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PRODUCTS
40.- ELECTRICITY

INTRODUCTION

The students who begin their professional career as electricians, assemblers or electrical maintenance technicians require a hands-on learning with equipment that reflect faithfully the electrical installations in which they will work in the future. An important electrical branch are electrical motors and control devices that need for their operation.

The motor drives are intended to control motors via the efficient management of their parameters such us voltage, frequency, turning speed, acceleration and deceleration ramps, soft starting, etc.

GENERAL DESCRIPTION

The "Practices in Installations, Wiring and Comissioning of DC and AC Motor Drives" application, WCMD, has been designed by Edibon for the formation at professional-practical level in the field of electrical motors controllers.

This application provides the future professionals with knowledge and essential skills on the assembly, installation, wiring and commissioning of industrial electrical motors drives. For this purpose, the application includes a specific manual in which is explained, at theoretical-practical level, the aspects concerning to the installation procedures of these devices

The WCMD includes the following elements:

- FP-KIT-4. Wiring Installation Kit.

- FP-KIT-10. Tubes and Fittings for Channelling Wiring Kit.

Elements additionals:

- CHER. Tool Box.

- MED65. Digital Multimeter.

- FP-MEG. Megohmmeter.

- FP-KIT-5. Measuring Kit.

- FP-KIT-6. Signalling and Control Kit.

- FP-KIT-8. PLC Installation and Programming Kit.

    - FP-KIT-9. 400V AC Circuit Breakers Kit.

- FP-DLT. Delay Timer.

- Electrical Machines:

    - FP-EMT5. 200 W DC Motor with Wound Rotor.

        FP-KIT-2. DC Motor Controller Installation Kit.

    - FP-EMT7. 370 W, 3000 rpm Asynchronous Three-Phase Motor of Squirrel Cage.

        FP-KIT-3. AC Motor Controller Installation Kit.

        FP-KIT-7. Manual Starters for Three-Phase Induction Motor of Squirrel Cage Kit.

        FP-ESS. Electronic Soft Starter.

        FP-AUTR3PH/1K. 1kVA Three Phase autotransformer.

Expansion learning software:

In addition, Edibon provides expansion learning software (WCMD/ICAI) to reinforce knowledge about this field.

This software is formed by:

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

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

The applications includes the following elements:

• FP-KIT-4. **Wiring Installation Kit.**

    100 meters of grey wire of 1.5 mm².

    100 meters of brown wire of 1.5 mm².

    100 meters of black wire of 1.5 mm².

    100 meters of green/yellow wire of de 1.5 mm².

    25 meters of screened wire.

• FP-KIT-10. **Tubes and fittings for channeling wiring kit.**

    PVC electrical conduit for wiring installation, 5 m.

    3 electrical boxes.

    Cable guide.

Elements additionals:

• CHER. **Tool Box.**

    Crimper.

    Tin.

    Meter.

    Insulation tape.

    Heat shrink.

    Voltage tester screwdriver.

    Cross-head screwdriver and flat-head screwdriver.

    Allen keys.

    Soldering iron.

    Rubber hammer.

    Wire terminals and Connection terminals.

    Flanges.

    Wire cutter.

    Screw Clamp Terminals.

• MED65. **Digital Multimeter.**

    This module has a digital multimeter of about 3 ½ digits, with double-jack ending cables of about 4 mm to facilitate interconnections.

    With this digital multimeter we will be able to measure:

        Voltage.

        Current.

        Resistance.

        Capacitors capacity.

        Temperature.

• FP-MEG. **Megohmmeter.**

    Measurement of insulation resistance.

    Maximun resistance: 400 MΩ.

    Continuity tester.

- FP-KIT-5. **Measuring Kit.**

  Clamp Meter:

   Clamp for alternating current measurements contactless.

   The clamp can measure:

    Current.

    Voltage.

    Resistance.

  A voltage and continuity tester:

   Voltage range: 12-690V AC.

   Phases rotating detection in three-phase systems.

   Polarity tester.

- FP-KIT-6. **Signaling and Control Kit.**

  Three commutators:

   Two positions commutator.

  Three signalling lamps:

   Nominal voltage: 230V AC.

   Three lamps (red, yellow and green).

  Emergency stop mushroom (230/400V AC):

   Supply voltage: 230/400V AC.

- FP-KIT-8. **PLC Installation and programming Kit.**

  PLC Siemens:

   Supply voltage: 24 V.

   Contacts:

    Eight digital inputs.

    Four relay outputs.

   Software of PLC programming is included.

  PLC power supply:

   Supply voltage: 230V AC.

   Output voltage: 24 V.

    8 x control switches.

     4 x relays (230V AC, 2NC, 2NO).

  - FP-KIT-9. **400V AC Circuit Breakers Kit.**

   Five three pole circuit breakers:

    Nominal voltaje of power terminals: 400V AC.

    Nominal voltaje of control terminals: 230V AC.

    Nominal voltaje coil: 230V AC.

    Auxiliary contacts: 3 NO / 2 NC.

- **Electrical machines:**

  - FP-EMT5. **200 W DC Motor with Wound Rotor.**

   Nominal power: 300 W.

   Armature voltage: 200V DC.

   Excitation voltage: 230V DC.

   Armature current: 1,5 A.

   Excitation current: 0,4 A.

   RPM: 3400/7500 r.p.m.

FP-KIT-2. **DC Motor Controller Installation Kit.**

   DC Motor Controller:

      Supply voltage: 230V AC (PH+N+G).

     Three ON-OFF switches:

       ON-OFF power switch.

       Star-Stop control activation switch.

       Internal tacho dynamo feedback switch.

     Two potentiometers:

       Speed control.

       Torque control.

     Terminals:

       Rotor terminals.

       Excitation terminals.

       Tacho dynamo terminals.

     Three driver status leds: (red, yellow and green).

     Variable output voltage: 0-300V CC.

  A control cabinet with door:

     Dimensions:

       Height: 500 mm.

       Width: 400 mm.

       Depth: 200 mm.

  Cut rail, 2 m.

  Grey cable duct for wiring, 2 m.

  200 W, DC Motor with Wound Rotor.

- FP-EMT7. **370W, 3000 rpm Three-Phase Induction Motor of Squirrel Cage.**

  Nominal power: 370 W.

  Nominal voltage: 3x 230/400V AC Δ/Y.

  Frequency: 50/60 Hz.

  Number of poles: 2.

  RPM: 2730 r.p.m.

  Nominal current: 1,67/ 0,97 A.

FP-KIT-3. **AC Motor Controller Installation Kit.**

  Frequency controller:

     Supply voltage: 230V AC.

     Nominal power: 0,4 kW.

     PWM output voltage connections:

       Three-Phases: 230V AC.

     Potentiometer for the induction motor control speed.

     Setting and visualization display of the machine parameters.

     EMC/EMI filter to limit electromagnetic interference.

   Speed control potentiometer.

  Control cabinet with door:

     Dimensions:

       Height: 500 mm.

       Width: 400 mm.

       Depth: 200 mm.

FP-KIT-7. **Manual starters kit for Three-Phase Induction Motor of Squirrel Cage.**

    Manual Star-Delta starter:

        Nominal Voltage: 400V CA.

        Maximum current contacts: 10 A.

        Star-Delta three position commutator:

            0: Open circuit.

            Y: star connection.

            Δ: delta connection.

    Direct manual starter:

        Nominal Voltage: 400V CA.

        Maximum current contacts: 10 A.

        Two positions commutator (ON-OFF):

            0: Open.

            1: Close.

    Manual direct starter with inversión:

        Nominal Voltage: 400V CA.

        Maximum current contacts: 10 A.

        Three positions commutator:

            0: Open.

            1: Direct connection.

            2: Inverse connection.

FP-ESS. **Electronic Soft Starter.**

    Nominal Voltage: 400V AC.

    Nominal current: 3,6 A.

    Nominal Power: 1,5 kW.

    IP: IP20.

    Three poles.

    Regulating potentiometer for setting the acceleration/deceleration ramp.

    Regulating potentiometer for starting voltage.

FP-AUTR3PH/1K. **1kVA Three Phase autotransformer.**

    Three-phase autotransformer.

    Nominal supply voltage: 400V AC (3PH).

    Nominal output voltage: 3 x 230V AC (3PH+N).

    Nominal power: 1 kVA.

    Transformer connection: YY0.

• **All necessary cables to realize the practical exercises are included.**

Cables and Accessories, for normal operation.

Manuals:

This unit is **supplied with the following manuals**: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Components and electrical devices installation in the electrical cabinet.

2.- Feeder wiring in the electrical cabinet.

3.- Wiring of AC frequency controller, electrical protections and power and control circuits.

4.- Programming and commissioning of frequency controller.

5.- Programming of acceleration time with the frequency controller.

6.- Programming of deceleration time with the frequency controller.

7.- Frequency/speed control with the AC frequency controller.

8.- Wiring of the PLC to the frequency controller for maneuvers automation.

9.- Programming of the PLC according to the requirements of the installation.

10.- Wiring of electronic soft starter for motors.

11.- Configuration and commissioning of electronic soft starter for AC motors.

12.- Wiring of DC motor controller.

13.- Wiring of DC motor to the DC motor controller.

14.- Torque/speed control of the DC motor with the DC controller.

15.- Wiring of AC motor manual starters.

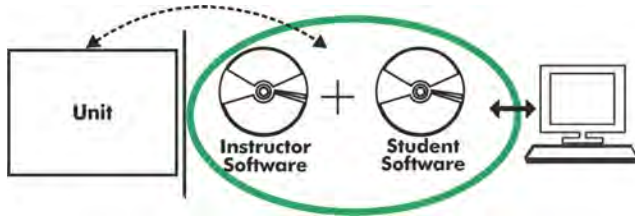- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: three-phase, 380V./50 Hz. or 208V./60 Hz., 20 Kw.

DIMENSIONS AND WEIGHTS

WCMD:

-Dimensions: 2000 x 400 x 2000 mm. approx.

(78.74 x 15.75 x 78.74 inches approx.)

-Weight: 100 Kg. approx.

(220 pounds approx.)

WCMD/ICAI. Interactive Computer Aided Instruction Software System:

With no physical connection between unit and computer, **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.

Instructor Software

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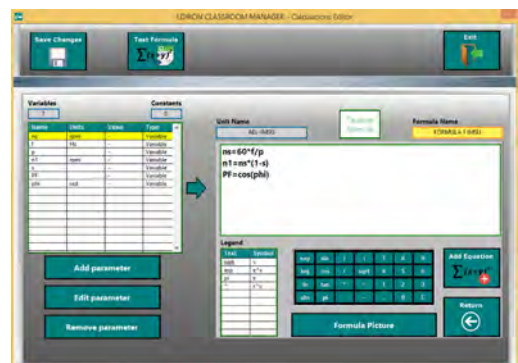
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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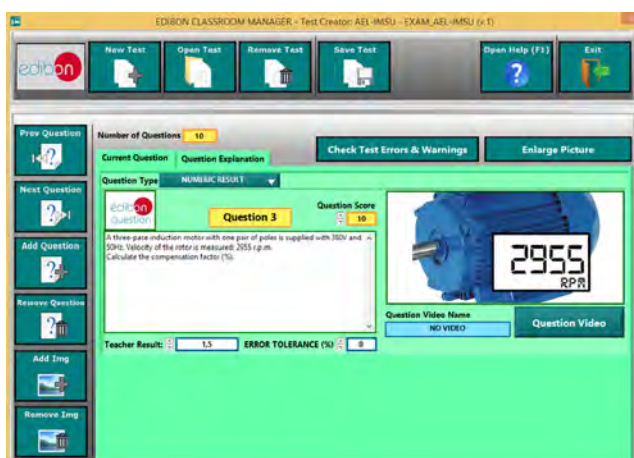
Innovative features:

• **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.**

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

ECAL. EDIBON Calculations Program Package - Formula Editor Screen

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

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

Student Software

- 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.
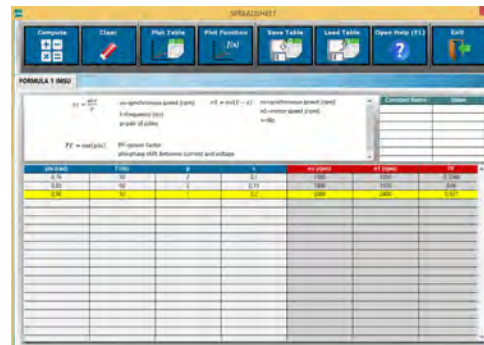
• Multimedia-Supported auxiliary resources.

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

EPE. EDIBON Practical Exercise Program Package Main Screen

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

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

ERS. EDIBON Results & Statistics Program Package - Question Explanation

ECAL. EDIBON Calculations Program Package Main Screen

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

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REPRESENTATIVE: