



Engineering and Technical Teaching Equipment

Three-Phase Transformer Trainer

AEL-TPTT

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↳ PRODUCTS
↳ 40.- ELECTRICITY



INTRODUCTION

A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction.

Electromagnetic induction produces an electromotive force within a conductor which is exposed to time varying magnetic fields.

Three-Phase transformers are used to increase or decrease the alternating voltages in electric power applications. To prove that the transformer meets customer’s specifications and design expectations, the transformer has to go through different testing procedures in manufacturer premises.



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

GENERAL DESCRIPTION

The AEL-TPTT Three-Phase Transformer Trainer has been designed by Edibon to allow the students to learn how carry out different transformer test and how they work. With this trainer, the user can wire the transformer and get different vector groups. The transformer ratio depends on the transformer connection and the user will can check it.

The student can analyze in depth the transformer since he will obtain the equivalent circuit and the losses of the machine. Besides, the user will study the behavior when resistive, inductive and capacitive loads are connected. On this way, different characteristic curves can be obtained such as open circuit characteristic, efficiency curve, etc.

The AEL-TPTT includes all necessary modules in order to realize all practical exercises described before, such as a transformer, ammeters, voltmeters, a power supply module and resistive, inductive and capacitive loads. Optionally, this trainer can include another transformer which allows studying the transformers connected in parallel.

Optionally, this trainer can be acquired with the Control and Data Acquisition System of Electrical Machines, EM-SCADA. This system is designed to analyze and monitoring all voltajes, currents and performace curves of dinamyc and static electrical machines. After testing procedures, the user can obtaint result reports.

The AEL-TPTT has the following modules:

- N-VPS01. AC 3PH Variable Power Supply.
- N-MED09. AC Ammeter (0-2.5 A). (2 units)
- N-MED22. AC Voltmeter (0-400V).
- N-MED33. 3-Phase Balanced Wattmeter 440 V.
- TPPT. Three-phase Power Transformer Unit.
- N-REVT/1K. 1kW Three-Phase Resistors Module.
- N-CONT/1K. 1kVA Three-Phase Capacitors Module.
- N-INDT/1K. 1kVA Three-Phase inductances module.
- N-ARR12. Direct Starter Module.

Second optional module:

- TPPT. Three-phase Power Transformer Unit.

Optional testing software:

- EM-SCADA. Control and Data Acquisition System Software for Electrical Machines, with SCADA.

Optional learning software:

In addition, Edibon provides optional software (AEL-TPTT/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 application AEL-TPTT can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks.

- N-RACK-B. (6 units).

Optionally the AEL-WBR. Electrical Workbench (Rack) can be supplied to place the rack/s.

Option B:

This application can be mounted on rail.

Optionally the AEL-WBC. Electrical Workbench (Rail) can be supplied to mount the modules.

The trainer includes the following modules:

- N-VPS01. **AC 3PH Variable Power Supply.**

ON-OFF removable key.

Input Voltage: 400 VAC, 3PH+N.

Output Voltage:

0...450 VAC.

0...24 VDC.

Maximum current: 2A

Frequency: 50/60 Hz.

Wheel to regulate the voltage.

Three lamps.

Measurement commutators:

One commutator to measure the voltage

6 positions: L1-N ; L2-N ; L3-N ; L1-L2 ; L1-L3 ; L2-L3

One commutator to measure the current

3 positions: L1, L2, L3

Three-Phase supply hose with IP44 3PN+E 32A 400V connecting plug.

Differential magnetothermal, 4 poles, 25A, 300mA AC 6KA.



N-VPS01

- N-MED09. **AC Ammeter (0-2.5 A). (2 units).**

Measurement range: 0-2.5 A.

Terminals:

Measurement Terminals.

Ground Terminal.



N-MED09

- N-MED22. **AC Voltmeter (0-400 VAC).**

Measurement range: 0-400 VAC.

Terminals:

Measurement Terminals.

Ground Terminal.



N-MED22

- N-MED33. **3-Phase Balanced Wattmeter 440 V.**

Nominal voltage : 440 VAC.

Terminals:

Measurement Terminals.

Ground Terminal.



N-MED33

Specifications

- **TPPT. Three- phase Power Transformer Unit.**

Primary nominal voltage: $3 \times 230/3 \times 400 \Delta / Y$.

Secondary nominal voltage: $3 \times 230/3 \times 400 \Delta / Y$.

Nominal power: 1kVA.



TPPT

- **N-REVT/1K. 1kW Three-Phase Resistors Module.**

Parallel, series, star and delta connection.

Resistance: $3 \times 750 \text{ Ohm}$.

Current: $3 \times 2 \text{ A}$.



N-REVT/1K

- **N-CONT/1K. 1kVA Three-Phase Capacitors Module.**

Nominal Voltage: 400 VAC.

For parallel, series, star and delta circuits.

Capacity: $3 \times 5/10/20/30 \mu\text{F}$.



N-CONT/1K

- **N-INDT/1K. 1kVA Three-Phase inductances module.**

Parallel, series, star and delta connections.

Nominal Voltage: 400 VAC.

Inductances: 1,2H; 1,6H; 2H; 2,4H; 2,8H; 3,2H .

Currents: 0,65A; 0,5A; 0,45A; 0,35A; 0,30A; 0,25A.



N-INDT/1K

- **N-ARR12. Direct Starter Module.**

Nominal voltage: 400 VAC.

Maximum contacts current: 10A.

Two positions commutator (ON-OFF):

0: Open circuit.

1: Closed circuit.



N-ARR12

Second optional module:

- **TPPT. Three- phase Power Transformer Unit.**

Primary nominal voltage: $3 \times 230/3 \times 400 \Delta / Y$.

Secondary nominal voltage: $3 \times 230/3 \times 400 \Delta / Y$.

Nominal power: 1kVA.



TPPT

- **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.- Wiring the three-phase transformer according with different configurations.
 - 2.- Calculation of transformer ratio according with different configurations.
 - 3.- Open circuit test.
 - 4.- Short circuit test.
 - 5.- Determination of equivalent circuit.
 - 6.- Drop voltage with resistive load.
 - 7.- Drop voltage with inductive load.
 - 8.- Drop voltage with capacitive load.
 - 9.- Study the efficiency of the transformer.
 - 10.- Determination of load which allows the maximum efficiency.
- Some practical exercises possibilities in order to study transformers in parallel connection:
- 11.- Objectives of transformers connected in parallel and conditions.
 - 12.- Study of equivalent circuit of the coupling with load.
 - 13.- Study of equivalent circuit of the coupling without load.
 - 14.- Analyzing of currents varying the power, short-circuit voltage and transformer ratio.

REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

AEL-TPTT:

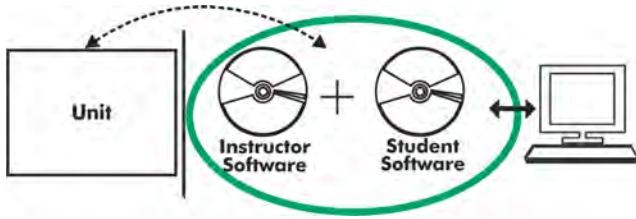
- Dimensions: 1380 x 840 x 2010 mm. approx.
(54.33 x 33.07 x 79.13 inches approx.).
- Weight: 45 Kg. approx.
(99 pounds approx.).

OPTIONAL SOFTWARE

- EM-SCADA. Control and Data Acquisition System Software for Electrical Machines, with SCADA. (For more information see catalogue. Click on the following link: <http://www.edibon.com/products/catalogues/en/units/electricity/advanced/EM-SCADA.pdf>)

Optional

AEL-TPTT/ICAI. Interactive Computer Aided Instruction Software System.



Without no physical connection between unit and computer (PC), 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.

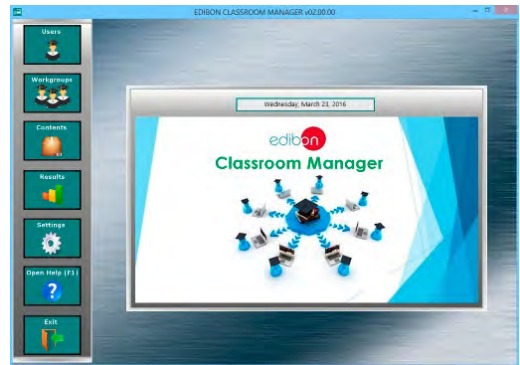
Instructor Software

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

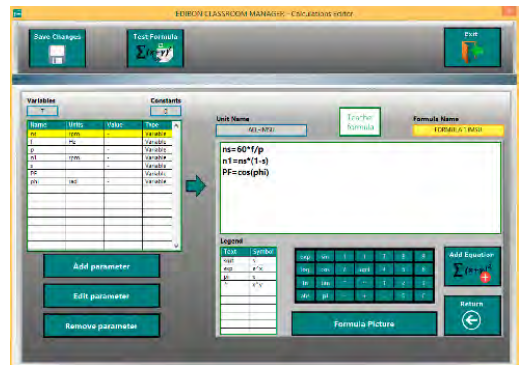
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

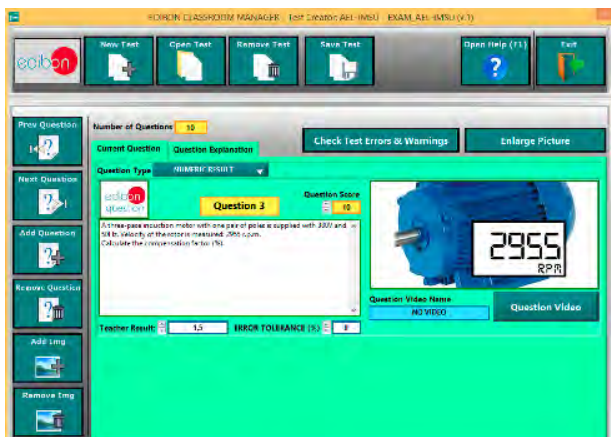
- User Data Base Management.**
- Administration and assignment of Workgroup, Task and Training sessions.**
- Creation and Integration of Practical Exercises and Multimedia Resources.**
- Custom Design of Evaluation Methods.**
- Creation and assignment of Formulas & Equations.**
- Equation System Solver Engine.**
- Updatable Contents.**
- Report generation, User Progression Monitoring and Statistics.**



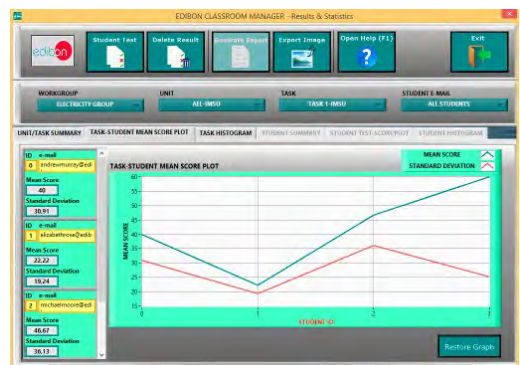
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application main screen



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

Optional

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:

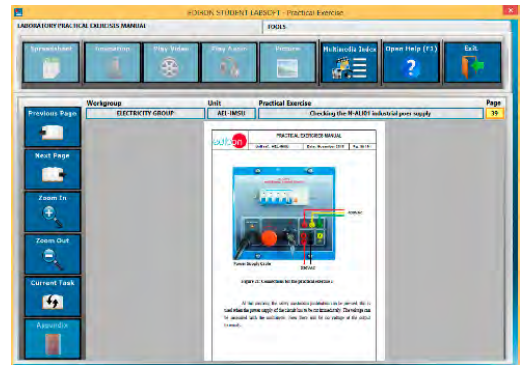
- Student Log-In & Self-Registration.**
- Existing Tasks checking & Monitoring.**
- Default contents & scheduled tasks available to be used from the first session.**
- Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- Evaluation Methods to prove your knowledge and progression.**
- Test self-correction.**
- Calculations computing and plotting.**
- Equation System Solver Engine.**
- User Monitoring Learning & Printable Reports.**
- Multimedia-Supported auxiliary resources.**

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

www.edibon.com/products/catalogues/en/units/electricity/ICAI-Electricity/ICAI-Electricity.pdf



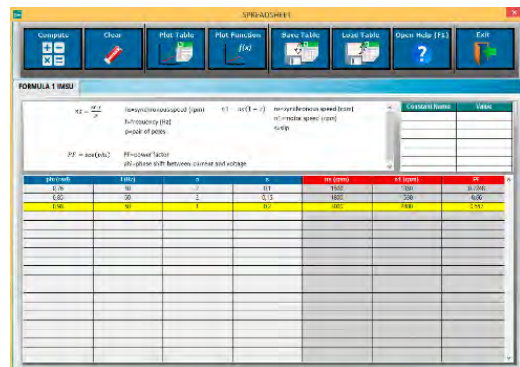
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package-Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

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



C/ Del Agua, 14. Polígono Industrial San José de Valderas.
28918 LEGANÉS. (Madrid). SPAIN.
Phone: 34-91-6199363 FAX: 34-91-6198647
E-mail: edibon@edibon.com WEB site: www.edibon.com

Edition: ED01/16
Date: October/2016

REPRESENTATIVE:

