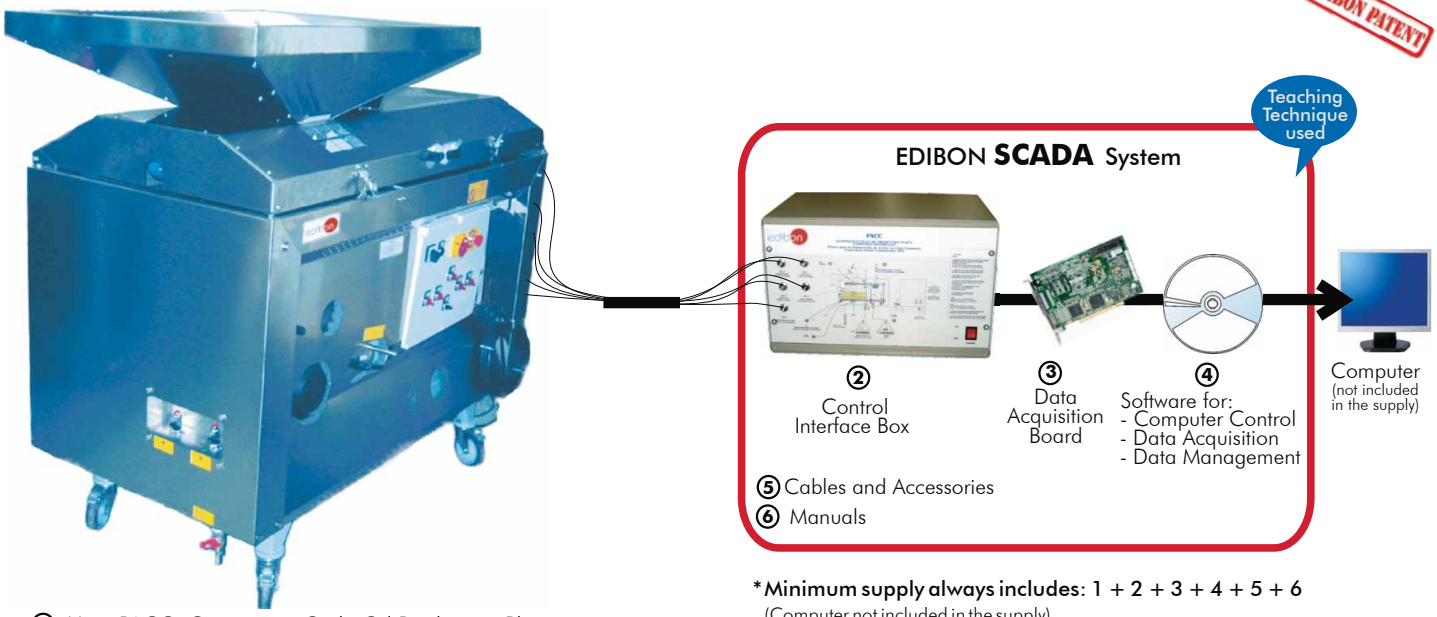
edibon
Technical Teaching Equipment

Computer Controlled **Continuous Cycle Oil Production Plant,** with SCADA

PACC



① Unit: PACC. Continuous Cycle Oil Production Plant

*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
12.-Food & Water Technologies

For more information about Key Features, click here:

ISO 9000: Quality Management
(for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate
(total safety)

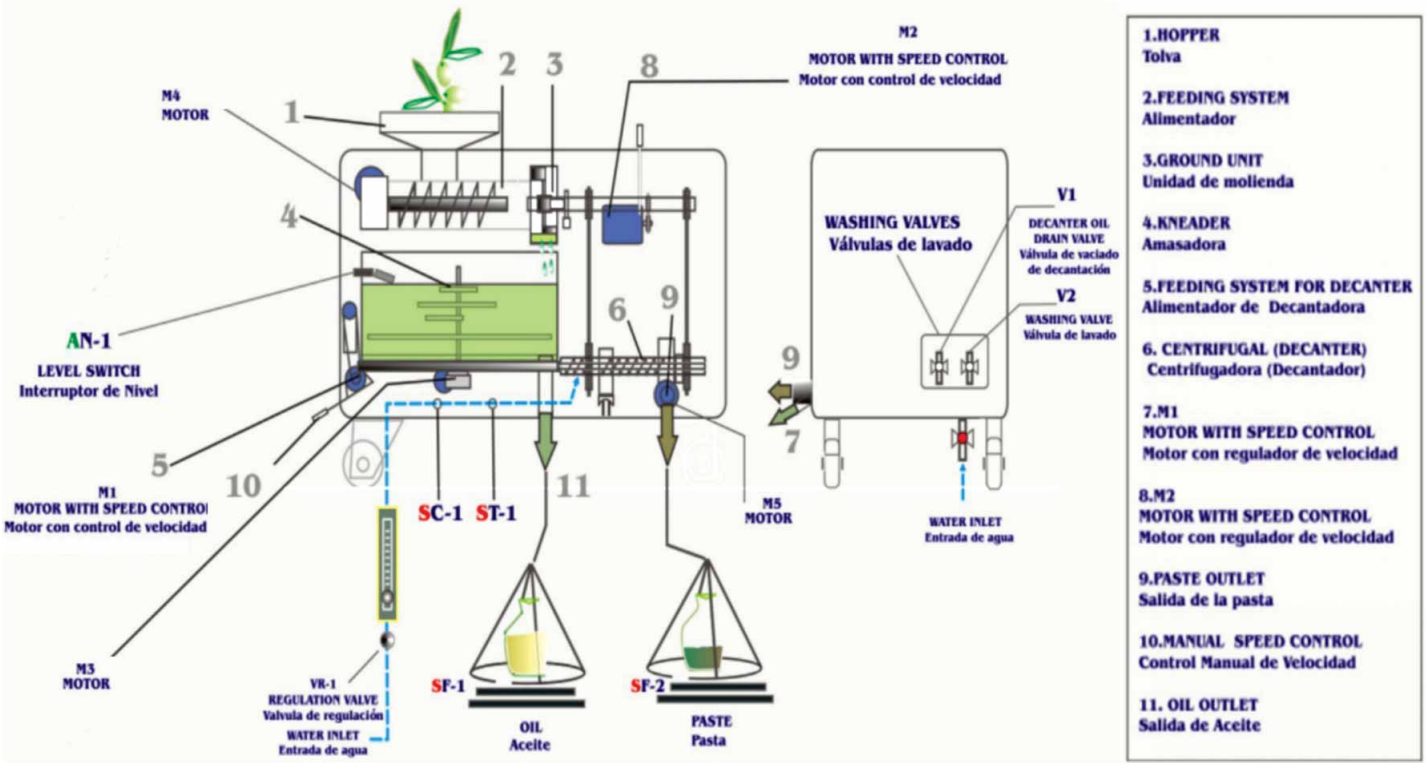
Certificates ISO 14000 and
ECO-Management and Audit Scheme
(environmental management)

Worlddidac Quality Charter Certificate
(Worlddidac Member)

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION

5 actuators and 4 sensors controlled from any computer, and working simultaneously

OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL



Note: **ST**= Temperature sensor. **SC**= Flow sensor. **SF**= Force sensor.

Items supplied as standard

① PACC. Unit:

Unit in stainless steel.
Diagram in the front panel with similar distribution to the elements in the real unit.
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 6 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.
- 2 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.
Isolated structure.
Regular revolving wheels.
Vibrations balancing system.
External unit, with anodized aluminium structure, for product collecting, with weighing system (2 Load Cells (50 Kg each one)).
This unit has 2 stainless steel aluminium tanks (capacity 50 l. each one).
Extraction speed: 50 kg/ hour. Power: 3 KW. Oil obtained has a temperature between 22-26ºC and an acidity approx.: 0.4º.
The unit incorporates wheels for mobility.

PACC. Unit

②PACC/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.

PACC/CIB

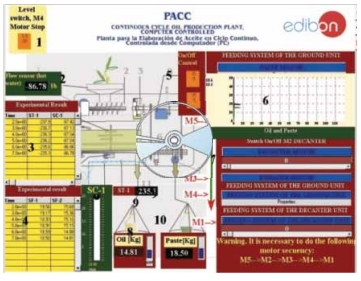
③ DAB. Data Acquisition Board:

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)=±10V. 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: 833 KS/s.
Output range(V)=±10V. Data transfers=DMA, interrupts, programmed I/0.
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 PACC/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 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 results and manipulation of the unit, during the process, by using a projector or an electronic whiteboard.



PACC/CCSOF

⑤Cables and Accessories, for normal operation.

⑥Manuals:

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

Continue...

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).

PLC-PI

⑧ PACC/PLC-SOF. PLC Control Software:

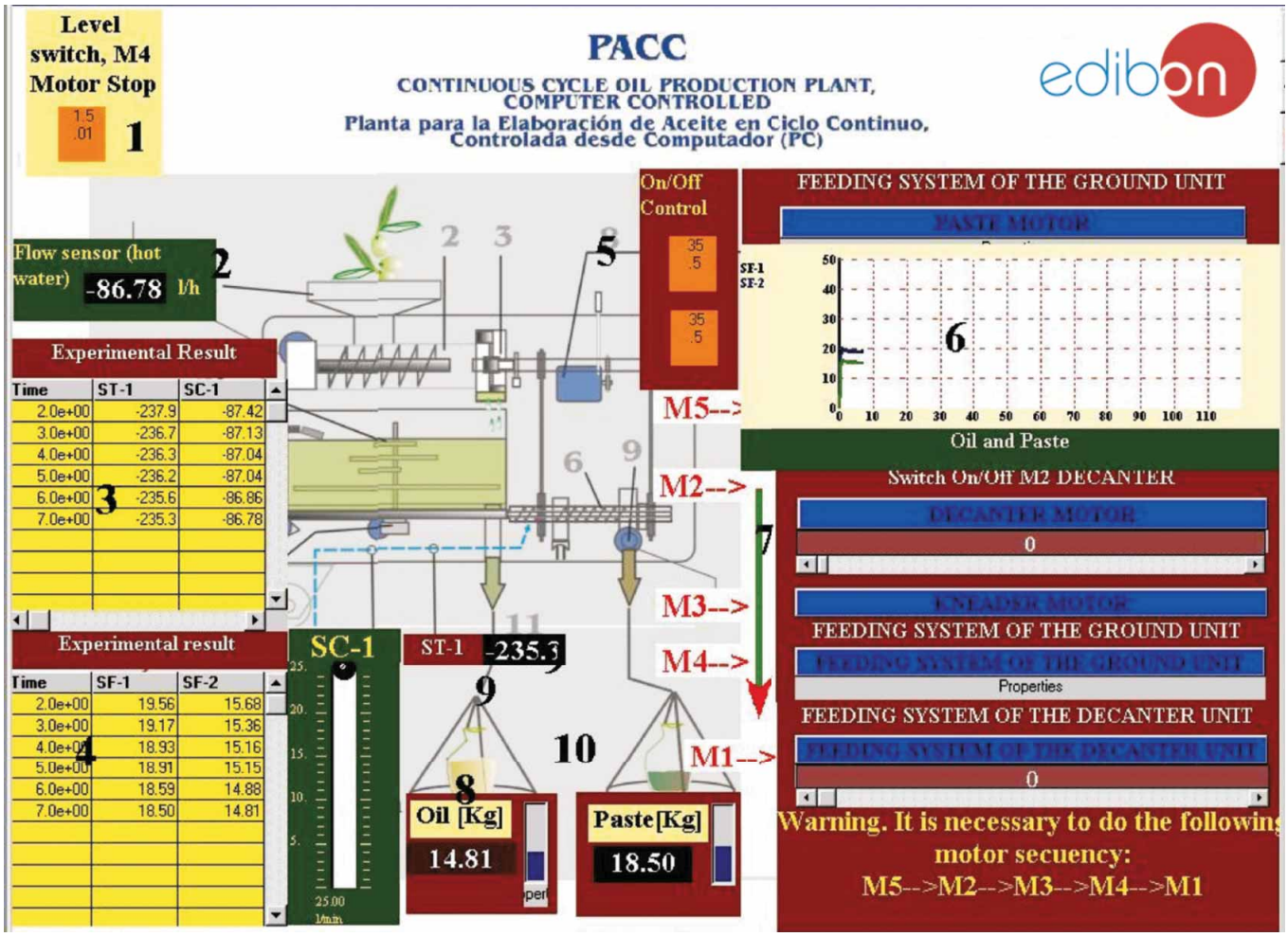
For this particular unit, always included with PLC supply.

Items available on request

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

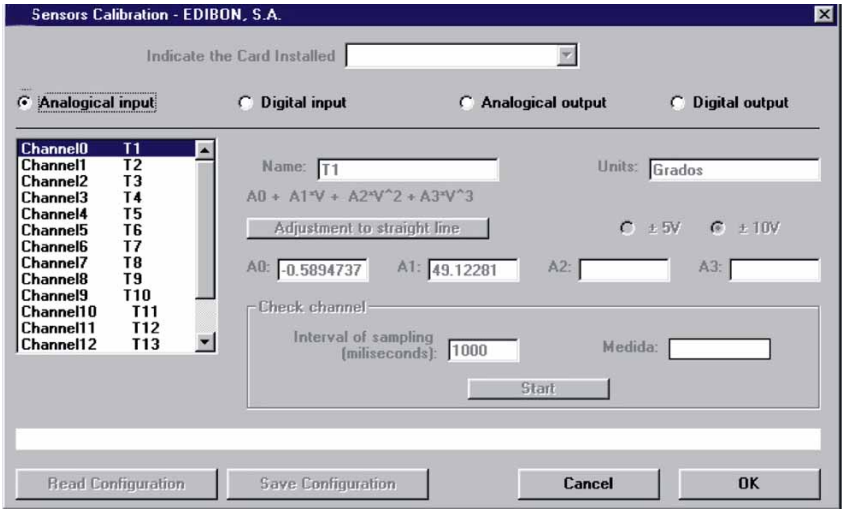
⑩ PACC/FSS. Faults Simulation System.

Some Software screens



Identifications	Description
1	Level switch alarm
2	Flow sensor; hot water
3	Experimental result, temperature & water flow
4	Experimental result; load cell SF-1 & SF-2
5	Control system, switch the motor off
6	Temperature evolution
7	Switch of the pump
8	Water flow
9	Temperature display
10	Weight for oil and residual product

Example of Sensors Calibration screen



EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

1.- Obtaining of Oil (olive, avocado, colza, sunflower).

2.- Obtained oil acidity measurement.

3.- Determination of the performance depending on the decanter centrifugation speed.

4.- Determination of performance depending on the type of food product used for oil production.

5.- Study of the influence of the collection time in the performance.

6.- Comparative study of the oil performance depending if the food product for its production has been just recollected or if previously it has been put in the sun to dry.

7.- Practice of cleaning the unit.

8.- Control System. Temperature Sensor Calibration.

9.- Control System. Flow Sensor Calibration.

10.-Flow Sensor Hysteresis Study.

11.-Load Cell SF-1 and SF-2 Calibration.

12.-Decanter Supply System Calibration.

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

13.-Control of the PACC unit process through the control interface box without the computer.

14.-Visualization of all the sensors values used in the PACC unit process.

15.-Calibration of all sensors included in the PACC unit process.

16.-Hand on of all the actuators involved in the PACC unit process.

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

18.-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).

19.-PLC hardware general use and manipulation.

20.-PLC process application for PACC unit.

21.-PLC structure.

22.-PLC inputs and outputs configuration.

23.-PLC configuration possibilities.

24.-PLC program languages.

25.-PLC different programming standard languages.

26.-New configuration and development of new process.

27.-Hand on an established process.

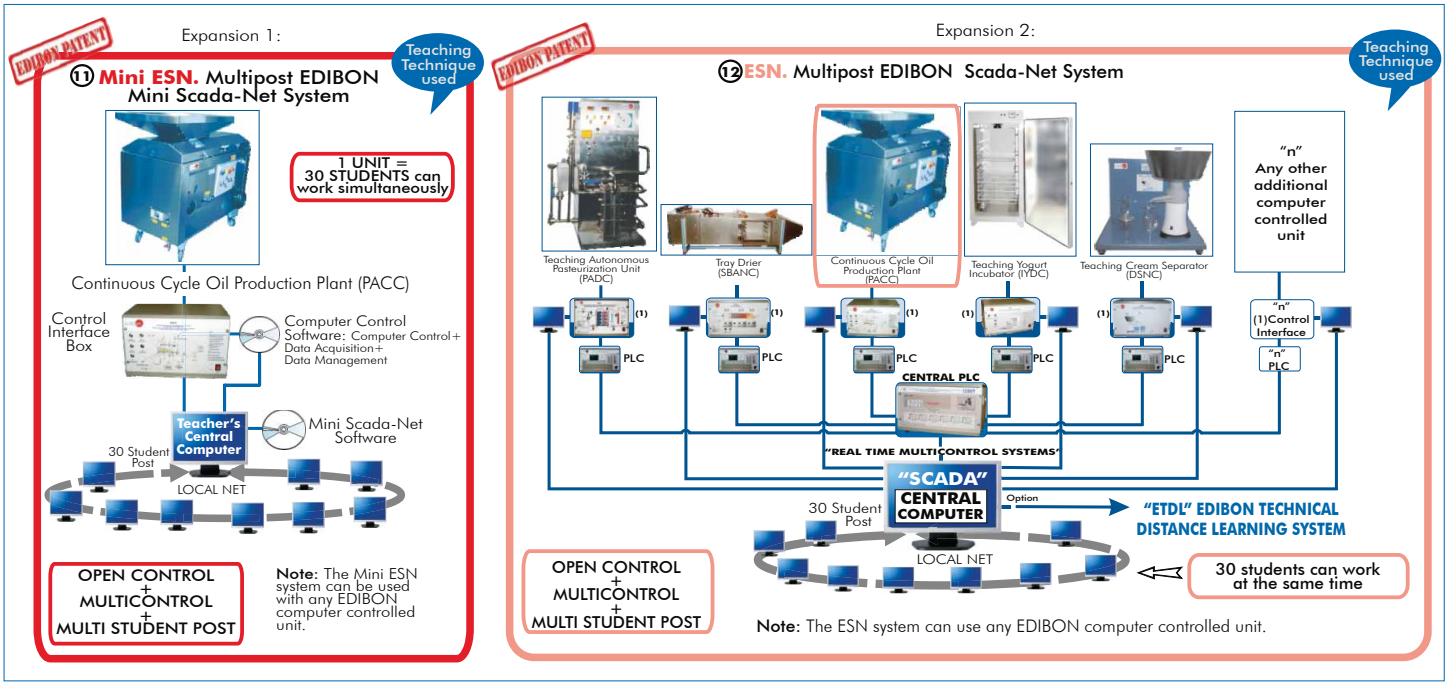
28.-To visualize and see the results and to make comparisons with the PACC unit process.

29.-Possibility of creating new process in relation with the PACC unit.

30.-PLC Programming Exercises.

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

POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS



ORDER INFORMATION

Items supplied as standard

Minimum configuration for normal operation includes:

- ① **Unit: PACC. Continuous Cycle Oil Production Plant.**
- ② **PACC/CIB. Control Interface Box.**
- ③ **DAB. Data Acquisition Board.**
- ④ **PACC/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
- ⑤ **Cables and Accessories**, for normal operation.
- ⑥ **Manuals.**

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

Expansions

- ⑪ Mini ESN. Multipost EDIBON Mini Scada-Net System.
- ⑫ ESN. Multipost EDIBON Scada-Net System.

REQUIRED SERVICES

- Electric Supply: 3 KW, single-phase, 220V/50Hz or 110V/60Hz.
- Water Supply.
- Computer (PC).

RECOMMENDED ACCESSORIES

- Stopclock.
- Burette.

DIMENSIONS & WEIGHTS

PACC Unit:	-Dimensions: 1500 x 800 x 1700 mm. approx.
	-Weight: 300 Kg. approx.
Control Interface Box:	-Dimensions: 490 x 330 x 310 mm. approx.
	-Weight: 10 Kg. approx.
PLC Module (PLC-PI):	-Dimensions: 490 x 330 x 310 mm. approx.
	-Weight: 30 Kg. approx.

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

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REPRESENTATIVE: