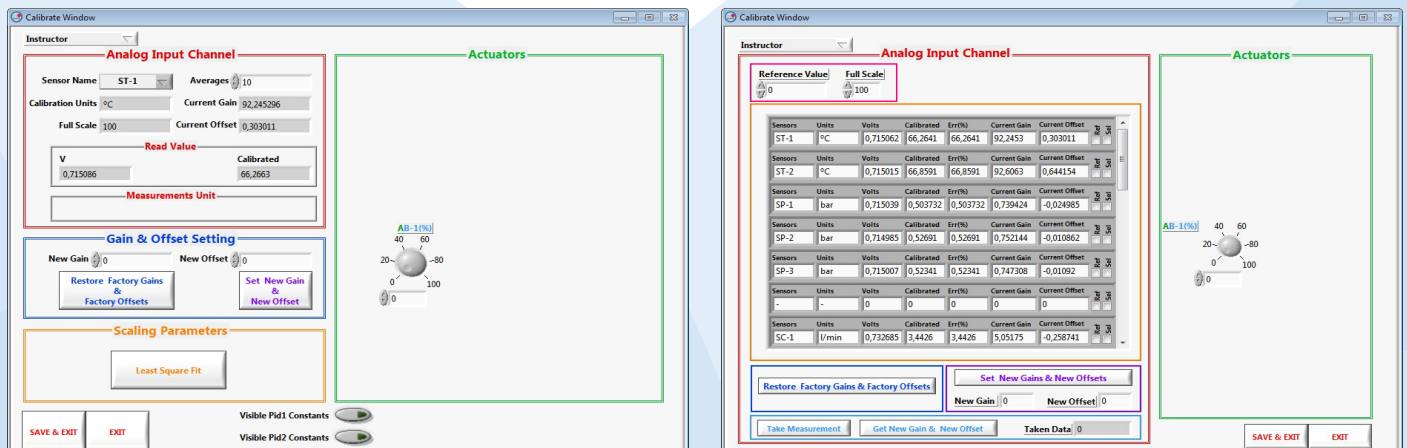
The researcher, the teacher and the students can calibrate the unit with a password provided by EDIBON. Factory calibration can be restored at any time.

RESULTS:
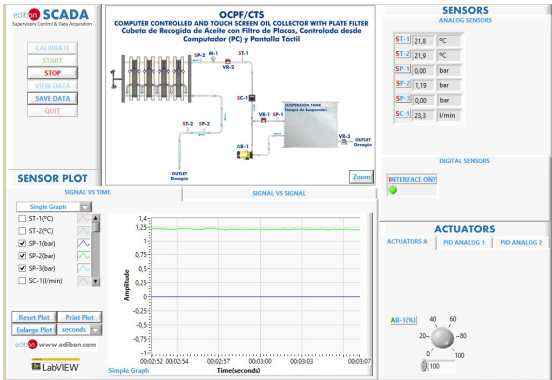
Representation in real time of the measured magnitudes. Representation of the pressure measurements evolution.

The pump control is done through a PID Control. When the target flow (SC-1) is reached, the pump is turned off.
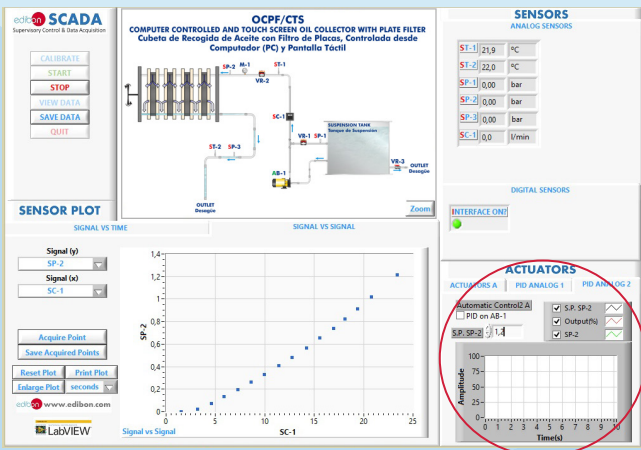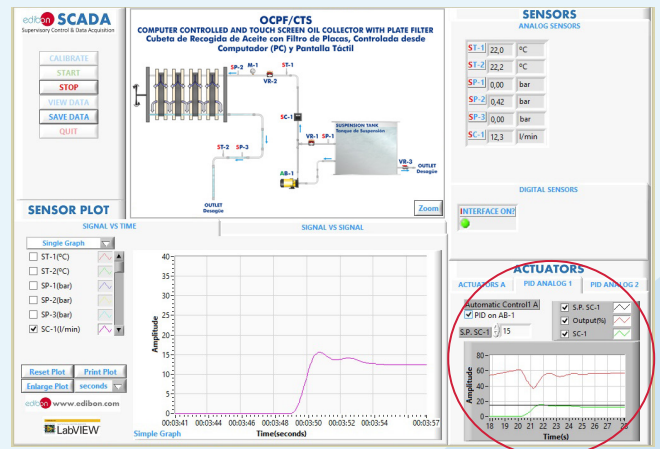
The pump control is done through a PID Control. When the target pressure (SP-2) is reached, the pump is turned off.

Signal versus signal chart when any of the measured variables can be represented.
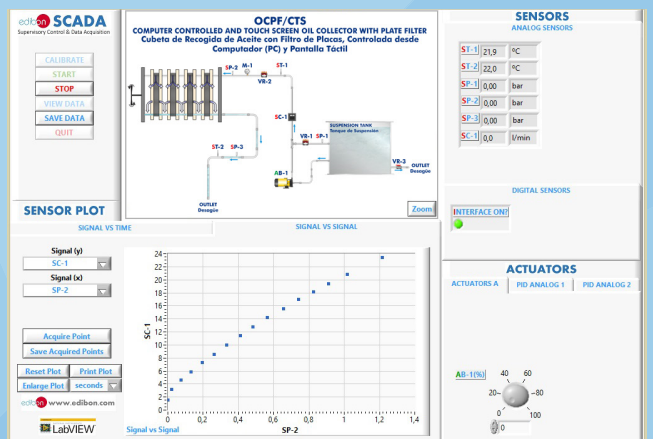
COMPLETE TECHNICAL SPECIFICATIONS

1. AC00 Pilot Plant:

- This plant includes all the necessary stages for the production of olive oil.
- Real unit used in olive oil industry.
- Sensors and actuators which allows the study and understanding of the differents processes of olive oil products production.
- Modular layout to allow adaptation to different spaces.

OWLR/CTS. Computer Controlled and Touch Screen Olive Washing Machine and Leaf Remover.

- Production: 100 - 150 kg/h
- Power: 0.75 kW
- Water consumption: 50 l/h.
- Olive elevator for feeding to a possible second stage.

PACC. Computer Controlled Continuous Cycle Oil Production Plant.

- Extraction speed: 50 Kg/hour. Power: 3 KW. Oil obtained has a temperature between 22 - 26 °C and an acidity approx.: 0.4°.
- Hopper (200 Kg capacity).
- Grinding unit (6000 rpm).
- Mixing unit (50 Kg capacity).
- Decanter with two phases, one for oil separation and other for water + paste separation.
- The decanter has double speed: 6000 and 5700 rpm.
- The decanter has six screws to control the quantity of the extracted oil.
- Two speed controllers, one for controlling the decanter speed and other for controlling the decanter feed speed.
- Sensors:
    Flow sensor.
    Two load cells-force sensors.
    Temperature sensor.
- Level switch.
- Five motors, two of them with speed control.
- Fixed protections in all parts with movement for avoiding any contact with the hands.
- Grille of protection on the hopper with borings.
- Electric blockage.
- Electric protection for electric current overload.
- Control board blockage with IP 54 protection class.
- Components in contact with the food product in stainless steel.
- Vibrations balancing system.
- External unit, with anodized aluminum structure, for product collecting, with weighing system (two Load Cells (50 Kg each one)).
- This unit has two stainless steel aluminum tanks (capacity 50 l each one).
- Dimensions: 1100 x 750 x 1100 mm approx.
- Weight: 75 kg approx.

OCPF/CTS. Computer Controlled and Touch Screen Oil Collector with Plate Filter.

- Production: 50 l/h.
- Capacity: 50 l.
- Main elements made of stainless steel AISI 304.
- Pumping device for dense products.
- Power: 0.55 kW.

EDLC. Computer Controlled Liquid Packaging Teaching Unit.

- Liquid and semi-dense products dosing machine based on dose delivery through a pneumatically-operated cylinder:

    Two cylinders with dosing nozzles with anti-drip system.

    Compressed air pressure: 6 - 8 bar.

    Dosing accuracy: ≤ 2 %.

    Dose range: 100 - 1000 ml.

    Air consumption: 370 l/min.

    Approximate production: ≤ 29 dose per minute.
    (*) The production will be influenced by the product, the selected dose, the configuration of the machine, etc.

- Air flow regulators to modify the lowering/lifting speed of the dosing nozzles.
- Air flow regulators to modify the closing/opening speed of each dosing nozzle.
- Dose adjusting handle.
- Air flow regulators to modify the speed of each cylinder.
- Supply tank, capacity: 20 l.
- Compressed air filter and regulator.
- Compressed air manometer.
- Eight limit switches.
- Three displacement sensors.
- Manual (with a pedal) or automatic operation mode.
- Safety pushbutton.
- Dimensions: 1200 x 450 x 900 mm approx.
- Weight: 50 kg approx.
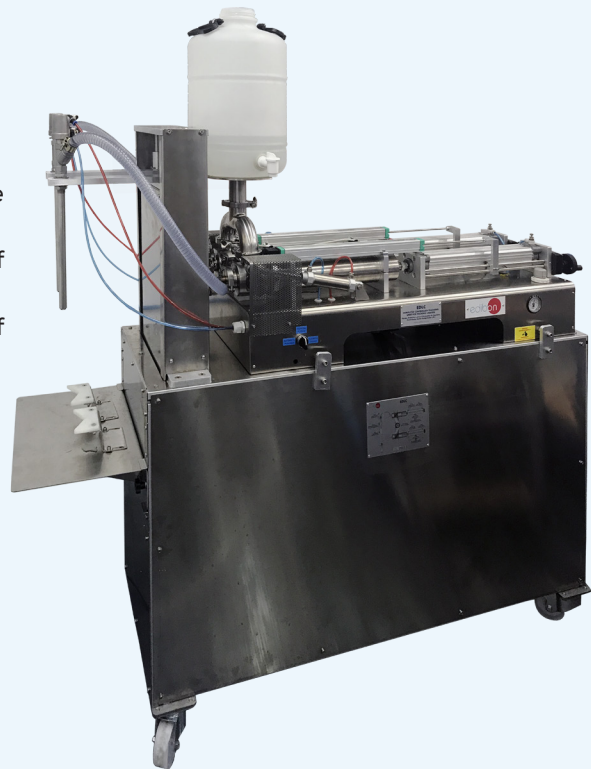
The complete pilot plant includes as well:

- Advanced Real-Time SCADA and PID Control.
- Open Control + Multicontrol + Real-Time Control.
- Specialized EDIBON Control Software based on LabVIEW.
- 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.
- 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. PLCHMI. IIoT Local/Remote Control and Monitoring with HMI (included):

- The expansion for PLC and HMI, "PLCHMI", is a system composed of an interface that includes PLC modules such as CPU, digital I/O module, analog I/O module, communications module, etc. and a control box with HMI display.

- PLC interface:
    PLC controller:
        Panasonic FP7 CPS31E CPU.
    Digital I/O modules:
        16 digital inputs; input range 0 V to 24 V.
        16 digital outputs; relay output.
    Analogue I/O modules:
        16 analog inputs; 16-bit resolution. Input range -10 V to +10 V.
        4 analog outputs; 16-bit resolution. Output range -10 V to +10 V.
    Connectors and Communication Ports:
        2-Port Ethernet Switch.
        SCSI connector.
    USB, DB-9 Series or DB-25 (if required).
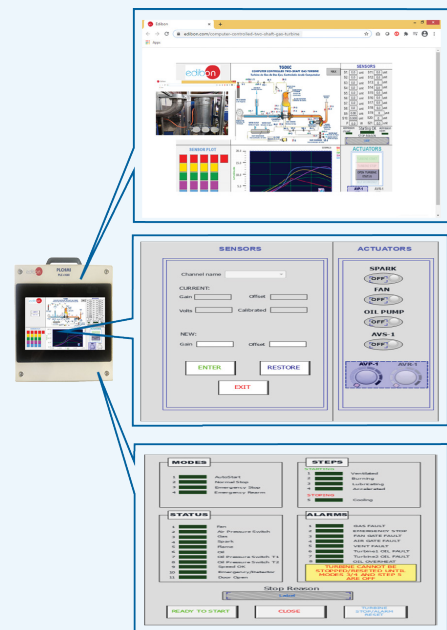
- HMI control box and display:
    HMI display:
        Touch Screen: Analog Resistive.
        Size: 10" 16:9 TFT.
        Resolution: 1024 x 600, WVGA.
        Colors: 64 K.
        Ethernet port.

3. AC00/CCSOF. Supervision Software + Control Software + Data Acquisition Software + Data Management Software:

SCADA System is composed of four Software Package with the following features:

- **The Supervision Software** is in charge of monitoring in real time start and stop elements, unexpected conditions and process evolution. In case of being necessary, it actuates on the system and notifies the user the incorrect operations.

- **The Control Software** allows to manage multiple process and variables in real time either a manual way or automatic way. Several type of algorithms of control such PID CONTROL are implemented depending on the field of study.

- **The Data Acquisition Software** focus on measuring and processing signals from the process with very high accuracy getting a synchronized and fast response of the system. A calibration system is part of this software to adjust the sensor measurements.

- **The Data Management Software** stores and represents, alarms, variables and process evolution in real time both in a graphic format and in a numeric format such time charts or process diagram. Printable reports can be generated or historian data can be loaded to study the experiments in detail.

The Software is open and flexible architecture that facilities to access different work levels both instructors and students. It is supported by current Windows operating system and industrial standards. The graphical user interface is intuitive and user- friendly.

4. Cables and Accessories, for normal operation.

5. Manuals:

Each 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 always included in the minimum supply (according to choice):
- AC00: OWLR/CTS, PACC, OCPF/CTS and EDLC.
- PLCHMI.
- AC00/CCSOF.
- Cables and Accessories.
- 8 Manuals for enabling normal and full operation.

REQUIRED SERVICES

- Electrical supply:
  - Single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.
  - Three-phase, 380 VAC – 400 VAC/50 Hz or 190 VAC – 240 VAC/60 Hz, 1 kW.
- Water supply and drain.
- Compressed air supply.
- Computer.

CONSUMABLES

- **Required (not included)**
  - Olives.

SIMILAR UNITS AVAILABLE

Offered in this catalog:
- AC00.   Computer Controlled and Touch Screen Pilot Plant for the Production of Oil.

Offered in other catalogs:
- CE00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Cereals.
- AS00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Seeds Oil.
- CA00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Meat.
- CI00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Citrus Fruits.
- FR00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Fruits.
- LE00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Dairy Products.
- TO00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Tomatoes.
- UV00.   Computer Controlled and Touch Screen Pilot Plant for the Grape Treatment.
- VE00.   Computer Controlled and Touch Screen Pilot Plants for the Production of Vegetables.

Additionally to the main items (1 to 5) described, we can offer, as optional, other items form 6 to 7. All these items try to give more possibilities for:

ESN. EDIBON SCADA-Net System.

ECL. EDIBON Cloud Learning.

EXPANSIONS

6. ESN. EDIBON Scada-Net Systems

The EDIBON Scada-Net Systems, "ESN", consists on the integration of EDIBON computer controlled units into the SCADA system in a local network.

The main feature of this system is the remote control of any EDIBON unit belonging to it from any control station included in the local network. In addition, any of these units can be visualized from any workstation.

Consequently, the efficiency of a laboratory with the "ESN" system is higher than the efficiency of a conventional laboratory.

- Higher laboratory performance since several students can work simultaneously. Several users can operate various units at the same time.
- Possibility of dividing the classroom into workgroups.
- Several experiments can be performed at the same time.
- Collaborative experiments performance.
- There are different user levels (manager, basic, intermediate and advanced) with different permissions.
- The manager has the absolute control of the system.
- The manager/teacher can supervise from his/her computer the operations every user is performing in any unit of the laboratory.
- Users and manager are connected at all times.
- Real time display and control of the whole system from an interactive whiteboard (touchscreen).
- CENTRALIZED AND SECURE SYSTEM, it can be totally controlled from the central computer (manager).
- The "ESN" System is MODULAR, OPEN and EXPANDIBLE.
- A vision system for real time monitoring of experiments is supplied.
- Visualization of the changes in a unit from any computer of the laboratory.
- All units can work simultaneously.
- The system is made up of as many units as required.
- The required infrastructure, both hardware and software is provided.

For more information see ESN catalog. Click on the following link: **www.edibon.com/en/edibon-scada-net**

7. ECL. EDIBON Cloud Learning

EDIBON Cloud Learning expansion, "ECL", is a solution designed to control EDIBON Technology based laboratories remotely in a simple and easy way.

EDIBON Cloud Learning, "ECL", is divided in two platforms:

Users Online Platform:

The main advantages of the Users Online Platform are:

- The **administrators** have full control over their laboratories thanks to the powerful class-administrator tool that allows the users management, logs visualization and progression monitoring. It also enables to assign users permissions to let them control EDIBON units or just display them. Furthermore, the administrator can upload and download measurements, data and multimedia resources.
- The **users** can learn interactively in a flexible environment as if they were in the laboratory, accessing through the Remote App to work with EDIBON units. Several users can work with one unit or one user with several units. The users can also upload and download measurements, data and graphs, multimedia resources and reports.

Remote App Platform:

Thanks to the Remote App Platform, the users can control EDIBON units and EDIBON SCADA software as if they were in the laboratory and share their expertise with the users community.

For more information see ECR catalog. Click on the following link: **www.edibon.com/en/edibon-cloud-learning**

ORDER INFORMATION

Main Items (EDIBON recommends the acquisition of all the units for a complete study of the process, although the following could be acquired):

1. **AC00. Computer Controlled and Touch Screen Pilot Plant for the Production of Oil:**

   <u>Units</u>:

   OWLR/CTS. Computer Controlled and Touch Screen Olive Washing Machine and Leaf Remover.

   PACC. Computer Controlled Continuous Cycle Oil Production Plant.

   OCPF/CTS. Computer Controlled and Touch Screen Oil Collector with Plate Filter.

   EDLC. Computer Controlled Liquid Packaging Teaching Unit.

2. **PLCHMI. IIoT local/remote Control and Monitoring with HMI.**
3. **AC00/CCSOF. PID Computer Control + Data Acquisition + Data Management Software.**
4. **Cables and Accessories,** for normal operation.
5. **Manuals.**

   *IMPORTANT: Under AC00 we always supply all the elements for immediate running as 1, 2, 3, 4 and 5.

Optional items (supplied under specific order):

- **EXPANSIONS:**

   6. ESN. EDIBON Scada-Net Systems.
   7. ECL. EDIBON Cloud Learning.

QUALITY CERTIFICATES

CERTIFIED ISO 9001 CERTIFIED ISO 14001 CERTIFIED OHSAS 18001 CE UL CSA

WARRANTIES

SPARE PARTS AVAILABILITY 15-YEAR edibon

WARRANTY 5-YEAR edibon

REPRESENTATIVE: