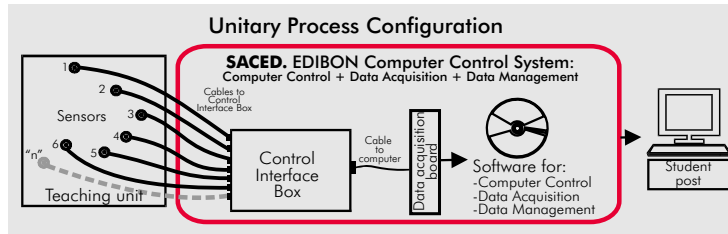
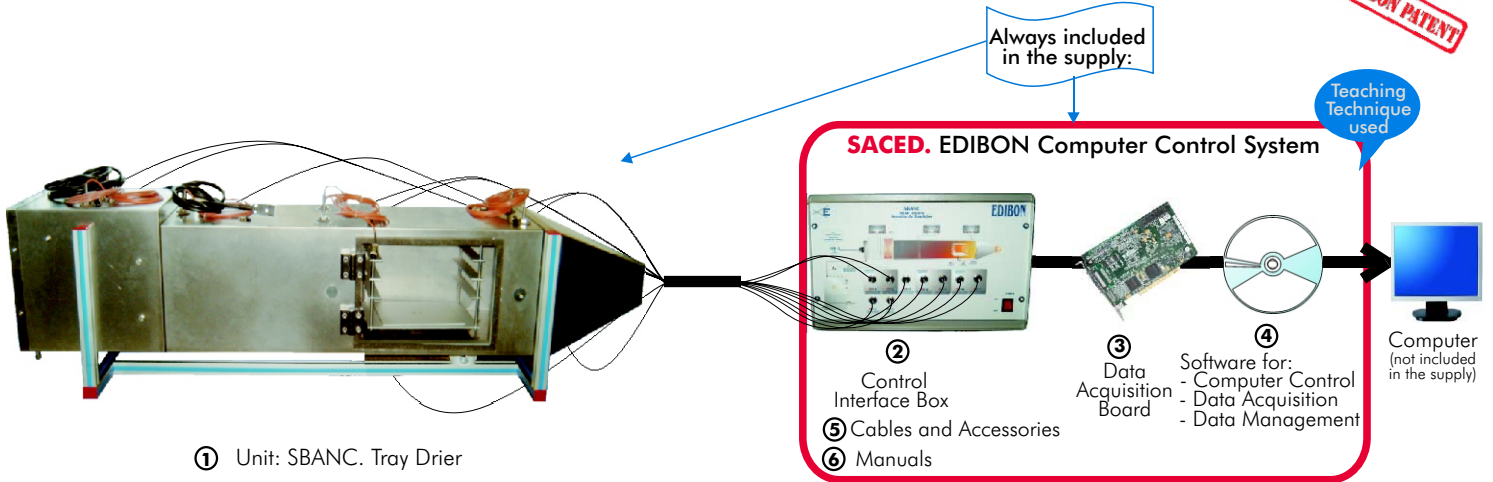


**EDIBON PATENT**



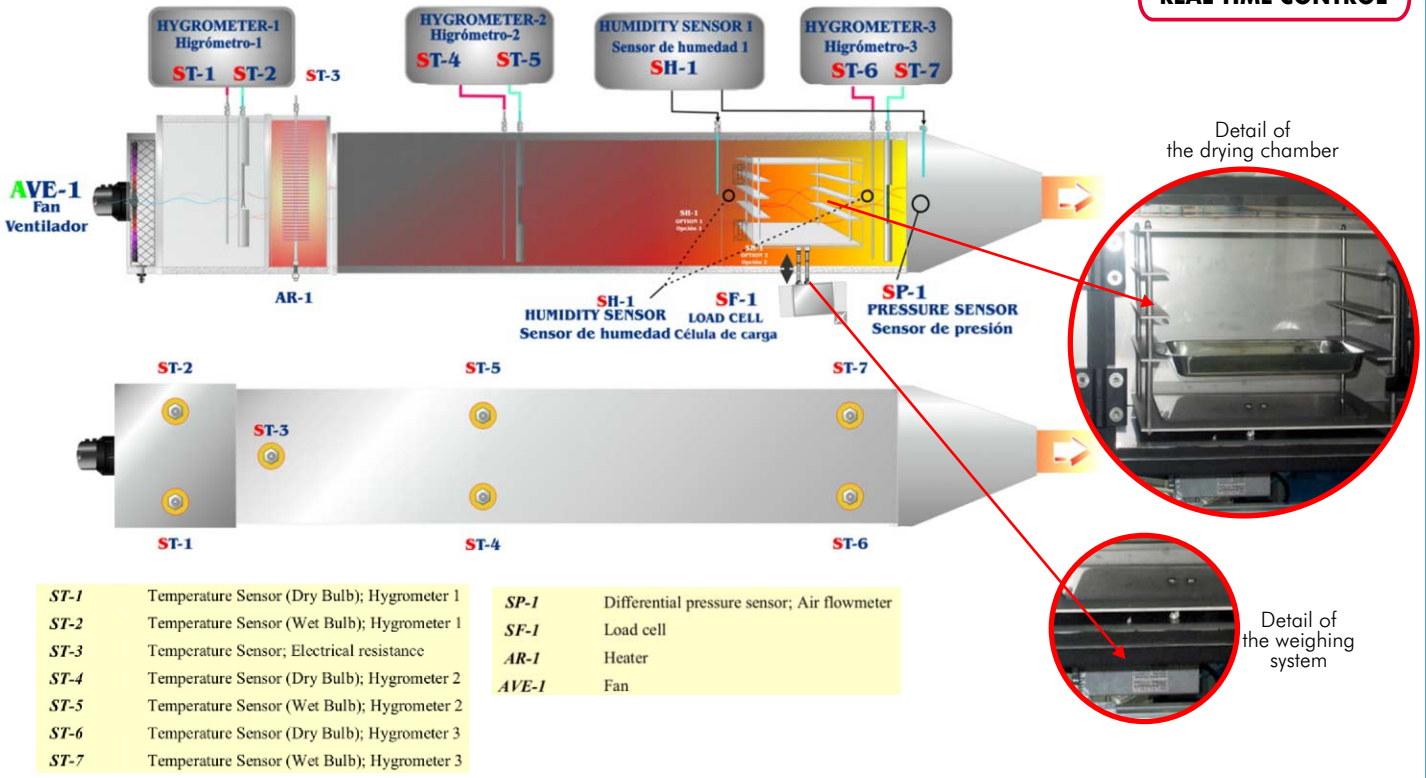
**www.edibon.com**

- Products
- Products range
- Units
- 11.- Chemical Engineering or
- 12.- Food & Water Technologies

### PROCESS DIAGRAM AND ELEMENTS ALLOCATION

2 actuators and 10 sensors controlled from any computer, and working simultaneously

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



## SPECIFICATIONS

### Items supplied as standard

#### ① SBANC. Unit:

This Unit has been designed for studying fluid mechanics, surfaces chemistry, solid structures and substances and energy balances, related to the drying processes. Its size is specially appropriate for laboratories.

This tray drier dries solids by passing a stream of hot air over trays of wet material.

Anodized aluminium structure.

Panels and main metallic elements in stainless steel.

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

Stainless steel rectangular conduct (1000 x 320 x 300 mm), which includes a support, a drying chamber with a door and a set of four bans, a square nozzle 300 mm long, whose side goes from 315 to 100 mm progressively.

Shielded Propeller Fan, with speed control from computer (PC).

Fan protector.

Weighing system for following the changes in weight of the solid due the evaporation or vaporisation of moisture during operation.

Load Cell-force sensor.

7 Temperature Sensors:

2 temperature sensors of Dry and Wet Bulb, before the electrical resistance.

1 temperature sensor in the electrical resistance.

2 temperature sensors of Dry and Wet Bulb, after the electrical resistance.

2 temperature sensors of Dry and Wet Bulb, after the drying chamber.

Differential pressure sensor.

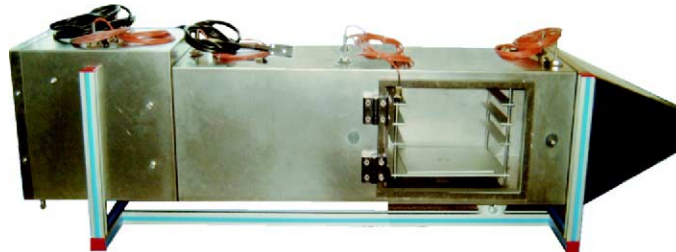
Air flow sensor.

Humidity sensor.

Electrical heater (resistance 3KW), computer controlled.

Recommended accessory: (not included in the standard supply)

TGV. Steam generator. For changing the moisture conditions in the process.



SBANC. Unit

#### ② SBANC/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 for -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 PID control with flexibility of modifications from the computer keyboard of the PID parameters, at any moment during the process. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. Real time PID control for parameters involved in the process simultaneously. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants).

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

Possibility of automatization of the actuators involved in the process.

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



SBANC/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)= $\pm 10V$ . 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)= $\pm 0V$ . 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 SBANC/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.

Analog and digital PID control. Menu for PID and set point selection required in the whole work range.

Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second guaranteed. Student calibration system for all 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 to 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.

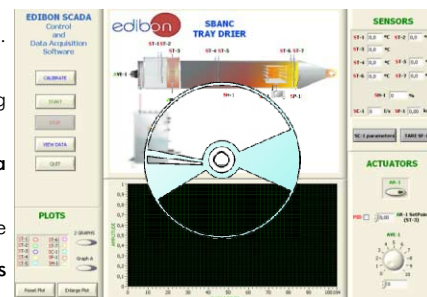
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SBANC/CCSOF

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

#### ⑥ Manuals:

This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and

\* References 1 to 6: SBANC + SBANC/CIB + DAB + SBANC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.

Continue...

**Complementary 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.

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.

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

DC input: 16 (24 V DC).

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 SBANC/PLC-SOF. PLC Control Software:**

For this particular unit, always included with PLC supply.



PLC-PI

**Items available on request**

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

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

**Software Main Screens**

Main screen

**Note:** ST=Temperature sensor. SP=Pressure sensor. SF=Force sensor (load cell). SH= Humidity sensor. SC=Flow sensor. AR=Heating resistance. AVE=Fan.

Examples of Sensors Calibration screens

Reference Select	Sensors	Volts	Calibrated	ΔT
<input type="checkbox"/>	ST-1	0.2753	28.8346	28.83
<input checked="" type="checkbox"/>	ST-2	0.3335	29.7856	29.79
<input type="checkbox"/>	ST-3	0.331	29.0641	29.06
<input checked="" type="checkbox"/>	ST-4	0.3254	29.5453	29.55
<input checked="" type="checkbox"/>	ST-5	0.3295	29.4276	29.43
<input checked="" type="checkbox"/>	ST-6	0.3458	34.752	34.75
<input type="checkbox"/>		-0.0037	-0.0037	0
<input type="checkbox"/>		-0.004	-0.01826	0.02
<input type="checkbox"/>		3.4768	3.4768	3.48
<input type="checkbox"/>		3.215	291.888	291.89
<input type="checkbox"/>		3.066	3.066	3.07
<input type="checkbox"/>		2.6614	2.6614	2.66
<input type="checkbox"/>		2.4281	2.4281	2.43
<input type="checkbox"/>	SC-1	0.1291	0.1424	0.14
<input type="checkbox"/>	SC-2	0.0104	-0.0211	0.02
<input type="checkbox"/>	AN-1	5.9886	5.9886	5.99

GAIN	OFFSET	r
ST-1	101.705	0.8354
ST-2	98.5001	-3.0594
ST-3	102.291	-4.7913
ST-4	102.262	-3.7268
ST-5	101.438	-3.9867
ST-6	91.5356	3.1025
1	0	0
105.08	-7.5992	0
1	0	0
1	0	0
92.6831	6.0646	0
1	0	0
1	0	0
1	0	0
SC-1	0.784847	0.0411
SC-2	0.9199	-0.0307
AN-1	1	0

Continue...

Some typical exercises results

The unit is in operation. This screen shows results in real time.

**EDIBON SCADA**  
Control and Data Acquisition Software

START

STOP

START SAVING...

**PLOTS**

ST-1	ST-6	2 GRAPHS
ST-2	ST-7	
ST-3	SC-1	Graph A
ST-4	SF-1	
ST-5	SH-1	

Reset Plot    Enlarge Plot

**SBANC TRAY DRIER**

**SENSORS**

ST-1	25,5 °C	ST-2	24,9 °C
ST-3	27,2 °C	ST-4	26,1 °C
ST-5	24,7 °C	ST-6	26,6 °C
ST-7	24,8 °C	SH-1	31 %
SC-1	70 l/s	SF-1	0,14 kg

SC-1 parameters    TARE SF-1

**Graph A**

AMPLITUDE

DATA POINTS

**Graph B**

AMPLITUDE

DATA POINTS

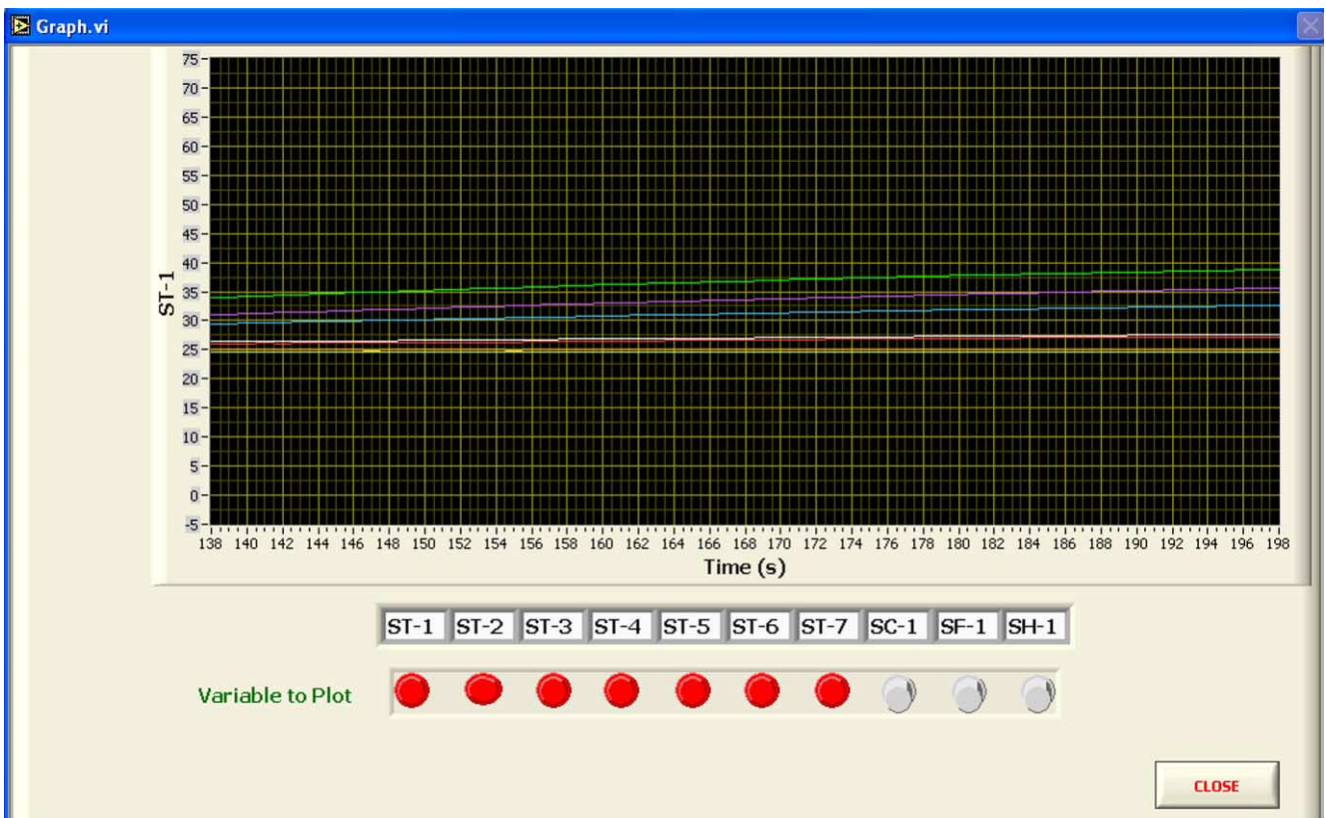
**ACTUATORS**

AR-1

PID  50,00 AR-1 SetPoint (ST-3)

AVE-1

Graphic representation of results at the end of a process.



## EXERCISES AND PRACTICAL POSSIBILITIES

### Some Practical Possibilities of the Unit:

- 1.- Demonstration of drying rate regimens.
- 2.- Determination of the efficiency of the warm-up resistance.
- 3.- Effect of the warm-up in an installation.
- 4.- Heat and mass transfer analogies.
- 5.- Obtaining of drying curves.
- 6.- Influence of the particle size.
- 7.- Influence of the air speed.
- 8.- Influence of the air temperature.
- 9.- Application of the psychometric in the drying.

Other possible practices:

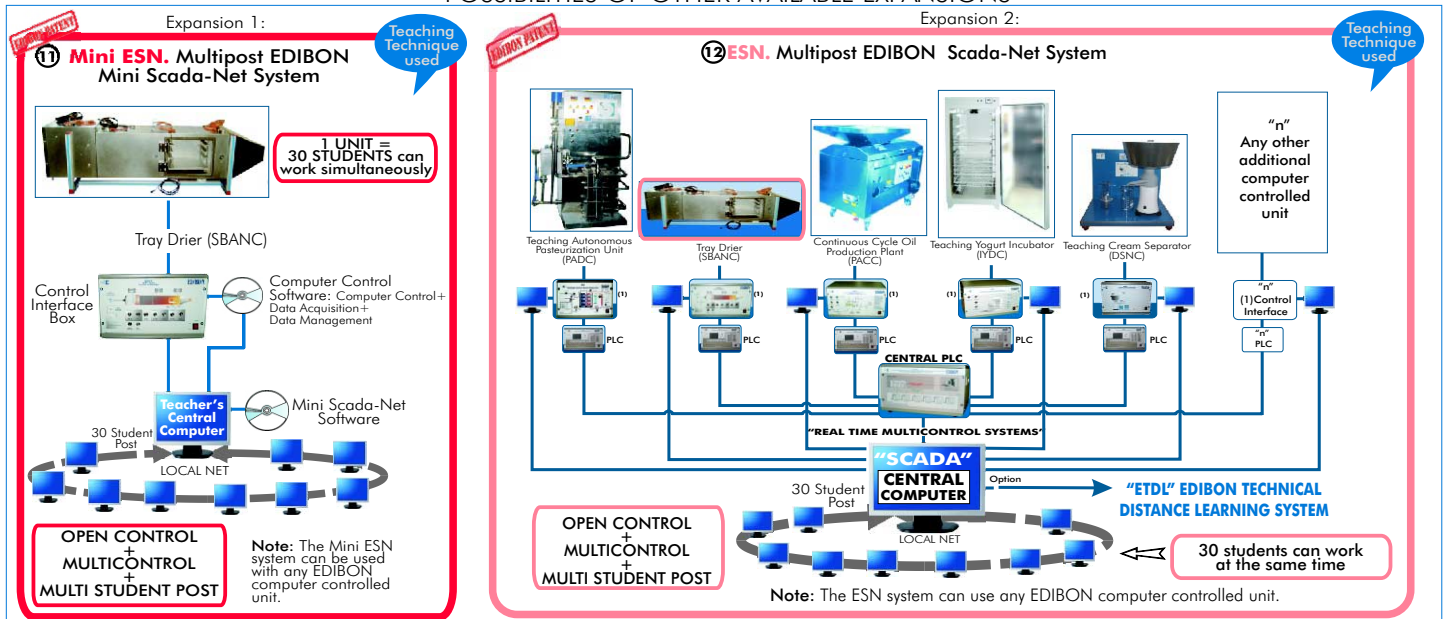
- 10.- Example of the determination of the properties of the air.
- 11.- Use of a psychometric map.
- 12.- Determination of the air flow.
- 13.- Dynamic simulation of the control systems.
- 14.- Sensors calibration.

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

- 15.- Control of the SBANC unit process through the control interface box without the computer.
- 16.- Visualization of all the sensors values used in the SBANC unit process.
- 17.- Calibration of all sensors included in the SBANC unit process.
- 18.- Hand on of all the actuators involved in the SBANC unit process.

- 19.- Realization of different experiments, in automatic way, without having in front the unit. (This experiment can be decided previously).
- 20.- 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).
- 21.- PLC hardware general use and manipulation.
- 22.- PLC process application for SBANC unit.
- 23.- PLC structure.
- 24.- PLC inputs and outputs configuration.
- 25.- PLC configuration possibilities.
- 26.- PLC program languages.
- 27.- PLC different programming standard languages (literal structured, graphic, etc.).
- 28.- New configuration and development of new process.
- 29.- Hand on an established process.
- 30.- To visualize and see the results and to make comparisons with the SBANC unit process.
- 31.- Possibility of creating new process in relation with the SBANC unit.
- 32.- PLC Programming Exercises.
- 33.- 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: SBANC. Tray Drier.
- ② SBANC/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ SBANC/CCSOF. Computer Control + Data Acquisition + Data Management Software, for normal operation.
- ⑤ Cables and Accessories.
- ⑥ Manuals.

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

#### Complementary items to the standard supply

- PLC. Industrial Control using PLC (7 and 8):
- ⑦ PCL-PI. PLC Module.
- ⑧ SBANC/PLC-SOF. PLC Control Software.
- ⑨ SBANC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).
- ⑩ SBANC/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

- Electrical supply: 220V./50 Hz or 110V./60 Hz, directly from the mains.
- Wet solids ( example: sand).
- Computer (PC).

### RECOMMENDED ACCESSORIES

- EDIBON Steam Generator (TGV), or similar steam generator.

### DIMENSIONS & WEIGHTS

- |                        |                                       |
|------------------------|---------------------------------------|
| SBANC Unit:            | -Dimensions: 2000x320x400 mm. approx. |
|                        | -Weight : 190 Kg. approx.             |
| Control Interface Box: | -Dimensions: 490x330x310 mm. approx.  |
|                        | -Weight: 10 Kg. approx.               |
| PLC Module (PLC-PI):   | -Dimensions: 490x330x310 mm. approx.  |
|                        | -Weight: 30 Kg. approx.               |

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

REPRESENTATIVE:



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