

THREE PHASE POWER SYSTEM TRAINER

EM-86386



SCIENSCOPE
EDU-LABS



BUATAN MALAYSIA
MADE IN MALAYSIA

The EDU-LABS EM86386 Three Phase Power System Trainer familiarizes students with three-phase power systems. The system first introduces the student to the fundamentals of three-phase power systems, such as the wye (star) and delta configurations, phase and line voltages, phase and line currents, phase balance, etc. Students then examine how to measure power in three-phase circuits using the two-wattmeter method, as well as how to determine the power factor. Finally, students explore the phase sequence and learn to determine the phase sequence of a three-phase power system.

The system consists of a series of modular slot-in panels modules housed in a compact epoxy coated casing. Each module represents one or more electrical / electronic components or on block diagram of a complex circuit. All functional parts of the components are mounted inside the modules with circuit symbols/mimic diagrams screen printed on the front PCB panel and terminated at 4mm safety sockets for student experimental practice.

All modular slot-in panels modules are inter connecting together by using 19mm short circuit shunt and / or 4mm stackable safety test leads sets to form the desired control circuits.

EXPERIMENT COVERAGE:

- Analyze three-phase circuits and learn to solve them.
- Discover the difference between line and phase voltages and currents.
- Calculate the active power dissipated in each phase of a three-phase circuit and the total active power dissipated in a circuit.
- Learn about phase sequence and wye and delta circuit configuration.
- Calculate the active, reactive, and apparent power in balanced, wye- or delta-connected, three-phase circuits.
- Analyze the phase sequence of a three-phase circuit using an oscilloscope.

EXPERIMENTS LISTS

1.0 THREE-PHASE CIRCUITS

- 1.1 Phase and line voltage measurements in the Power Supply
- 1.2 voltage, current, and power measurements in a wye-connected circuit
- 1.3 Voltage, current, and power measurements in a delta-connected circuit

2.0 THREE PHASE POWER MEASUREMENT

- 2.1 Voltage, current, and power measurements in a wye-connected circuit
- 2.2 Voltage, current, and power measurements in a delta-connected circuit

3.0 PHASE SEQUENCE

Objective: To determine what a phase sequence is and why it is important to know the phase sequence of a three-phase power system. Also to determine the phase sequence of a three-phase power system using an oscilloscope.

- 3.1 Determining the Phase Sequence of a Three-Phase Power System Using an Oscilloscope
- 3.2 Connecting an Oscilloscope to a Three-Phase Power System
- 3.3 Determining the Phase Sequence of the Three-Phase Ac Power Source

UNIVERSAL AC/DC POWER SUPPLY EM-30-09-02-01



- Power Input Requirement: Three Phase 240V/415V, 50Hz
- Connection: 3P+N+PE Output terminations by using 4mm terminals socket.
- Input fed with AC 5 pin plug 32A AC Plug and Socket.
- Pilot lamps provided to indicate all live supplies.
- With On/Off Switch
- Fuse Protection.
- Fixed Single Phase AC Power Supply: 3 x 240V AC; 8A AC (Phase To Neutral; R-N, B-N, Y-N)
- Fixed Three Phase AC Power Supply: 3 x 450V AC; 8A AC (Phase To Phase; R-Y, Y-B, B-R)
- Adjustable Single Phase & Three Phase AC / DC Power Supply (Simultaneously):
 - 3 x 0 ~ 450VAC; 8A AC (Phase To Phase)
 - 3 x 0 ~ 240V AC; 8A AC (Phase To Neutral)
 - 1 x 0 ~ 450VDC; 8A DC (DC Output)
- Three Phase 5 Pin AC Plug 32A with 1.5m length 5 core power cable.
- Instruction Manual

**RESISTIVE LOAD UNIT
EM-30-07-01**



Single & Three phase Resistive Load 7 steps variable per phase

- Max Power : 3x100 watt
- Voltage : 240/415 Volt
- Frequency : 50Hz
- Protection : Fuse

**INDUCTIVE LOAD UNIT
EM-30-07-02**



Single-Three phase Inductive Load 7 steps variable per phase

- Max Power : 3x100 VAR
- Voltage : 240/415 Volt
- Frequency : 50Hz
- Protection : Fuse

**DIGITAL AC VOLTMETER
EM-30-13-03 (4 UNITS)**



- Measurement range : AC 0 ~ 600V
- Display : 3 ½ digits 14.2 mm LED
- Accuracy : $\pm 0.2\% \pm 1$ digit
- Resolution : 1V
- Input impedance : 1M Ω
- Power source : 220Vac, 50/60 Hz
- Unit Type : Panel H1
- Terminals: 4mm Safety Sockets

**DIGITAL AC AMMETER
EM-30-13-04 (4 UNITS)**



- Measurement range : AC 0 ~ 5A
- Display : 3 ½ digits 14.2 mm LED
- Accuracy : $\pm 0.3\% \pm 1$ digit
- Resolution : 0.01 A
- Input impedance : < 0.1 Ω
- Power source : 220Vac, 50/60 Hz
- Unit Type : Panel H1
- Terminals: 4mm Safety Sockets

THREE PHASE POWER QUALITY METER EM-30-13-16



- Display Type: HD LCD Display
- Real-Time Measurement
 - Phase voltage: V1, V2, V3, VInavg
 - Line voltage: V12, V23, V31, Vllavg
 - Current: I1, I2, I3, Iavg, In
 - Active power: per phase and total active power
 - Reactive power: per phase and total reactive power
 - Apparent power: per phase and total apparent power
 - Power factor: per phase and total power factor
 - Total frequency
- Energy And Demand
 - Four quadrant active energy: Import, Export, Total, Net
 - Four quadrant reactive energy: Import, Export, Total, Net
 - Active, Reactive, Apparent demand

- Power Quality Analysis
 - Voltage unbalance
 - Current unbalance
 - Voltage THD (Total harmonic distortion), Odd-even harmonic distortion
 - Voltage individual harmonics, Crest factor
 - Current THD, Odd-even harmonic distortion
 - Current individual harmonics, K factor
- Communication
 - Ethernet 10/100M network port
 - RS485 communication port
 - MODBUS RTU communication protocol
- Trend Logging
 - Phase voltage
 - Line voltage
 - Current
 - Active power
 - Reactive power
 - Apparent power
 - Power factor
 - Frequency
 - Three-phase unbalance
 - Active energy
 - Reactive energy
 - Apparent energy
 - Phase
- Settable Logging Interval
 - Logging from 1min to 60min, interval settable
- Software Accessibility
 - 4 Tariffs (DataLog) Sharp, peak, flat, valley in different season and schedule (TOU)
 - Accuracy: $\pm 0.5\%$
 - Protection: Fuse
 - Power Supply: AC240VAC, 50Hz
 - Terminals: 4mm Safety Socket

POWER MANAGEMENT SOFTWARE EM-30-13-16-PMS



- PC management software; web browse data
- True-RMS measuring parameters
- ANSI and IEC 0.2 accuracy class
- Power quality analysis
- 4 quadrant energy
- Data logging
- Measure individual harmonics from 2nd to 49th
- TOU, 4 Tariffs, 6 Seasons, 6 Schedules
- Ethernet 10/100M network port interface

**PHASE SEQUENCE METER
EM-30-13-08**



- Display Type: Analog
- Input Voltage: Three Phase 150V ~ 500VAC
- Accuracy: $\pm 0.5\%$
- Terminals: 4mm Safety Socket
- Unit Type : Panel H1

**CONNECTING SAFETY TEST LEAD SET
EM-30-15-03**



- The set consists of safety test lead set in 5 different coded colors and lengths and 2 type bridging plug set chosen to allow the realization of all experiment manual.
- Leads are capable of 15A current safety plugs (4mm): 25cm x 10 units, 50cm x 10 units, 100cm x 5 units, 150cm x 5 units
- 19mm Bridging Plug Set x 10 units
- 19mm Bridging Plug Set (Stackable) x 10 units

**EXPERIMENTAL TABLE
EM-30-16-01-02**



- 5' Standard Desktop
- Dimension:
- Length : 1500mm
- Width : 800mm
- Height : 850mm
- 3 Layer Drawer (Optional)

**EXPERIMENT PANEL FRAME
EM-30-16-02-02**



- Din Standard A4 With Two Shelves
- Side Frame: T Shape
- Dimension:
- Length : 1450mm
- Width : 20mm
- Height : 300mm

Note: Due to products continuous development process, layout and specification may change without prior notices.