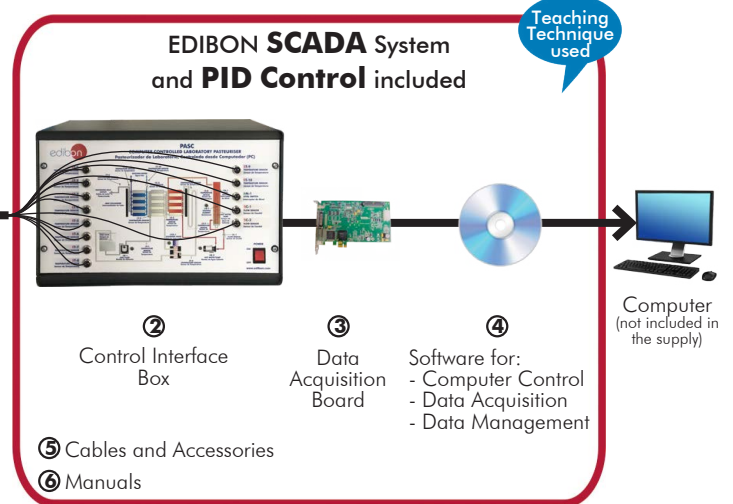


PASC



① Unit: PASC. Computer Controlled Laboratory Pasteurizer



* Minimum supply always includes: 1 + 2 + 3 + 4 + 5 + 6
(Computer not included in the supply)

Key features:

- **Advanced Real-Time SCADA and PID Control.**
- **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 ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.**
- **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**



www.edibon.com

PRODUCTS
↳ 12.-FOOD & WATER
TECHNOLOGIES

For more information about key features, click here



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



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



"Worlddidac Quality Charter" and Platinum Member of Worlddidac

INTRODUCTION

Pasteurization is a thermal process performed on liquids (generally food) to reduce pathogens (for example, bacteria, protozoa, molds, yeasts, etc.) contained in them.

One of the thermal treatment reasons is a “partial sterilization” of liquid food, altering its physical structure, chemical components and organoleptic properties as little as possible. After the pasteurization operation, treated products are quickly cooled and hermetically sealed for good security purposes. Therefore, to know the heat transfer mechanism in food is essential for the pasteurization.

Three pasteurization methods are used nowadays. They differ in the temperature applied, as well as in the industrial process they are used to.

VAT: It consists in heating liquids to a temperature of approximately 63 °C and then leaving it for 30 minutes to cool down in the same container. After that time, liquids are immediately packed to prevent contamination.

HTST: Liquids are quickly heated between 71 °C and 89 °C, depending on their type, for only 15 seconds. This method is the most common one in industry since it is quick and allows working with large volumes.

UHT: Also known as ultra-high temperature processing, it consists in subjecting liquids to a temperature of 137 °C for 2 seconds, to cool it down quickly afterwards.

The Computer Controlled Laboratory Pasteurizer, “PASC”, is a small scale continuous flow pasteurizer designed by EDIBON. It performs HTST pasteurization (High Temperature Short Time), which simulates the working conditions of a real plant, but allows small amounts of product can be pasteurized in a short period, resulting in an economical unit whose operation is easy to understand for students.

GENERAL DESCRIPTION

The Computer Controlled Laboratory Pasteurizer, “PASC”, allows continuous flow conditions with flow rates between 1 and 30 l of product per hour. Temperatures up to 90 °C can be obtained and residence times and efficiencies can be changed. The main element of the laboratory pasteurizer is its plate heat exchanger. It is divided into three sectors, for heating, interchanging and cooling.

A series of pasteurization process stages can be distinguished:

- 1) A first stage where the preheating of the food product is realized.

The pasteurizer receives the product from the feed tank and preheats it in the central section (interchanging) of the heat exchanger, by crosscurrent circulation with the pasteurized and hot product.

- 2) Then, the product flows to a second heating stage where the temperature of the product is increased to a value enough to eliminate the high microorganisms (72 °C approx.), during a holding time.

This heating stage is obtained by circulating the product crosscurrent with the hot water from the tank where there is a heating element.

The product is kept at the pasteurization temperature during 15 – 20 seconds in the retention section.

- 3) Instead of the pasteurized product going out at 72 °C, it is made to circulate crosscurrent with the incoming product at 4 °C, so a double effect is obtained:

Energy savings when preheating the incoming product from the initial temperature of 4 °C to 56 °C. The efficiency in the energy recuperation process can reach 75 %.

Outlet of the pasteurized product at the temperature of 40 °C, which helps the last stage.

- 4) The last stage in the heat exchanger is to process the cooling of the product for its conservation. To do this, the product is passed through the last heat exchanger sector by crosscurrent circulation with the cold water.



PASC detail

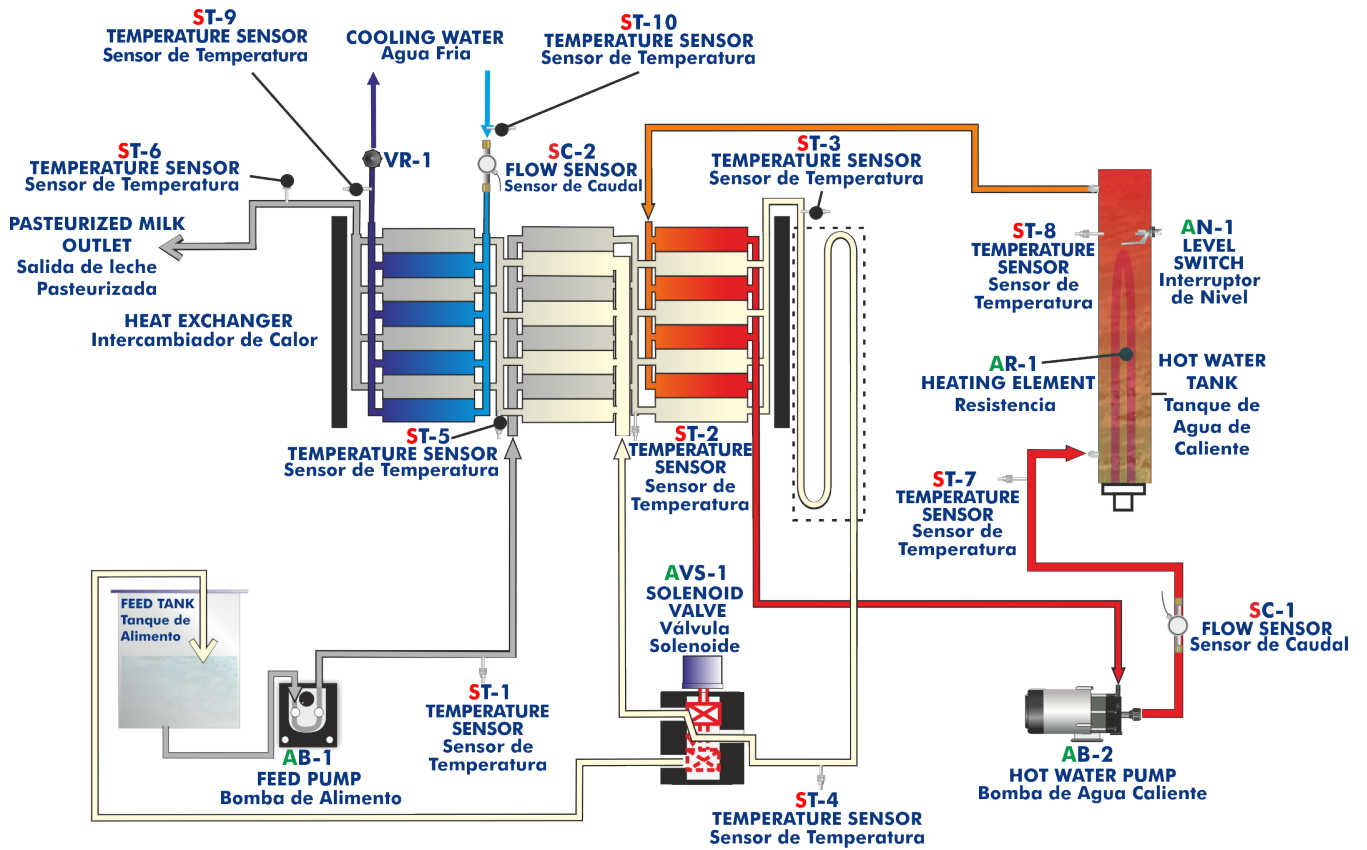
The Computer Controlled Laboratory Pasteurizer, “PASC”, also allows the student to become familiar with a cleaning process known as CIP (Clean In Place) and is automatically carried out by sectors, as it is in real pasteurization plants.

This Computer Controlled Unit is supplied with the EDIBON Computer Control System (SCADA), and includes: The unit itself + a Control Interface Box + a Data Acquisition Board + Computer Control, Data Acquisition and Data Management Software Packages, for controlling the process and all parameters involved in the process.

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION

4 actuators and 12 sensors controlled from any computer, and working simultaneously

OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL



COMPLETE TECHNICAL SPECIFICATIONS (for main items)

With this unit there are several options and possibilities:

- Main items: 1, 2, 3, 4, 5 and 6.
- Optional items: 7, 8, 9 and 10.

Let us describe first the main items (1 to 6):

① PASC. Unit:

Bench-top unit.

Anodized aluminum frame and panels made of painted steel.

Main metallic elements made of stainless steel.

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

Pasteurization capacity: 30 l/h.

Feed tank of 5 l of capacity, made in glass.

Dosing feed pump (peristaltic type) computer controlled, with adjustable flow by means of a frequency inverter:

Process range: 0 – 30 l/h.

CIP range up to 100 l/h.

Water heating system, composed of:

Centrifugal pump of hot water circulation, computer controlled.

Heating resistance of 1500 W, computer controlled.

Stainless steel tank, capacity: 7 l.

PID control from the computer of the tank water temperature.

Circuit made in stainless steel.

Flow sensor for the hot water; range: 0 – 6 l/min.

Level switch to protect the heating element.

Plates heat exchanger divided in three sections:

N° of plates in the interchanging section: 6.

N° of plates in the pasteurization section: 13.

N° of plates in the cooling section: 6.

Here, the pasteurization process is produced, by means of crosscurrent product pass against the resistance water.

Water temperature in the heating section: 80 °C approx.

Retention time: 20 seconds at 30 l/h (approx. for milk).

It also has a product cooling stage for its conservation.

Water refrigeration circuit, made in stainless steel.

Flow sensor for the cooling water; range: 0 – 6 l/min.

Food circuit made in alimentary grade material.

There are different lengths to change the residence times at pasteurization temperature.

Pasteurized food production automatic system, composed of a three-way solenoid electrovalve, computer controlled, which also makes easier the CIP (Clean In Place) process.

Ten temperature sensors ("J" type) with range up to 600 °C, to measure:

The product temperature in different stages of the pasteurizer heat exchanger.

The temperatures to control the hot and cold water.

Tank water temperature, controlled by PID.

The complete unit includes as well:

Advanced Real-Time SCADA and PID Control.

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 ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.

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.



Unit: PASC

② PASC/CIB. Control Interface Box:

The Control Interface Box is part of the SCADA system.

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 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, heating elements, control valves, etc.

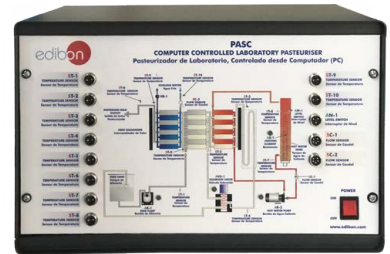
Real time PID control for parameters involved in the process simultaneously.

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 moment and in 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, another electronic in the control interface and the third one in the control software.



PASC/CIB

③ DAB. Data Acquisition Board:

The Data Acquisition board is part of the SCADA system.

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

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)= ±10 V. Data transfers=DMA, interrupts, programmed I/O. DMA channels=6.

Analog output:

Number of channels=2. Resolution= 16 bits, 1 in 65536.

Maximum output rate up to: 900 KS/s.

Output range (V)= ±10 V. Data transfers=DMA, interrupts, programmed I/O.

Digital Input/Output:

Number of channels=24 inputs/outputs. D0 or DI Sample Clock frequency: 0 to 100 MHz.

Timing: Number of Counter/timers=4. Resolution: Counter/timers: 32 bits.

The Data Acquisition board model may change at any moment, providing the same or better features than those required for the unit.



DAB

④ PASC/CCSOF. PID Computer Control + Data Acquisition + Data Management Software:

The three softwares are part of the SCADA system.

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.

Analog and digital PID control.

PID menu and set point selection required in the whole work range.

Management, processing, comparison and storage of data.

Sampling velocity up to 250 KS/s (kilo samples per second).

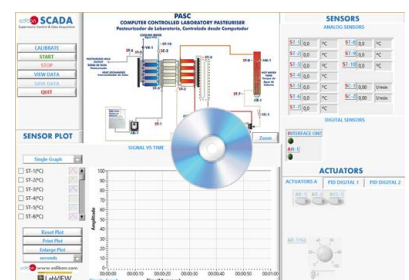
Calibration system for the sensors involved in the process.

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 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 the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.



PASC/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 are the main items: PASC + PASC/CIB + DAB + PASC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

- 1.- Study of the HTST pasteurization of alimentary products.
 - 2.- Study of the destruction of damaging organisms.
 - 3.- Calibration of the peristaltic feed pump.
 - 4.- Start of the pasteurization plant; operation with water.
 - 5.- Determination of the relation between the heating water temperature according to the liquid flow to pasteurize.
 - 6.- Determination of the survival curve for the different bacterial floras.
 - 7.- Determination of the threshold temperature for a constant warming time of the product to treat.
 - 8.- Determination of the necessary time to obtain a desired sterility volume.
 - 9.- Determination of the thermal reduction time curve.
 - 10.- Study and application of the CIP cleaning of the pasteurizer.
 - 11.- Study of different chemical cleaning methods.
- Additional practical possibilities:
- 12.- Sensors calibration.
- Other possibilities to be done with this unit:
- 13.- Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
- 14.- Open Control, Multicontrol and Real Time Control.
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
 - 15.- The Computer Control System with SCADA and PID Control allow a real industrial simulation.
 - 16.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
 - 17.- This unit can be used for doing applied research.
 - 18.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
 - 19.- Control of the PASC unit process through the control interface box without the computer.
 - 20.- Visualization of all the sensors values used in the PASC unit process.
- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.
- Water supply and drain.
- Computer.

DIMENSIONS AND WEIGHTS

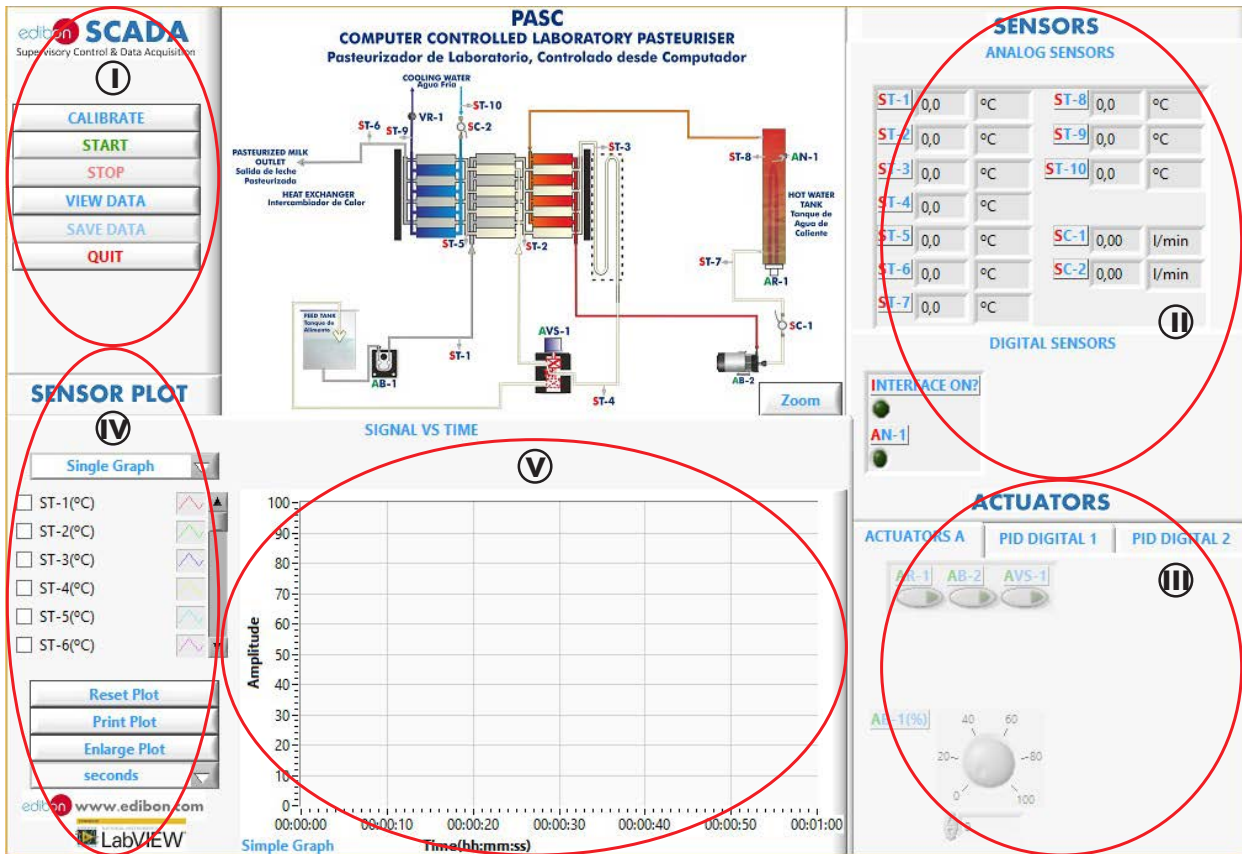
- PASC:
- Unit:
- Dimensions: 800 x 750 x 1000 mm approx.
(31.49 x 29.52 x 39.37 inches approx.)
 - Weight: 80 Kg approx.
(176 pounds approx.)
- Control Interface Box:
- Dimensions: 490 x 330 x 310 mm approx.
(19.29 x 12.99 x 12.20 inches approx.)
 - Weight: 10 Kg approx.
(22 pounds approx.)

SIMILAR UNITS AVAILABLE

- Offered in this catalog:
- PASC. Computer Controlled Laboratory Pasteurizer.
- Offered in other catalog:
- PADC. Computer Controlled Teaching Autonomous Pasteurization Unit.

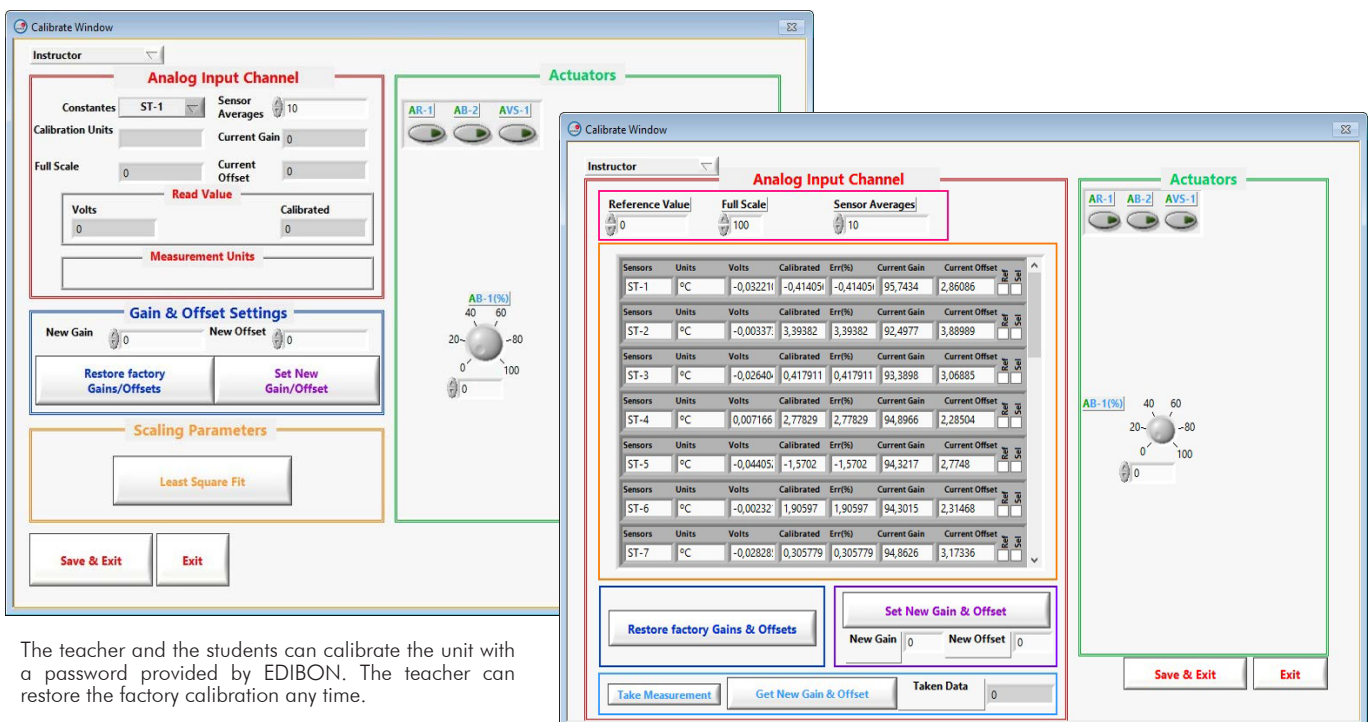
SOFTWARE MAIN SCREENS

SCADA and PID Control Main screen



- ❶ Main software operation possibilities.
- ❷ Sensors displays, real time values, and extra output parameters. Sensors: ST=Temperature sensor. SC=Flow sensor.
- ❸ Actuators controls. Actuators: AB=Pump. AR=Heating element. AVS=Solenoid valve.
- ❹ Channel selection and other plot parameters.
- ❺ Real time graphics displays.

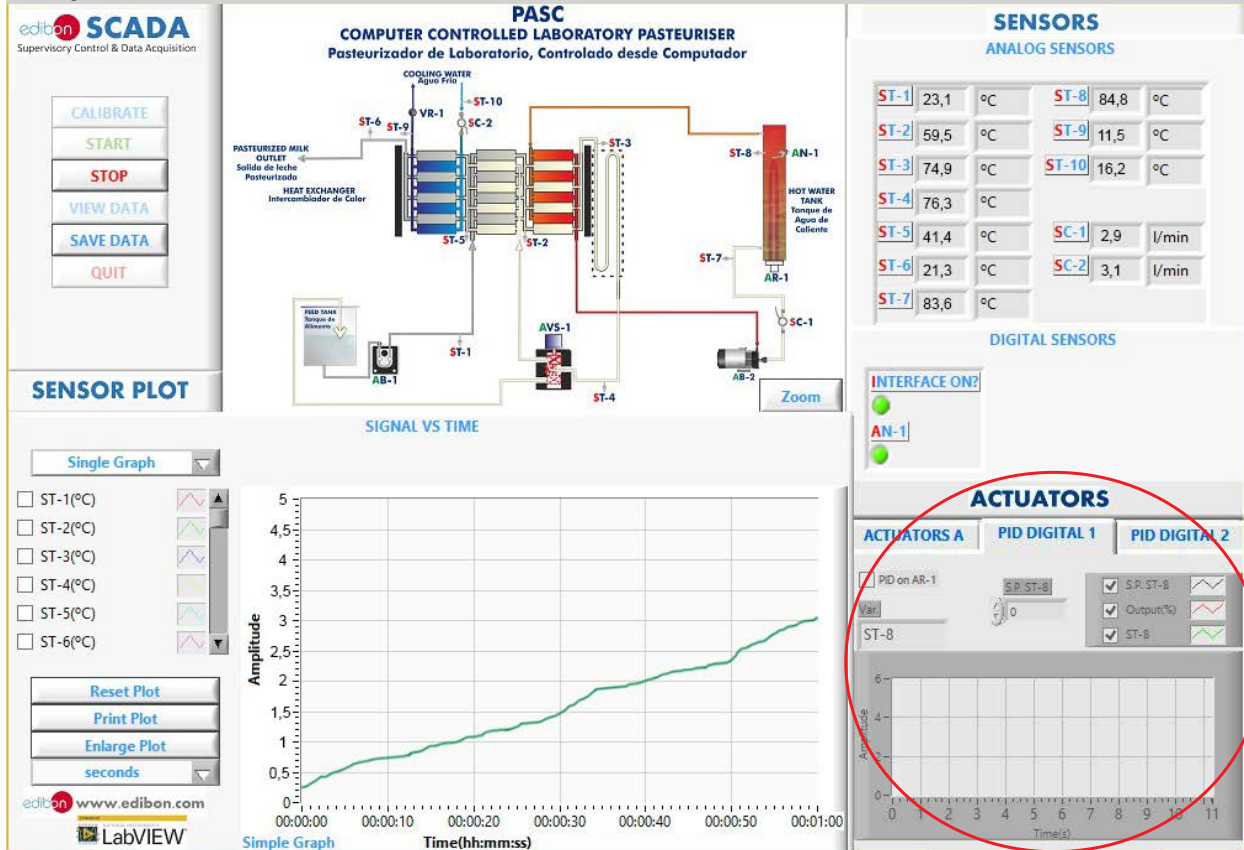
Software for Sensors Calibration Example of screen



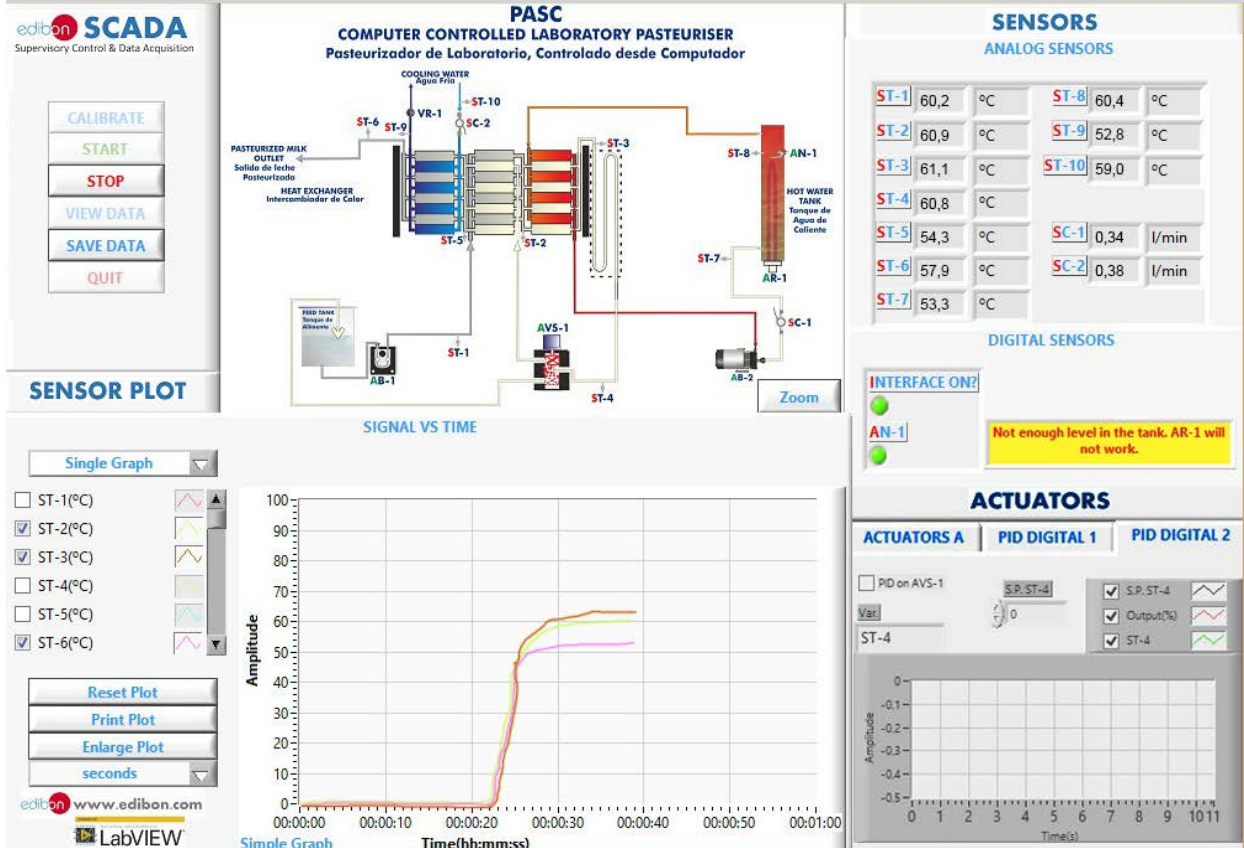
The teacher and the students can calibrate the unit with a password provided by EDIBON. The teacher can restore the factory calibration any time.

SOME REAL RESULTS OBTAINED FROM THIS UNIT

Heating temperature control is done through a PID control. When the target temperature is reached at the temperature sensor (ST-8), the heating element is turned off.



The safety level switch turns the heating element off if there is not enough level in the hot water tank.



COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

Additionally to the main items (1 to 6) described, we can offer, as optional, other items from 7 to 10.

All these items try to give more possibilities for:

- a) Technical and Vocational Education configuration. (ICAI and FSS)
- b) Multipost Expansions options. (MINI ESN and ESN)

a) Technical and Vocational Education configuration

⑦ PASC/ICAI. Interactive Computer Aided Instruction Software.

This complete software package consists of an Instructor Software (EDIBON Classroom Manager - ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft - ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

This software is optional and can be used additionally to items (1 to 6).

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- Updatable Contents.
- Report generation, User Progression Monitoring and Statistics.

- ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

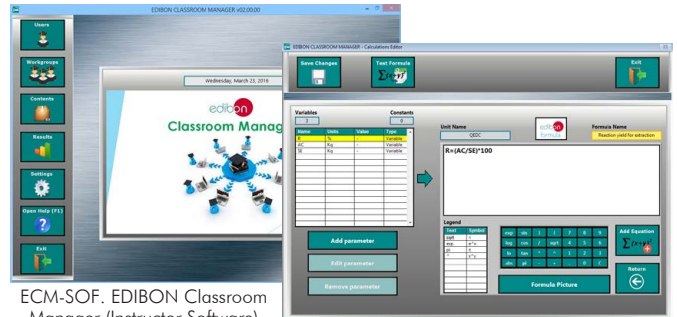
Innovative features:

- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- Test self-correction.
- Calculations computing and plotting.
- Equation System Solver Engine.
- User Monitoring Learning & Printable Reports.
- Multimedia-Supported auxiliary resources.

For more information see ICAI catalogue. Click on the following link:

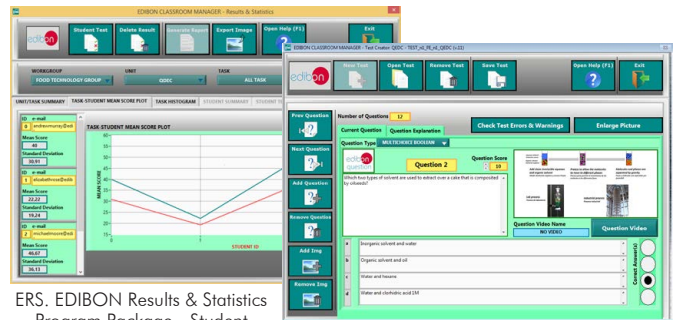
www.edibon.com/en/interactive-computer-aided-instruction-software

Instructor Software



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen

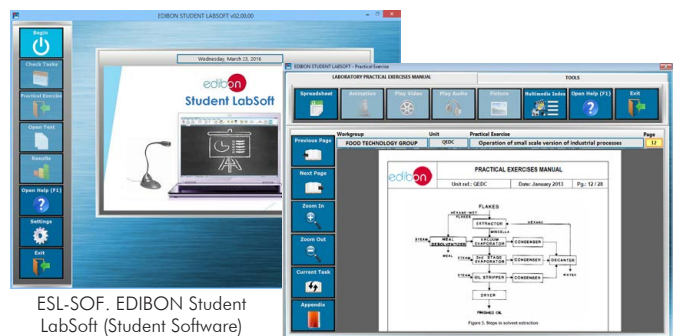
ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

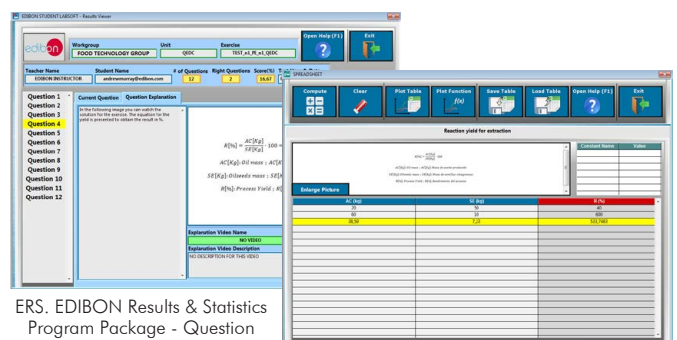
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

Student Software



ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation

ECAL. EDIBON Calculations Program Package Main Screen

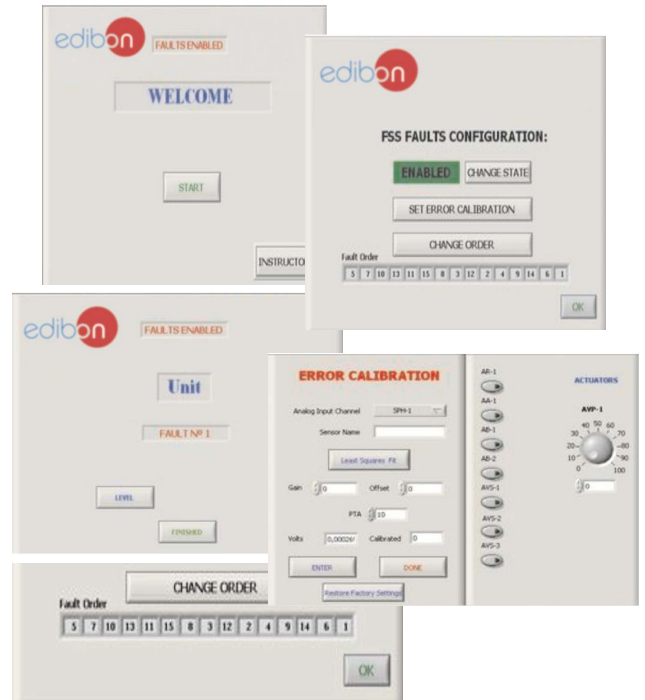
⑧ PASC/FSS. Faults Simulation System.

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit. It is useful for Technical and Vocational level.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them. There are several kinds of faults that can be grouped in the following sections:

- Faults affecting the sensors measurement:
 - An incorrect calibration is applied to them.
 - Non-linearity.
- Faults affecting the actuators:
 - Actuators channels interchange at any time during the program execution.
 - Response reduction of an actuator.
- Faults in the controls execution:
 - Inversion of the performance in ON/OFF controls.
 - Reduction or increase of the calculated total response.
 - The action of some controls is annulled.
- On/off faults:
 - Several on/off faults can be included.

Example of some screens



For more information see FSS catalogue. Click on the following link:

www.edibon.com/en/fault-simulation-system

b) Multipost Expansions options

⑨ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

MINI ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously. It is useful for both, Higher Education and/or Technical and Vocational Education.

The MINI ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA and PID Control integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit. Then, the number of possible users who can work with the same unit is higher than in an usual way of working (usually only one).

Main characteristics:

- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA and PID Control, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work doing "real time" control/multicontrol and visualisation.
- Instructor can see in the computer what any user/student is doing in the unit.
- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.
- This system allows you can save time and cost.
- Future expansions with more EDIBON Units.

For more information see MINI ESN catalogue. Click on the following link:

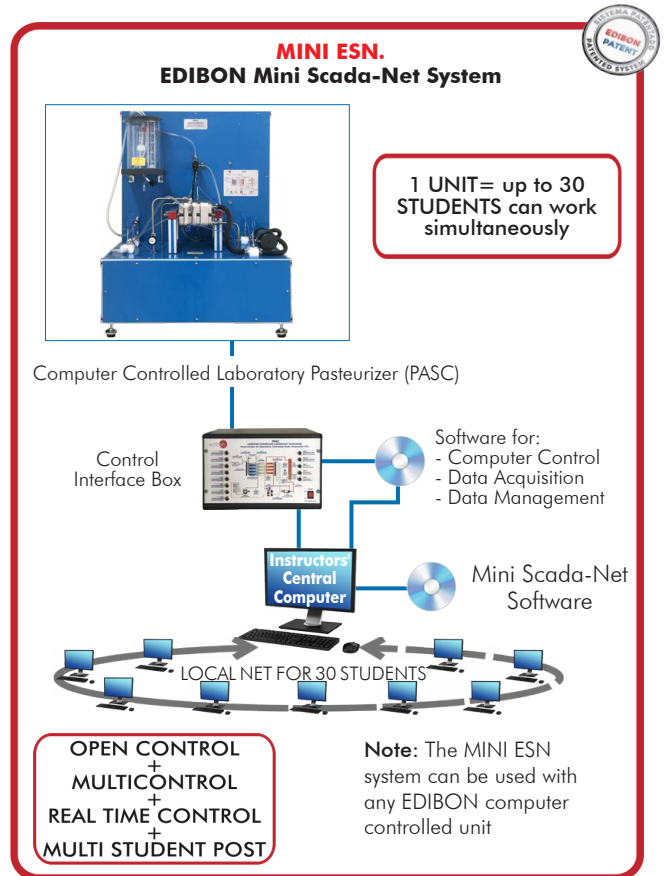
www.edibon.com/en/edibon-scada-net

⑩ ESN. EDIBON Scada-Net Systems.

This unit can be integrated, in the future, into a Complete Laboratory with many Units and many Students.

For more information see ESN catalogue. Click on the following link:

www.edibon.com/en/edibon-scada-net



ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

- ① **Unit: PASC. Computer Controlled Laboratory Pasteurizer.**
- ② **PASC/CIB. Control Interface Box.**
- ③ **DAB. Data Acquisition Board.**
- ④ **PASC/CCSOF. PID Computer Control + Data Acquisition + Data Management Software.**
- ⑤ **Cables and Accessories**, for normal operation.
- ⑥ **Manuals.**

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

Optional items (supplied under specific order)

a) Technical and Vocational Education configuration

- ⑦ PASC/ICAL. Interactive Computer Aided Instruction Software.
- ⑧ PASC/FSS. Faults Simulation System.

b) Multipost Expansions options

- ⑨ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.
- ⑩ ESN. EDIBON Scada-Net Systems.

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 Diagram in the front panel with distribution of the elements similar to the real one.
 Pasteurization capacity: 30 l/h.
 Feed tank of 5 l of capacity, made in glass.
 Dosing feed pump (peristaltic type) computer controlled, with adjustable flow by means of a frequency inverter:
 Process range: 0 – 30 l/h.
 CIP range up to 100 l/h.
 Water heating system, composed of:
 Centrifugal pump of hot water circulation, computer controlled.
 Heating resistance of 1500 W, computer controlled.
 Stainless steel tank, capacity: 7 l.
 PID control from the computer of the tank water temperature.
 Circuit made in stainless steel.
 Flow sensor for the hot water; range: 0 – 6 l/min.
 Level switch to protect the heating element.
 Plates heat exchanger divided in three sections:
 N° of plates in the interchanging section: 6.
 N° of plates in the pasteurization section: 13.
 N° of plates in the cooling section: 6.
 Here, the pasteurization process is produced, by means of crosscurrent product pass against the resistance water.
 Water temperature in the heating section: 80 °C approx.
 Retention time: 20 seconds at 30 l/h (approx. for milk).
 It also has a product cooling stage for its conservation.
 Water refrigeration circuit, made in stainless steel.
 Flow sensor for the cooling water; range: 0 – 6 l/min.
 Food circuit made in alimentary grade material.
 There are different lengths to change the residence times at pasteurization temperature.
 Pasteurized food production automatic system, composed of a three-way solenoid electrovalve, computer controlled, which also makes easier the CIP (Clean In Place) process.
 Ten temperature sensors ("J" type) with range up to 600 °C, to measure:
 The product temperature in different stages of the pasteurizer heat exchanger.
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 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 ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.
 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 PASC/CIB. Control Interface Box:

The Control Interface Box is part of the SCADA system.
 Control interface box with process diagram in the front panel.
 The unit control elements are permanently computer controlled.
 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.
 All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process.
 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 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 moment and in real time, of parameters involved in the process simultaneously.
 Three safety levels, one mechanical in the unit, another electronic in the control interface and the third one in the control software.

③ DAB. Data Acquisition Board:

The Data Acquisition board is part of the SCADA system.
 PCI Express Data acquisition board (National Instruments) to be placed in a computer slot.
 Analog input: Channels= 16 single-ended or 8 differential. Resolution= 16 bits, 1 in 65536. Sampling rate up to: 250 KS/s (kilo samples per second).
 Analog output: Channels=2. Resolution= 16 bits, 1 in 65536.
 Digital Input/Output: Channels=24 inputs/outputs.
 The Data Acquisition board model may change at any moment, providing the same or better features than those required for the unit.

④ PASC/CCSOF. PID Computer Control +Data Acquisition+Data Management Software:

The three softwares are part of the SCADA system.
 Compatible with the industry standards.
 Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.
 Analog and digital PID control. PID menu and set point selection required in the whole work range.
 Management, processing, comparison and storage of data.
 Sampling velocity up to 250 KS/s (kilo samples 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.
 Open software, allowing 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 the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.

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.

Exercises and Practical Possibilities to be done with the Main Items

- 1.- Study of the HTST pasteurization of alimentary products.
 - 2.- Study of the destruction of damaging organisms.
 - 3.- Calibration of the peristaltic feed pump.
 - 4.- Start of the pasteurization plant; operation with water.
 - 5.- Determination of the relation between the heating water temperature according to the liquid flow to pasteurize.
 - 6.- Determination of the survival curve for the different bacterial floras.
 - 7.- Determination of the threshold temperature for a constant warming time of the product to treat.
 - 8.- Determination of the necessary time to obtain a desired sterility volume.
 - 9.- Determination of the thermal reduction time curve.
 - 10.- Study and application of the CIP cleaning of the pasteurizer.
 - 11.- Study of different chemical cleaning methods.
- Additional practical possibilities:
- 12.- Sensors calibration.
- Other possibilities to be done with this unit:
- 13.- Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 14.- Open Control, Multicontrol and Real Time Control.
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
 - 15.- The Computer Control System with SCADA and PID Control allow a real industrial simulation.
 - 16.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
 - 17.- This unit can be used for doing applied research.
 - 18.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
 - 19.- Control of the PASC unit process through the control interface box without the computer.
 - 20.- Visualization of all the sensors values used in the PASC unit process.
- Several other exercises can be done and designed by the user.

a) Technical and Vocational Education configuration

⑦ PASC/ICAI. Interactive Computer Aided Instruction Software.

This complete software package consists of an Instructor Software (EDIBON Classroom Manager - ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft - ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc...so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- Updatable Contents.
- Report generation, User Progression Monitoring and Statistics.

- ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- Test self-correction.
- Calculations computing and plotting.
- Equation System Solver Engine.
- User Monitoring Learning & Printable Reports.
- Multimedia-Supported auxiliary resources.

⑧ PASC/FSS. Faults Simulation System.

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them.

There are several kinds of faults that can be grouped in the following sections:

Faults affecting the sensors measurement:

- An incorrect calibration is applied to them.
- Non-linearity.

Faults affecting the actuators:

- Actuators channels interchange at any time during the program execution.
- Response reduction of an actuator.

Faults in the controls execution:

- Inversion of the performance in ON/OFF controls.
- Reduction or increase of the calculated total response.
- The action of some controls is annulled.

On/off faults:

- Several on/off faults can be included.

b) Multipost Expansions options

⑨ **MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.**

MINI ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously.

The MINI ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA and PID Control integrated in a local network. This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit.

Main characteristics:

- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA and PID Control, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work doing "real time" control/multicontrol and visualisation.
- Instructor can see in the computer what any user/student is doing in the unit.
- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.
- This system allows you can save time and cost.
- Future expansions with more EDIBON Units.

The system basically will consist of:

This system is used with a Computer Controlled Unit.

- Instructor's computer.
- Students' computers.
- Local Network.
- Unit-Control Interface adaptation.
- Unit Software adaptation.
- Webcam.
- MINI ESN Software to control the whole system.
- Cables and accessories required for a normal operation.

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



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