Key features:

- **Advanced Real-Time SCADA.**
- **Open Control + Multicontrol + Real-Time Control.**
- **Specialized EDIBON Control Software based on Labview.**
- **National Instruments Data Acquisition board (250 KS/s, kilo samples per second).**
- **Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**
- **Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**
- **Capable of doing applied research, real industrial simulation, training courses, etc.**
- **Remote operation and control by the user and remote control for EDIBON technical support, are always included.**
- **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**
- **Designed and manufactured under several quality standards.**
- **Optional CAL software helps the user perform calculations and comprehend the results.**
- **This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

For more information about Key Features, click here
The Computer Controlled Combustion Laboratory Unit “TVCC” unit enables the students the study and understanding of many aspects related to combustion, using a small scale unit based on an industrial dual burner.

The TVCC unit is mounted on a metallic structure that enables a safe access to the equipment and an easy handling and access to the burner, combustion chamber and all the accessories and control panels.

The burner starts the combustion with light-oil (diesel or gas-oil) or with gas (natural gas or LPG). The gas (either from a LPG cylinder or from the premises’ supply) and fuel-oil stored in two tanks provided with the unit are fed to the burner through suitable ducts and valves.

Both lines include their corresponding filter and the appropriate safety measures.

Prior to the combustion start, the burner begins with an air purge, later on it burns the corresponding fuel and, automatically, it is set to a safe working conditions.

The burner has an integrated fan that provides the air required for the combustion, a flame detection sensor and an ignition controller. This fan has a differential pressure sensor to measure the air flow provided, a thermocouple to determine its temperature and a regulator for the air flow to be introduced in the burner.

The flame burns inside a stainless steel combustion chamber cooled with water. Such chamber has 5 observation points (of 100 mm.) at their sides which allow to observe the flame.

The unit also includes a manual digital analyzer for the combustion fumes. It allows to determine the composition of such gases, the air excess, content in O₂, CO, CO₂ and CO/CO₂ ratio.

This way, students can study the effect of the fuel/air ratio in the characteristics of the flame, in the efficiency of the combustion, in the constituents of the combustion fumes, etc., as well as the influence of all these aspects in the use of different fuels.

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.
With this unit there are several options and possibilities:
- Main items: 1, 2, 3, 4, 5 and 6.
- Optional items: 7, 8 and 9.

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

**TVCC. Unit:**

Metallic structure that guarantees a good stability and resistance.
Diagram in the front panel with similar distribution to the elements in the real unit.
Stainless steel combustion chamber (700 mm. x 1100 mm.) with 5 pieces of 100 mm. Diameter for the observation points.
Cooling jacket with thermometer, manometer and pressure switch to avoid overpressure in the jacket.
Dual burner of 150 kW to work both with natural gas (or other and fuel-oil).
Fan integrated in the burner with a regulating lever for the air flow.

The natural gas line includes:
- Manual valve.
- Gas filter.
- Pressure sensor, range: 0-10 bar.
- Pressure regulator, range: 0-3 bar.
- Manometer, range: 0 - 400 mbar.
- Electronic solenoid valve and safety pressure switch.
- Flow sensor, range: 3-21 m³/h.
- Needle valve to regulate the gas inlet flow.

The fuel oil line includes:
- Manual valve.
- Electronic solenoid valve.
- Flow sensor, range: 4-38 Kg/h.
- Needle valve to regulate the liquid fuel inlet flow.
- 2 Storage and supply tanks for the fuel-oil.
- Suction pump of the fuel into the burner.

Air ventilation, safety and drain valves.

5 Temperature sensors: combustion chamber, cooling water inlet and outlet, combustion fumes outlet and air inlet to the burner.

4 Flow sensors: natural gas inlet, light-oil inlet, cooling water flow inlet (range: 1.5 - 30 l./min.) and air inlet (by means of a differential pressure sensor, range: 0-1 PSI).
1 Pressure sensor: natural gas inlet, range: 0-10 bar.
Combustion gases analyzer: measurement of the content in O$_2$, CO and CO$_2$, efficiency of the combustion, air excess and CO/CO$_2$ ratio.
2 Solenoid valves, one for each working flow: gas or fuel-oil.
Flame detection sensor and ignition controller.
Safety measures. The feeding to the burner is cut off when:
- The outlet water temperature exceeds 80ºC.
- The pressure of the cooling jacket exceeds 1 bar.
- A water flow higher than 5 l./min is not detected.

The unit includes wheels for its mobility.

The complete unit includes as well:

**Advanced Real-Time SCADA.**

Open Control + Multicontrol + Real-Time Control.
Specialized EDIBON Control Software based on Labview.
National Instruments Data Acquisition board (250 KS/s, kilo samples per second).
Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.
Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.

Capable of doing applied research, real industrial simulation, training courses, etc.
Remote operation and control by the user and remote control for EDIBON technical support, are always included.

Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).
Designed and manufactured under several quality standards.
Option CAL software helps the user perform calculations and comprehend the results.

This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.
**TVCC/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 computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.
Real time computer control for pumps, compressors, heating elements, control valves, etc.
Real time computer control for parameters involved in the process simultaneously.
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.

**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.

**TVCC/CCSOF. 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.
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.
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.
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Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.
Real time computer control for pumps, compressors, heating elements, control valves, etc.
Real time computer control for parameters involved in the process simultaneously.
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.

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

**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: TVCC + TVCC/CIB + DAB + TVCC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.*
### DIMENSIONS AND WEIGHTS

**TVCC:**

- **Unit:**
  - Dimensions: 2200 x 1000 x 1900 mm approx.  
  - Weight: 400 Kg. approx. 

- **Control Interface Box:**
  - Dimensions: 490 x 330 x 310 mm approx.  
  - Weight: 10 Kg. approx. 

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### EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

1. Study of the combustion process and the burner operation.
2. Familiarisation of the adjustment and operation of an oil or gas burner.
3. Effect of the air/fuel ratio both in the efficiency of the combustion and in the measuring of the combustion gases components and in the temperature.
4. Effect of the air/fuel ratio on energy balance.
5. Effect of the air/fuel ratio on heat transfer.
6. Effect of the flame radiation on heat transfer and observed temperature.
7. Comparison of flue gas analysis with theoretical predictions.
8. Comparison of the performance of different fuels.
9. Assessment of a burner, including:
   - Flame stability.
   - Flame shape.
   - Flame radiation.
   - Firing rate.
   - Turndown range.
   - Smoke emission.
10. Comparison between a gas burner and a gas-oil burner.
11. Sensors calibration.

**Other possibilities to be done with this Unit:**

12. Many students view results simultaneously.  
   - To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
13. Open Control, Multicontrol and Real Time Control.  
   - This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivate parameters; etc., in real time.
15. This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
16. This unit can be used for doing applied research.
17. This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
18. Control of the TVCC unit process through the control interface box without the computer.
19. Visualization of all the sensors values used in the TVCC unit process.

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

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### REQUIRED SERVICES

- Electrical supply: single-phase, 220 V/50 Hz. or 110 V/60 Hz.
- Water supply.
- Gas: natural gas or LPG. Minimum flow of 7 m³/h at a pressure of 2 bar.
- Gas-oil: kerosene, diesel or other light fuel (approximate density between 790-840 kg/m³ and viscosity between 0.011-0.055 cm²/s at 40ºC). Minimum flow: 10 kg/h.
- Exhaust pipe for combustion fumes.
- Computer.

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**Additional practical possibilities:**

- Sensors calibration.
- Many students view results simultaneously.
- To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
- Open Control, Multicontrol and Real Time Control.
- This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivate parameters; etc., in real time.
- The Computer Control System with SCADA allows a real industrial simulation.
- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
- This unit can be used for doing applied research.
- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
- Control of the TVCC unit process through the control interface box without the computer.
- Visualization of all the sensors values used in the TVCC unit process.
- Several other exercises can be done and designed by the user.
By using a free of charge code, the teacher and the students can calibrate the unit. The teacher can recover his/her own calibration by using the EDIBON code that we give free of charge.

Software for Sensors Calibration
Example of screen
Running the software of the TVCC unit and pressing Start, the software gives the possibility to the user of choosing the fuel with which he/she wants to work: Fuel-oil or gas fuel.

The state of the different elements of the unit (fan, solenoid valves, pressure switches, ignition controller, etc.) can be displayed in the software of the TVCC unit.
Some real results obtained from this Unit

Data collected by sensors can be represented in function of time.

During the combustion process the software of the TVCC unit makes it possible to display the temperature at Key points of the unit (from ST-1 to ST-5). The evolution along the process can be seen either numerically or graphically, representing the data as they are collected.
Some **real** results obtained from this Unit

During the main practical exercises with the unit, the fuel/air ratio is changed and the influence of this change in different parameters is studied. It is possible to display with the software every flow which have influence on the process: air, cooling water, fuel-oil, and fuel gas. They can be either numerically or graphically displayed.
Additionally to the main items (1 to 6) described, we can offer, as optional, other items from 7 to 9.
All these items try to give more possibilities for:

a) Technical and Vocational Education configuration. (ICAI)
b) Multipost Expansions options. (Mini ESN and ESN)

a) Technical and Vocational Education configuration

TVCC/ICAI. Interactive Computer Aided Instruction Software System.

This complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM) totally integrated with the Student Software (EDIBON Student Labsoft -ESL). 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. EDIBON Classroom Manager (Instructor Software).

ECM 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 progress 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. EDIBON Student Labsoft (Student Software).

ESL 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:

Mini ESN. EDIBON Mini Scada-Net System.

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 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, 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/products/catalogues/en/Mini-ESN.pdf

ESN. EDIBON Scada-Net System.

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/products/catalogues/en/units/thermodynamicsthermotechnics/esn-thermodynamics/ESN-THERMODYNAMICS.pdf
<table>
<thead>
<tr>
<th><strong>Main items</strong> (always included in the supply)</th>
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<td>Minimum supply always includes:</td>
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<tr>
<td><strong>1</strong> Unit: TVCC. Computer Controlled Combustion</td>
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<td>Laboratory Unit.</td>
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<td><strong>5</strong> Cables and Accessories, for normal operation.</td>
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<td><strong>6</strong> Manuals.</td>
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</table>

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

<table>
<thead>
<tr>
<th><strong>Optional items</strong> (supplied under specific order)</th>
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<td><strong>a) Technical and Vocational configuration</strong></td>
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<td><strong>7</strong> TVCC/ICAI. Interactive Computer Aided Instruction Software System.</td>
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| **b) Multipost Expansions options**              |
| **8** Mini ESN. EDIBON Mini Scada-Net System.    |
| **9** ESN. EDIBON Scada-Net System.              |
**TVCC. Units:**
Metallic structure that guarantees a good stability and resistance.
Diagram in the front panel with similar distribution to the elements in the real unit.
Stainless steel combustion chamber (700 mm x 1100 mm) with 5 pieces of 100 mm. Diameter for the observation points.
Cooling jacket with thermometer, manometer and pressure switch to avoid overpressure in the jacket.
Dual burner of 150 kW to work both with natural gas or other and fuel-oil.
Fan integrated in the burner with a regulating lever for the air flow.
The natural gas line includes:
- Manual valve.
- Gas filter.
- Pressure sensor, range: 0-10 bar.
- Pressure regulator, range: 0-3 bar.
- Manometer, range: 0 - 400 mbar.
- Electronic solenoid valve and safety pressure switch.
- Flow sensor, range: 3-21 m³/h.
- Needle valve to regulate the gas inlet flow.
The fuel oil line includes:
- Manual valve.
- Electronic solenoid valve.
- Flow sensor, range: 4-38 Kg/h.
- Needle valve to regulate the liquid fuel inlet flow.
- 2 Storage and supply tanks for the fuel-oil.
- Suction pump of the fuel into the burner.

Air ventilation, safety and drain valves:
- 5 Temperature sensors: combustion chamber, cooling water inlet and outlet, combustion fumes outlet and air inlet to the burner.
- 4 Flow sensors: natural gas inlet, light-oil inlet, cooling water flow inlet (range: 1.5 - 30 l./min.) and air inlet
(by means of a differential pressure sensor, range: 0-1 PSI).
- 1 Pressure sensor: natural gas inlet, range: 0-10 bar.
- Combustion gases analyzer: measurement of the content in O₂, CO and CO₂, efficiency of the combustion, air excess and CO/CO₂ ratio.
- 2 Solenoid valves, one for each working flow: gas or fuel-oil.
- Flame detection sensor and ignition controller.
- Safety measures. The feeding to the burner is cut off when:
  - The outlet water temperature exceeds 80°C.
  - The pressure of the cooling jacket exceeds 1 bar.
  - A water flow higher than 5 l./min is not detected.

The unit includes wheels for its mobility.

The complete unit includes as well:
- Advanced Real-Time SCADA.
- Open Control + Multicontrol + Real-Time Control.
- Specialized EDIBON Control Software based on Labview.
- National Instruments Data Acquisition board (250 KS/s, kilo samples per second).
- Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before making measurements.
- Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.
- Capable of doing applied research, real industrial simulation, training courses, etc.
- Remote operation and control by the user and remote control for EDIBON technical support, are always included.
- Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).
- Designed and manufactured under several quality standards.
- Optional CAL software helps the user perform calculations and comprehend the results.

This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.

**TVCC/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.
Safe and filtered signals to avoid external interferences.
Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.
Real time computer control for parameters involved in the process simultaneously.
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 electrical in the control interface and the third one in the control software.

**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.

**TVCC/CCSOF. 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.
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.

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

**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 combustion process and the burner operation.
2. Familiarisation of the adjustment and operation of an oil or gas burner.
3. Effect of the air/fuel ratio both in the efficiency of the combustion and in the measuring of the combustion gases components and in the temperature.
4. Effect of the air/fuel ratio on energy balance.
5. Effect of the air/fuel ratio on heat transfer.
6. Effect of the flame radiation on heat transfer and observed temperature.
7. Comparison of flue gas analysis with theoretical predictions.
8. Comparison of the performance of different fuels.
9. Assessment of a burner, including:
   - Flame stability.
   - Flame shape.
   - Flame radiation.
   - Firing rate.
   - Turndown range.
   - Smoke emission.
10. Comparison between a gas burner and a gas-oil burner.

Additional practical possibilities:
11. Sensors calibration.

Other possibilities to be done with this Unit:
12. Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
13. Open Control, Multicontrol and Real Time Control.
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivate parameters; etc, in real time.
15. This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
16. This unit can be used for doing applied research.
17. This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
18. Control of the TVCC unit process through the control interface box without the computer.
19. Visualization of all the sensors values used in the TVCC unit process.

- Several other exercises can be done and designed by the user.
TENDER SPECIFICATIONS (for optional items)

a) Technical and Vocational Education configuration

TVCC/ICAI. Interactive Computer Aided Instruction Software System.

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

- ECM: EDIBON Classroom Manager (Instructor Software).
  ECM 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: EDIBON Student Labsoft (Student Software).
  ESL 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.

b) Multipost Expansions options

Mini ESN. EDIBON Mini Scada-Net System.

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 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, 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 “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’ computer.
- 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.