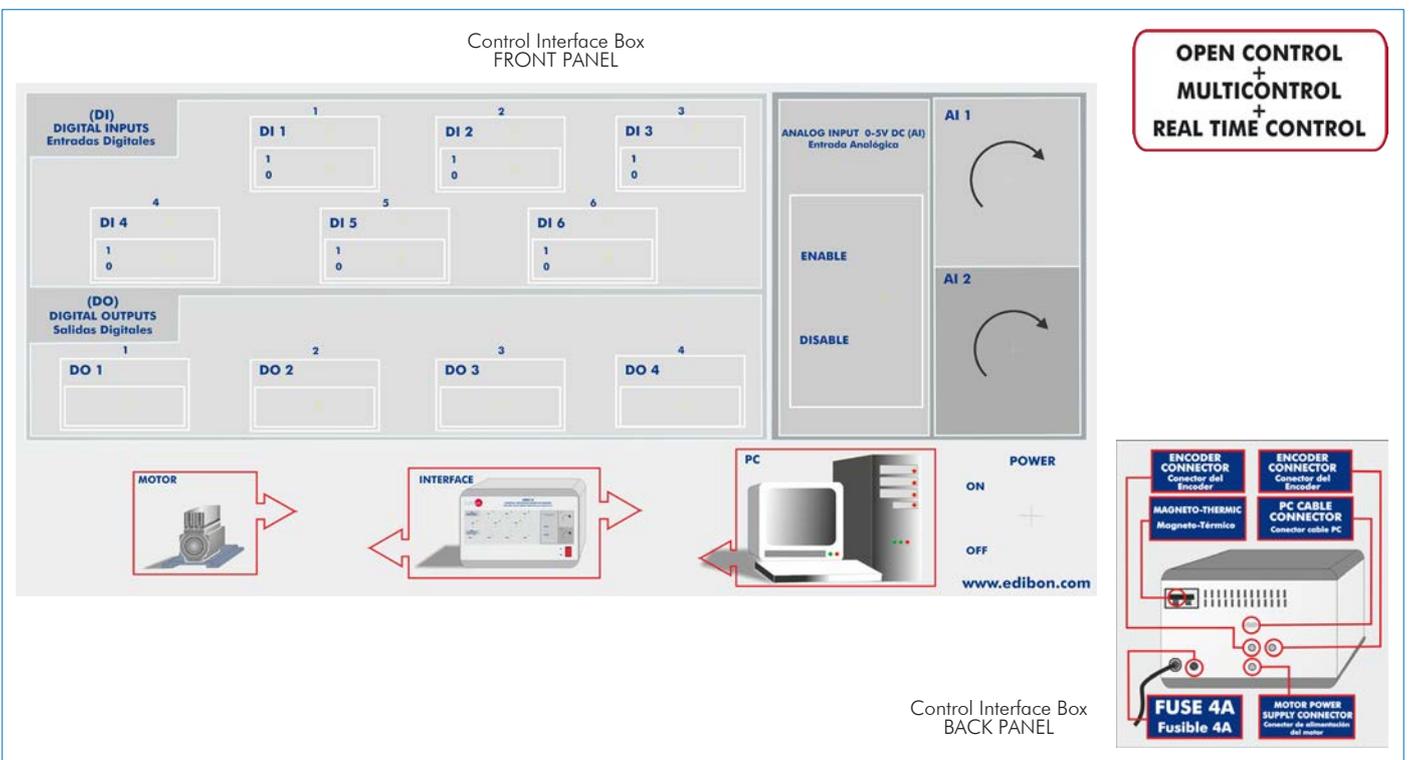


① Unit: SERIN/CC. Computer Controlled Advanced Industrial Servosystem Trainer (for DC Motors)

www.edibon.com
↳ PRODUCTS
↳ 20.- ELECTRONICS

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



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

COMPLETE TECHNICAL SPECIFICATIONS (for main items)

With this unit there are several options and possibilities:

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

Let us describe first the main items (1 to 4):

① **SERIN/CC. Unit:**

The "SERIN/CC" trainer consists on a Control Interface Box and a Direct Current Motor and Encoder Module.

The Control Interface Box has a 4-quadrants servo amplifier for DC motors that controls the motor speed, position and current of the motor. In order to do this control the feedback is done thanks to an encoder.

The RS232 communication between the Control Interface Box and the computer provides the possibility of commanding the motor from the computer and to visualize the most important signals of the motor.

The 4-quadrant servo amplifier controls the motor operation and the braking operation in both rotation directions clockwise and counterclockwise.

Velocity, Position and Torque Control.

It allows predefined moves and programming.

Control Interface Box:

Front panel:

Seven digital outputs:

They have led's that indicate if the outputs are active or not.

Output 1: this output indicates when the system has been referenced already.

Output 2: this output indicates when a target position is reached.

Output 3: this output indicates when the motor is running.

Output 4: this output indicates when a command can not be executed.

Output 5: this output indicates when an error occurs.

Output 6: this output is a user definable PWM-output (5 V, 0 – 100% duty cycle, 50 kHz).

Output 7: this output is the common cathode of the freewheeling diode of the low side drivers.

Thirteen digital inputs:

Seven user definable digital inputs for process control.

Digital input (trigger signal).

Three digital inputs: reference, left limit and right limit:

DI reference: digital input for reference switch.

DI left limit: digital input for left limit switch of a linear unit.

DI right limit: digital input for right limit switch of a linear unit.

Two digital inputs power stage and stop:

DI power stage: digital input for enabling the power stage.

DI stop: digital input for switching the regulation off if the signal is removed.

Two analog inputs with voltages in the range of 0 – 5 V.

Two potentiometers to select the value of the analog inputs (0 – 5 V DC), these potentiometers are enabled by a commuting switch placed next to them.

Ignition Switch. When the unit is on, the red LED is active and lighting.

Back panel:

Voltage supply. There is a voltage supply that feeds the unit with 220 V of alternating current.

Motor power supply. It is a 24 V DC motor power supply (it is a three wires connection motor +, motor -, and one taking to earth).

Connection port in series. It is a connection plug to connect the Control Interface with the PC by the RS-232 port, in order to allow the software to manage the motor.

Connection with the Feedback. It is a connection with the motor Feedback. It allows the encoder to manage the motor.

Direct Current Motor and Encoder Module:

DC Motor, 90W. Position, speed and current are controlled by the Control Interface.

Digital encoder, 500 pulses per revolution, with RS232 communication port.

Two power supply wires (one for the motor and other for the Control Interface).

Two communication RS232 wires (one from the Control Interface to the computer and other from the Control Interface to the encoder).



Unit: SERIN/CC

② **SERIN/CC/CCSOF. Computer Control + Data Acquisition + Data Management Software:**

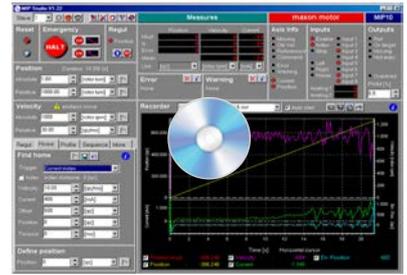
Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. **Compatible with the industry standards.**

Registration and visualization of all process variables in an automatic and simultaneously way.

Flexible open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.

Management, processing, comparison and storage of data.

Comparative analysis of the obtained data, after to the process and modification of the conditions during the process.



SERIN/CC/CCSOF

③ **Cables and Accessories**, for normal operation.

④ **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 4 are the main items: SERIN/CC + SERIN/CC/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.- Autotuning.
- 2.- Manual tuning of the position regulator.
- 3.- Motion commands in MPBUS RS232 mode.
- 4.- Signals Graph, Transient Analysis.
- 5.- Batch Commands.
- 6.- User's parameters, Position Val., Velocity Val., Acceleration Val.
- 7.- Digital inputs and outputs in I/O mode.
- 8.- Load and braking simulation.
- 9.- Searching reference.
- 10.-Input/Output functions.
- 11.-State commands and Exception.
- 12.-Velocity, Position and Torque control.

REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

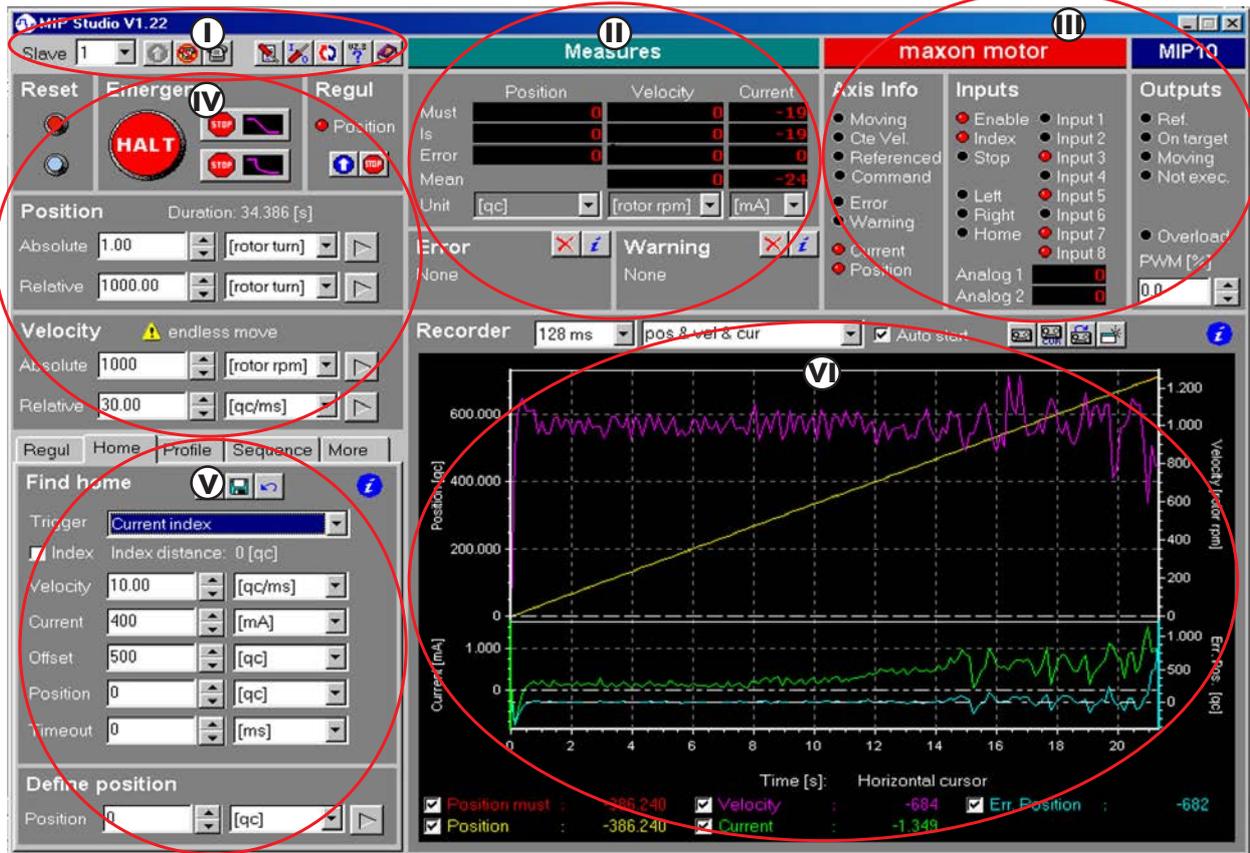
- SERIN/CC:
- Control Interface Box:
- Dimensions: 490 x 330 x 310 mm approx.
(19.29 x 12.99 x 12.20 inches approx.)
 - Weight: 40 Kg approx.
(88 pounds approx.)
- Direct Current Motor + Encoder Module:
- Dimensions: 300 x 300 x 120 mm approx.
(11.81 x 11.81 x 4.72 inches approx.)
 - Weight: 5 Kg approx.
(11 pounds approx.)

AVAILABLE VERSIONS

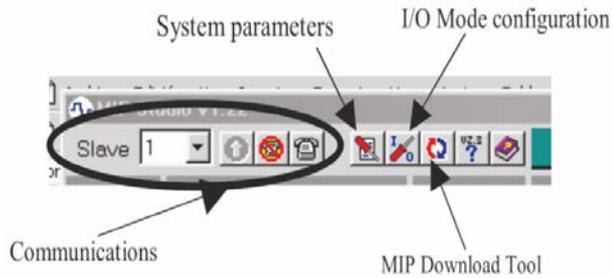
- Offered in this catalogue:
- SERIN/CC. Computer Controlled Advanced Industrial Servosystem Trainer (for DC Motors).
- Offered in other catalogues:
- SERIN/CA. Computer Controlled Advanced Industrial Servosystems Trainer (for AC motors).
 - SERIN/CCB. Servosystems Basic Trainer (for DC Motors).

SOFTWARE MAIN SCREENS

RTC (Real Time Control System) Main screen



I Menu section.



II Measures section.

III Inputs, Outputs and Axis info section.

IV Reset, Halt, Position Regulation, Position Control and Velocity section.

V Section of Regulation, Reference, Sequence, etc.

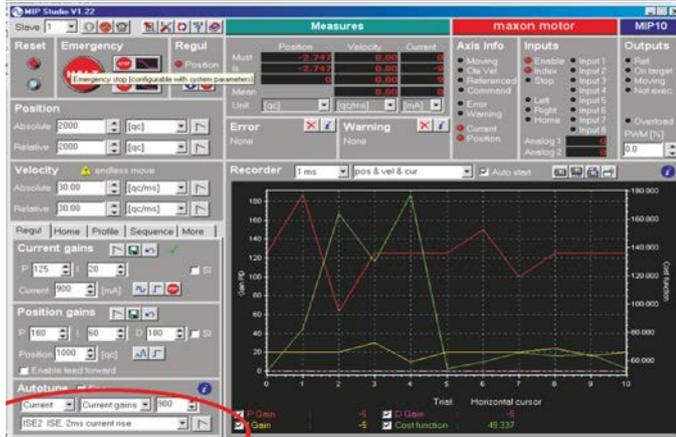
VI Graphics section.

SOME REAL RESULTS OBTAINED FROM THIS UNIT

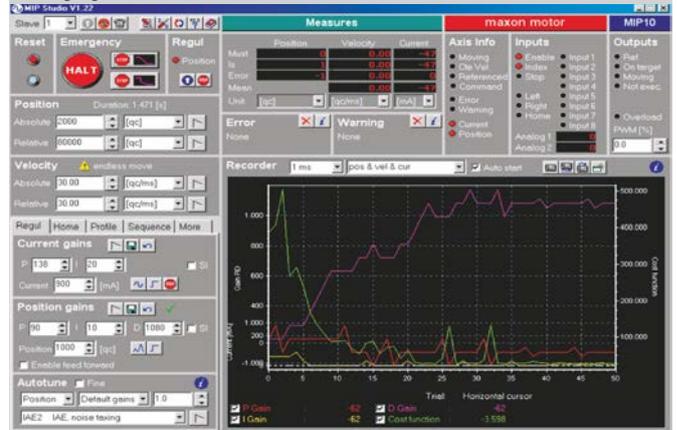
Autotuning

Gains Tuning

1.- In the lower left corner of the screen there is the autotuning function. Once the autotuning is done we can see the parameters on the emerging window.



2.- We can, as well, develop the position autotuning choosing the POSITION option (where before CURRENT were chosen) with the parameters used. We can observe the regulation parameters on the emerging window too.



Emerging window:

Autotune results													
Cost function	Gains before			Gains of start			Gains of end			Trials			
	P	I	D	P	I	D	P	I	D		Cost		
1 ISE2 ISE 2ms current rise	125	20	0	50	25	0	312128	138	20	0	54534	5.7	27

Emerging window:

Autotune results													
Cost function	Gains before			Gains of start			Gains of end			Trials			
	P	I	D	P	I	D	P	I	D		Cost		
6 IAE2 IAE, noise taxing	90	0	990	180	60	180	387853	90	10	1080	22336	17.4	50

3.- We will have both graphics: firstly the current regulation and then the position regulation graphic after to make a relative movement (on the right upper side we find the options for the movements in position and speed).

This is what we get with the current regulation:



Once the position autotuning is done, this is the graphic for the same 80.000 qc relative movement:



Signals Graph, Transient Analysis

Recorder function

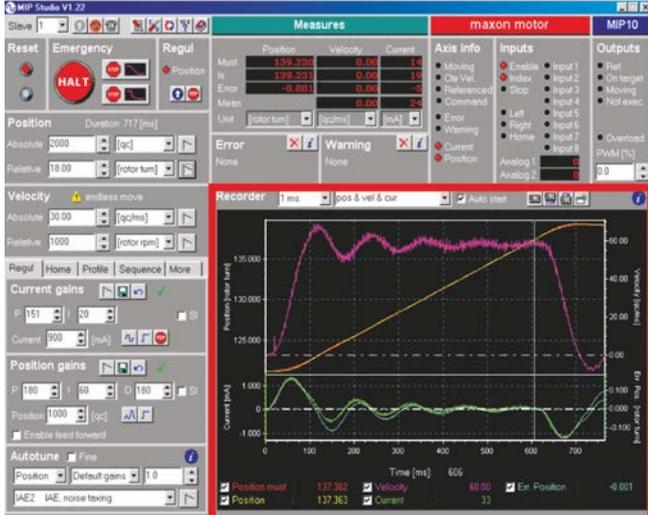
(this function provides graphs for the parameters used on the movement of the motor. We have included values for each parameter, that allow the transient analysis)

1.- Values for each parameter (position, current, velocity) are included, that allow the transient analysis. Firstly, the position graph is shown versus the velocity and the current.

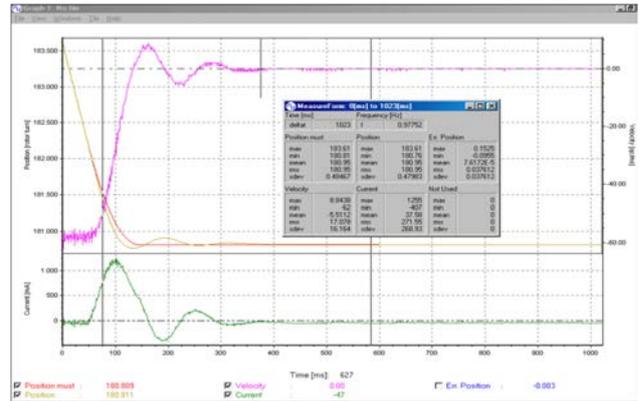
Autostart is selected, 1 ms is introduced and position & velocity & current are chosen, in this way, these data of these parameters will be recorded for a later use of the graph.

2.- In this zone of the main screen corresponding to RECORDER, there are 4 buttons:

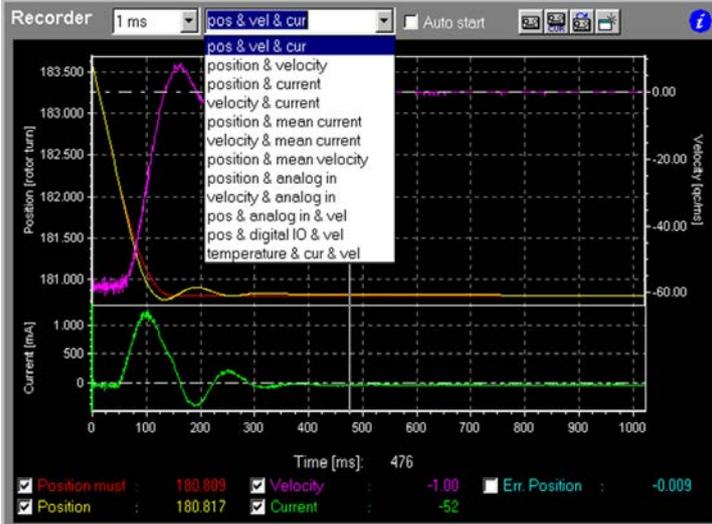
- Start Recording.
- Start Recording Current and Duty Cycle.
- Reload Recorded Data.
- Open new window for display graph.



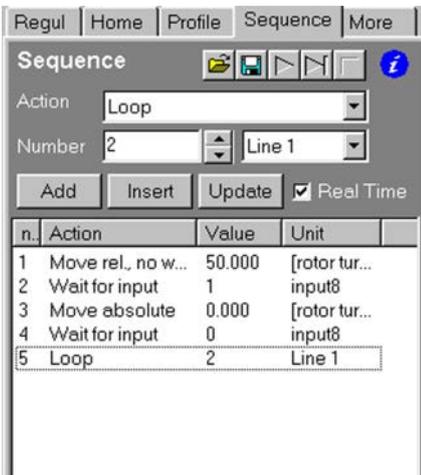
Example of a graph: In this graph we can analyze measures values, during the execution of other functions.



3- This window shows the options from the submenu "Variables to be recorded"

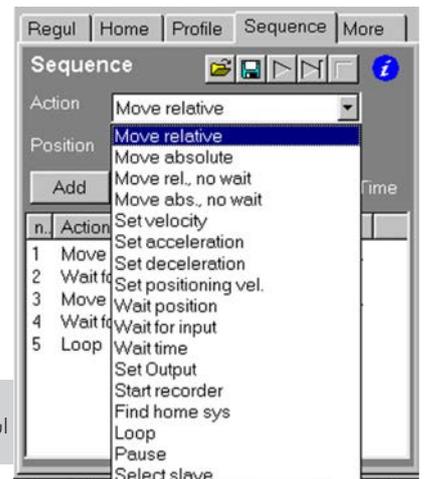


Batch Commands



The "sequence" menu allows us to put one action after another one (series connection)

This is the list of available options. With these instructions we can develop useful sequences for industrial purposes.



Some **real** results obtained from this Unit

User's parameters, Position Val, Velocity Val, Acceleration Val

The servomotor's control system allows the definition of some parameters, in a way these can be used with digital inputs from the system

Mode configuration

Position [qc] (inputs 6-2)

0	Clear errors	10A	0	20A	0	30A	0
1	Rotation	11A	0	21A	0	31	Search
2	Rotation	12A	0	22A	0		
3	Define origin	13A	0	23A	0		
4	Stop motion	14A	0	24A	0		
5A		15A	0	25A	0		
6A	6000	16A	0	26A	0		
7A	0	17A	0	27A	0		
8A	0	18A	0	28A	0		
9A	0	19A	0	29A	0		

Profile (inputs 8-7)

Velocity [rpm]	Acceleration [ms]
0 100	0 100
1 500	1 100
2 1000	2 100
3 2000	3 100

Configuration

- debounce trigger (input 1)
- debug info (I/O-Text mode only)
- use digital outputs for status
- position 5-17 are relative
- position 18-30 are relative

Movement relative to: previous target

OK Cancel

Digital inputs and outputs in I/O mode

Digital inputs/outputs configurations windows

I/O-Mode configuration

Position [qc] (inputs 6-2)

0	Clear errors	10A	700	20A	0	30A	0
1	Rotation	11A	0	21A	0	31	Search
2	Rotation	12A	0	22A	0		
3	Define origin	13A	0	23A	0		
4	Stop motion	14A	0	24A	0		
5A	600	15A	0	25A	0		
6A	0	16A	0	26A	0		
7A	400	17A	0	27A	0		
8A	0	18A	0	28A	0		
9A	0	19A	0	29A	0		

Profile (inputs 8-7)

Velocity [rpm]	Acceleration [ms]
0 150	0 10
1 500	1 30
2 1050	2 50
3 2100	3 300

Configuration

- debounce trigger (input 1)
- debug info (I/O-Text mode only)
- use digital outputs for status
- position 5-17 are relative
- position 18-30 are relative

Movement relative to: previous target

OK Cancel

Values: 0.32767

Default: MP10: 90, MP20: 90, MP50: 90, MP100: 60

Remark: When a motion error occurs (e.g. position error too big), the software viscous braking slows down the motor with a current proportional to the momentary speed. Braking current = «Brake Gain» * Velocity. The braking current is limited to the «Maximum Continuous Current» (Pwr. nr. 14). The software viscous braking is an important safety mechanism on MIP controllers and therefore the «Brake Gain» should be properly tuned to provide adequate braking for your system. Determine the optimal value by trial, using the «Brake» command at high speed. The «Identify» function of MIP Studio can compute the «Brake Gain», given a desired braking duration. Nevertheless it is recommended to test the braking afterwards to see if the drive is braking properly (see recorder). Since firmware version 3.51, the effect of the Brake Gain was divided by 10 for an increased resolution.

Load and braking simulation

We use the braking system, connected to the servomotor to simulate a load or braking the servo due to a course end. In this windows we observe that the simulation of a course end begins at the home option, adjusting the menu parameters.

MIP Studio V1.22

Slave: 1

Measures | maxon motor | MIP10

Reset | Emergency | Regul

Position: Duration: 34.386 [s]
 Absolute: 1.00 [rotor turn]
 Relative: 1000.00 [rotor turn]

Velocity: endless move
 Absolute: 1000 [rotor rpm]
 Relative: 30.00 [qc/ms]

Regul: Home | Profile | Sequence | More

Find home

Trigger: Current index
 Index Index distance: 0 [qc]
 Velocity: 10.00 [qc/ms]
 Current: 400 [mA]
 Offset: 500 [qc]
 Position: 0 [qc]
 Timeout: 0 [ms]

Define position

Position: 0 [qc]

Recorder: 128 ms | pos & vel & cur | Auto start

Graph: Position [qc], Velocity [rotor rpm], Current [mA] vs Time [s]

Position must: -386.240 | Velocity: -684 | Err. Position: -682
 Position: -386.240 | Current: -1.349

Searching reference

MIP Studio V1.22

Slave: 1

Measures | maxon motor | MIP10

Reset | Emergency | Regul

Position: Duration: 118 [ms]
 Absolute: 2000 [qc]
 Relative: 2000 [qc]

Velocity: endless move
 Absolute: 0.00 [qc/ms]
 Relative: 30.00 [qc/ms]

Regul: Home | Profile | Sequence | More

Find home

Trigger: Current index
 Index Index distance: -1734 [qc]
 Velocity: 10.00 [qc/ms]
 Current: 400 [mA]
 Offset: 500 [qc]
 Position: 0 [qc]
 Timeout: 0 [ms]

Define position

Position: 0 [qc]

Recorder: 1 ms | pos & vel & cur | Auto start

Graph: Position [qc], Velocity [qc/ms], Current [mA] vs Time [ms]

Position must: 155 | Velocity: 155 | Current: 155
 Position: 155 | Current: 155

Permanent System Parameters of MIP10

Home trigger: Current rise
 Also search encoder index
 Search velocity: 10.00 [qc/ms] | Search velocity: 300 [rpm]
 Current threshold (mechanical stop): 400 [mA]
 Offset movement: 500 [qc] | Position after homing: 0 [qc]

Auxiliary encoder: Encoder with 90° phase-shifted signals A, B
 Ratio (electronic gear): 1.00 [n:1]

Parameter Reference

Home Trigger
 Parameter nr. 30
 Type: Integer

Meaning
 Defines which switch or signal is used for triggering the reference position

Values
 The following mentioned values are allowed:
 1 = Index of the encoder
 2 = Reference switch (HOME input)
 3 = Reference switch + index of the encoder
 4 = Left limit switch (LEFT LMT input)
 5 = Left limit switch + index of the encoder
 6 = Right limit switch (RIGHT LMT input)
 7 = Right limit switch + index of the encoder
 8 = Current rise («Current Threshold» = par nr. 32)
 9 = Current rise + index of the encoder

Default
 8 (= trigger on current rise)

Remark
 The current rise is used when the system has no switches and the system needs to be referenced on a mechanical stop. The «Current Threshold» (Par. nr. 32) determines the threshold for the detection of the current rise when hitting the mechanical stop.

Some **real** results obtained from this Unit

Input/Output functions

Visualization of the digital inputs anytime. Lights on (red) or off (black), the input's state (1 or 0)

The left screenshot shows the MIP Studio V1.22 interface. The 'maxon motor' window is highlighted in red. It displays real-time data for Position, Velocity, and Current, along with a 'Recorder' window showing a graph of Position [qc] and Current [mA] over time. The right screenshot shows the 'L/D Mode configuration' dialog box, which allows for configuring various parameters like Position [qc], Velocity [qc/ms], and Current [mA]. A red arrow points to the 'debounce trigger (input 1)' checkbox.

State commands and Exceptions

Example of windows of Errors and Warning signals

The screenshot shows the MIP Studio V1.22 interface in an error state. The 'Error 40 STOP activated' and 'Warning 186 Reset requested' are displayed in red and purple boxes. The 'Recorder' window shows a graph of Position [qc] and Current [mA] over time. The 'Error & Warning Reference' window provides detailed information about the error, including its meaning, caused by, effect, and related parameters.

Error & Warning Reference

Yes	Velocity [qc/ms]	Current [mA]
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00

Meaning
 * The STOP switch (opening contact) was activated, i.e. the signal on the STOP input was removed.

Caused by
 * STOP switch activated (contact open)
 * STOP input not connected to the correct signal level
 * Loose contact of the STOP-switch
 * Short time break of the power supply voltage (glitch)

Effect
 * The position regulation is switched off
 * If «Brake on STOP» is set, the software viscous braking slows the motor down.
 * The current regulation is switched off afterwards, if «Stop current regul. on STOP» is set.

Remark:
 If «Enable clearing STOP error» is 0, this error requires a RESET to be cleared.
 A short time voltage break due to an overload of the power supply can trigger a STOP if Vstop is connected to the STOP input!
 Please refer to the section «Hardware Reference» for detailed information about the STOP input.

Related parameters
 * Brake on STOP (Pw. nr. 7, bit 3)
 * Stop current regul. on STOP (Pw. nr. 7, bit 2)
 * Enable clearing STOP error (Pw. nr. 7, bit 6)

COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

Additionally to the main items (1 to 4) described, we can offer, as optional, other items from 5 to 7.

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

⑤ **SERIN/CC/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 4).

- 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

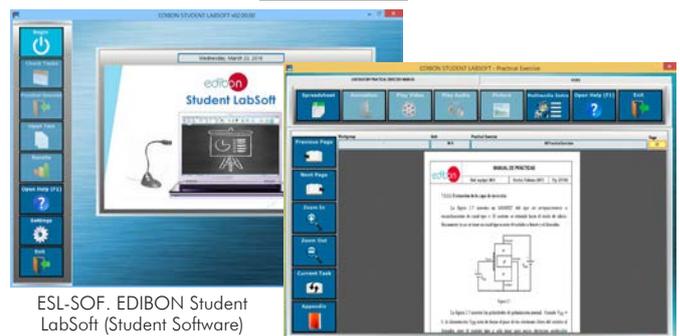
ECAL. EDIBON Calculations Program Package - Formula Editor Screen



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

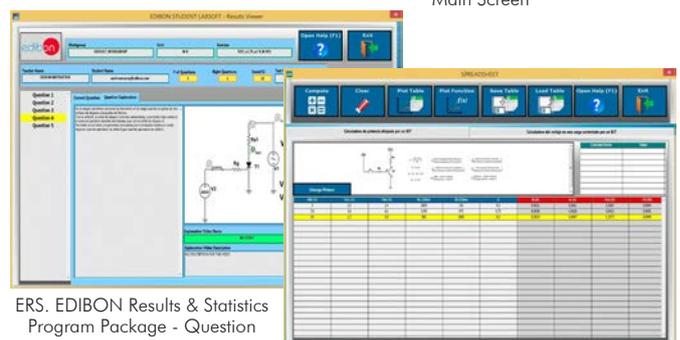
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

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

⑥ **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:

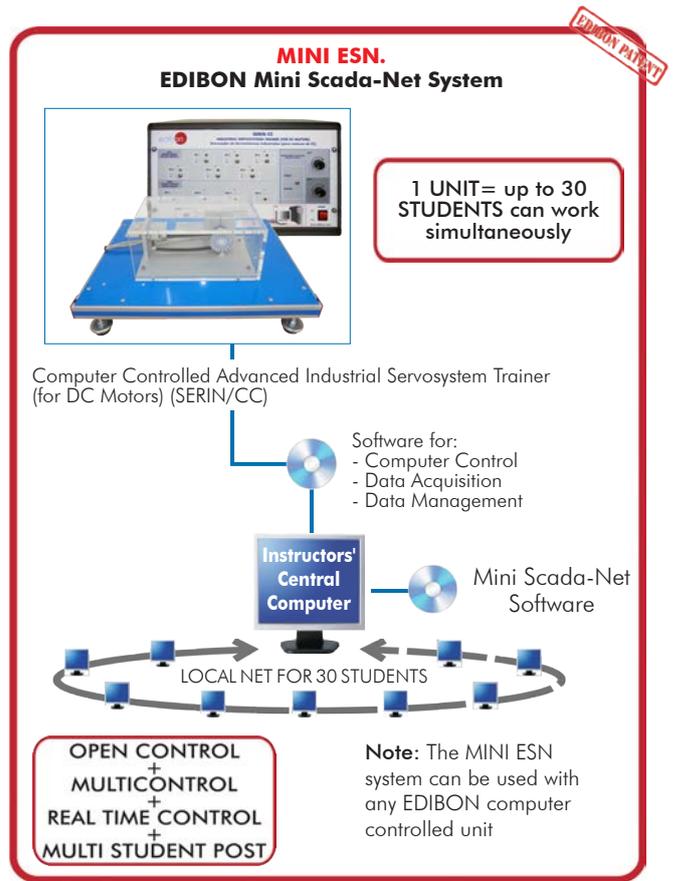
www.edibon.com/en/files/expansion/MINI-ESN/catalog

⑦ **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



ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

- ① **Unit: SERIN/CC. Computer Controlled Advanced Industrial Servosystem Trainer (for DC Motors).**
- ② **SERIN/CC/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
- ③ **Cables and Accessories**, for normal operation.
- ④ **Manuals.**

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

Optional items (supplied under specific order)

a) Technical and Vocational Education configuration

- ⑤ SERIN/CC/ICAL. Interactive Computer Aided Instruction Software System.

b) Multipost Expansions options

- ⑥ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.
- ⑦ ESN. EDIBON Scada-Net Systems.

①SERIN/CC. Unit:

The "SERIN/CC" trainer consists on a Control Interface Box and a Direct Current Motor and Encoder Module.
 The Control Interface Box has a 4-quadrants servo amplifier for DC motors that controls the motor speed, position and current of the motor. In order to do this control the feedback is done thanks to an encoder.
 The RS232 communication between the Control Interface Box and the computer provides the possibility of commanding the motor from the computer and to visualize the most important signals of the motor.
 The 4-quadrant servo amplifier controls the motor operation and the braking operation in both rotation directions clockwise and counterclockwise. Velocity, Position and Torque Control.
 It allows predefined moves and programming.

Control Interface Box:

Front panel:

Seven digital outputs:

- They have led's that indicate if the outputs are active or not.
- Output 1: this output indicates when the system has been referenced already.
- Output 2: this output indicates when a target position is reached.
- Output 3: this output indicates when the motor is running.
- Output 4: this output indicates when a command can not be executed.
- Output 5: this output indicates when an error occurs.
- Output 6: this output is a user definable PWM-output (5 V, 0 – 100% duty cycle, 50 kHz).
- Output 7: this output is the common cathode of the freewheeling diode of the low side drivers.

Thirteen digital inputs:

- Seven user definable digital inputs for process control.
- Digital input (trigger signal).
- Three digital inputs: reference, left limit and right limit:
 - DI reference: digital input for reference switch.
 - DI left limit: digital input for left limit switch of a linear unit.
 - DI right limit: digital input for right limit switch of a linear unit.
- Two digital inputs power stage and stop:
 - DI power stage: digital input for enabling the power stage.
 - DI stop: digital input for switching the regulation off if the signal is removed.
- Two analog inputs with voltages in the range of 0 – 5 V.
- Two potentiometers to select the value of the analog inputs (0 – 5 V DC), these potentiometers are enabled by a commuting switch placed next to them.
- Ignition Switch. When the unit is on, the red LED is active and lighting.

Back panel:

- Voltage supply. There is a voltage supply that feeds the unit with 220 V of alternating current.
- Motor power supply. It is a 24 V DC motor power supply (it is a three wires connection motor +, motor -, and one taking to earth).
- Connection port in series. It is a connection plug to connect the Control Interface with the PC by the RS-232 port, in order to allow the software to manage the motor.
- Connection with the Feedback. It is a connection with the motor Feedback. It allows the encoder to manage the motor.

Direct Current Motor and Encoder Module:

- DC Motor, 90W. Position, speed and current are controlled by the Control Interface.
- Digital encoder, 500 pulses per revolution, with RS232 communication port.
- Two power supply wires (one for the motor and other for the Control Interface).
- Two communication RS232 wires (one from the Control Interface to the computer and other from the Control Interface to the encoder).

②SERIN/CC/CCSOF. Computer Control +Data Acquisition+Data Management Software:

Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards.
 Registration and visualization of all process variables in an automatic and simultaneously way.
 Flexible open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.
 Management, processing, comparison and storage of data.
 Comparative analysis of the obtained data, after to the process and modification of the conditions during the process.

③Cables and Accessories, for normal operation.

④Manuals:

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.- Autotuning.
- 2.- Manual tuning of the position regulator.
- 3.- Motion commands in MPBUS RS232 mode.
- 4.- Signals Graph, Transient Analysis.
- 5.- Batch Commands.
- 6.- User´s parameters, Position Val., Velocity Val., Acceleration Val.
- 7.- Digital inputs and outputs in I/O mode.
- 8.- Load and braking simulation.
- 9.- Searching reference.
- 10.-Input/Output functions.
- 11.-State commands and Exception.
- 12.-Velocity, Position and Torque control.

TENDER SPECIFICATIONS (for optional items)

a) Technical and Vocational Education configuration

⑤ **SERIN/CC/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.

b) Multipost Expansions options

⑥ **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 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 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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