EDITION 2

ELECTRICAL ENGINEERING

AMTEC TECHNIQUIP

Engineering The Future

Suppliers Of Educational Engineering Equipment & Accessories

MADE IN SOUTH AFRICA

30 YEARS OF ENGINEERING EXCELLENCE

BEE LEVEL 2 company 125% recognition

+27 (0) 11 823 2678 SALES @AMQUIP.CO.ZA | WWW.AMTECTECHNIQUIP.CO.ZA

Amtec Techniquip applies 30 years of knowledge & experience in the design, manufacture and import of educational engineering equipment, accessories, instrumentation and consumables.

During this time, we have been a market leader in innovation, bringing many new concepts and products to the educational industry while expanding our comprehensive range of quality teaching equipment to a level unsurpassed by any other company in the industry.

This includes unique new methods of introducing and educating the learners in all facets of modern engineering. Our products are visual and demonstrational to best teach and explain concepts from basic engineering, all the way up to research and thesis levels in the most advanced forms of engineering.

Amtec Techniquip's commitment to the end user...

AMTEC offers a personal approach to each and every end user as we are always available to meet and discuss any requirements face-to-face basis to provide a tailor-made solution.

AMTEC have a large footprint throughout Southern Africa and regularly visit the countries and provinces we service while also keeping our customers up-to-date with any new products and innovations we bring to the market.

AMTEC supplies expert training on all our products. Our team of experts offer training at the end user or alternately at our head office in Jhb. All our products are supplied with their relevant manuals, course materials and exercise guides.

AMTEC offers unmatched after-sales service and customer support. All our equipment is supplied complete with ICT (Installation, Commissioning & Training). Our sales and support teams are at the end user's disposal should any assistance be needed during the life of a product.

AMTEC offers an extended Service and Maintenance plan to make sure that your equipment and apparatus are maintained to ensure a long lifespan with little or no downtime.

AMTEC makes use of only quality components to ensure reliability and longevity of all our manufactured equipment. This provides the end user with peace of mind and a product that will stand the test of time in an educational environment.

AMTEC has the manufacturing capability to R+D and manufacture "one-off" designs and customise any equipment within our range to meet the end users requirements. We have many accessories, add-ons and tooling that can work in conjunction with our equipment and trainers.

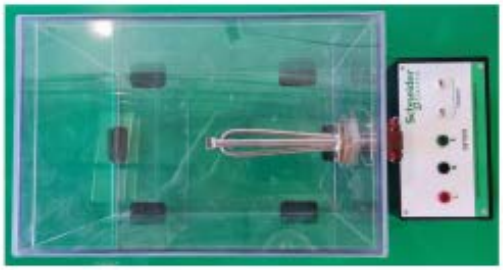
AMTEC offers a 24-month factory warranty on all our products supported by the backing of our local & international suppliers.

AMTEC UNIQUE SOLUTIONS
FOR UNIQUE CUSTOMERS

AMTEC TECHNIQUIP manufactures and imports a wide variety in our standard range of equipment, and we have also supported many large Corporations, Industrial companies and Private Training centers throughout Southern African with tailored, bespoke solutions for their individual requirements. Some examples of Projects undertaken by AMTEC:

- Schneider Electric - collaboration for Electrical panels and desktop trainers as part of an Educational Upliftment initiative in neighboring African countries.
- Mercedes Benz East London Plant - Electrical and Mechanical trade test center equipment.
- SAB South African Breweries Training center Rosslyn - Renovation and extension of U-shaped cubicles.
- Anglo Platinum Rustenburg Training center - PLC individual cubicles.
- Sasol Colliery Trade test center Standerton - Full house of Trade Testing equipment.
- Lephalale TVET - 4 sided cubicles with interchangeable Electrical panels.

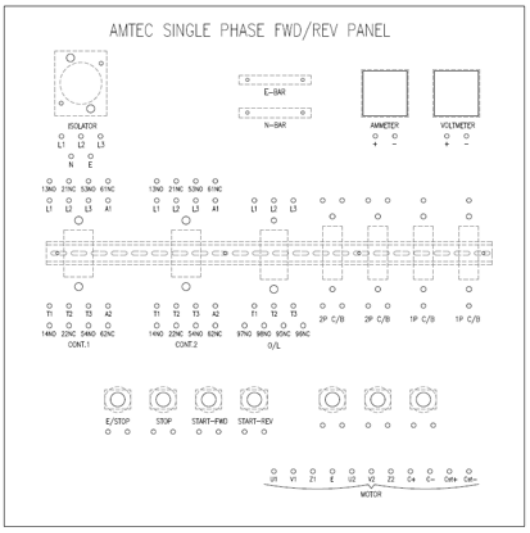
AMTEC UNIQUE SOLUTIONS
FOR UNIQUE CUSTOMERS



AMTEC PANEL OVERVIEW

AMTEC TECHNIQUIP Electrical panel overview

- Electrical grade phenolic board is being used according to SANS specs for resistance (Fire retardant and self-extinguishing)
- Silk-screen printed ABS panel layout also available
- Connections are available via 6mm brass studs (High Conductivity and low resistance) or connection via 4mm plug in sockets
- High Quality components are used which are aligned with International standards
- Electrical lock out via key switch or electrical isolator 2m mains lead included with workstation
- Studs are spaced for safe and easy connection
- AMTEC labels our panels and connections points with CNC engraving, offering a professional and longer-lasting finish
- We can alter or re-arrange some of these points and labels to cater to customers needs and requirements
- We are able to supply a PDF of a panel layout prior to manufacture



AMTEC PANEL CONFIGURATIONS

AMTEC Techniquip has a variety of panel configurations available to aid a lecturer in training a student for fault finding, repairs and panel wiring.

Fault finding Panels/ Starters: (FF)

- Pre-wired fully functional electrical panel
- Student identify, locate and repair faults
- Includes pre-wired faults in a lockable fault box, which is triggered by toggle switches
- Includes wiring diagram of panel and preset faults
- All AMTEC electrical panels are available in this FAULT FINDING configuration
- Additional components such as Motors, Workstations and PLCs may be added on request

Studs At The Bottom: (SB)

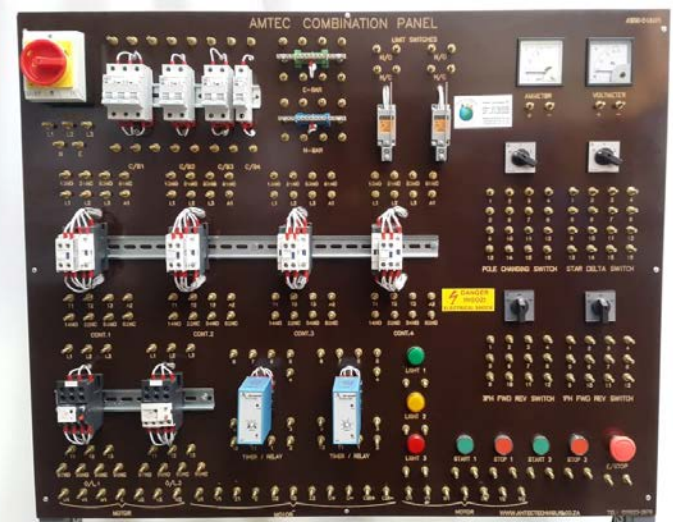
- All components connections are wired to brass studs at bottom of panel
- Student required to ring-out and identify studs & then hard wires entire panel
- Studs may be labeled by engraving for identification
- This configuration saves material costs as it uses less wire
- Includes wiring diagram of panel and preset faults
- All AMTEC electrical panels are available in this STUDS AT THE BOTTOM configuration
- Additional components such as Motors, Workstations and PLCs may be added on request

Plug in Lead: (PI)

- All components connections are wired to plug in lead sockets
- Sockets may be labeled by engraving for identification
- This configuration saves time as students do not need to hard wire the panel
- This configuration saves on material costs as it uses no wire buy reuseable plug in leads
- Includes wiring diagram of panel and preset faults
- All AMTEC electrical panels are available in this PLUG IN configuration
- Additional components such as Motors, Workstations and PLCs may be added on request

Unwired Panel: (UN)

- All components wired to studs which are located along side their respective components
- Student wires Entire panel by connecting studs
- Studs may be labeled by engraving for identification
- Includes wiring diagram of panel
- All AMTEC electrical panels are available in this UNWIRED configuration
- Additional components such as Motors, Workstations and PLCs may be added on request



Trace & Repair / Missing link / Open type starter panel: (MLO)

- Trace and repair type Pre-wired Panel
- Identify faults and repair faults by connecting the missing link studs
- This is an open/bare type of wired electrical starters
- Studs may be labeled by engraving for identification
- Includes wiring diagram and fault sheet
- All AMTEC electrical panels are available in this MISSING LINK configuration
- Additional components such as Motors, Workstations and PLCs may be added on request

Trace & Repair / Missing link / Enclosure panel: (MLE)

- Enclosed type Pre-wired Panel
- Enclosed type simulates industry specified starters in enclosures as one would find in industry.
- Identify faults and repair faults by connecting the missing link studs
- Studs may be labeled by engraving for identification
- Includes wiring diagram of panel & fault sheet.
- All AMTEC electrical panels are available in this ENCLOSED MISSSING LINK configuration
- Additional components such as Motors, Workstations and PLCs may be added on request

AMTEC PANEL LIST

List of current available Training Panels:

COMBINATION TYPE PANELS:

Amtec has designed a number of combination / multiple task panels to enable end users to cut costs and complete various tasks on a single panel.

- **Combination Wiring Type Starter Panel A:**

Single Phase FWD/REV (Manual (Rotary Switch), Semi-Auto & Fully Auto / Oscillating Sim)
Three Phase FWD/REV (Manual (Rotary Switch), Semi-Auto & Fully Auto / Oscillating Sim)
Star/Delta (Manual (Rotary Switch), Semi-Auto & Fully Auto)
Pole Changing (Manual (Rotary Switch), Semi-Auto & Fully Auto)
Sequence Starting
Direct On Line

- **Combination Wiring Type Starter Panel B:**

Auto Transformer
Single Phase FWD/REV (Manual/Rotary Switch, Semi-Auto & Fully Auto / Oscillating Sim) Three Phase FWD/REV (Manual/Rotary Switch, Semi-Auto & Fully Auto / Oscillating Sim) Star/Delta (Manual/Rotary Switch, Semi-Auto & Fully Auto)
Pole Changing (Manual (Rotary Switch), Semi-Auto & Fully Auto)
Sequence Starting
Direct On Line

- **Task specific Panels:**

  - Single Phase FWD/REV Panel (Manual/Rotary Switch, Semi-Auto & Fully Auto)
  - Three Phase FWD/REV Panel (Manual/Rotary Switch, Semi-Auto & Fully Auto)
  - Star / Delta Combination Panel (Manual/Rotary Switch, Semi Auto & Fully Auto)
  - Pole Changing / Two Speed Panel (Manual/Rotary Switch, Semi-Auto & Fully Auto)
  - Sequence Starting Combination Panel (Allows 7 various sequence starting techniques)
  - Energy Metering / KWH Combination Panel (Includes 3 x 1PH, 1 x 3PH & Load Balancing)

AMTEC PANEL LIST

Task Specific Training Panels

Available in various configurations with connections via brass studs or plug in sockets:

- Trace & Repair / Missing Link (240V / 400V Control Circuits)
- Panel Wiring (240V / 400V Control Circuits)
- Fault Finding (240V / 400V Control Circuits)

- PLC Controlled Motor Starter Panel (Various available & Custom projects can be built)

- Demountable Motor Control Panel

- Single Phase Manual FWD/REV Panel
- Single Phase Semi-Auto FWD/REV Panel
- Single Phase Fully Auto / Oscillating FWD/REV Panel

- Three Phase Manual / Rotary Switch FWD/REV Panel
- Three Phase Semi-Auto FWD/REV Panel
- Three Phase Fully Auto / Oscillating FWD/REV Panel

- Star-Delta Manual / Rotary Switch Starter Panel
- Star-Delta Semi-Auto Starter Panel
- Star-Delta Fully Auto Starter Panel
- Star-Delta / FWD/REV Starter Panel
- Enclosed / Open Type Branded Star-Delta Starter (Full, MCE, ZEST, LOVATO,TELE, ABB)

- Pole Changing / Two Speed Manual / Rotary Switch Starter Panel
- Pole Changing / Two Speed Semi-Auto Starter Panel
- Pole Changing Fully Automatic / Oscillating Starter Panel

- Automatic Slip Ring Resistance Starter Panel (Two Stage Start)
- Automatic Slip Ring Resistance Starter Panel (Three Stage Start)
- Liquid Resistance Starter Panel c/w Dipper Unit
- Plug in – Neutral Slip Ring 4 Step Joystick Panel
- Slip Ring Hoist Panel
- 4 Step Joystick PLC Slip Ring Panel

- Fully Automatic Auto Transformer Starter

- Sequences Starter 1 – 7 Tasks

- Relay / Alarm Training Panel
- Relay / Alarm Panel with Relay Tester

- 3 Heat, 5 Heat Simmerstat Panel with BC Lamps
- Basic Switching Training Panel

AMTEC PANEL LIST

Task Specific Training Panels Continued...

- CT/PT(VT) Training Panel (16V) Basic
- CT/PT(VT) Training Panel (110V)
- CT/PT(VT) Training Panel (110V) includes Transformer Calculations

- Limit / Pressure Switch Panel

- Single Phase Configurable Transformer Panel (For Star- Delta Configs)
- Three Phase Configurable Transformer Panel (For Star-Delta Configs)
- Three Phase Industrial Transformer 1.1KVA Star-Delta Configurable

- Energy Meter / KWH Meter Panel (3 x Single Phase Meters)
- Energy Meter / KWH Meter Panel (1 x Three Phase Meter)
- Energy Meter / KWH Meter Panel c/w Range Extension
- Load Balancing Panel

- Ward Leonard Motor / Generator Set
- AC Motor / DC Generator Panel & Motor Set
- DC Motor / AC Generator Panel & Motor Set

- DC FWD/REV Rotary Switch Starter Panel
- DC FWD/REV Face Plate Starter Panel
- DC FWD REV 4 Step Joystick Controller Panel (Millright)

- VFD / VSD Training Commissioning / Programming Panel

- Cable Phasing Panel

- Direct On-Line Starter Panel

- Stove Trainer Panel

- Inverter / UPS Training Panel

Please enquire about your motor and load configurations for your Electrical panels

AMTEC PANEL AND WORKSTATION ACCESSORIES

Amtec Techniquip manufacture a large range of Trade-test, Combination and Specialty panels. These are available on a variety of workstations depending on customers needs and workshop requirements.

- AMTEC can offer many options on workstations, but are also able to work together with customers to R+D and customize a solution that will best work for their requirements.
- AMTEC offer numerous additional accessories to customize the workstations:
    - PAPILS - Plug in lead set - we offer complete sets of plug in leads for 1 and 3 phase applications
    - PA00RT - Relay Tester
    - PA00CT - Continuity Tester
    - OW18A - Multimeter - panel mounted for convenience
    - WAC004 - Heavy duty Lockable castor-wheels - can be added to most workstations to make them easy to move, store or rearrange
    - Fixed Motor shelves, Mobile Motor trolleys, Fixed Motor plates - various options are available for mounting of the motors required for panel tasks
    - Panel mounted
        - PAAV240 - Voltmeter 240VAC
        - PAAV400 - Voltmeter 400VAC
        - PAAVDC - Ammeter 240VDC
    - Plug sockets - three phase or single phase
    - Panel backing - to increase the safety of panels enclosing rear of panels

AMTEC WORKSTATIONS

AMTEC training panels can be mounted to various Workstations configurations as follows:

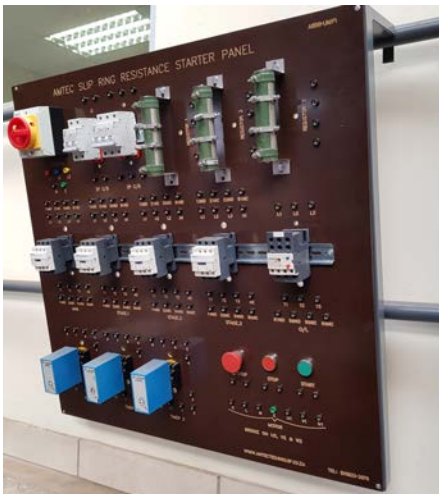
Amtec Double-sided Compact Workstation

Amtec Compact Workstation with Motor mount

Amtec Laboratory Workstation with Motor mount

Amtec Blue enclosure for Table-top trainers

Amtec Cube - 4 sided Workstation



Amtec Hanging frame

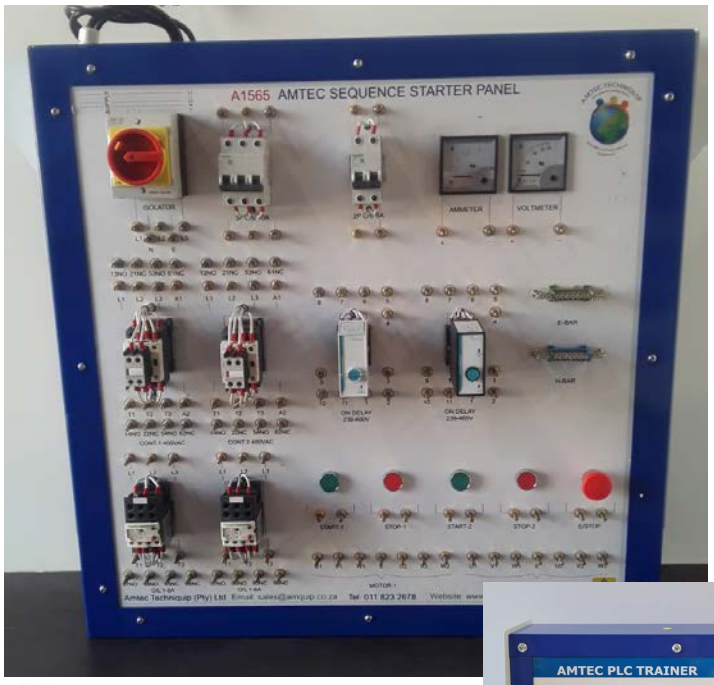
Amtec Double Cubicle Workstation

Amtec Hinged Workstation

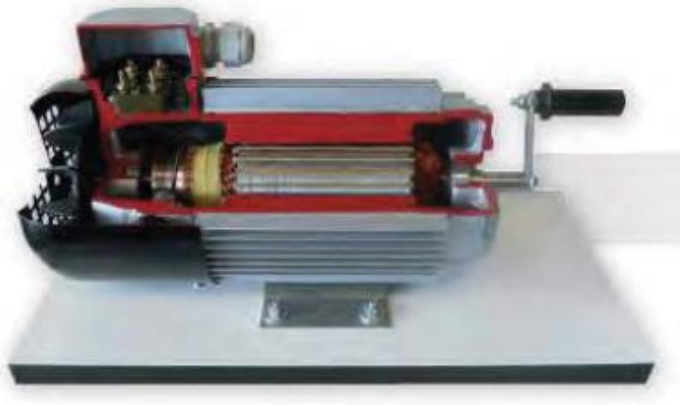
Amtec Benchtop Workstation

AMTEC NEW-LOOK DESKTOP MODULES AND WALL MOUNTS

AMTEC Techniquip has developed a new range of modular desktop panels, enclosures and workstations.
Modern design, laser-engraved and powder-coated.
Chat to our sales team to get more info!



AMTEC SECTIONED EQUIPMENT

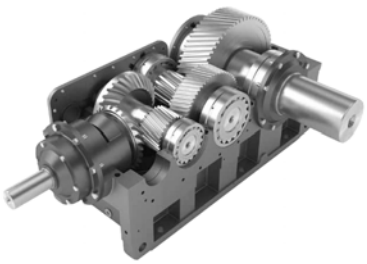


Amtec has designed and manufactured a number of motor testing sets with education and learners in mind. Motor Testing sets allow for a visual experience to understand the internal construction and workings of various electric motor available on the market today. Motors are sectioned and painted various colours to identify the “cut line” and various components within the sectioned unit. Motors are supplied complete with an A3 poster detailing the various components or parts used in the motor.

FEATURES:

- User Manual and A3 poster of exlopded sectioned motor.
- Epoxy powder coated table top frame.
- Painted various colours to define the various cuts and /or compoents.
- Safe & Easy to Use.
- Supplied Standard with Amtec’s 24 month warrantee.

AMTEC offers sectioned equipment such as Pumps, Valves and Gearboxes



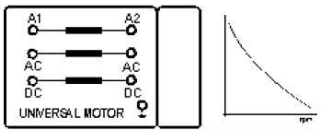
AMTEC ELECTRIC MOTORS

All machines are of industrial nature and suitable for continuous operation and are available in 0.2 KW or 0.3 KW most suitable for training, research and educational applications. AMTEC motors are provided complete with silkscreen printed junction box with connection available via:

- BRASS STUDS
- PLUG IN SOCKETS
- POWER CABLE 2 METER

DC electrical machines:

- Design: with typical industrial characteristics
- Complete with base plate and coupling cog for easy engagement with other machine
- Input/output with standard 4 mm safety sockets
- Imprinted terminal boards with the synoptic
- Two shaft ends on request
- Manual explaining theory and practice
- Protection against thermal overload
- also available: 1kW, 3kW



MOD.3130E Universal Motor

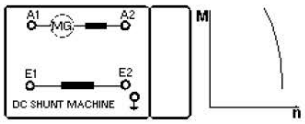
Modes: AC motor DC series motor

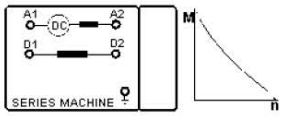
- Nominal voltage: 220V DC/AC
- Nominal speed: 3000rpm
- Nominal power: 0,3kW (DC) / 0,2kW (AC)

MOD.3140 Shunt Wound Machine

Modes: Motor, self- and externally excited generator;

- Nominal voltage: 220V
- Excitation voltage: 220V
- Nominal speed: 3000rpm
- Nominal power: 0,25Kw (mot) / 0,2kW(gen)





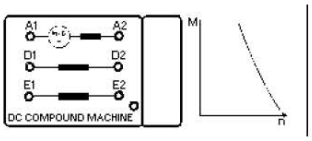
MOD.3150 Series Wound Machine

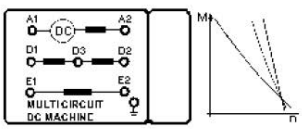
- Modes: series motor
- Nominal voltage: 220V
- Nominal speed: 3000rpm
- Nominal power: 0,2kW

MOD.3160 Compound Wound Machine

Modes: Motor, self-and externally excited generator.

- Nominal voltage: 220V
- Excitation voltage: 220V
- Nominal speed: 3000rpm
- Nominal power: 0,25kW(mot)/0,2kW(gen)





MOD.3165 Multi circuit Wound Machine

Modes: Shunt wound motor/generator, series wound motor, compound wound motor/generator.

- Nominal voltage: 220V
- Excitation voltage: 220V
- Nominal speed: 3000rpm
- Nominal power: 0,25kW (mot)/0,15kW (gen)

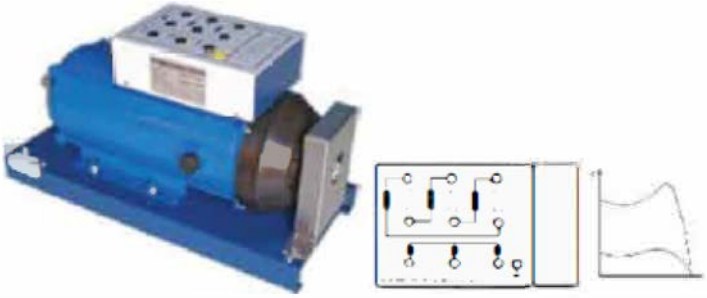
AMTEC ELECTRIC MOTORS

Common characteristics for all electrical machines:

- Design: with typical industrial characteristics
- Complete with base plate and coupling cog for easy engagement with other machine
- Input/output with standard 4 mm safety sockets
- Imprinted terminal boards with the synoptic
- Two shaft ends on request
- Manual explaining theory and practice
- Protection against thermal overload
- also available: 1kW, 3kW

MOD.3040
3-Phase Squirrel Cage Motor

- Nominal voltage: 220/380V, delta/star / 50Hz
- Nominal speed: 2800rpm
- Nominal power: 0,37kW
- Cosφ=0,69



MOD.3050
3-phase Slip Ring Asynchronous Motor

- Nominal voltage: 230/400V (delta/star)/ 50Hz
- Nominal speed: 2800rpm
- Nominal power: 0,2kW
- Cosφ=0,82

MOD.3060
3-Phase Dahlander Motor 2/4 Poles

- Nominal voltage: 400V (star-star) / 50Hz
- Nominal speed: 2800/1400 rpm
- Nominal power: 0,29/0,22kW
- Cosφ=0,8/0,7

MOD.3065
3-Phase motor 2/4 Poles
Two separate windings

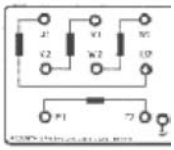
- Nominal voltage: 400V (star/star) / 50Hz
- Nominal speed: 2800/1400rpm
- Nominal power: 0,6/0,4kW

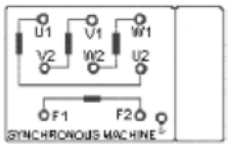
AMTEC ELECTRIC MOTORS

MOD.3070
Three Phase salient poles Synchronous Generator

Modes: motor, generator.

- Nominal vol age: 220/380V/ 50Hz (delta/star)
- Excitation voltage: 200Vdc
- Nominal speed: 3000rpm
- Nominal power: 0,25kW(gen)/0,2kW(mot)





MOD.3074
Three Phase Synchronous Machine

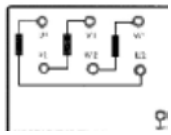
Non-salient pole rotor.

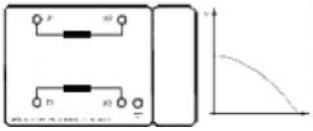
Modes: motor, generator

- Nominal voltage: 220/380V/ 50Hz (delta/star)
- Excitation voltage: 200Vdc
- Nominal speed: 3000rpm
- Nominal power: 0,25kW(gen)/0,2kW(mot)

MOD.3080
3-phase Reluctance Motor

- Nominal voltage: 220V/380V (delta/star)/ 50Hz
- Nominal speed: 3000rpm
- Nominal power: 0,2kW
- Cosφ=0,6

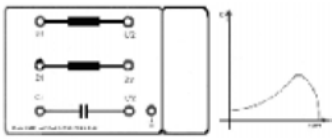




MOD.3072
Single Phase Synchronous Generator

Non-salient pole rotor.

- Nominal voltage: 230V
- Excitation voltage: 200V DC
- Nominal power: 0,25 kW
- Speed: 3000rpm

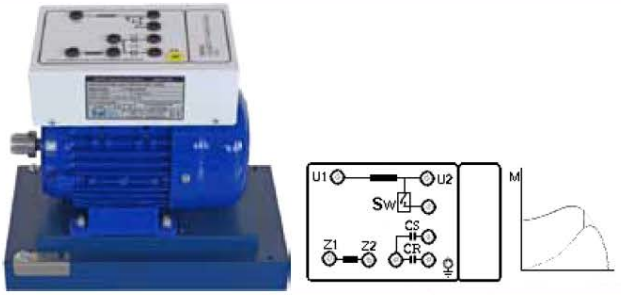


MOD.3090
Single Phase a.c. Capacitor Run Motor

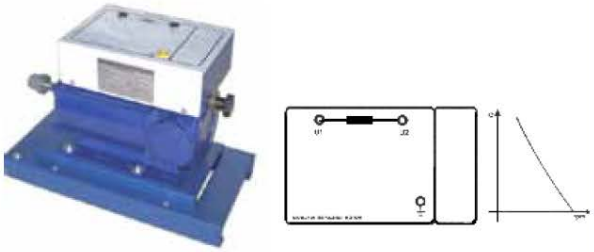
- Nomina voltage: 230Vac/50Hz
- Speed: 2800rpm
- Nomina power: 0,37kW
- Cosφ=0,94

AMTEC ELECTRIC MOTORS

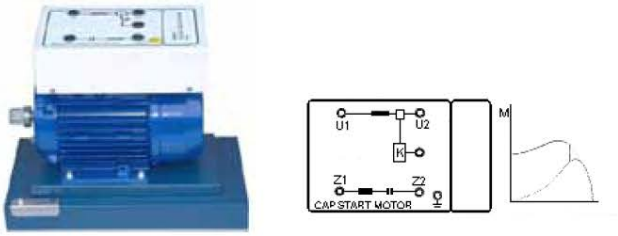
MOD.3095
Split phase motor 2P 220V
Single-phase motor with starting auxiliary phase, complete with centrifugal starting switch.
- Nominal voltage: 230V AC 1PH /50Hz
- Speed: 2800 rpm
- Nominal power: 0,25kW
- Starting capacitor and run capacitor



MOD.3100
Single Phase Repulsion Motor
Motor with infinitely variable speed in both directions.
- Nominal voltage: 230V single-phase, 50Hz
- Nominal speed: 3000-0-3000 rpm
- Nominal power: 0,2kW

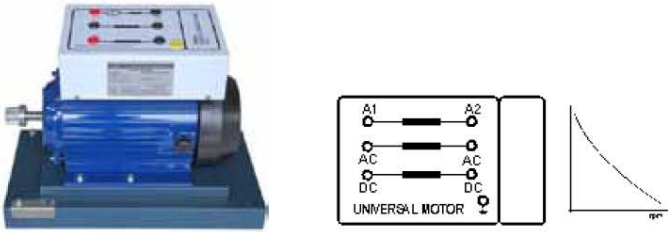


MOD.3120
Single Phase a.c. Capacitor Start Motor
- Nominal voltage: 230V AC / 50Hz
- Speed: 2800 rpm
- Nominal power: 0,3 Kw
- Starting capacitor



MOD.3122 Single Phase a.c. Capacitor Start/Capacitor Run Motor
Complete with starting relay.
- Nominal voltage: 230V AC single-phase/ 50Hz
- Speed: 2800 rpm
- Nominal power: 0,24 Kw
- Starting capacitor and run capacitor

MOD.3130E
Universal Motor
Modes: AC motor/ DC series motor.
- Nominal voltage: 220V DC/AC
- Nominal speed: 3000rpm
- Nominal power: 0,3Kw (DC) / 0,2kW (AC)



**AMTEC can also supply Motor Test Benches, Sectioned motors, Dissectible Motor sets and Motor Test benches.

Please contact us if you have a special requirement or need more information on the motors, motor training panels, accessories and sectioned equipment we can supply.

AMTEC MOTOR TEST UNITS

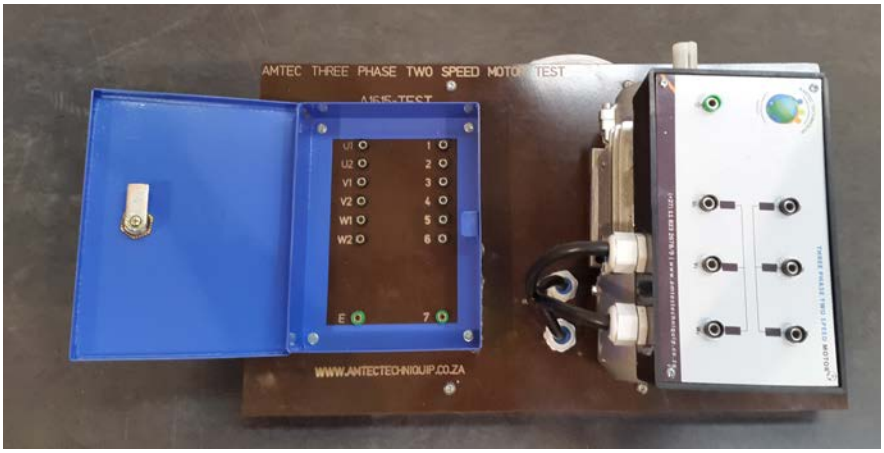
OVERVIEW

Amtec has designed and manufactured a number of motor testing sets with education and technicians in mind. Motor Testing sets allow for the following Tests to be performed on various motor available on the market today:

- Visual Inspections.
- Mechanical Inspections.
- Electrical Inspection.

Trainer includes a lockable junction box allowing the trainer to perform the following:

- Switch the internal motor windings so they are never the same for various learners.
- Add Short Circuit Bridges to the internal motor windings.
- Add Closed circuit bridges to the internal motor windings.



FEATURES:

- User Manuals, test & fault sheet for the various inspections.
- Epoxy powder coated table top frame.
- Lockable epoxy powder coated winding junction box.
- Prewired and assembled.
- Various leads for manipulation of the windings.
- Connections to winding are made via 4mm safety plug in sockets.
- Safe Relaible & Easy to Use.
- Supplied Standard with Amtec's 24 month warrantee.

Motor Test Sets Available:

- A1612-TEST – Single Phase Squirrel Cage Motor Test Unit(Twin Capacitor type).
- A1613 –TEST – Single Phase Squirrel Cage Motor Test Unit (Single Capacitor Type).
- A1614-TEST – Three Phase Squirrel Cage Motor Test Unit.
- A1615-TEST – Pole Changing / Two Speed Motor Test Unit.
- A1616-TEST – Three Phase Asynchronous Slip Ring Motor Test Unit.
- A1617-TEST – Direct Current Compound Excitation Motor Test Unit.

AMTEC VSD / VFD TRAINER PANEL

AMTEC Techniquip manufactures a variety of VSD Trainer Panels from fundamental principles to Advanced fault recogniion.

Amtec Variable Speed Drive Training Panel

This panel covers the principles of hard wiring and programming of Variable Speed Drive Units
Available with the following options (on request):

- Most Switching Methods covered
- Various VSD types Available
- Panel available prewired with faults / as below / missing link type
- Electrical lock out / key control and indication lamp.
- 16 A 3 phase Plug
- Connections available via 6mm Brass studs or 4mm plug in sockets
- Workstation which includes frame (refer to workstation for options)
- 0.55Kw 3 phase 220/380 V motor
- Main and Control circuit diagrams
- Flywheel and protective cover

AMTEC DEMOUNTABLE / DISSECTABLE MOTOR SET

Amtec Demountable Motor Set

A unique and robust motor training system for the study of the construction, operation, control and characteristics of electrical machines commonly in use.

Components supplied allow the assembly and coupling of 2 machines.

Motors are rated at 0.37KW, F80, and are available in both high and low voltage systems.

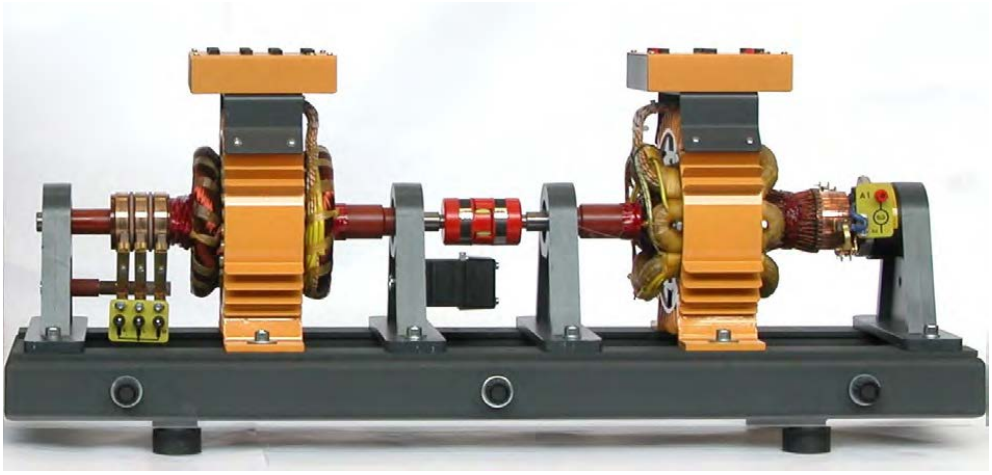
COMPONENTS

- Slipring Rotor
- Allen Keys
- Coupling Set
- Assembly Bolt & Nut Sets
- 4x Aluminium Stators (Split Phase, Capacitor, 3 phase, DC)
- DC Rotor
- DC Brushgear
- Clamping Set
- Experiment Manual
- Cage Rotor
- Slipring Brushgear
- Centrifugal Switch Set
- 4x Glass-Filler Nylon End Shields

ELECTRICAL ASSEMBLY COMBINATIONS

- Split Phase Motor 3 ph
- Cage Motor
- 3 ph Alternator
- DC Shunt Motor
- Universal Motor
- 3 ph Slip Ring Motor 1 ph Alternator DC
- Series Motor
- Capacitor Start and/or Run Motor 3 ph Synchronous Motor
- DC Generator
- DC Compound Motor

DELORENZO DISSECTIBLE ELECTRICAL MACHINE



DL 10280SD

The system is a complete kit of components suitable for assembling the rotating electric machines, both for direct current and for alternating current. It allows the students to carry on a critical and well analyzed assembly, in order to understand the production techniques before performing practical tests of the operating characteristics.

The system is supplied at 220/380 AC 50 Hz and 220 DC.

APPLICATIONS

- Assembly, operation and tests on electrical machines:
- Study of the magnetic field
- Principles of the electromagnetic induction
- Separately shunt, series and compound excited dc motors
- Separately shunt, series and compound excited dc generators
- Induction motors: three-phase slip ring and squirrel cage, single-phase repulsion and with capacitor
- Dahlander connection
- Three-phase synchronous motor
- Induction regulator and phase transformer
- Alternator
- Universal motor

DL 10280SD Components

1. Baseplate
2 Four removable bearing housings
3. Coupling
4. Elastic buffer
5. Optical speed transducer
6. Clamping screws
7. Keys
8. Dc stator, with salient poles
9. Ac stator, with three-phase winding
10. Commutator rotor
11. Brush holder with two brushes
12. Squirrel cage rotor
13. Slip ring rotor
14. Brush holder with 3 pairs of brushes

EXPERIMENTS for the manual configuration

Nr.	Experiment	10280	10281	10282N	10283	10284	10285	10185	10310	10300A 10284	10116	10125
1	Flux produced by the poles	X	X	X								
2	Main magnetic field	X	X	X								
3	Intensity of the magnetic field	X	X	X								
4	Induced voltage	X	X	X								
5	Inter pole effect	X	X	X								
6	No-load magnetic neutral axis	X	X	X								
7	Rotating magnetic field	X	X	X	X							
8	3-phase squirrel cage motor, 2 poles, 24 VΔ	X	X	X						X		
9	3-phase squirrel cage motor, 2 poles, 42 VY	X	X	X	X					X		
10	3-phase squirrel cage motor, 2 poles, 24 VΔΔ	X	X	X						X		
11	3-phase squirrel cage motor, 2 poles, 42 VYY	X	X	X						X		
12	3-phase squirrel cage motor, 4 poles, 24 VΔ	X	X	X						X	X	
13	3-phase squirrel cage motor, 4 poles, 42 VY	X	X	X						X		
14	3-phase Dahlander motor, 4/2 poles, 42 VΔ/YY	X	X	X				X		X		
15	Split phase motor	X	X	X	X					X		
16	Capacitor start and run motor	X	X	X	X					X		
17	3-phase motor with wound rotor, 2 poles, 42 VYY	X	X	X	X					X		
18	Phase shifter	X	X	X	X	X	X					
19	Induction regulator	X	X	X	X	X	X					
20	3-phase synchronous induction motor, 2 poles, 24 VΔ	X	X	X						X		X
21	3-phase synchronous induction motor, 2 poles, 24 VΔΔ	X	X	X						X		X
22	DC motor with separate excitation	X	X	X	X					X		
23	DC motor with shunt excitation	X	X	X	X					X		
24	DC motor with series excitation	X	X	X	X					X		
25	DC motor with compound excitation, long shunt	X	X	X	X					X		
26	DC motor with compound excitation, short shunt	X	X	X	X					X		
27	Single phase series motor	X	X	X						X		
28	Repulsion motor	X	X	X	X					X		
29	Synchronous motor winding resistance	X	X	X								
30	Synchronous motor no-load test	X	X	X	X							
31	Synchronous motor short-circuit characteristics	X	X	X	X							
32	Synchronous motor short-circuit test	X	X	X	X							
33	Synchronous motor Behn - Eschenberg's method	It uses the data from experiments 29, 30, 31										
34	Synchronous motor load test	X	X	X	X							
35	Synchronous motor conventional efficiency	It uses the data from experiments 29, 30, 32, 33										
36	Parallel connection of the alternator with the mains	X	X	X	X				X			
37	Alternator as synchronous motor	X	X	X	X				X			
38	DC generator winding resistance	X	X	X								
39	DC generator test of the no-load motor (Swinburne)	X	X	X	X							
40	DC generator no-load e.m.f.	X	X	X								X
41	DC generator excitation characteristics	X	X	X								X
42	Separate excitation dynamo	X	X	X	X							X
43	Shunt excitation dynamo	X	X	X	X							X
44	Series excitation dynamo	X	X	X	X							X
45	Compound excitation dynamo	X	X	X	X							X

AMTEC SNAPTRICITY TRAINING KIT

The Snaptricity set allows the reuse os electronic components to teach a variety of fundamentals in electronics.

Snaptricity set SCR750:

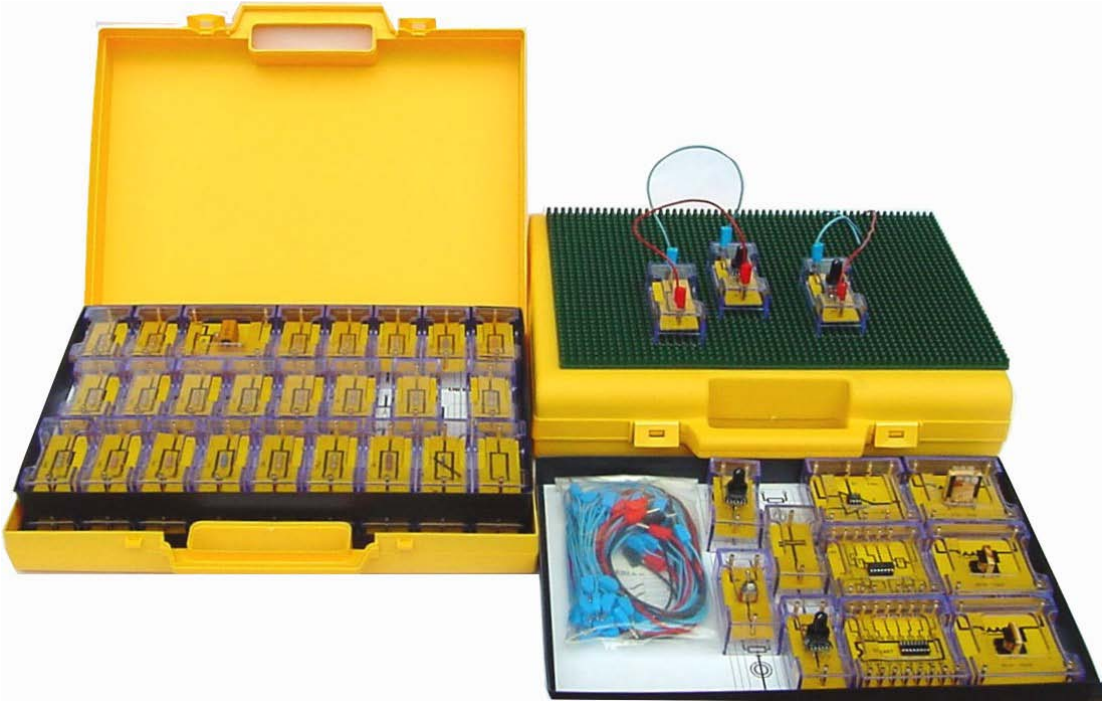
- 138 pages of electronics basic principles curriculum
- Student and lecturers guide
- Covers a range of topics capacitors, transistors, motors, intergrated circuits, diodes, series circuits, parallel circuits, solar energy, electromagnetism etc.
- Contents and modules of the trainer cover the following topics:
  - Basic Components and Circuits
  - Motors & Electricity
  - Resistance
  - Capacitors
  - Transistors
  - Oscillators & electronic Sound
  - Integrated Circuits
  - Electromagnetism & Radio
  - Meters, Transformers & FM Radio
  - Diodes & Applications
  - Electronic Switches
  - Electromagnetism
  - Sun Power

Summary of Components included:

Connecting Wires	LED's	Ammeter
Battery	PNP Transistor	Transformer
Switches	NPN Transistor	FM Module
Lamps	Microphone	Diodes
PCB	Speaker	7 Segment Display
Solder	Whistle Clip	Recording IC
Motor	Music IC	Relay
Fuse	Alarm IC	SCR
Resistors (various)	Spacewar IC	Solar Cell
Adjustable Resistors	Power Amplifier	Electromagnet
Photo Resistor	High Frequency IC	Vibration Switch
Capacitors (various)	Inductor	Spring Sockets
Adjustable Capacitor	Antenna	Computer Interface

DELORENZO DL 2152

ELECTRONICS TRAINING KIT



The kit includes a set of components allowing a full course on general electronics to be developed.
All components are mounted on a printed circuit board fixed to metal tacks anchored on transparent plastic material modules, allowing consequently the vision of the components and the related symbol silk-screened on the PCB, the mechanical protection of the component, the electrical safety against accidental contacts and easy replacement of damaged components.
All the modules are ready to be placed on a rubber circuit designer included in the kit.
The set of modules is housed in briefcases.
From the educational point of view, the student is trained in component recognition and in acquiring the manual skill necessary to realize a circuit following the diagrams reported in the handbook.

Examples of performable exercises

- Check of the fundamental laws of the electric networks
- Study of circuits in transient and steady conditions
- Characteristic measurements for different kinds of filters
- Half and full-wave rectifiers
- Applications of rectifier diodes and Zener diodes
- Measurement of pnp and npn transistor
- Study and applications of UJT and JFET transistors
- Realization of different types of amplifiers
- Study of SCR and its dc and ac applications
- Realization of circuits with DIACs and TRIACs
- Analysis of operational amplifiers and their applications

List of components

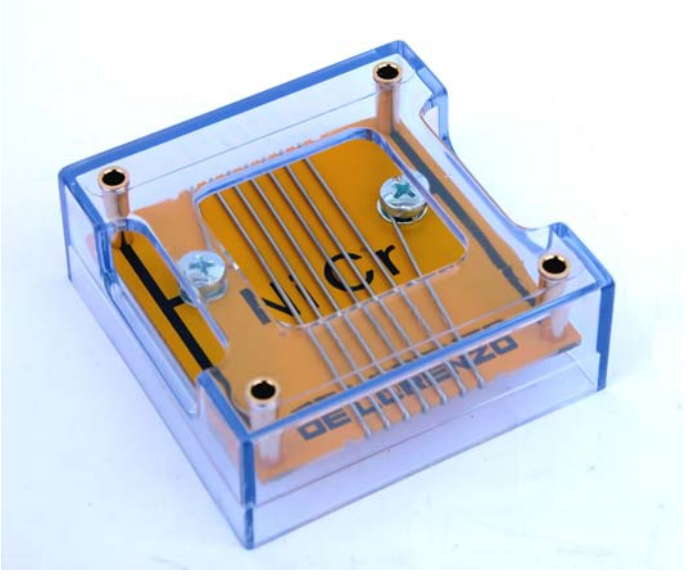
- 4 linear potentiometers
- 24 resistances, 2W
- 1 VDR
- 10 capacitors
- 3 inductances
- 4 diodes and 1 Zener diode
- 1 switch
- 1 rectifying bridge
- 2 integrated circuits
- 1 UJT
- 1 DIAC
- 4 transistors
- 1 JFET
- 1 TRIAC
- 1 SCR
- 30 cables of different lengths (10, 25, 50 cm)
- 1 rubber circuit designer
- 2 briefcases

DL 2160
Kit for general electricity

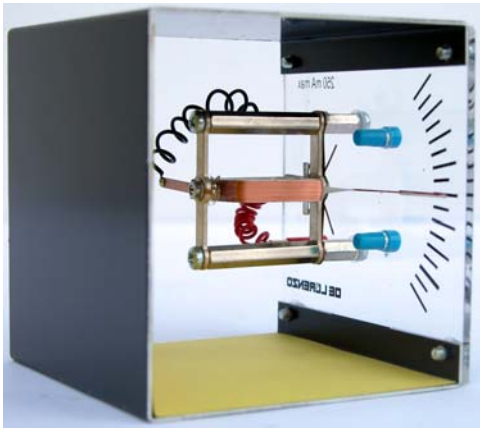
The kit is composed of a set of components and devices that allow a practical demonstration of the most important laws of electricity and electromagnetism.
All the components are mounted on metal or plastic bases complete with terminals for an easy connection of the test circuits through multiple jack cables.
The kit is supplied with a manual that outlines the different subjects of the practical exercises in a simple and progressive way. It is to be underlined the importance of the suggested method, which is based on the direct observation and quantification of the phenomena to highlight the fundamental scientific laws.
Due to the simplicity of its components and to the guided testing procedures contained in the manual, this kit is suitable for courses both in electrophysics and electrical engineering. The tests can be carried out by students under full safety conditions.

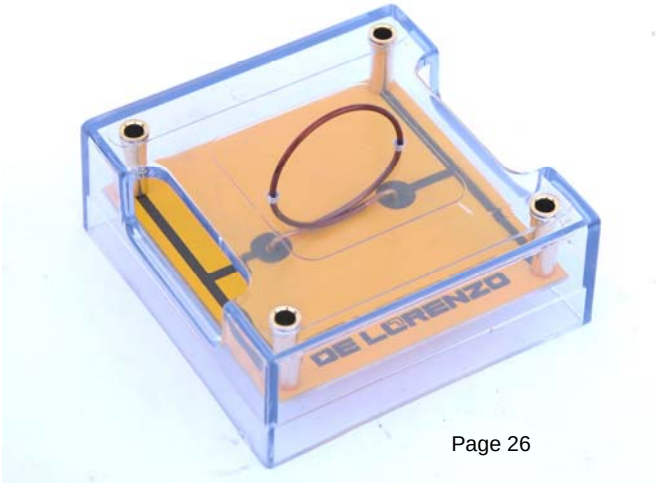
Example of performable exercises

- Compass
- Magnetic field
- Magnetic flux and induction
- Electromagnetism
- Magnetic circuits
- Hysteresis cycle
- Electric motor
- Electrodynamic actions
- Electromagnetic induction
- Faraday's law
- Lenz's law
- Emf of self induction



- Emf of mutual induction
- Electric current
- Direct current
- First law of Kirchhoff
- Electric current intensity
- Electromotive force (emf) of a generator
- Difference of potential or electric voltage
- Ohm's law
- Electric resistance
- Electric resistivity
- No-ohmic resistor
- Voltage drop
- Internal resistance of a generator
- Series and parallel generators
- Series and parallel resistance
- Electric power and energy
- Potentiometer
- Current shunt
- Second law of Kirchhoff
- Analysis of an electric network through Kirchhoff's laws
- Mesh currents
- Effect superposition
- Thevenin's theorem
- Electric efficiency
- Norton's theorem
- The relay
- Joule effect
- Thermoelectric effect
- Thermocouple
- Eddy currents
- Electric field
- Capacitors, capacitance
- Single phase alternate current
- Pure resistance
- Pure inductance
- Pure capacitance
- Phase shift between two signals
- Series RL and RC circuits
- Active, reactive and apparent power
- Series resonance
- Inductive reactance depending on frequency
- Capacitive reactance depending on frequency
- Parallel RL and RC circuits
- Series and parallel capacitors
- Parallel resonance
- Miniature transformer
- Electrolytic dissociation and conduction in solutions



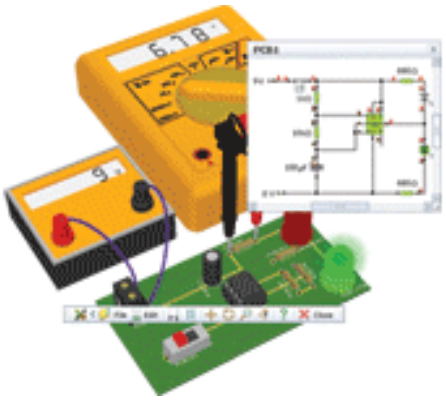


AMTEC CROCODILE CLIP SIMULATION SOFTWARE

Allows for the design and simulation of curcuits using over 150 types of components, with the ability to test and refine your designs as you work.

Technology

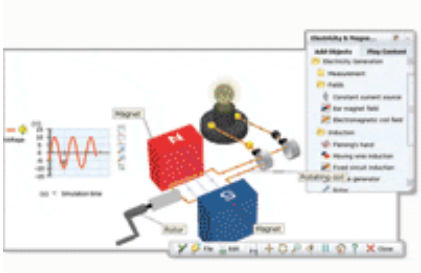
A complete simulator for electronic design. It covers...



- **Electronics** — design and simulate circuits using over 150 types of component, testing and refining your design as you work.
- **PCB design** — convert your circuits into 3D PCB simulations, whose layouts can be exported for manufacture.
- **PIC programming** — program simulated PIC or PICAXE chips using simple flowcharts, before exporting to chips.

Mechanisms — experiment with a range of mechanical inputs

Science



A range of virtual labs that let you simulate physics and chemistry experiments safely and easily.

- **Electricity and Magnetism** - simulate power generation and transmis-sion, and analogue electrical circuits.
- **Light and Sound** - experiment with sound, water and light waves, and ray diagrams.
- **Force and Motion** - investigate projectiles, oscillations, gravity and motion.
- **Electrochemistry** - experiment with electrolysis, using a range of electrodes and solutions.

Inorganic & physical chemistry - simulate reactions safely and easily with over 100 chemicals.

Mathematics

- **3D Shapes** — investigate 3D shapes easily, fold and unfold nets, and measure properties.
- **Statistics** — experiment with statistics and probability, using tools that include 3D games and a line-up of people.

A colourful mathematical modelling tool, which lets you experiment with sta-tistics, probability, 3D shapes and coordinates.

Coordinates - learn about 2D and 3D coordinates, with custom games.

AMTEC MEASURING INSTRUMENTS

Multimeter

Insulation tester

Digital Loop & PSC tester

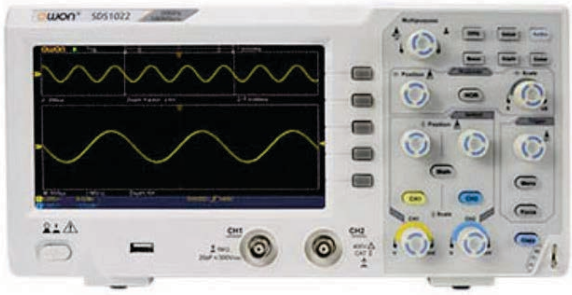
Phase rotation meter

Voltage Detector

Clamp meter

Earth Leakage tester

Digital and Analog Oscilloscope



LUX Meter

Sound level meter

Earth Resistance tester

Power meter

Line and Voltage Detector

AMTEC PLUG-IN DIDACTIC TRAINER

Amtec Techniquip has developed and designed a modular solution for the study of domestic, industrial circuits & Electrical Machines. The system was developed with cost effectiveness and training in mind. The system can be purchased in 5 Core Sets depending on the application requirements, however the modularity of the system allows it to be enhanced at any time by adding any of the various modules mentioned in list of components available. The user is also able to purchase equipment and components according to their specific curriculum or learning outcomes. All the components and units are supplied with a comprehensive detailed manual providing both theory and experimental procedures, available in hard and soft copy formats.

Safety and longevity have been a priority in the design of the equipment, ensuring the protection of the user and the components. All connections are made via 4mm plug in sockets. The components, frames and enclosures are manufactured with a high quality finish and epoxy powder coated to ensure a long lasting lifespan.

All the components and machines are nominally rated at 370W and are either bench or frame mounted. They are purpose designed to replicate the characteristics of larger machines and circuits used commonly in industry.

The system is designed with the following benefits:

- *Modular Concept provides flexibility for individual requirements, expansion is always available.*
- *Low Cost*
- *Portability and convenient storage*
- *Electrical & Mechanical Safety Built in*
- *All Components and solutions are provided with in depth Training guides and manuals*

The modular set provides solutions for the following topics:

- *Domestic Installations & circuits*
- *Industrial Installations & circuits*
- *Study of Single Phase Machines*
- *Study of Three Phase Machines*
- *Measuring Instruments*
- *Transformers (Single Phase & Three Phase)*

Domestic Installation Core Set:

The System has been designed to replicate domestic installation and its circuits. The sets are supplied complete with Training manual.

1) AMPIDOM1 – Amtec Didactic Domestic Installation & appliance Core Training Set

- Workstation with Single Frame
- Power Supply Unit
- One Way Switching Module
- Two Way Switching Module
- Intermediate Switching Module
- Fluorescent Lighting Module
- Double Energy Saving Down Lights Module
- Double Incandescent Lamp Module
- Lighting MCB Module
- User Manual

2) AMPIDOM2 – Amtec Didactic Domestic Installation & appliance Core Training Set

Training set is comprised of didactics workstation, power supply unit and 17 modules, set includes the following:

- Workstation
- Power Supply Unit
- DB / Distribution Board Module (includes earth leakage, Isolates and circuit breakers)
- Lighting Set of Modules (mentioned above)
- Lighting arrestor module
- Geyser Simulation Module with Isolator module
- Stove Plate Module with isolator Module
- Heat Switching Module (3 Heat & 5 Heat Switch)
- KWH meter Module
- Plug Top Module

Industrial Installation Core Set:

The System has been designed to replicate industrial installations and its relevant circuits. The sets are supplied complete with Training manual.

The sets are aimed at wiring principles and techniques used industry for starting of electric motors / machines.

1) AMPIMS1 – Amtec Didactic Industrial Installation Core Training Set

The AMPIMS1 Set is designed to wire the following industrial motor circuits:

i) Direct On-Line Starting of a single phase & three phase motor
ii) Star / Delta Starting of a three phase motor (with timers and push buttons)
iii) Starting of motors in sequence
iv) Single Phase Reversing Motor Circuit
v) Three Phase Reversing Motor Circuit

Training set is comprised of didactic workstation, power supply unit and 16 modules, set includes the following:

- Workstation
- Power Supply Unit
- 1 x Lock Out Isolator Module
- 3 x 400V Contactor & NO/NC Auxiliary Module
- 2 x Electronic Timer (Multi Type) Module
- 2 x Thermal Overload Module
- 2 x Start / Stop Push button Module
- 1 x Forward / Stop / Reverse Module
- 1 x Emergency Stop Module
- 1 x Industrial Indicator Module (Lamp)
- 1 x Double Pole MCB Module
- 1 x Triple Pole MCB Module
- 1 x Earth / Neutral Bar Module
- 1 x Three Phase 220/380V Motor Unit
- 1 x Three Phase 400/660V Motor Unit
- 1 x Single Phase Electric Motor Unit

2) AMPIMS2 – Amtec Didactic Advanced Industrial Installation Core Training Set

The AMPIMS1 Set is designed to wire the following industrial motor circuits with measuring instruments:

i) Direct On-Line Starting of a single phase & three phase motor
ii) Star / Delta Starting of a three phase motor (with timers and push buttons)
iii) Starting of motors in sequence
iv) Single Phase Reversing Motor Circuit
v) Three Phase Reversing Motor Circuit
vi) Starting of Three Phase motor with Auto Transformer
vii) Starting of a 3 Phase Slip Ring motor
viii) Study of Single Phase & Three Phase Transformers

Training set is comprised of didactic workstation, power supply unit and 20 modules, set includes the following:

- Workstation
- Power Supply Unit
- 1 x Lock Out Isolator Module
- 3 x 400V Contactor & NO/NC Auxiliary Module
- 2 x Electronic Timer (Multi Type) Module
- 2 x Thermal Overload Module
- 2 x Start / Stop Push button Module
- 1 x Forward / Stop / Reverse Module
- 1 x Emergency Stop Module
- 1 x Industrial Indicator Module (Lamp)
- 1 x Double Pole MCB Module
- 1 x Triple Pole MCB Module
- 1 x Earth / Neutral Bar Module
- 1 x Auto Transformer Module
- 1 x Slip Ring Resistor Module
- 1 x Triple Transformer Module
- 1 x Triple Ammeter 0 – 5A Module
- 1 x Triple Voltmeter 0 – 500V Module
- 1 x Three Phase 220/380V Motor Unit
- 1 x Three Phase 400/660V Motor Unit
- 1 x Single Phase Electric Motor Unit
- 1 x Three Phase Slip Ring Motor

Alternative Industrial Option:

Set is comprised of a grid type frame and power supply unit mounted to a workstation.

Components sets or individual components from the list mentioned previously are mounted to the frame. The circuits are physically wired to the components.

AMTEC INDUSTRIAL PLUG-IN DIDACTIC TRAINER MODULES

Motor starter control, Electrical machines and Measuring instrumentation available for Modular Plug-in Trainer:

- Contactor N/o 230 VAC
- Electronic Timer 230VAC
- Single pole Circuit breaker
- Double pole Circuit breaker
- Triple Pole Circuit breaker
- Thermal Overload
- Voltmeter
- Ammeter
- Frequency meter
- Single-phase watt meter
- Three-phase phasemeter
- Resistive load
- Inductive load
- Capacitive load
- Earth and Neutral Bar
- VSD - Variable speed drive unit
- CT - current transformer
- VT/PT - Voltage/ potential transformer
- Single phase transformer
- Three phase transformer
- Auto transformer
- HMI - Human interface
- Rectifier
- Isolator
- Three-phase power supply
- DC power supply
- Universal Relay
- Thermal Relay
- Time Relay
- Start Stop Button
- Emergency push button
- Emergency stop Steel Latching
- Fwd/Stop/Rev Button
- Three pole switch
- Star/delta Starter rotatory switch
- Pole switching for Dahlander /2 speed motors
- Single phase motor
- Three phase motor
- Slip ring 380V motor
- DC compound motor
- DC shunt motor
- DC series motor
- Limit switch
- Single phase Fwd/Rev switch
- Three phase Fwd/Rev switch
- Direct starter with inversion
- Inductive proximity sensor
- Capacitive proximity sensor
- Photoelectrical barrage sensor
- Photoelectrical reflecting sensor
- Level magnetic sensor
- Probes / level sensor
- Position sensor
- Triple Pilot light/Industrial indicator
- Pulse counter

AMTEC DOMESTIC PLUG-IN DIDACTIC TRAINER MODULES

Domestic and Civil instrumentation available for Modular Plug-in Trainer:

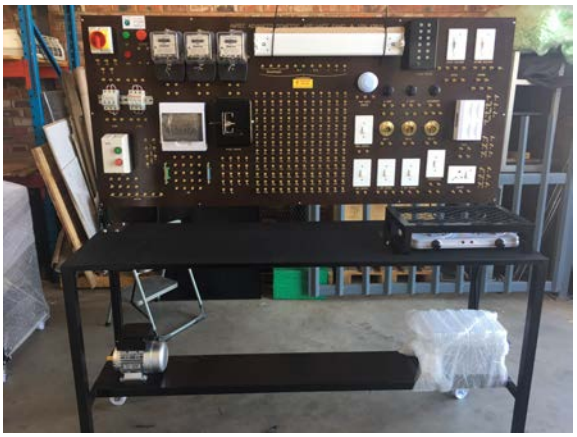
- Voltmeter
- Ammeter
- Single phase KWh Meter
- Three phase kWh Meter
- Multimeter
- Surface DB Complete
- 1 way switch
- 2 way switch
- Intermediate Switch
- 3 pin wall plug
- Fluorescent
- 3, 5 Heat Switch
- Pool Timer
- Motion detector
- Smoke detector
- Temperature controller
- Brightness controller
- Universal dimmer
- Shutter Actuator
- Valve Actuator
- Blinker
- Twilight switch
- Photovoltaic energy kit
- PLC controller
- HMI controller
- Gas detector
- Passive infrared sensor
- Electronic Timer 230VAC
- Single MCB
- Double pole MCB
- Three Pole MCB
- Overload 2.5
- Start Stop Button
- Start Stop Start Button
- Emergency stop Steel Latching
- 3 Pilot light/ Industrial indicator
- Earth and Neutral Bar
- Halogen lamps and single-phase transformer
- Low consumption fluorescent lamp
- Metal Halide lighting
- Sodium Vapor lighting
- Mercury lighting
- Downlight 220V
- Emergency light
- Fluorescent
- Bell/door opener
- Brass Batton
- Alarm
- Stove
- Geyser

AMTEC DOMESTIC TRAINER

AMTEC Techniquip has a variety of Domestic Training panels covering the principles of Fault finding and Wiring found in most household scenarios. These panels aid a lecturer in up-skilling students for real-life situations of fault finding, panel wiring, lighting and appliance repairs. These panels are available in BASIC and ADVANCED forms and may be mounted on a workstation or built into a cubicle style. Panels are assembled on electrical phenolic board and may be configured with a choice of plug-in connections or hard-wiring via brass studs.

Basic Domestic and Commercial Training panel:

- Geyser simulator with isolator
- Stove top with control via 3 and 5 heat and simmer switches
- DB Board
- Basic lighting and Light switch configuration
- Power plug points
- Day/Night switch
- 1 and 2 way switching
- kWh Meter
- Transformer bell



Amtec Advanced Domestic Appliance Trainer

Amtec Combination Panel Domestic Appliance and Advanced Lighting Trainer

AMTEC DOMESTIC TRAINER

Domestic lighting

- Basic lighting trainer
  - Light fittings
  - 1 and 2 way switching
  - Intermediate switching
  - Basic Wiring
- Advanced lighting trainer
  - Downlighters 24V and 240V
  - Light switching panel
  - Metal Halide/ Sodium Vapor/ Mercury
  - Flouresent
  - BC lights
  - Stove top with control
    via 3 and 5 heat and simmer

- ADVANCED LIGHTING

- COMBINATION DOMESTIC AND INDUSTRIAL LIGHTING

AMTEC COC INSTALLATION WIRE WAY TRAINER

OVERVIEW

Unit has been manufactured according to the latest trade test requirements. Allowing the user to construct, wire and test a number of various domestic / industrial circuits. Trainer is supplied on a double sided station to allow construction to be done simultaneously on either side of the station. Trunking, PCV conduit / Steel Bosal type wire ways are mounted directly to the superwood board. These are then wired and connections are made to the various components supplied.

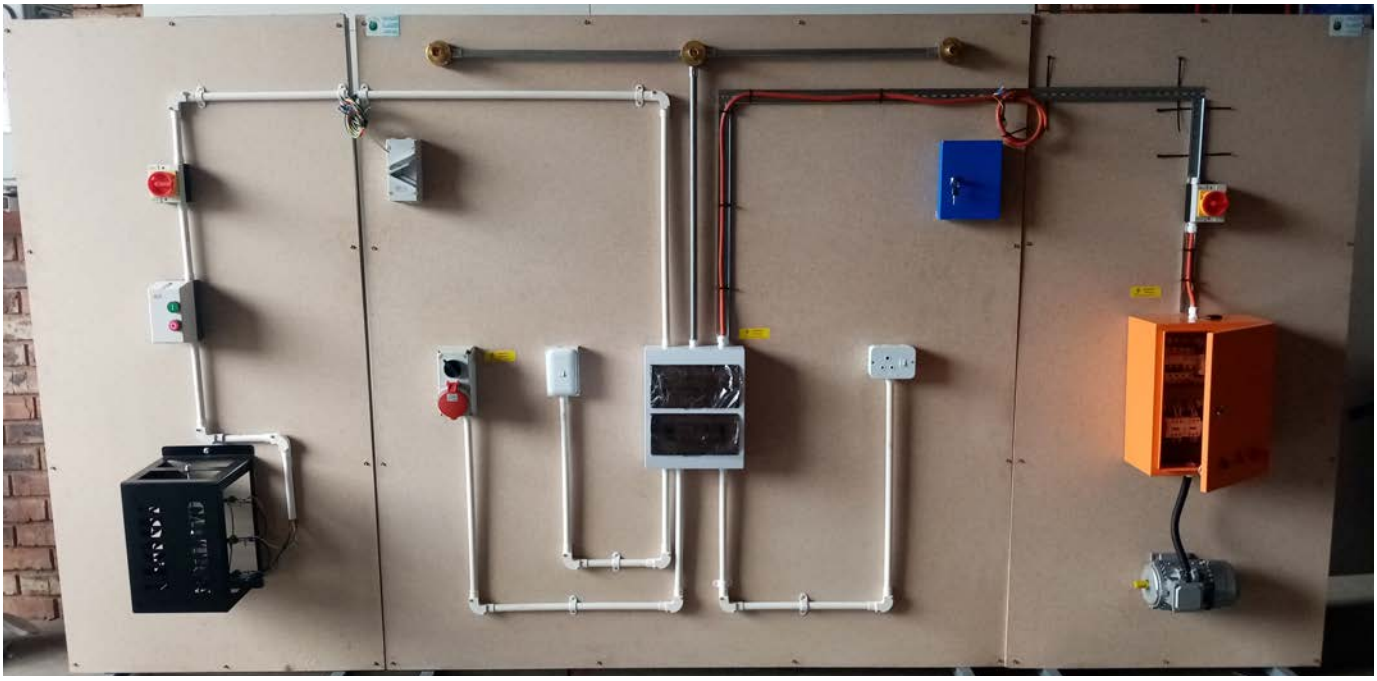
Allowing testing of the construction, wiring and neatness of the learner.

- **FEATURES:**
- Supplied complete with user manuals, wiring diagrams and test sheet
- Set is not limited to trade Test Constructions and allows for construction of various / user defined circuits.
- Includes pre-constructed obstructions and pre built wire ways that can be removed and rebuilt
- Includes distribution Board
- Electrical Lock out Isolator and Mains lead to ensure user safety
- Epoxy powder coated a-Frame type workstation (double sided.
- Superwood boards are easily and can be replaced locally for low cost.
- Easy, Safe and reliable
- Supplied complete with Amtec's 24month Warrantee.

OPTIONAL ACCESSORIES:

- PM00CW – Lockable Castor Wheels
- Advanced set of Conduit bundle and accessories / fittings
- Advanced set of Steel Bosal bundle and accessories / fittings
- Bench Vice
- Pipe Benders
- Hickey

AMTEC INSTALLATION, WIRING AND INDENTIFICATION TESTING PANEL



Overview:

The AMTEC Installation and Wiring Panel simulates single phase and three phase installation as found in the field

Wiring according to SANS

Combination of PVC and steel conduit

Includes pre-wired faults in a lockable fault box, which is triggered by toggle switches Load is simulated with stove element

Panels can be customized and designed to customers requirements

Panel layouts can also be customized for wall mounting, workstations or cubicle style.

AMTEC DOMESTIC APPLIANCES

AMTEC TECHNIQUIP provide Domestic Appliance trainers used to teach the principles of fault finding and repairing the inner workings of common household appliances. AMTEC can supply recognized brand name appliances in two configurations:

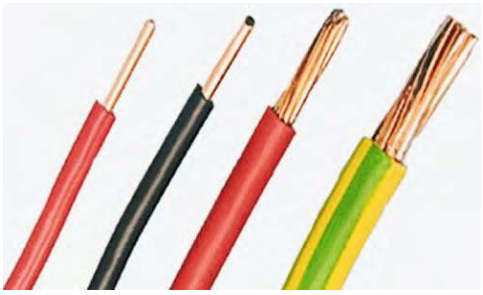
- Sectioned and Operational fault finding appliances:
  Sectioned with perspex covers to allow students to see moving parts and understand internal operations.
  These trainers include lockable fault boxes with predetermined switchable faults.
- Plug-In Configuration appliances:
  Designed to simulate real operating appliances.
  Allows students the ability to build a complete unit from scratch. Uses 4mm Plug-In leads to do connections.

Various types of appliances available:

- Stove
- Geyser
- Washing machine
- Microwave
- Fridge
- Deep Freezer
- Toaster
- Kettle

AMTEC TOOLS, ACCESSORIES AND CONSUMABLES

AMTEC supply a wide variety of related tools, accessories and instrumentation



- Silicone reinforced, stackable plug-in leads available in
    - Various colours - Red, Black, Blue, Green, White, Brown, Grey, Purple
    - Various sizes, styles and lengths
- Lugs, Ferrules, Sockets and binding posts
- Crocodile clips, Banana plug sockets and leads
- Tool Boxes
- Soldering Iron
- Trunking, PVC and steel conduit
- Conduit
- Meters - Clamp meter, LCR, Megger, DMM, Oscilloscope
- Machine tools
- Wire and Consumables
- Gauges and Measuring instruments

AMTEC AST-R SWITCHING AND SIMULATION TRAINER

OVERVIEW:

Trainer assists the user in identification, testing and wiring of various switches found in industry and domestic installations. The unit is a perfect tool for the introduction to switch theory and practical's. Wiring can be confirmed by means of LED lamps included on the unit.

The trainer covers the following switching techniques:

- Three Heat Switching
- Five Heat Switching
- Simmerstat Switching
- SPST Switch
- SPDT Switch
- DPDT Switch

FEATURES:

- Supplied complete with user manuals, wiring diagrams and test sheet.
- Supply voltage available via switched 4mm safety sockets.
- Internal connections are made to the switches via 4mm safety sockets.
- Electrically Insulated materials used.
- Allows for connection up to 3A ac (max) loads / LED incorporated LED lamps
- Wiring of configurations done via 4mm safety stackable leads.
- Results can be confirmed by Lamps.
- Epoxy powder coated enclosure.
- Safe, reliable & easy to use.
- Voltage tests can be measure via analogue / digital multimeter
- Supplied Standard with Amtec's 24 month warrantee.

AMTEC TX-1 TRANSFORMER TRAINER

Easy and safe single phase rebuildable transformers

Overview:

This is a safe rebuild able single phase transformer trainer supplied complete with various primary and secondary coils

The core is made from Silicum sheets, in a “U” shape.

Units are assembled on a base of 230x150mm on rubber feet. Two braces clamp the parts into place and can easily be opened.

TX1 Primary Supply coil - 220V, 800VA 440 turns . Imax =4A. Fuse protected.
TX2 Secondary coils 5 units, Numbeor of turns 6;12;24;48 and 96, Imax 3,3 to 50A.
TX3: Secondary with 2 coils in Series, each of 1000 turns 0.8A.
TX4: Secondary with 2 coil in series, each 220 turns 3.6A -220/110V

Dimensions: Approximately 350mm high x 300mm long x 200mm wide 10kg

AMTEC ATX-R SINGLE AND THREE PHASE TRANSFORMER TRAINER

OVERVEIW:

AMTEC Transformer trainer assists the user in identification, continuity testing and wiring of Single Phase & Three Phase Air cooled double wound Transformers.

Single Phase Transformer Configuration Trainer

Allows for the user to learn and understand single phase “multi tap” transformer theory with positive and negative tapings manipulating the output voltages and proving the theory in practice.

Three Phase Transformer Configuration:

Allows the user to learn and understand three phase
“Multi Tap” Transformers theory. The transformer can be configured in the following three phase configurations via the various input tapping’s available on the transformer -10% - 400Vac - +10%

The Transformer has multiple configurations via the various configurations and tapping that are available on the trainer.

FEATURES:

- Supplied complete with user manuals, wiring diagrams and results sheet.
- Supply voltage available via switched 4mm safety sockets.
- Internal connections are made to the transformer via 4mm safety sockets.
- Electrically Insulated materials used.
- Allows for connection up to 1Aac (max) loads.
- Wiring of configurations done via 4mm safety stackable leads.
- The input and output voltages can be easily measured with a multi-meter.
- Epoxy powder coated enclosure.
- Safe, reliable & easy to use.
- Voltage tests can be measure via analogue / digital multimeter
- Supplied Standard with Amtec’s 24 month warrantee.

AMTEC VARIAC / VARIABLE AUTOTRANSFORMERS

• Bare for references finishing with a “N”
• With a stainless steel case for references finishing with “A” or “P”
• Protected by a case, fitted with 4 casters, circuit breaker and ON/OFF LED for references finishing with a “PE” Covered (P and PE) units have a mains cable at the primary and safety terminals at the secondary.

AMTEC THREE PHASE AND SINGLE PHASE RESISTIVE, CAPACITIVE AND INDUCTIVE LOADS

Load banks are available with resistive, inductive, and capacitive load elements. Resistive units test power sources without changing the power factor. Inductive and capacitive load elements can be used to simulate for non-unity loads and to adjust the power factor of circuits.

AMTEC TOOLS, ACCESSORIES AND CONSUMABLES

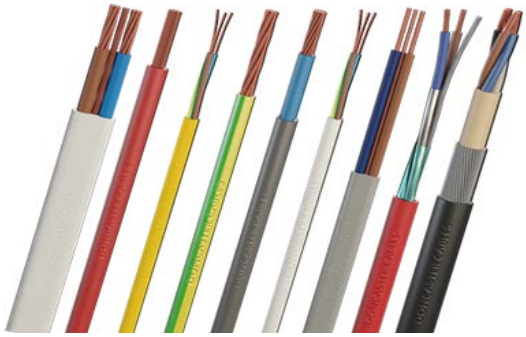
AMTEC supply a wide variety of related tools, accessories and instrumentation

PVC fittings and conduit

Electrical components

Electronic components

Electrical Consumables



Electrical wires and cables:

- **GP wire**
- **Solid wire**
- **Armored cable**
- **Unarmored cable**
- **Surfix cable**
- **Cabtyre**
- **Panel flex**
- **Bare copper**

AMTEC AUTOMATION

AMTEC HMI / PLC TRAINERS

AMTEC Techniquip manufactures a variety of HMI & PLC Trainers for the fundamentals to advanced fault recognition.

Amtec Basic HMI Trainer:

- Designed to teach students connectivity to HMI and HMI Programming
- Includes Manuals
- Includes Software
- Includes Cables from PC-HMI
- Variety of HMI's available (Delta, Lovato, Schneider, Siemens etc.)
- Includes Program that Tests all components on HMI are functional
- On request, free of charge includes Training basic and advanced

AMTEC PLC TRAINERS

Amtec PLC Trainer – Programming, Interface & Simulation

Amtec Techniquip has designed and developed PLC Trainers using various PLCs used in industry. The PLC Trainers are prewired so as to allow the unit to withstand everyday use in the classroom, workshop or laboratory. The Trainer has both Switches and LED Lamps for use as a stand-alone unit, however the unit can also be interfaced to external equipment.

All units are supplied with the software and programming cable.

Intermediate PLC desktop trainer that focuses on Programming, Interface and Simulation. It is enclosed in a powder coated sheet metal enclosure, with a silk-screen printed façade labelling all components and connection points

- Schneider PLC Zelio including software and data cable
- Inputs triggered by 8xx SPST switches for demonstration of various PLC logics, Ladder diagrams and Function block diagrams
- 8xx Corresponding 16mm pilot lights to signal trigger with SPST switches
- 4xx 16mm pilot Indication lights
- Easy connection via plug in safety sockets and leads
- Unit can be used stand-alone or can be interfaced to various hardware such as motor, signal tower, conveyor belt, elevator simulator and other PLC controlled modules.
- Desktop unit for use in the classroom, laboratory or workshop
- Supplied with complete user manual and sample exercises
- 24V dc supply for user safety
- Mounted to robust epoxy powder coated enclosure.
- Safe & Reliable
- Supplied with Single phase plug for connection to mains

Optional Accessories

Amtec HMI Simulation Module – Allows the user to interface the various I/O's to and HMI with preloaded virtual experiments

PLC Brands Available:

- Delta
- Schneider
- Siemens
- Lovato
- Mitsubishi

Dimensions & Weight:

- 300mm (l) x 250mm (d) x 150mm (h)
- 4.5Kg

AMTEC PLC TRAINERS

Amtec PLC Trainer – Programming, Simulation, Interface and Wiring Type

OVERVIEW

Amtec Techniquip has designed and developed PLC / Programmable Logic Controller Trainers using various PLC's used in industry. The PLC is prewired so as to allow the unit to withstand everyday use in the classroom, workshop or laboratory. The trainer includes a number of components commonly used as input devices and output devices to allow the unit to be a stand-alone set allowing the user to familiarise himself / herself with programming a PLC, Loading the program, and connecting the PLC to various components. The unit can also be used as a stand-alone module and interfaced to external equipment.

Advanced PLC desktop trainer that focuses on Programming, Interface, Simulation and Wiring. It is enclosed in a powder coated sheet metal enclosure, with a silk-screen printed façade labelling all components and connection points

- Schneider PLC Zelio including software and data cable
- Control components used for demonstration of various PLC logics, Ladder diagrams and Function block diagrams are available as follows:
  - 12xx Digital Inputs
  - 8xx Relay Outputs / Digital
  - 6xx Switches as SPST & Push-to-make function
  - 1xx Plunger limit switch
  - 1xx Roller limit switch
  - 1xx Lever limit switch
  - 8xx Coloured pilot lights
  - 1xx Electromagnetic counter
  - 1xx 24V DC Buzzer
  - 2xx 24V DC Motor
- Trainer is set up to simulate:
  - PLC Motor control
  - Traffic light intersection
  - Elevator simulation
  - Mini process control
- Easy connection via plug in safety sockets and leads
- Unit can be used stand-alone or can be interfaced to various hardware such as motor, signal tower, conveyor belt, elevator physical simulator and other PLC controlled modules.
- Desktop unit for use in the classroom, laboratory or workshop
- Supplied with complete user manual and sample exercises
- 24V dc supply for user safety
- Mounted to robust epoxy powder coated enclosure.
- Safe & Reliable
- Supplied with Single phase plug for connection to mains

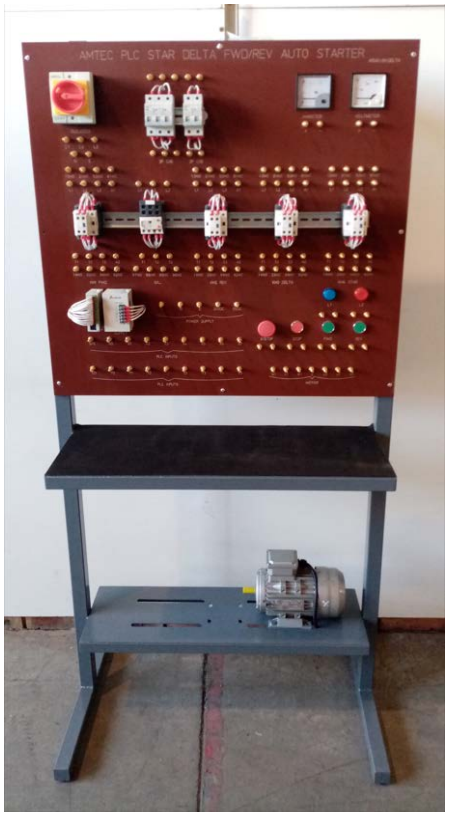
OPTIONAL ACCESSORIES:

Amtec HMI Simulation Module – Allows the user to interface the various I/O's to and HMI with preloaded virtual experiments

Amtec Traffic Light simulator:

- Designed for application of programs to real life situations
- Includes Manuals
- Includes Software
- Includes communication Cables from PC-PLC
- Variety of PLCs available (Delta, Lovato, Schneider, Siemens etc.)
- Includes simulation example programs
- Includes Program that Test all components on PLC are functional
- On request, free of charge includes Training basic and advanced

Amtec Combination PLC STAR/DELTA FWD/REV:



- Designed for various motor starting sequences via PLC
- Includes Manuals
- Includes Software
- Includes Cables from PC-PLC
- Variety of PLCs available (Delta, Lovato, Schneider, Siemens etc.)
- Includes Program that Test all components on PLC are functional
- On request, free of charge includes Training basic and advanced

Amtec is in partnership with major PLC brands:

DELTA

Schneider Electric

A-B QUALITY
Allen-Bradley

MITSUBISHI ELECTRIC

SIEMENS

HITACHI
Inspire the Next

AMTEC PLC TRAINERS

AMTEC Conveyor belt PLC module

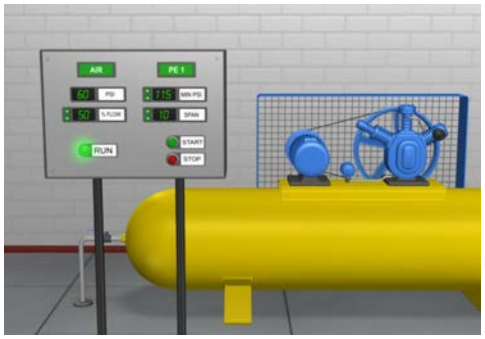
De Lorenzo Elevator PLC module

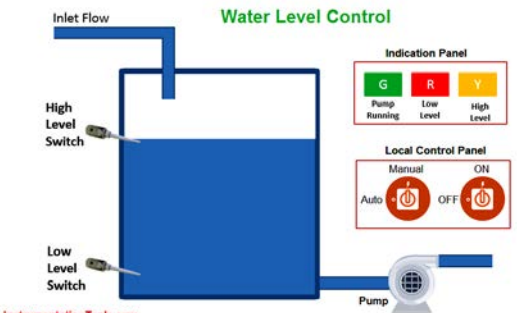
DL 2122M

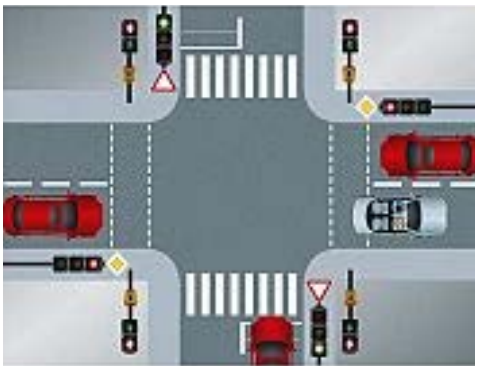
AMTEC Signal tower PLC module

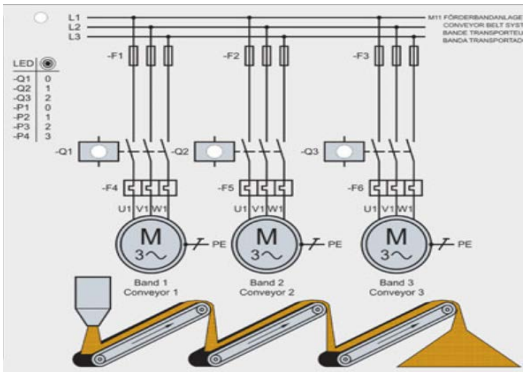
Simulated PLC Scenarios

- HMI controller
- Alarms
- Gas detector
- Passive infrared sensor
- Perimeter sensor
- Blinker
- Motion switch
- Day/night switch
- Position sensor
- Capacitive proximity sensor
- Photoelectrical barrage sensor
- Photoelectrical reflecting sensor
- Level magnetic sensor
- Pulse counter
- Smoke detector
- Temperature controller
- Brightness controller
- Shutter actuator
- Infrared transmitter









AMTEC MEASURING INSTRUMENTATION

Bluetooth Digital Multimeter

OW18A/OW18B

+ 3 5/6 bit resolution
+ Data Logger + Multimeter + Thermometer
+ BLE 4.0 wireless transmission, more stable, less power consumption
+ Chart and Diagram mode helps to analyze the data tendency
+ Flashlight function lightens the darkness
+ Support NCV non-contact voltage sense
+ True RMS test supported
+ Widely supported on Android, iOS and Windows
+ Build-in offline record function supports non-stop up to 7 days non-stop recording

		Measurement Range	Resolution	Accruacy
DC Voltage		60.00mV / 600.0mV (EU)	0.01 mV	±(0.5%+2 dig)
		600.0mV / 6.000V / 60.00V / 600.0V	0.1 mV	
		1000V	1 V	±(0.8%+2 dig)
AC Voltage		6.000V / 60.00V / 600.0V	1 mV	±(0.8%+3dig)
		750V	1 V	±(1%+3dig)
DC Current	µA	60.00uA / 600.0µA	0.01µA	±(0.8%+2dig)
	mA	60.00mA / 600.0mA	0.01mA	
	A	20.00A	0.01A	±(1.2%+3dig)
AC Current	µA	60.00uA / 600.0µA	0.1µA	±(1%+3dig)
	mA	60.00mA / 600.0mA	0.01mA	
	A	20.00A	0.01A	±(1.5%+3dig)
Resistance		600.0Ω / 6.000kΩ / 60.00kΩ / 600.0kΩ / 6.000MΩ	0.1Ω	±(0.8%+2dig)
		60.00MΩ	0.01 MΩ	±(2%+3dig)
Capacitance		60.00nF / 600.0nF / 6.000µF / 60.00µF	0.01nF	±(2.5%+3dig)
		600.0µF / 6.000mF / 60.00mF	0.1µF	±(3%+5dig)
Frequency		9.999Hz / 99.99Hz/999.9Hz / 9.999kHz / 99.99kHz / 99.9kHz / 9.999MHz	0.001Hz	±(0.8%+2dig)
Duty Ratio		0.1% - 99.9% (typical value : Vrms=1V, f=1kHz)	0.1%	±(1.2%+3dig)
		0.1% - 99.9% (≥1kHz)		±(2.5%+3dig)
Temperature (°C/°F)		- 50 ℃~ +400℃	1℃	±(2.5%+3dig)
		-58 ℉~ +752 ℉	1℉	±(4.5%+5dig)
Display		5999		
Frequency Response		(40 - 1000) Hz		
Shift Rate		3 times/s		

Bluetooth Module	√ (only in OW18B)	Auto Ranging	√
True RMS	√	LCD Backlight	√
Diode Test	√	Automatic-manual Range Selection	√
Auto Power-off	√	Input Protection	√
On-off Warning	√	Input Impedance	≥10MΩ
Low-battery Indicator	√	Safety Compliance	600V CATIV, 1000V CATIII
Data Hold	√	NCV	√
Relative Measurement	√	Dimension (W×H×D)	196 x 88.5 x56 (mm)
Flashlight	√	Weight (without package)	0.30 kg

Digital Clamp Meter

- CM240

+ Performance Specifications

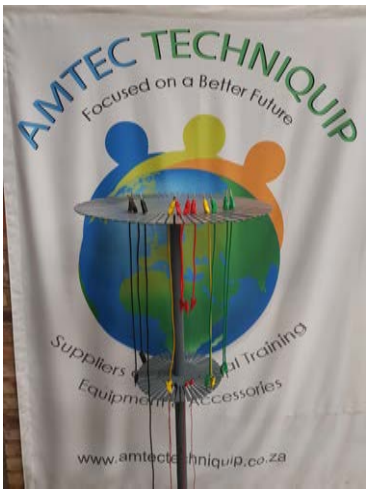
	Range	Accuracy
AC Voltage	2V / 20V / 200V	± (1.2%+5-digit)
	600V	± (1.5%+5-digit)
DC Voltage	200mV	± (0.8%+5-digit)
	2V / 20V / 200V	± (0.8%+5-digit)
	600V	± (1.0%+5-digit)
AC Current	2.000A	± (4%+20-digit) ≦ 0.4A, ± (3%+15-digit)
	20.00A	± (3%+15-digit) ≦ 0.4A, ± (2%+10-digit)
	200.0A / 400A	± (2%+5-digit)
Resistance	200.0Ω	± (1.2%+5-digit)
	2.000kΩ / 20.00kΩ / 200.0kΩ	± (1%+3-digit)
	2.000MΩ	± (1.2%+5-digit)
	20.00MΩ	± (1.5%+5-digit)
Features		
Display Count	2000	
Auto Range	√	
Data Hold	√	
Jaw Capacity	28mm	
Diode	√	
Continuity Buzzer	√	
MAX Mode	√	
Low-battery Indicator	√	
Auto Power-off	√	
General		
Power	2 x 1.5V AAA batteries	
Dimension (W x H x D)	65 x 177 x 28 (mm)	
Weight (without package)	186 g	
Safety Rating	600V, CAT III	

AMTEC PLUG IN LEADS AND SOCKETS

AMTEC supply a wide variety of plug in leads, sockets, connectors and accessories for electrical panels, didactic equipment and trainers

Amtec Lead

Hanger Trolley

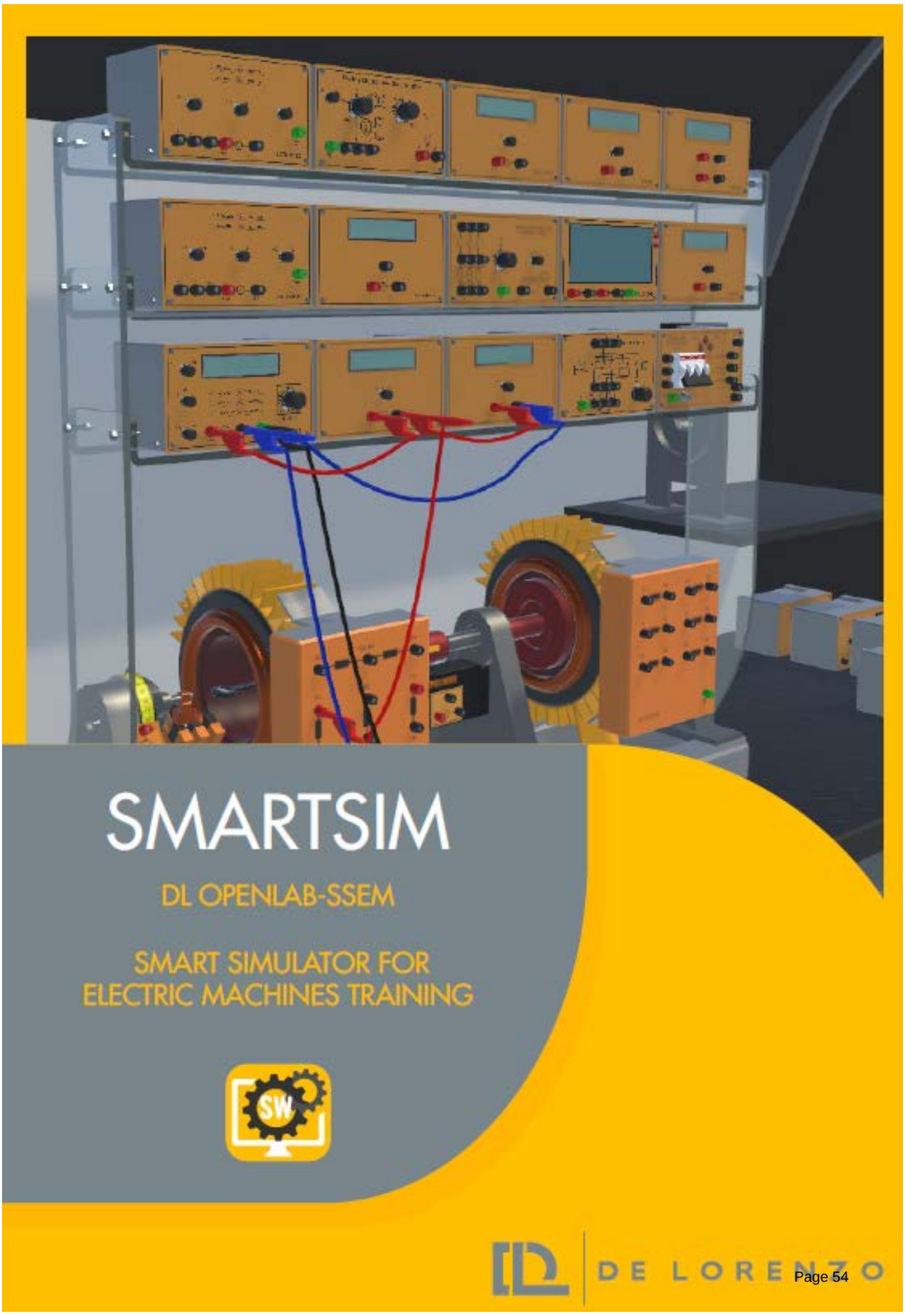


	**Product name :** 2110 Serie	
	Description : Stacking 4 mm Banana (male) Plug to Stacking 4 mm Banana (male) Plug Lead.	
Electric protection : 33 V AC / 70 V DC, up to 36 A.	**Color :** Red, black, white, blue, green, yellow.	**Cable type :** PVC 0.75 mm² (AWG18) (12 A), PVC 1.00 mm² (AWG17) (20 A), PVC 1.50 mm² (AWG15) (25 A), PVC 2.50 mm² (AWG13) (36 A), Silicone 0.75 mm² (AWG18) (12 A), Silicone 1.00 mm² (AWG17) (20 A), Silicone 1.50 mm² (AWG15) (25 A), Silicone 2.50 mm² (AWG13) (36A)

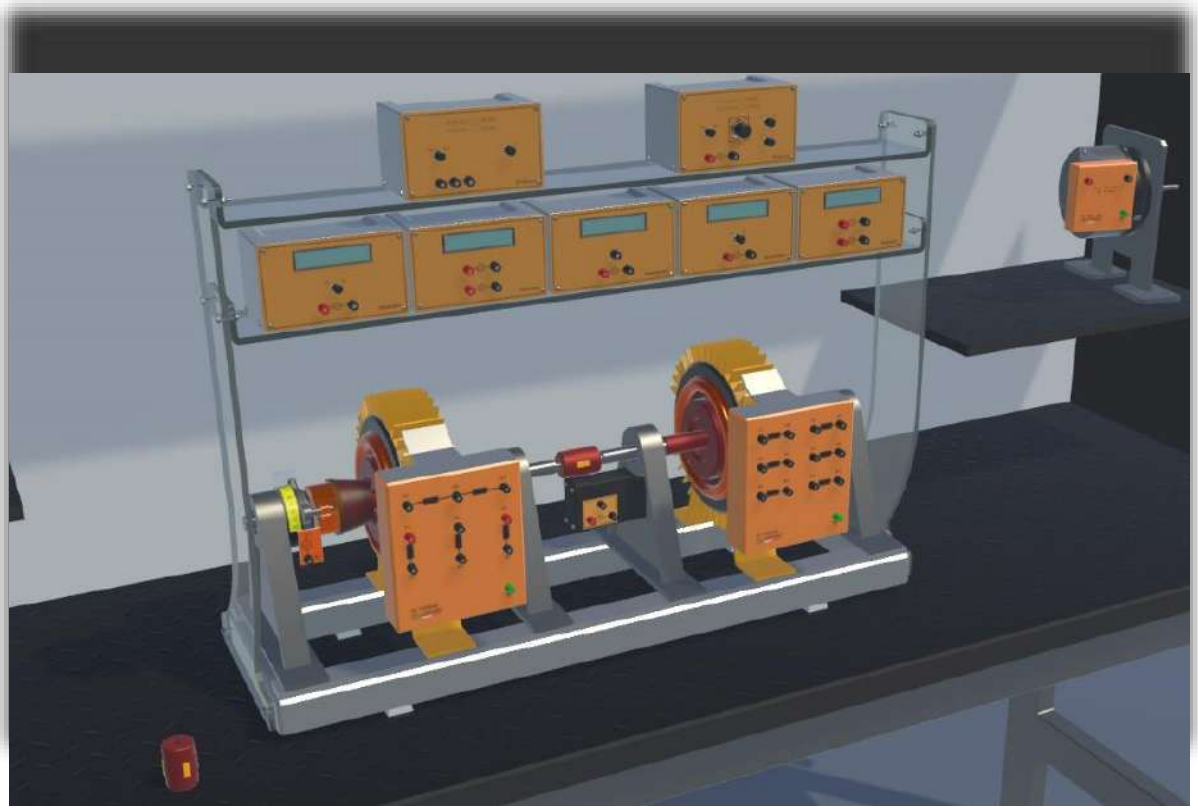
	**Product name :** 2210 Serie	
	Description : Stacking Retractable Sleeve 4 mm Banana (male) Plug to Stacking Retractable Sleeve 4 mm Banana (male) Plug Lead.	
Electric protection : 600 V CAT II, reinforced insulation, pollution degree 2, up to 36 A.	**Color :** Red, black, white, blue, green, yellow.	**Cable type :** PVC 0.75 mm² (AWG18) (12 A), PVC 1.00 mm² (AWG17) (20 A), PVC 1.50 mm² (AWG15) (25 A), PVC 2.50 mm² (AWG13) (36 A), Silicone 0.75 mm² (AWG18) (12 A), Silicone 1.00 mm² (AWG17) (20 A), Silicone 1.50 mm² (AWG15) (25 A), Silicone 2.50 mm² (AWG13) (36A)
Lenght : 10 cm (4 ''), 25 cm (10 ''), 50 cm (20 ''), 100 cm (39 ''), 150 cm (59 ''), 200 cm (79 '').	**Detail :**	

	**Product name :** 3113	
	Description : 4 mm Banana (female) Jack (socket) w/ M6 Threaded Stud and Hex Nuts.	
Electric protection : 33 V AC / 70 V DC, 36 A.	**Color :** Red, black, white, blue, green, yellow.	**Cable type :**
Lenght :	**Detail :**	

	**Product name :** 3270	
	Description : 4 mm Banana (female) Jack (socket) w/ 2 mm Solder Hole. Ideal for panel mounting, round nut fixing.	
Electric protection : 1000 V CAT II / 1000 V CAT III / 600 V CAT IV, reinforced insulation, pollution degree 2, 25 A.	**Color :** Red, black, blue, green, yellow, brown, purple, gray, yellow / green.	**Cable type :**
Lenght :	**Detail :** Fixing tool : 2 complementary wrenchs (P / N 3297 and P / N 3299). Gray plastic spacer (P / N 3282) for surface mount. Economical version : hex nut instead of round nut.	


SMARTSIM
DL OPENLAB-SSEM
SMART SIMULATOR FOR
ELECTRIC MACHINES TRAINING
SW
DE LORENZO

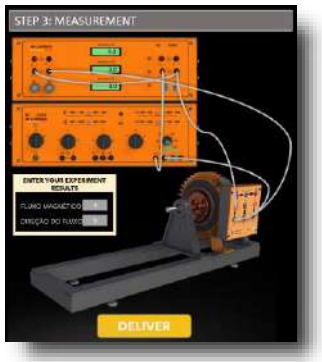
SMART SIMULATOR FOR ELECTRIC MACHINES TRAINING



DL OPENLAB-SSEM

The DL OPENLAB SMARTSIM is a software that has been developed to teach main topics related to electric machines in a unique and effective way. With this software, students can improve their individual experience studying electric machines in practice. Students will be able to carry out several experiments dealing with the following topics:

- mechanical assembly,
- wiring, tests and measurements.



This software will be able to reproduce the features and behaviours of DE LORENZO Electric Machines Laboratory – DL OPENLAB.
With this type of software developed by DE LORENZO, students can learn in their own rhythm and teachers have more time to support the class, manage and improve the process because - unlike any other simple simulator - it grants the following benefits:

1) EFFECTIVE GUIDE FOR STUDENT: possibility to access learning topics, with theory, instructions and experiment proposals. The software includes a virtual version of the DL OPENLAB system;

Student logs in, so his progress can be tracked

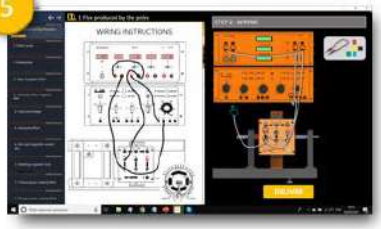
… chooses one of the learning topics

… accesses theory, experiments' proposals and instructions

2) AUTOMATIC VALIDATION OF STUDENTS' TASKS: the software automatically verifies if the student completed successfully each task in order to allow him/her to go ahead with the next one;

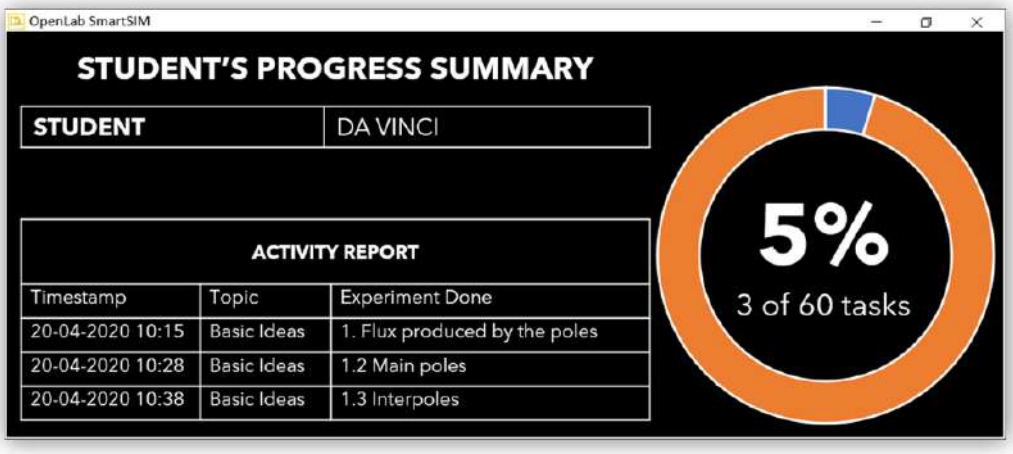
Student works on the assembly of the electrical machine

… then makes the electrical connections



… and with all that correctly done, runs the experiment.

3) TRACKING OF STUDENTS' PROGRESS: the teacher can verify the students' progress any time consulting the specific summary in the software or exporting it to a spreadsheet.

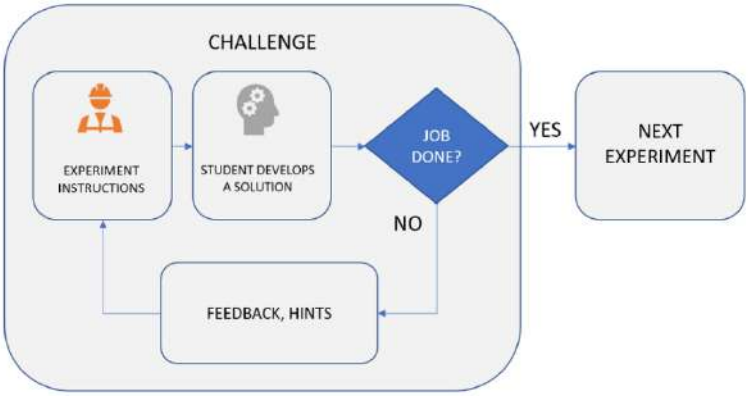


How does it help the professor?

With this software, the teacher spends less time explaining topics, verifying students' activities and helping students do identify mistakes that do not allow the successful completion of the experiment. That means that the professor has more time to manage the class, make improvements and help students who need more attention. The two following points grant such benefits:

1) The software automatically verifies the experiments carried out by the students and it gives relevant feedbacks:

   Like in a game that has different phases with challenges and missions, the DL OPENLAB-SSEM software includes practical experiments that need to be successfully completed to let the student access the next one. The teacher does not need to verify continuously if the student carried out the experiment. Moreover, many questions students would make about "what could be wrong" are automatically "answered" by the software when the student does not perform the experiment successfully. The image below summarizes this process.



2) The software tracks the students' progress and it allow exporting reports:

   At any time, the professor may verify how many and – specifically - which experiments the student has completed. That report can be used to track students' activities and it can be considered as an evaluation tool. This report can be generated and displayed directly in the system or it can be exported to a spreadsheet (see image below).

Timestamp	Student	Topic	Experiment
20-04-2020 10:15	Da Vinci	Basic Ideas	1. Flux produced by the poles
20-04-2020 10:28	Da Vinci	Basic Ideas	1.2 Main poles
20-04-2020 10:38	Da Vinci	Basic Ideas	1.3 Interpoles

DIDACTIC EXPERIENCE AND APPLICATION

The software guarantees a complete experience in the field of electrical machines. Students can approach this topic starting from the basic concepts, such as the analysis of magnetic fields and fluxes, up to advanced experiments based on characterization of machines and efficiency analysis.
Through this system, it is possible to assemble a relevant number of electric machines to carry out the following didactic experiences:

- Study of the magnetic field
- Principles of the electromagnetic induction
- Separately shunt, series and compound excited DC motors
- Separately shunt, series and compound excited DC generators
- Induction motors: three-phase slip ring and squirrel cage, single-phase repulsion and with capacitor
- Dahlander connection
- Synchronous three-phase motor, induction regulator and phase shifter, alternator, universal motor

SET OF ASSEMBLED MACHINES

The system is based on a set of components that allow the assembly of the rotating machines. The set consists of the following components:

1. Base plate
2. Supports with bearing
3. Coupling joints
4. Flexible coupling
5. Electronic speed transducer
6. Assembling screws
7. Wrenches
8. DC stator
9. AC stator
10. Rotor with commutator
11. Brush holder with 2 brushes
12. Squirrel cage rotor
13. Slip-Ring rotor
14. Brush holder with 6 brushes

The system also includes adjustable DC and AC power supplies, instruments, loads, starting devices, etc., in order to perform all the experiments of the electric machines.

LEARNING TOPICS

This software covers 6 topics and proposes 45 experiments for the students.
The experiments are listed below, grouped by learning topics.

GENERAL CHARACTERISTICS AND BASIC CONCEPTS	
1	Flux produced by the poles
2	Main magnetic field
3	Intensity of the magnetic field
4	Induced voltage
5	Inter pole effect
6	No-load magnetic neutral axis
7	Rotating magnetic field

INDUCTION MOTOR	
8	3-phase squirrel cage motor, 2 poles, 24 VΔ
9	3-phase squirrel cage motor, 2 poles, 42 VY
10	3-phase squirrel cage motor, 2 poles, 24 VΔΔ
11	3-phase squirrel cage motor, 2 poles, 42 VYY
12	3-phase squirrel cage motor, 4 poles, 24 VΔ
13	3-phase squirrel cage motor, 4 poles, 42 VY
14	3-phase Dahlander motor, 4/2 poles, 42 VΔ/YY
15	Split phase motor
16	Capacitor start and run motor
17	3-phase motor with wound rotor, 2 poles, 42 VYY
18	Phase shifter
19	Induction regulator
20	3-phase synchronous induction motor, 2 poles, 24 VΔ
21	3-phase synchronous induction motor, 2 poles, 24 VΔΔ

DIRECT CURRENT MOTORS	
22	DC motor with separate excitation
23	DC motor with shunt excitation
24	DC motor with series excitation
25	DC motor with compound excitation, long shunt
26	DC motor with compound excitation, short shunt

COMMUTATOR MOTORS FOR ALTERNATING CURRENT	
27	Single phase series motor
28	Repulsion motor

SYNCHRONOUS MACHINE	
29	Synchronous motor winding resistance
30	Synchronous motor no-load test
31	Synchronous motor short-circuit characteristics
32	Synchronous motor short-circuit test
33	Synchronous motor Behn - Eschenberg's method
34	Synchronous motor load test
35	Synchronous motor conventional efficiency
36	Parallel connection of the alternator with the mains
37	Alternator as synchronous motor

DIRECT CURRENT GENERATORS	
38	DC generator winding resistance
39	DC generator test of the no-load motor (Swinburne)
40	DC generator no-load e.m.f.
41	DC generator excitation characteristics
42	Separate excitation dynamo
43	Shunt excitation dynamo
44	Series excitation dynamo
45	Compound excitation dynamo

SMART GRID

INTRODUCTION

WHY A SMART GRID?

Since the early 21st century, opportunities to take advantage of improvements in electronic communication technology to resolve the limitations and costs of the electrical grid have become apparent.

Technological limitations on metering no longer force peak power prices to be averaged out and passed on to all consumers equally.

In parallel, growing concerns over environmental damage from fossil fuel-fired power stations has led to a desire to use large amounts of renewable energy.

Dominant forms such as wind power and solar power are highly variable, and so the need for more sophisticated control systems became apparent, to facilitate the connection of sources to the otherwise highly controllable grid. Power from photovoltaic cells (and to a lesser extent wind turbines) has also, significantly, called into question the imperative for large, centralised power stations.

The rapidly falling costs point to a major change from the centralised grid topology to one that is highly distributed, with power being both generated and consumed right at the limits of the grid.

Finally, growing concern over terrorist attack in some countries has led to calls for a more robust energy grid that is less dependent on centralised power stations that were perceived to be potential attack targets.

SMART GRID

WHAT IS A SMART GRID?

The Smart Grid is a system for an "intelligent distribution" of electricity, able to know the consumption of the various end users and to manage the generation and distribution of electricity according to demand.

Simply put, if in a given area we have a potential overload of energy, the excess energy can be redistributed to other areas that need it, based on the actual requests from end users.

Furthermore, the software that runs the Smart Grid monitors the electrical flow of the system, integrates renewable energy into the network and activates / suspends the industrial or domestic processes during periods when electricity costs less / more.

The smart grid knows our requirement of power consumption. When the demand for electricity is at its maximum, the smart grid automatically adapts to the demand by picking up excess energy from many sources to avoid overload problems or interruptions of power.

It has, therefore, the function of sharing the electricity that is generated from various sources, both public and private, traditional and renewable, and ensuring that electrical devices use electricity as efficiently as possible.

WHAT IS A SCADA SOFTWARE?

The **SCADA** (Supervisory Control And Data Acquisition) is an industrial control system that performs the following functions:

- acquisition of the physical quantities that are needed for the control and the supervision of the system;
- control, by means of actuators, of its operation;
- supervision, to visually monitor, through the so termed synoptic diagrams, the operating status of the system, the alarms, etc., also in remote control.

SCADA systems supervise, control, optimize and manage the systems for the generation and transmission of electrical energy as well as the distribution networks.
They allow to collect, store and analyze data from hundreds of thousands of data points in national or regional networks, to model networks, to simulate operations, highlight faults, prevent them and finally participate in the energy markets.
They are a vital part of modern networks and enable the development of the smart grids that must handle enormous amounts of energy from renewable sources produced by generators of large and small scale, to maintain stability in the network despite the intermittency of these sources and the bidirectionality of the energy flow.

SMART GRID

Special configuration prepared for the Worlddidac Exhibition

TRAINING OBJECTIVES

The Smart Grid trainer can be considered a **multidisciplinary laboratory**, because it allows studying and exercising different technical subjects, that are then integrated in a full Smart Grid system setup.

Actually, the Smart Grid trainer is an integrated laboratory that can be useful for a huge number of undergraduate and graduate courses in the engineering school. The laboratory equipment can be configured to create different exercises, which reinforce basic and advanced concepts in electric energy. The equipment can be interconnected to form **a full smart grid system**. However, as you can see from the list of experiments in the next paragraph, conventional topics, such as electric machines, distribution systems and so on could be covered by the Smart Grid trainer; this innovative laboratory can include class demonstrations and laboratory experiments under regular laboratory classes.

There are fundamental topics that are needed for understanding the smart grid concept and they have to be connected with real life situations, yet a set of different topics could be added in order to get a special curricula. The **core topics** include: electric circuits, electric machinery, hydroelectricity, wind energy, photovoltaic solar energy, renewable energies, power transmission, power distribution.

Furthermore, **additional courses** can benefit from the smart grid trainer, such as, for example: power system engineering & analysis, electric machines, linear control systems, electrical distribution engineering and smart grids automation, power generation operation and control, power electronics, cost and construction of electrical supply, power system stability, optimization methods, stochastic processes, embedded systems.

The smart grid system can be used by mechanical and electrical engineering students as a longtime project as it comprises enough elements to cover most of the topics listed above.

SMART GRID

LIST OF MODULES

DL 2108T26	BRUSHLESS CONTROLLER WITH MOTOR	2
DL 1021/4	THREE-PHASE ASYNCHRONOUS MOTOR	1
DL 1013A	BASE	2
DL 1026P4	THREE-PHASE SYNCHRONOUS MACHINE	1
DL 1017R	RESISTIVE LOAD	1
DL 1017L	INDUCTIVE LOAD	1
DL 1017C	CAPACITIVE LOAD	1
DL 2108TAL-CP	THREE PHASE SUPPLY UNIT	1
DL 1067S	MOTOR DRIVEN POWER SUPPLY	1
DL 7901TT	OVERHEAD LINE MODEL – 360 KM	1
DL 7901TTS	OVERHEAD LINE MODEL – 110 KM	1
DL 10065N	ELECTRICAL POWER DIGITAL MEASURING UNIT	2
DL 2109T29	THREE-PHASE POWER METER	3
DL 2108T25	GENERATOR SYNCHRONIZING RELAY	1
DL 2108T23	FEEDER MANAGER RELAY	1
DL 2108T02	POWER CIRCUIT BREAKER	3
DL 2108T02A	POWER CIRCUIT BREAKER	1
DL 2108T19	REACTIVE POWER CONTROLLER	1
DL 2108T20	SWITCHABLE CAPACITOR BATTERY	1
DL 9031	CIRCUIT BREAKER	1
DL 9013G	INVERTER GRID	1
PFS-85	PHOTOVOLTAIC SOLAR PANEL	1
DL SIMSUN	LAMPS FOR THE PHOTOVOLTAIC SOLAR PANEL	1
DL WINDSIM	WIND SIMULATOR	1
DL HUBRS485F	MODBUS COMMUNICATION HUB	1
DL SCADA-WEB	SOFTWARE SCADA	1
DL 1080TT	THREE-PHASE TRANSFORMER	3
DL 1155SGWD	KIT OF CONNECTING LEADS	1
DL 1001-1-AS	WORKBENCH	2
DL 2100-3M-AS2	FRAME	1
DL PCGRID	ALL-IN-ONE PERSONAL COMPUTER	1
SOCKET-MAIN	MAIN SOCKETS	1
SOCKET-EXT	SOCKET EXTENSION	1
DL 2100TT	THREE-PHASE TRANSFORMER	1

Options:

- **Wind energy grid connection.** It allows adding a wind energy system in parallel to the photovoltaic solar system in the utilization section of the system **– ordering code:**
  DL SGWD-W (which includes the DL SGWD and the DL WIND-A1G option).

AMTEC ELECTRONIC WORKSTATION

Typically these benches are made to house Industrial Electronics equipment or Electronic trainers and ancillaries. The unit has a single supply cable of 15A 220V with the option of an Emergency cutout and or Circuit Breaker/Earth Leakage dependent on requirements. A number of 220V supply points are available on the unit. Cabling can be supplied to power units, through the rear dummy panel. Units are also supplied with steel framework and wooden work surface, with or without rubber mat.

Amtec Standard Electronics Workstation (Part# AEWB)

- Steel Powder coated frame workstation with lockable draws cupboard & storage area for all equipment
- built in AC Variable power supply
- plug in socket point 220V built in

Amtec Complete Electronics Workstation

(Part# AEWC)

- Steel Powder coated frame workstation with lockable draws cupboard & storage area for all equipment
- built in AC Variable power supply
- plug in socket point 220V built in
- Oscilloscope
- Function Generator
- DC Power supply
- Benchtop Multimeter
- Electronics Tool Bag with Tools
- 500g Solder
- Resistance & capacitance Box
- 4 electronics Board Sets mono, multi, triac & A-Stable multi vibrators.

AMTEC DVD LIST

Amtec Techniquip has training DVDs and manuals available for common processes in the various Engineering workshop teaching various principles from safety in the workplace to various machines.

We have the following DVD's available for the Engineering Workshop.

DVD Description	PART NO	COURSE
AC & DC MACHINES DVD + 2 MANUALS	AMTECDVD001	Electrical
AC INDUCTION MOTORS DVD + 2 MANUALS	AMTECDVD002	Electrical
AIR CONDITIONING & REFRIGERATION DVD + 2 MANUALS	AMTECDVD003	AC
ANALOGUE OSCILLOSCOPE DVD + 1 MANUAL	AMTECDVD004	Electronics
AUTO ELECTRICAL TESTING DVD + 1 MANUAL	AMTECDVD005	Auto Electrical
AUTOMATIC PROCESS CONTROL DVD + 2 MANUALS	AMTECDVD006	Instrumentation
AUTOMOTIVE ELECTRICAL MAINTENANCE DVD + 1 MANUAL	AMTECDVD007	Auto Electrical
BASIC BEARING MAINTENANCE DVD + 2 MANUALS	AMTECDVD008	Mechanical
BASIC CENTRIFUGAL PUMPS DVD + 2 MANUALS	AMTECDVD009	Mechanical
BASIC HAND TOOLS DVD + 2 MANUALS	AMTECDVD010	Various
BASIC HYDRAULIC MAINTENANCE DVD + 2 MANUALS	AMTECDVD011	Mechanical
BELT AND CHAIN DRIVES DVD + 1 MANUAL	AMTECDVD012	Mechanical
BRAZING AND BRAZE WELDING DVD + 2 MANUALS	AMTECDVD013	Mechanical
COMPOUND MITRE SAW DVD + 1 MANUAL	AMTECDVD014	Mechanical
COMPRESSED AIR SYSTEMS DVD + 2 MANUALS	AMTECDVD015	Mechanical
CONFINED SPACES DVD + 2 MANUALS	AMTECDVD016	Various
DRILLING TAPPING AND THREADING DVD + 2 MANUALS	AMTECDVD017	Mechanical
ELECTRICAL ANGLE GRINDER DVD + 2 MANUALS	AMTECDVD018	Mechanical
ELECTRICAL CONSTRUCTION OPERATOR DVD + 2 MANUALS	AMTECDVD019	Electrical
ELECTRICAL TEST EQUIPMENT DVD + 2 MANUALS	AMTECDVD020	Electrical
ELECTRICITY IN THE WORKPLACE DVD + 2 MANUALS	AMTECDVD021	Electrical
ESSENTIAL KNOWLEDGE FOR WELDERS DVD + 1 MANUAL	AMTECDVD022	Welding
FIRE SAFETY SERIES DVD + 1 MANUAL	AMTECDVD023	Various
FIRE SAFETY FOR OFFICES DVD - NO MANUALS	AMTECDVD024	Various
FORKLIFT OPERATOR TRAINING 2 DVDs + CD ROM	AMTECDVD025	Fork Lift
GAS HAZARD AWARENESS DVD + 1 MANUAL	AMTECDVD026	Welding
GAS METAL ARC WELDING DVD + 1 MANUAL	AMTECDVD027	Welding
GAS SAFETY - PORTABLE CYLINDER HANDLING DVD + 1 MANUAL	AMTECDVD028	Welding
GEARED REDUCTION UNITS DVD + 1 MANUAL	AMTECDVD029	Mechanical
GENERAL SAFETY IN THE WORKPLACE 2 DVDs + CDROM	AMTECDVD030	Various
GENERAL WELDING SAFETY DVD + 1 MANUAL	AMTECDVD031	Welding
GRINDING MACHINES DVD + 2 MANUALS	AMTECDVD032	Mechanical
LEAD ACID BATTERIES DVD + 2 MANUALS	AMTECDVD033	Electrical
LIGHT DUTY HAND SOLDERING DVD + 1 MANUALS	AMTECDVD034	Electrical
LIGHT VOLTAGE JOINTS DVD + 1 MANUAL & EVJ MANUAL	AMTECDVD035	Electrical
LUBRICATION DVD + 1 MANUAL	AMTECDVD036	Mechanical
MEASURING & MARKING (BASIC ENG SKILLS) DVD + 1 MAN	AMTECDVD037	Mechanical
MECHANICAL COUPLING ALIGNMENT DVD + 2 MANUALS	AMTECDVD038	Mechanical
MECHANICAL THREADED FASTENERS DVD + 1 MANUAL	AMTECDVD039	Mechanical
MEDIUM VOLTAGE JOINTS 2 DVDs - NO MANUALS	AMTECDVD040	Electrical
OXY/ACETYLENE EQUIPMENT DVD + 2 MANUALS	AMTECDVD041	Welding
OXY/ACETYLENE PROCESS DVD + 2 MANUALS	AMTECDVD042	Welding
PRECISION MEASURING INSTRUMENTS DVD + 2 MANUALS	AMTECDVD043	Welding
PRESSURE VESSEL TESTING DVD + 1 MANUAL	AMTECDVD044	Mechanical
PROGRAMMABLE LOGIC CONTROLLERS DVD + 2 MANUALS	AMTECDVD045	Electrical
SAFE LIFTING & MOVING 2 DVDs + CD ROM	AMTECDVD046	Various
SEALS & GASKETS DVD + 2 MANUALS	AMTECDVD047	Various
SHIELDED METAL ARC WELDING DVD + 2 MANUALS	AMTECDVD048	Welding
TUNGSTEN INERT GAS WELDING DVD + 2 MANUALS	AMTECDVD049	Welding
VALVES AND VALVE MAINTENANCE DVD + 2 MANUALS	AMTECDVD050	Mechanical
WORKING WITH PORTABLE LADDERS DVD + 2 MANUALS	AMTECDVD051	Mechanical

AMTEC TECHNIQUIP
Engineering The Future
Suppliers Of Educational Engineering Equipment & Accessories

BEE LEVEL 2 company
125% recognition

30 YEARS OF ENGINEERING EXCELLENCE

Street Address: Unit 20 Hughes Industrial Park
Cnr. Oscar and Romeo Street
Hughes, Boksburg
South Africa
1460

Phone: +27 11 823-2678
Fax: +27 11 823-1919

Email: sales@amquip.co.za (International/ General Sales)
marco@amquip.co.za (Sales Manager)
nick@amquip.co.za (Sales Manager)

Website: www.amtectechniquip.co.za

Postal Address: Postnet Suite #71,
Private Bag X01
Farrarmere
Benoni, 1518

GPS coordinates: -26.183503 28.229474

"Please feel free to contact us should you require a Quotation or Technical information & datasheets"