edibon

Engineering and Technical
Teaching Equipment

EDIBON **SCADA** System
and **PID Control** included

EDIBON PATENT

Teaching Technique used

② Data Acquisition Board

③ Software for:
- Computer Control
- Data Acquisition
- Data Management

Computer
(not included in the supply)

④ Cables and Accessories

⑤ Manuals

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

① Unit: AUHTC. Computer Controlled UHT Unit

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

POWERED BY
NATIONAL INSTRUMENTS
LabVIEW

www.edibon.com
➥PRODUCTS
➥12.-FOOD & WATER TECHNOLOGIES

For more information about Key Features, click here

PDF Adobe

You Tube

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 relatively gentle thermal process (with temperatures lower than 100 °C) applied to food in order to reduce any possible pathogenic agent or to neutralize the enzymes that modify the flavors of certain foods. The result is either a safe product to be consumed in the short term, milk for instance, or in a longer term, bottled fruit.

There are three different processes: vat or slow pasteurization, High temperature short time pasteurization (HTST) and Ultra High Temperature pasteurization (UHT).

The Computer Controlled UHT Unit, "AUHTC", is a compact design and easy installation pilot plant that works as independent unit or as part of an integrated process finishing that allows for studying in depth the pasteurization process of products and the variables of the process.

GENERAL DESCRIPTION

The Computer Controlled UHT Unit, "AUHTC", follows a continuous process working mode and allows either for working with large batches or a more economical operation, since the maximum working capacity will be 15 l minimum.

It can operate with a great variety of products: beer, jellies, creams, sauces, etc. The unit is suitable to work with food since materials employed are appropriate for that use. A static stirrer is included to be used with high viscosity products.

The product is introduced into the plant through a computer controlled speed pump.

The product preheating, heating and cooling stages can be done either in a tube heat exchanger or in a plate heat exchanger.

To guarantee that the product keeps a high temperature for several seconds to kills microorganisms, there is a retention tube to extend the retention time.

Finally, the unit also includes a bypass system to divert the product that has not been treated

AUHTC detail

to the adjusted temperature. Computer controlled solenoid valves are used both in this system and to perform the heat exchanger selection.

The pilot plant allows for connecting several elements, such as a homogenizer, if necessary. There is a connection after the heating stage.

An additional plate exchanger is included to optimize the cooling of the product depending on the flow.

The instrumentation required to analyze all the important parameters of the process is also included: temperature, flow, level and pressure.

Additionally, the pilot plant includes a color 10 inches HMI display to visualize and activate the controls and indicators required: product supply pump and water pump, level sensors and lack of product or water warning alarm, solenoid valves, etc.

The software included with the unit allows real time data acquisition, allowing a manual operation of the plant stages.

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
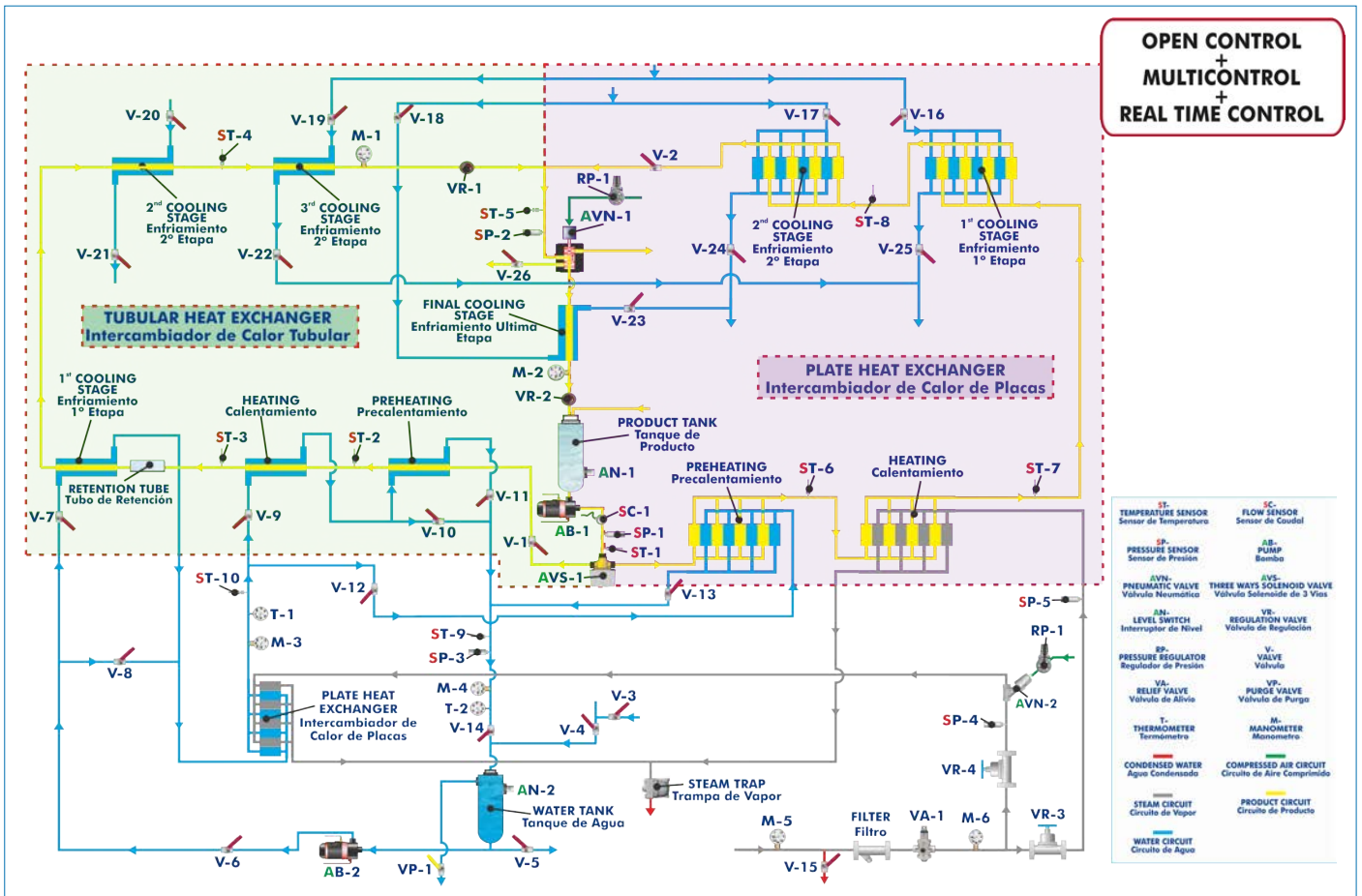
With this unit there are several options and possibilities:

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

Let us describe first the main items (1 to 5):

①**AUHTC. Unit:**

Anodized aluminum frame and panels made of painted steel.

The unit includes wheels to facilitate its mobility.

Main metallic elements made of stainless steel.

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

It includes wheels for its mobility.

The AUHTC unit mainly consists of:

Color 10 inches HMI display with PLC.

Pilot plant:

Raw material processing range: 30 – 100 l/h.

Product tank, volume: 3 l.

Hot water tank, volume: 8 l.

Computer controlled product feed pump.

Heat exchange process:

Preheating: indirect with hot water, heated by steam injection, impelled by a pump.

Heating: steam injection, steam generator not included.

Tubular heat exchanger:

Made of AISI 316 stainless steel.

Number of tubes:

Two tubes for preheating stage.

Ten tubes for the heating stage.

Ten tubes for the cooling stage.

Four additional cooling tubes.

Diameter: 15 mm.

Plate heat exchanger:

Made of AISI 316 stainless steel.

Number of plates:

Sixteen plates for preheating stage.

Seven plates for the heating stage.

Sixteen plates for the cooling stage.

Eight additional cooling plates.

Plate exchanger for the hot water circuit.

Static stirrer.

Computer controller pneumatic valves.

Instrumentation:

Product flow meter, range: 0.1 – 25 l/min.

Five pressure sensors in key points of the system, range: 0 – 10 bar.

Ten "J" type sensors in key points of the system.

The unit includes all the safety measures required for a safe operation:

Temperature limits.

Level sensors that cut in case of low level of product.

High pressure safety switch.

Relief valve (10 bar).

Six manometers and two thermometers.

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: AUHTC

② **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/0. 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/0.

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.

DAB

③ **AUHTC/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.
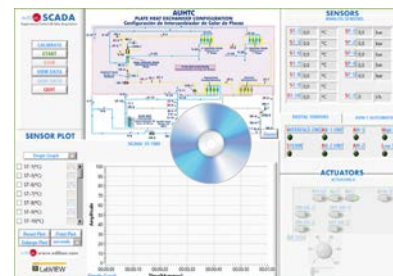
AUHTC/CCSOF

④ **Cables and Accessories**, for normal operation.

⑤ **Manuals:**

This unit is **supplied with 8 manuals**: Required Services, Assembly and Installation, Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

∗References 1 to 5 are the main items: AUHTC+ DAB + AUHTC/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.- Milk pasteurization, comparison of raw and treated product.

2.- Control of pathogenic bacteria, useful life assessment.

3.- Energy balances.

4.- Built-in clean in place (CIP).

5.- Analysis of the two-stage cooling option.

6.- Study of different types of heat exchanger.

7.- Study of the continuous operation mode.

8.- Study of the batch operation mode.

Other possibilities to be done with this Unit:

9.- Many students view results simultaneously.

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

10.- 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.

11.- The Computer Control System with SCADA and PID Control allow a real industrial simulation.

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

13.- This unit can be used for doing applied research.

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

15.- Control of the AUHTC unit process through the control interface box without the computer.

16.- Visualization of all the sensors values used in the AUHTC 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.
- Computer.
- Water supply: 10 l/min at 2 bar.
- Compressed air supply: 7 l/sec at 8 bar.
- Steam supply: 30 kw of heating power at the outlet (6 bar min).

DIMENSIONS AND WEIGHTS

AUHTC:

Unit:

-Dimensions: 1200 x 700 x 1750 mm approx.

(47.24 x 27.56 x 68.90 inches approx.)

-Weight: 200 kg approx.

(440 pounds approx.).

SCADA and PID Control
Main screen

Ⓘ Main software operation possibilities.

Ⓘ Displays de los sensores, valores en tiempo real, y parámetros extra de salida. **Sensores:** ST= Sensor de temperatura. SC= Sensor de caudal. SP= Sensor de presión.

Ⓘ Actuators controls. **Actuators:** AVN=Pneumatic valve. AN=Level switch. AB=Pump. AVS= Solenoid valve. PROD=Production. AUT=Automatic. REC=Recirculation.
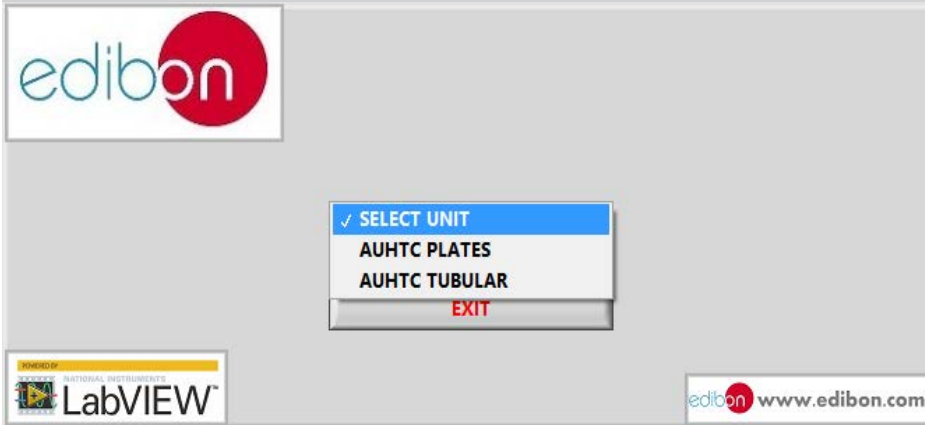
Ⓘ Channel selection and other plot parameters.

Ⓥ 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.

Selection of the exchanger to be used in the process.

Representation in real time of the measured magnitudes. Operation with plate exchangers.

Representation in real time of the measured magnitudes. Operation with plate exchangers in automatic mode.

Representation in real time of the measured magnitudes. Operation with tube exchangers. The software shows different state indicators.

Some **real** results obtained from this Unit

Representation in real time of the measured magnitudes. Operation with tube exchangers in automatic mode.

edibon **SCADA**
Supervisory Control & Data Acquisition

CALIBRATE
START
STOP
VIEW DATA
SAVE DATA

Periodic (sec)
0,5   2928,4   sec
Take Data   Taken Data
STOP SAVING

SENSOR PLOT

Single Graph

☑	ST-1(°C)
☑	ST-2(°C)
☑	ST-3(°C)
☑	ST-4(°C)
☑	ST-5(°C)
☑	ST-9(°C)
☑	ST-10(°C)

Reset Plot   Print Plot
Enlarge Plot   minutes

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LabVIEW

AUHTC
TUBULAR HEAT EXCHANGER CONFIGURATION
Configuración de Intercambiador de Calor Tubular

SIGNAL VS TIME

SENSORS
ANALOG SENSORS

ST-1	30,1	°C	SP-1	6,3	bar
ST-2	86,8	°C	SP-2	0,1	bar
ST-3	140,0	°C	SP-3	4,3	bar
ST-4	50,0	°C	SP-4	2,6	bar
ST-5	37,8	°C			
ST-9	99,6	°C	SC-1	2	l/h
ST-10	148,4	°C			

DIGITAL SENSORS   AVN-1 AUTOMATIC

Operation
Recirculation

ACTUATORS
ACTUATORS A

PROD   AUT   REC   AVN-2
ON AB-1   OFF AB-1
ON AB-2   OFF AB-2
AB-1(%)   40   60
20   80
0   100
100

Amplitude vs Time(hh:mm:ss)
Simple Graph

Visualization and representation of saved data.

OPEN FILE   CLOSE

FILE NAME
Saved data_"AUHTC".xls

SIGNALS VS TIME | SIGNAL VS SIGNAL

○	ST-1(°C)	1	0
○	ST-2(°C)	1	0
○	ST-3(°C)	1	0
○	ST-4(°C)	1	0
○	ST-5(°C)	1	0
○	ST-9(°C)	1	0
○	ST-10(°C)	1	0
○	SP-1(bar)	1	0
○	SP-2(bar)	1	0
○	SP-3(bar)	1	0
○	SP-4(bar)	1	0
○	SC-1(l/min)	1	0
○	AB-1(%)	1	0
○	INTERFACE	1	0

| ST-1(°C) |
| ST-2(°C) |
| ST-3(°C) |
| ST-4(°C) |
| ST-5(°C) |
| ST-9(°C) |
| ST-10(°C) |
| SP-1(bar) |
| SP-2(bar) |
| SP-3(bar) |
| SP-4(bar) |
| SC-1(l/mi |
| AB-1(%) |
| INTERFAC |
| STEAM |
| AB-1 ON? |
| AB-2 ON? |
| AN-1 |
| High Tem |
| AN-2 |
| Low Temp |

Amplitude vs Time(s)

Additionally to the main items (1 to 5) described, we can offer, as optional, other items from 6 to 9.

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

⑥ AUHTC/ICAI. Interactive Computer Aided Instruction Software System.
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/files/expansion/ICAI/catalog

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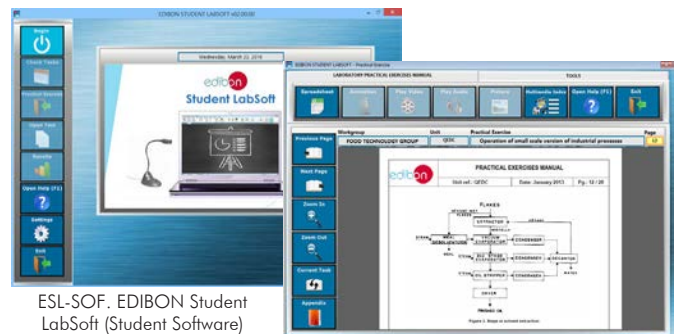
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

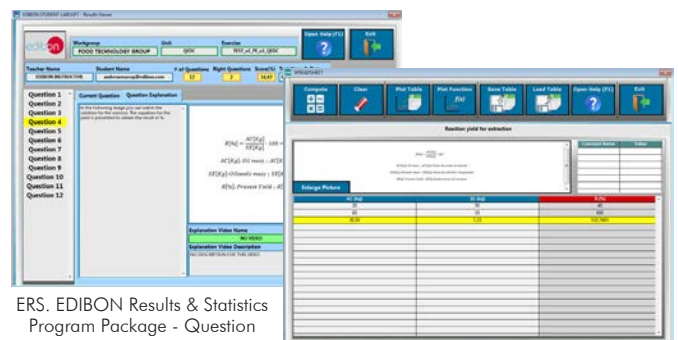EPE. EDIBON Practical Exercise Program Package Main Screen

ERS. EDIBON Results & Statistics Program Package - Question Explanation

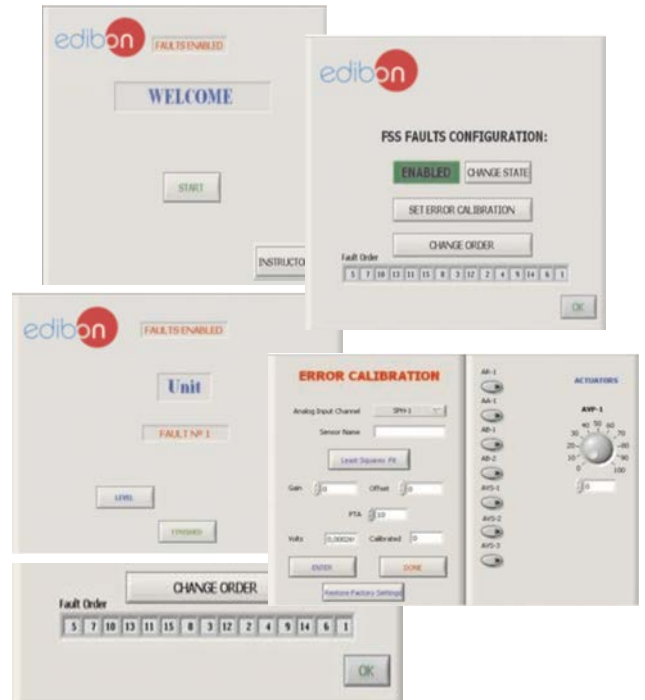ECAL. EDIBON Calculations Program Package Main Screen

⑦ **AUHTC/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.

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

www.edibon.com/en/files/expansion/FSS/catalog

Example of some screens

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b) Multipost Expansions options

⑧ **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/files/expansion/MINI-ESN/catalog

MINI ESN.
EDIBON Mini Scada-Net System

Computer Controlled UHT Unit (AUHTC)

1 UNIT= up to 30 STUDENTS can work simultaneously

Software for:
- Computer Control
- Data Acquisition
- Data Management

Instructors' Central Computer

Mini Scada-Net Software

LOCAL NET FOR 30 STUDENTS

OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL + MULTI STUDENT POST

Note: The MINI ESN system can be used with any EDIBON computer controlled unit

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⑨ **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/files/expansion/ESN/catalog
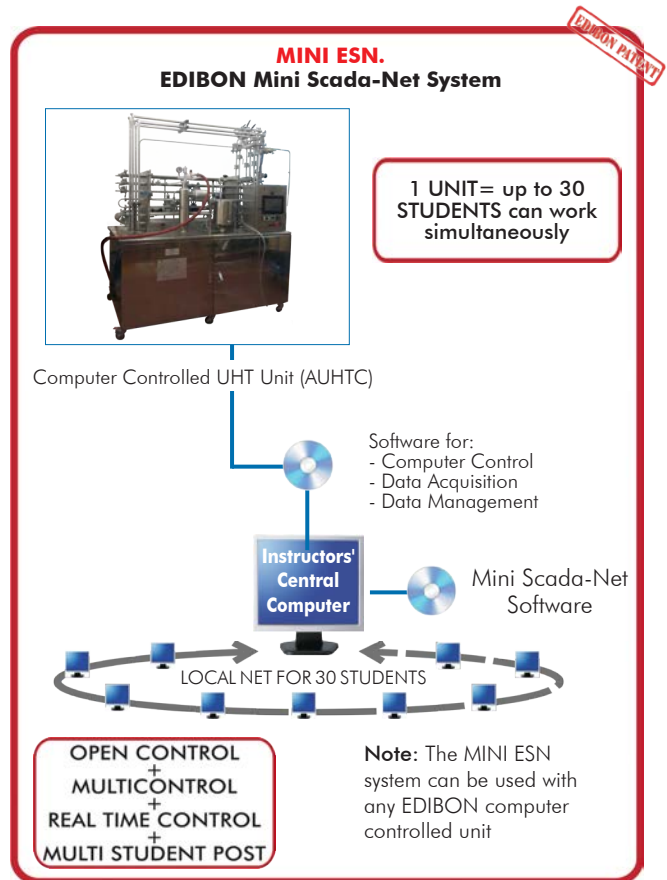
Main items (always included in the supply)

Minimum supply always includes:

① Unit: AUHTC. Computer Controlled UHT Unit.

② DAB. Data Acquisition Board.

③ AUHTC/CCSOF. PID Computer Control + Data Acquisition + Data Management Software.

④ Cables and Accessories, for normal operation.

⑤ Manuals.

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

Optional items (supplied under specific order)

a) Technical and Vocational Education configuration

⑥ AUHTC/ICAI. Interactive Computer Aided Instruction Software System.

⑦ AUHTC/FSS. Faults Simulation System.

b) Multipost Expansions options

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        Made of AISI 316 stainless steel.
        Number of tubes:
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          Four additional cooling tubes.
        Diameter: 15 mm.
      Plate heat exchanger:
        Made of AISI 316 stainless steel.
        Number of plates:
          Sixteen plates for preheating stage.
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  Plate exchanger for the hot water circuit.
  Static stirrer.
  Computer controller pneumatic valves.
  Instrumentation:
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  The unit includes all the safety measures required for a safe operation:
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    Relief valve (10 bar).
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Analog output: Channels=2. Resolution=16 bits, 1 in 65536.
Digital Input/Output: Channels=24 inputs/outputs.

③AUHTC/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.

④Cables and Accessories, for normal operation.

⑤Manuals:
This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

Exercises and Practical Possibilities to be done with the Main Items

1.- Milk pasteurization, comparison of raw and treated product.

2.- Control of pathogenic bacteria, useful life assessment.

3.- Energy balances.

4.- Built-in clean in place (CIP).

5.- Analysis of the two-stage cooling option.

6.- Study of different types of heat exchanger.

7.- Study of the continuous operation mode.

8.- Study of the batch operation mode.

Other possibilities to be done with this Unit:

9.- Many students view results simultaneously.

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

10.-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.

11.-The Computer Control System with SCADA and PID Control allow a real industrial simulation.

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

13.-This unit can be used for doing applied research.

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

15.-Control of the AUHTC unit process through the control interface box without the computer.

16.-Visualization of all the sensors values used in the AUHTC unit process.

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

<u>a) Technical and Vocational Education configuration</u>

⑥ AUHTC/ICAI. Interactive Computer Aided Instruction Software System.

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.

⑦ AUHTC/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.

<u>b) Multipost Expansions options</u>

⑧ 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.

REPRESENTATIVE: