edibon

Engineering and Technical Teaching Equipment

Flexible Manufacturing System 9

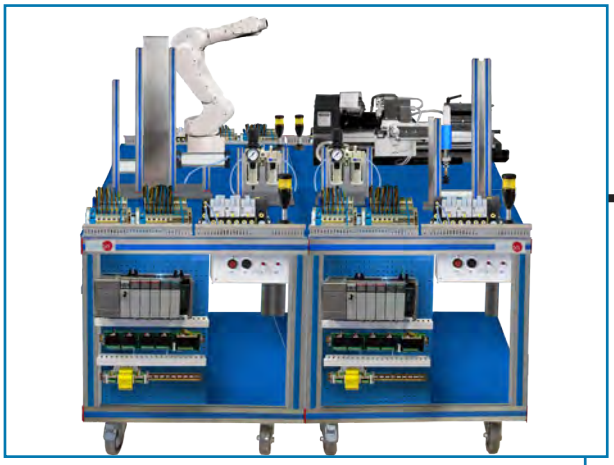
AE-PLC-FMS9

Available with PLC, as:
- PANASONIC
- SIEMENS
- MITSUBISHI
- ALLEN BRADLEY
- OMRON

Etc...

EDIBON PATENT

Teaching Technique used



① Unit: AE-PLC-FMS9. Flexible Manufacturing System 9

Computer Control System

Computer (not included in the supply)

1.1 AE-PLC-PAN. PANASONIC PLC Application

② PLC, HMI and web server programming software

④ SAC. Silent Air Compressor Unit

⑤ Cables and Accessories

⑥ Manuals

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

③ Component Workstations:

- 3.1 AE-PLC-A. Feeding Workstation for Pieces
- 3.2 AE-PLC-CF. Sorting Workstation
- 3.3 AE-BR. Robotic Arm Workstation
- 3.4 AE-CNCT. CNC Turning Workstation

Key features:

- **Open Control + Multicontrol + Real-Time Control.**
- **PLC, HMI and web server programming software.**
- **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 3 safety systems (Mechanical, Electrical & Electronic).**
- **Designed and manufactured under several quality standards.**
- **Optional software to perform 2D and 3D simulations of the processes studied and supervise and control the real system (SCADA).**
- **Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.**

OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL

www.edibon.com
PRODUCTS
60.- MECHATRONICS & COMPUMECHATRONICS

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)

Certificate and Worlddidac Member

INTRODUCTION

Since the 1950s, the computer integration in the manufacturing systems it has been a complete revolution, increasing productivity and quality of all type of products. These computer integration systems included a lot of component from very different technologies as hydraulic, pneumatic, electrical, robotics, chemical, etc. For this reason these types of systems requires workers with specific skills to ensure that they are working properly.

The Flexible Manufacturing System 9, "AE-PLC-FMS9", has been designed by EDIBON to study how work a complete manufacturing system.

The "AE-PLC-FMS9" system includes a set of practical exercises through which the student will understand how work an automatic pieces feeding system, a pieces sorting system, a robotic arm and a CNC turning machine.

GENERAL DESCRIPTION

The Flexible Manufacturing System 9, "AE-PLC-FMS9" is a modular system composed of four workstations: the "AE-PLC-A" Feeding Workstation for Pieces, the "AE-PLC-CF" Sorting Workstation, the "AE-BR" Robotic Arm Workstation and the "AE-CNCT" CNC Turning Workstation.

The objective of the "AE-PLC.FMS9" system is to provide pieces with different colors and materials to the sorting system, where the pieces are classified depending on the specifications of the manufacturing process. Then the robotic arm is able to pick pieces from the sorting workstation and place to the CNC turning system, where the pieces are turned.

The process of the "AE-PLC-FMS9" is explained in the following lines:

- First, the feeding system provides the pieces of different colors and materials to the sorting workstation. The sorting system classifies the pieces at three different places depending of the piece characteristics detected.
- Then, the Robotic Arm Workstation pick the sorted pieces and placed in the CNC Turning Workstation. Once the piece is turned, the Robotic Arm pick again the piece from the CNC machine.

Each workstation is locally commanded by a PLC device and, in turn, a central PLC coordinates all workstations. The communication network between workstations and PC is based on the Ethernet protocol.

The "AE-PLC-FMS9" system design by EDIBON allows the users to learn the basic concepts of automation as the operation of an Ethernet network or how to program a PLC and about other areas as pneumatic, electro-pneumatic, etc.

The Robotic Arm and the CNC machine included in the "AE-PLC-FMS9" system, contains the control console controller and the programming software in order to program and operate with them.

The optional "AE-AS" software is design to teach the students how works real automation software. This software allows making 2D and 3D processes simulations, supervising and controlling SCADA systems, programming and communicating PLCs, simulating hydraulic, pneumatic and electronic devices' operation, etc.

EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

Practical possibilities to be done with the Flexible Manufacturing System 9 (AE-PLC-FMS9):

1.- Introduction to flexible manufacturing system (FMS).
2.- Introduction to pneumatics and electro-pneumatics.
3.- Study of the sensor detection.
4.- Testing the digital inputs and outputs of the automatic system through a PLC.
5.- Modify manufacturing parameters through the PLC.
6.- Configuration of a pneumatic application.
7.- Introduction to the Human-machine interface systems (HMI).
8.- Study of an automatic control of an industrial system.
9.- Control of the flexible manufacturing system through a central PLC in an Ethernet network with local PLC in each workstation.
10.- Manage the flexible manufacturing system through the HMI device.

Posibilidades prácticas para realizar con el software opcional para la Simulación de Sistemas de Automatización (AE-AS):

- Automation Systems Simulation Software (AE-AS):

11.- Introduction to the SCADA control system.
12.- OPC server system with Ethernet.
13.- SCADA control of an automatic industrial system through PC.

Practical possibilities to be done with the Workstation alone:

- Feeding Workstation for Pieces (AE-PLC-A).

14.- Manual control of a Feeding system.
15.- Automatic control of a Feeding system.
16.- Change the parameters of the Feeding process.
17.- Optimize the process time.
18.- Study and analysis of the faults inserted in the process with the fault generation module.

- Sorting Workstation (AE-PLC-CF).

19.- Manual control of a sorting system.
20.- Automatic control of a sorting system.
21.- Change the parameters of the sorting process.
22.- Optimize the process time.
23.- Study and analysis of the faults inserted in the process with the fault generation module.

- Robotic Arm Workstation (AE-BR).

24.- Introduction to robotic systems.
25.- Robotic arm configuration.
26.- Set a simple movement of the robotic arm.
27.- Set a simple pick and place function with the robotic arm.

- CNC Turning Workstation (AE-CNCT).

28.- Introduction to CNC systems.
29.- CNC machine configuration.
30.- Tools and clamping system of the CNC turning machine.
31.- Manual configuration of simple movements in the CNC turning machine.
32.- Loading the desire CAD file format in the CNC turning machine.
33.- Turning a piece with the desire specifications.

Other possibilities to be done with this Unit:

34.- Many students view results simultaneously.
35.- To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
36.- 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.
37.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
38.- This unit can be used for doing applied research.
39.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
40.- Visualization of all the sensors values used in the AE-PLC-FMS9 unit process.
- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: single phase, 220V./50 Hz. or 110V./60 Hz.
- Computer.

DIMENSIONS AND WEIGHTS

AE-PLC-FMS9 unit:
- Dimensions: 3000 x 1800 x 1700 mm. approx.
(118.10 x 70.86 x 66.92 inches approx.)
- Weight: 640 Kg. approx.
(1410 pounds approx.).

RECOMMENDED ACCESSORIES (Not Included)

- AE-AS. Automation System Simulation Software (Optional).

AVAILABLE VERSIONS

Offered in this catalogue:

- AE-PLC-FMS9. Flexible Manufacturing System 9.

Offered in other catalogue:

- AE-PLC-FMS1. Flexible Manufacturing System 1.
- AE-PLC-FMS2. Flexible Manufacturing System 2.
- AE-PLC-FMS3. Flexible Manufacturing System 3.
- AE-PLC-FMS4. Flexible Manufacturing System 4.
- AE-PLC-FMS5. Flexible Manufacturing System 5.
- AE-PLC-FMS6. Flexible Manufacturing System 6.
- AE-PLC-FMS7. Flexible Manufacturing System 7.
- AE-PLC-FMS8. Flexible Manufacturing System 8.
- AE-PLC-FMS10. Flexible Manufacturing System 10.
- AE-PLC-FMS11. Flexible Manufacturing System 11.
- AE-PLC-FMS12. Flexible Manufacturing System 12.
- AE-PLC-FMS13. Flexible Manufacturing System 13.
- AE-PLC-FMS14. Flexible Manufacturing System 14.

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 and FSS)
b) Multipost Expansions options. (MINI ESN and ESN)

a) Technical and Vocational Education configuration

⑦ AE-PLC-FMS9/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:

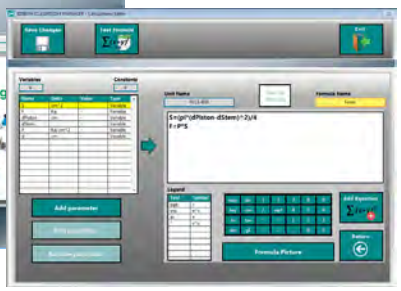
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge 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

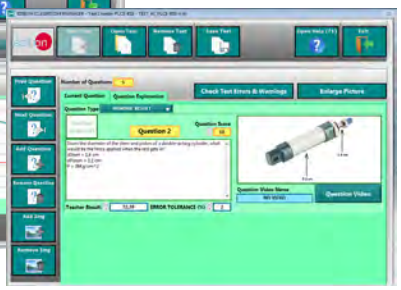
Instructor Software

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



ECAL. EDIBON Calculations Program Package - Formula Editor Screen

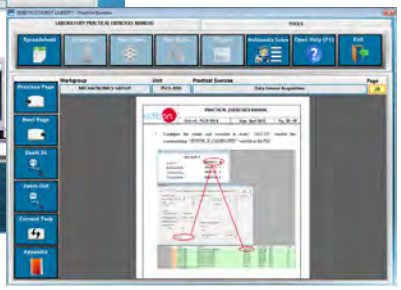
ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram



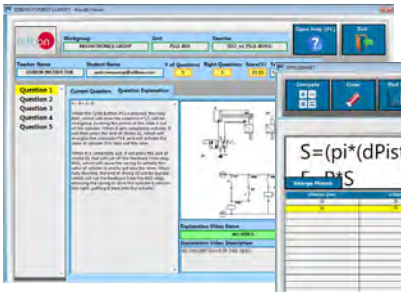
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

Student Software

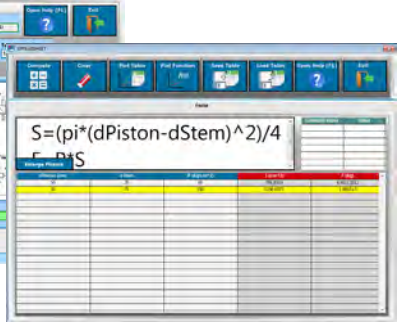
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

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 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:

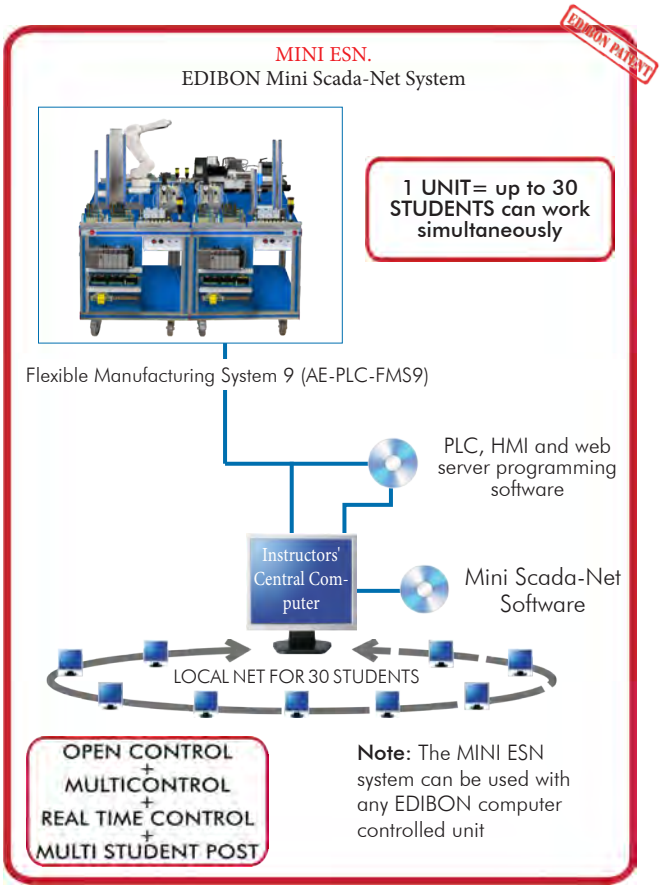
- It allows an easier and quicker understanding.

- 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/en/files/expansion/MINI-ESN/catalog



⑨ESN. 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

ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

① **Unit: AE-PLC-FMS9. Flexible Manufacturing System 9.**

② **PLC, HMI and web server programming software.**

③ **Component Workstations.**

- ③.1 AE-PLC-A. **Feeding Workstation for Pieces.**
- ③.2 AE-PLC-CF. **Sorting Workstation.**
- ③.3 AE-BR. **Robotic Arm Workstation.**
- ③.4 AE-CNCT. **CNC Turning Workstation.**

④ **SAC. Silent Air Compressor Unit.**

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

⑥ **Manuals.**

*IMPORTANT: Under AE-PLC-FMS9 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 AE-PLC-FMS9/ICAI. Interactive Computer Aided Instruction Software System.

b) Multipost Expansions options

⑧ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

⑨ ESN. EDIBON Scada-Net Systems.

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

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REPRESENTATIVE: