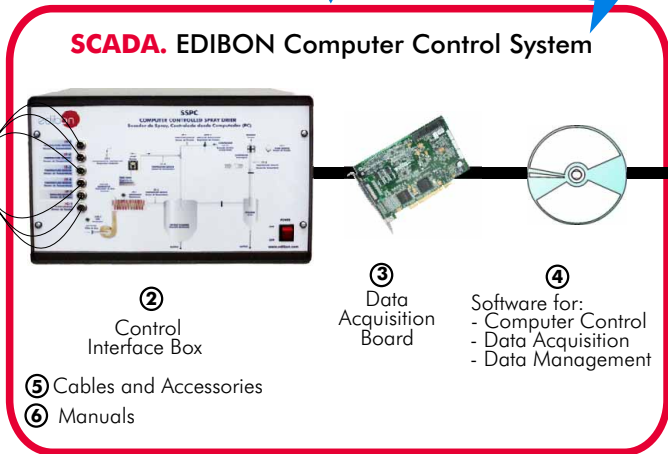
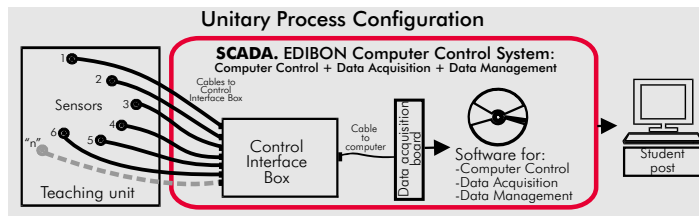


① Unit: SSPC. Spray Drier

Always included in the supply:



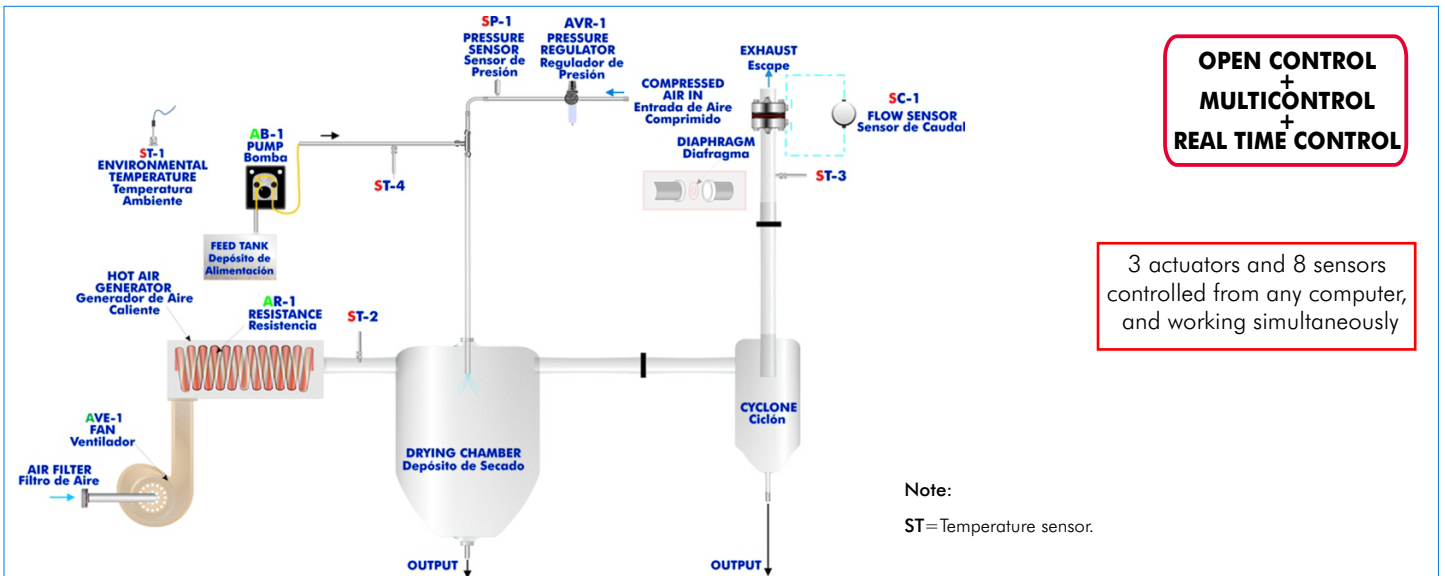
Computer (not included in the supply)



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

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL

3 actuators and 8 sensors controlled from any computer, and working simultaneously

Note:
ST=Temperature sensor.



ISO 9001:2000 Certificate of Approval



European Union Certificate



Certificates ISO 14001: 2004 and ECO-Management and Audit Scheme (environmental management)



Worlddidac Quality Charter Certificate Worlddidac Member

DESCRIPTION

Bench mounted spray drier for processing aqueous emulsions, solutions, suspensions and colloidal solutions.

This spray drier is appropriate to form part of the development/evaluation process of:

Drinks beverages, fish extracts, materials sensitive to high temperatures, milk and egg derivatives, vegetal extracts, etc.

A peristaltic pump delivers the liquid sample from a container through a small diameter jet into the main chamber.

At the same time compressed air enters the outer tube of the jet which causes the liquid to emerge as a fine atomised spray into the drying chamber. Heated air is blown through the main chamber evaporating the liquid content of the atomised spray. The solid particles of the material are collected in the sample collection bottle.

The exhaust airflow is directed to atmosphere or to an extraction system existing in the laboratory.

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 SSPC. Unit:

Bench mounted spray drier. Drier fully made with glass.

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

Downward co-current operation (a fine jet of the product is brought into contact with a hot air stream).

Glass main chamber.

Glass separator cyclone.

Sample collection glass bottle.

Waste collection glass tube.

Exhaust tube.

Standard jet of 0.5 mm Ø. It incorporates a de-blocking device.

Peristaltic pump, with variable speed, computer controlled. Product flow rate: 0 to 1800 ml/h. approx.

Heater of 3 kW, computer controlled. PID control over the air inlet temperature.

Air inlet temperature: maximum 200°C.

Fan (0.4 kW; 3000 r.p.m.), computer controlled. Drying air flow: 70 m³/h. (fixed) approx.

4 Temperature sensors, "J" type, for measurement of:

Environmental temperature.

Air inlet temperature.

Exhaust vapour temperature.

Sampling temperature.

2 Humidity sensors (air inlet and air outlet).

Flow sensor for exhaust vapour measurement, range: 0-100 m³/h.

Pressure sensor for inlet compressed air, range: 0-6 bar.

② SSPC/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 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.

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)= ±1.0V. Data transfers=DMA, interrupts, programmed I/O. DMA channels=6.

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

Output range(V)= ±1.0V. Data transfers=DMA, interrupts, programmed I/O.

Digital Input/Output: Number of channels=24 inputs/outputs. DO or DI Sample Clock frequency: 0 to 1 MHz.

④ SSPC/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.

Analogue 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. 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.

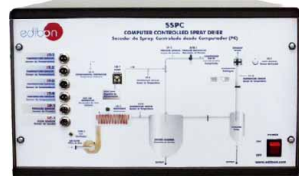
⑤ Cables and Accessories, for normal operation.

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



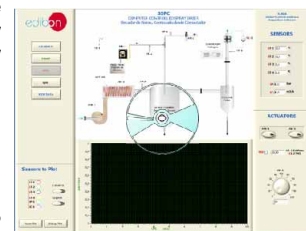
SSPC. Unit



SSPC/CIB



DAB



SSPC/CCSOF

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 VDC).

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

High-speed counter.

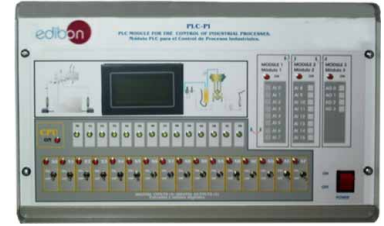
Multi-point PID control.

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

Communication RS232 wire, to computer (PC).

⑧ SSPC/PLC-SOF. PLC Control Software:

For this particular unit, always included with PLC supply.



PLC-PI

Items available on request

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

⑩ SSPC/FSS. Faults Simulation System.

Software Main Screens

Main screen

SSPC
COMPUTER CONTROLLED SPRAY DRIER
Secador de Spray, Controlado desde Computador

SCADA
EDIBON Control and Data Acquisition Software

SENSORS

- ST-1 0,0 °C
- ST-2 0,0 °C
- ST-3 0,0 °C
- ST-4 0,0 °C
- SP-1 0,0 Bar
- SC-1 0,0 m3/h

ACTUATORS

- AVE-1
- AR-1

Sensors to Plot

- ST-1 (Red)
- ST-2 (Green)
- ST-3 (Blue)
- ST-4 (Yellow)
- SP-1 (Cyan)
- SC-1 (Purple)

2 GRAPHS
Graph A

Reset Plot Enlarge Plot

AMPLITUDE vs TIME (secs)

Note: ST=Temperature sensor. SP= Pressure sensor. SC= Flow sensor. AVE= Fan. AR= Heating resistance. AB=Pump.

Example of Sensors Calibration screen

CALIBRATION

Restore Setting Instructor

Technical Support

Analog Input Channel: ST-1

Sensor Name: ST-1

Calibration units: °C

Full Scale: 100

Gain: 95,7706 Offset: -0,391638

Least Squares Fit

PTA: 10

Volts: 0,2338 Calibrated: 22

ENTER EXIT

EXIT & SAVE

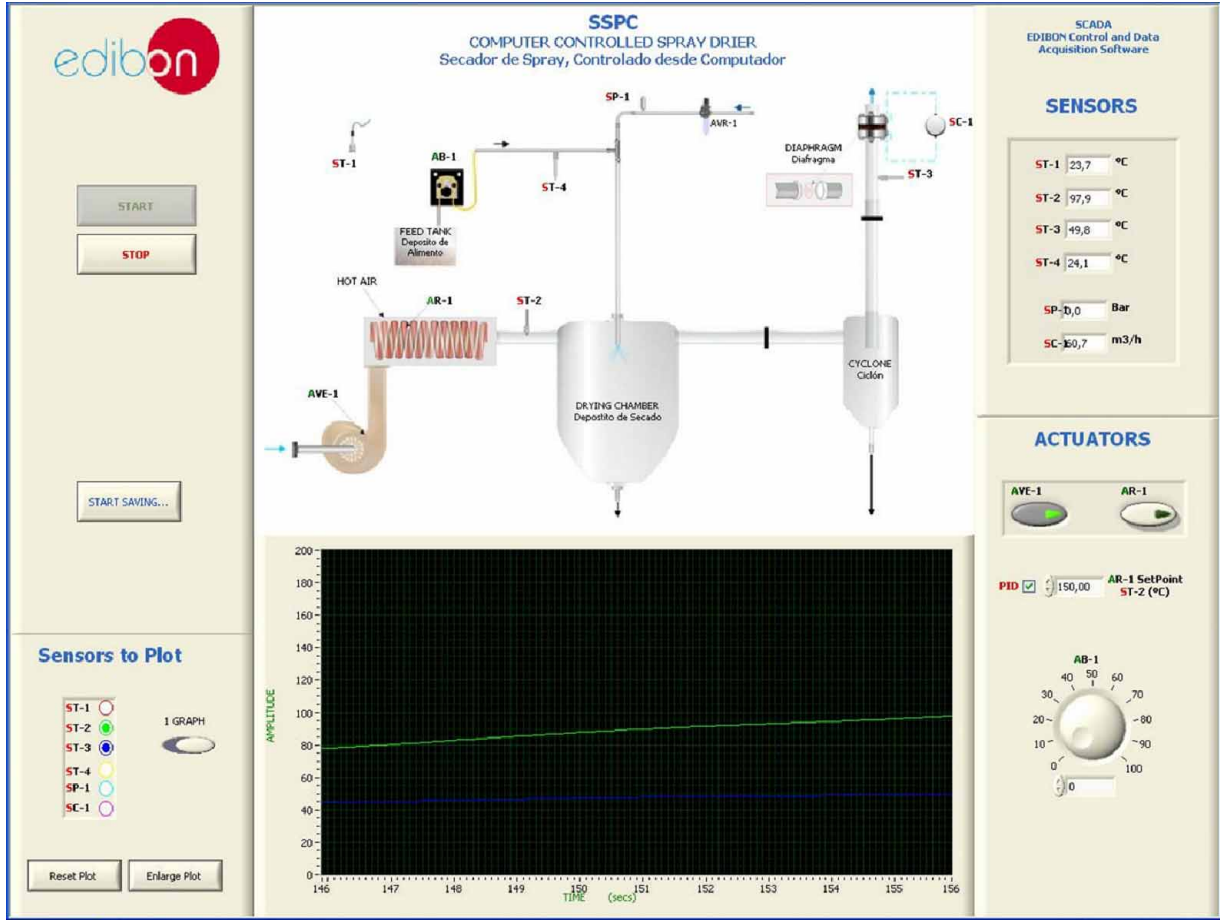
ACTUATORS

- AR-1
- AA-1
- AB-1
- AVE-1

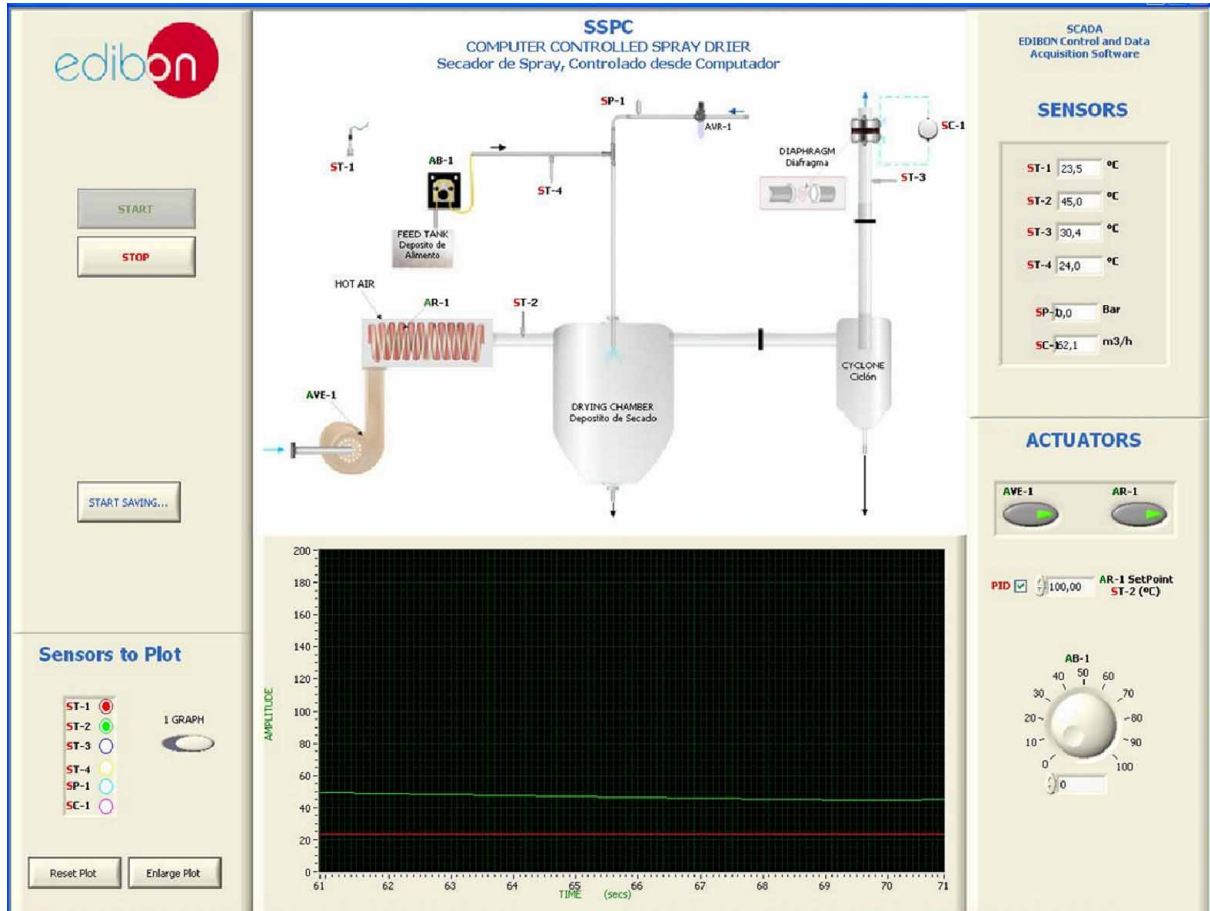
Continue...

Some typical exercises results

In the ST-2 y ST-3 sensors graphic, we can check the difference of temperature between the air input and output, observing that the temperature get lower when we atomize the product.



We stop the heating resistance and during 15 minutes is advisable to keep AVE-1 running until ST-2 value is close to ST-1 value.

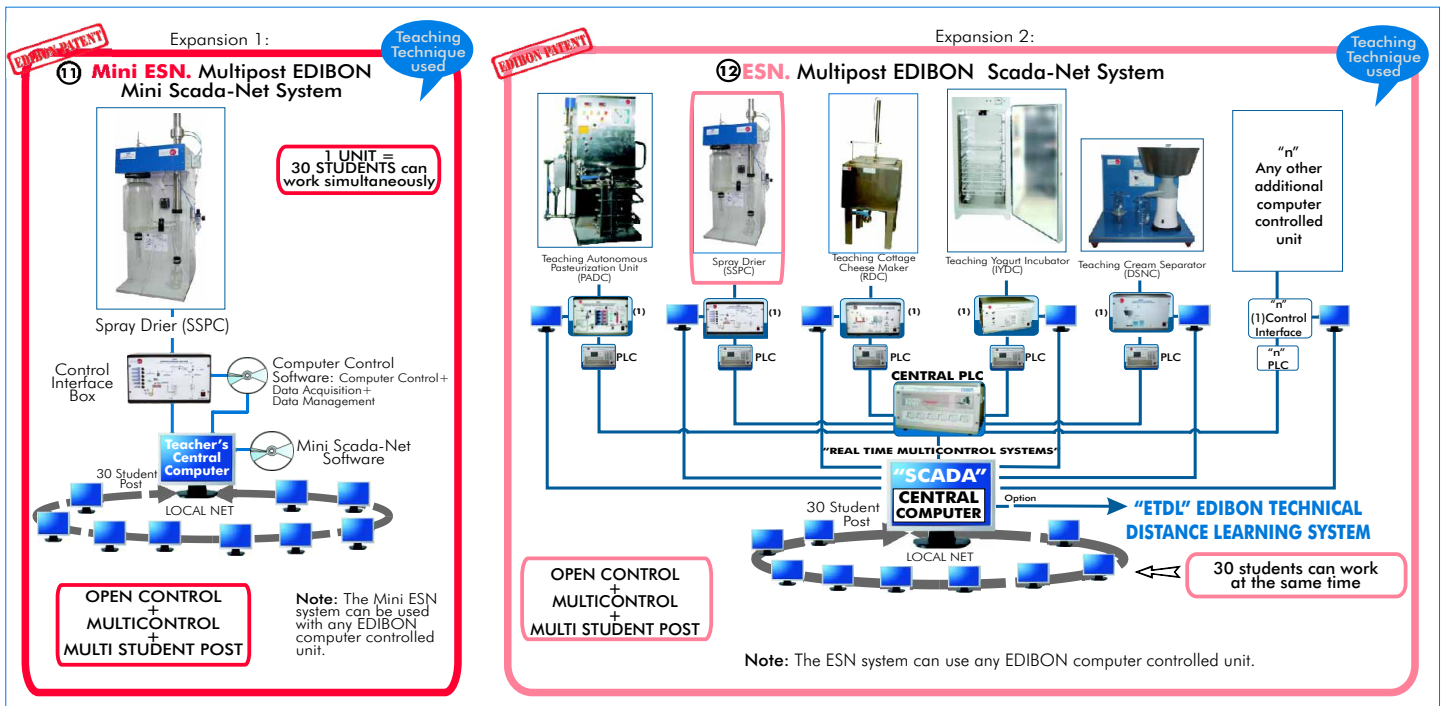


EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- 1.- Operation principle of a spray drier.
 - 2.- Effect of the drop size on the drying process.
 - 3.- Effect of the input temperature on the drying process.
 - 4.- Effect of the feed flow of the product on the drying process.
 - 5.- Mass balance of a spray drier.
 - 6.- Energy balance of a spray drier.
 - 7.- Spray drier efficiency.
- Other possible practices:
- 8.- Sensors calibration.
- Practices to be done by PLC Module (PLC-PI) + PLC Control Software:
- 9.- Control of the SSPC unit process through the control interface box without the computer.
 - 10.- Visualization of all the sensors values used in the SSPC unit process.
 - 11.- Calibration of all sensors included in the SSPC unit process.
 - 12.- Hand on of all the actuators involved in the SSPC unit process.
 - 13.- Realization of different experiments, in automatic way, without having in front the unit. (This experiment can be decided previously).
 - 14.- 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).
 - 15.- PLC hardware general use and manipulation.
- 16.- PLC process application for SSPC unit.
 - 17.- PLC structure.
 - 18.- PLC inputs and outputs configuration.
 - 19.- PLC configuration possibilities.
 - 20.- PLC program languages.
 - 21.- PLC different programming standard languages (literal structured, graphic, etc.).
 - 22.- New configuration and development of new process.
 - 23.- Hand on an established process.
 - 24.- To visualize and see the results and to make comparisons with the SSPC unit process.
 - 25.- Possibility of creating new process in relation with the SSPC unit.
 - 26.- PLC Programming Exercises.
 - 27.- 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: SSPC. Spray Drier.
- ② SSPC/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ SSPC/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ⑤ Cables and Accessories, for normal operation.
- ⑥ Manuals.

*** IMPORTANT: Under SSPC 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 SSPC/PLC-SOF. PLC Control Software.
 - ⑨ SSPC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).
 - ⑩ SSPC/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: single-phase, 220V./50Hz. or 110V./60Hz.
- Compressed air supply (approx. 45 l/h at 8 bar).
- Computer (PC).

DIMENSIONS & WEIGHTS

- SSPC Unit: -Dimensions: 500 x 500 x 1500 mm. approx.
-Weight: 80 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:

Issue: ED01/10
Date: April/2010



Electronic Console

DESCRIPTION

Bench mounted spray drier for processing aqueous emulsions, solutions, suspensions and colloidal solutions.

This spray drier is appropriate to form part of the development/evaluation process of:

Drinks beverages, fish extracts, materials sensitive to high temperatures, milk and egg derivatives, vegetal extracts, etc.

A peristaltic pump delivers the liquid sample from a container through a small diameter jet into the main chamber.

At the same time compressed air enters the outer tube of the jet which causes the liquid to emerge as a fine atomised spray into the drying chamber. Heated air is blown through the main chamber evaporating the liquid content of the atomised spray. The solid particles of the material are collected in the sample collection bottle.

The exhaust airflow is directed to atmosphere or to an extraction system existing in the laboratory.

SPECIFICATIONS

Bench mounted spray drier. Drier fully made with glass.

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

Downward co-current operation (a fine jet of the product is brought into contact with a hot air stream).

Glass main chamber.

Glass separator cyclone.

Sample collection glass bottle.

Waste collection glass tube.

Exhaust tube.

Standard jet of 0.5 mm Ø. It incorporates a de-blocking device.

Peristaltic pump, with variable speed. Product flow rate: 0 to 1800 ml/h. approx.

Heater of 3 kW.

Air inlet temperature: maximum 200°C.

Fan (0.4 kW; 3000 r.p.m.). Drying air flow: 70 m³/h. (fixed) approx.

4 Temperature sensors, "J" type, for measurement of:

Environmental temperature.

Air inlet temperature.

Exhaust vapour temperature.

Sampling temperature.

2 Humidity sensors (air inlet and air outlet).

Pressure meter (manometer) for compressed air.

Electronic Console:

Metallic box.

Temperature sensors connections.

Digital display for temperature sensors.

Selector for the temperature sensors.

Fan switch.

Pump speed regulator.

Heater controller.

Humidity controller.

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- 1.- Operation principle of a spray drier.
- 2.- Effect of the drop size on the drying process.
- 3.- Effect of the input temperature on the drying process.
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- 5.- Mass balance of a spray drier.
- 6.- Energy balance of a spray drier.
- 7.- Spray drier efficiency.

REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz. or 110V./60Hz.
- Compressed air supply (approx. 45 l/h at 8 bar).

DIMENSIONS & WEIGHTS

SSPB:

- Unit: -Dimensions: 500 x 500 x 1500 mm. approx.
-Weight: 80 Kg. approx.
- Electronic console: -Dimensions: 490 x 330 x 310 mm. approx.
-Weight: 10 Kg. approx.

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



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