TERCO

MADE IN SWEDEN BY TERCO

Electrical Installation Laboratory

Guarantee & Terms

All overseas deliveries are dispatched in special, made to order wooden crates, extremely sturdy and damage resistant.

The guarantee is valid for 24 months from delivery and covers repair or exchange of parts, defective due to faulty design or workmanship at our factory. Detailed conditions of guarantee are specified in our Terms of Guarantee.

Spare parts for 2-5 years of normal operation can be offered on request.

Regular after-sales service is performed by the worldwide network of Terco representatives, along with the advice and support of our engineers.

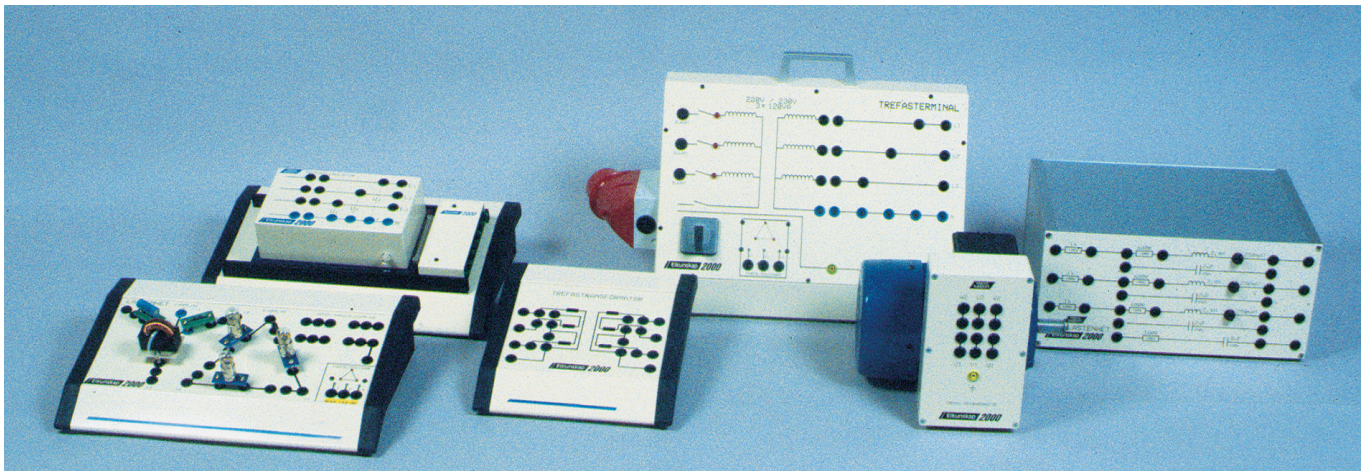
Commissioning and training is normally offered separately. Special training can be arranged on request either in Sweden or on site.

Terco is ISO 9001:2008 certified

Terco reserves the right to make changes in the design and modifications or improvements of the products at any time without incurring any obligations

CONTENT

3-Phase AC



In this section, basic knowledge of 3-phase systems is studied. These include single phase and three phase systems, phase difference, motors, three phase transformers and control of motors. The practical exercises are completed in two stages, first using extra low voltage (14V) and finally with supply voltage 380-415V, 3 phase, 50-60Hz.

This laboratory package for 3-phase consists of a 3-phase simulator board which produces a 3-phase sine wave voltage of 14V. There is also a measuring point, power output (touch protected) and 4 fault finding switches. The board is used together with the Base Unit 2000.

The 3-phase simulator board has a multiplexer function which enables the student to study three different waveforms on one channel on the oscilloscope.
To study the different types of load, a special load unit for the 3-phase simulator board is used. The student can connect in Y, D, series and parallel, with different loads. A phase sequence meter is also included.

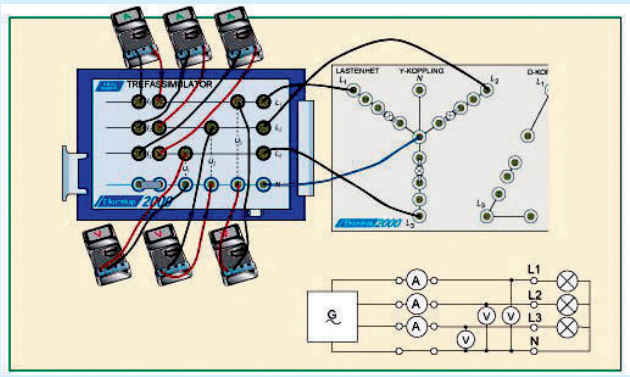
Using the 3-phase terminal, 400V AC can be connected. Different loads can be applied from the load unit which has R, L and C loads.

7 multimeters are required, (preferably with both analogue and digital scales). 1 wattmeter and an oscilloscope with digital memory are also required in order to complete the course.

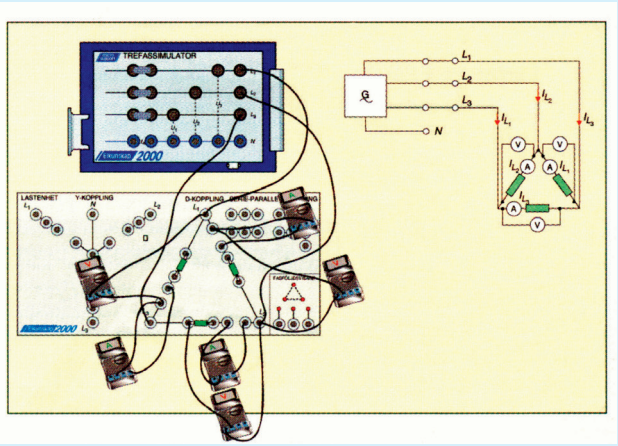
This course is a continuation from the course in DC and single phase AC circuits. It provides a sound base for the study of electrical engineering and basic knowledge of 3-phase AC. The ability to calculate and solve problems with different types of load with phase difference, is developed.

The knowledge and skill required to complete fault finding and the ability to correct faults in equipment used in a 3-phase system can also be achieved.

Extracts from the Lab Experiment book



3.2 Measurement of a star (Y) connection.
Delta Connection
Do **not** switch on the Base Unit.
Connect the measuring instruments and the 3 resistors (33ohms) in delta formation as shown in 3.4. Fill in the measured values in the table.
Calculate the power in each resistor and enter the values in the table.



Calculate the total power.
Describe the relationship between the power developed in D resp.Y connections.

ELE102000 Base Unit 2000

Base Unit 2000 is the base for the Lab System 2000. It is a Control Box comprising power supply, circuit box and PCB-holder.

Into the Base Unit laboratory cards can be fitted. The cards have been carefully designed to suit each particular area of study. The lab cards when fitted are automatically powered via D-sub connector.

Base Unit 2000 is a common unit to be connected to different equipment. The Base Unit is connected to 230 V AC and feeds voltage to the connected modules which are inserted between a pair of short guides and there connected to a 64-pole housing.

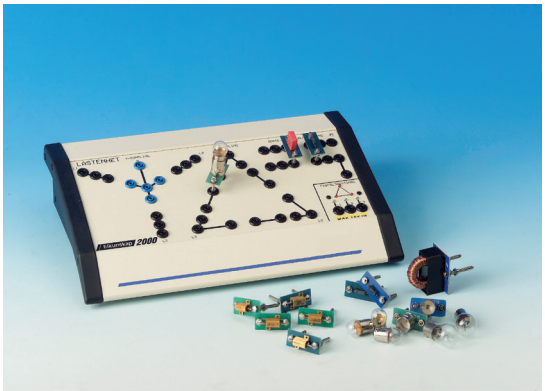
General data
Supply voltage 230 V , 50 - 60 Hz 1-phase
The unit has 6 outputs with following data:
Output 1 - 3: DC 12V / 3 A with LED indication and fuses
Output 4 - 6: AC 12V / 3 A with LED indication and fuses

Dimensions: 370 x 180 x 75 mm
Weight: 4 kg

ELE102230 3-Phase Simulator

The 3-phase simulator is used as a voltage source for most of the exercises using 3 phase.

General data
Dimension: 100 x 140 x 40 mm
Weight: 1kg



ELE102231 3-Phase Load Unit Low Voltage

The 3-phase load unit is connected to the 3 phase simulator. From the load unit resistive, inductive and capacitive loads can be connected. These can be connected in star (Y) or delta (D). A phase rotation meter for voltages under 50V is built into the unit. The unit is delivered complete with the load components.

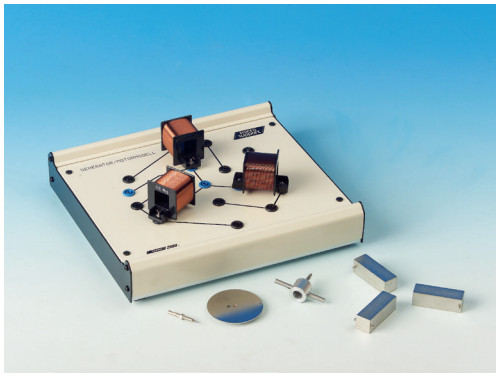
General data
Dimension: 400 x 170 x 315 mm
Weight: 12 kg

ELE102234 3-Phase Transformer

The 3-phase transformer is designed to connect to the 3 phase simulator. Setting 1:2. The unit can be connected in different combinations of star(Y) and delta (D).

General data

Dimension: 260 x 220 x 90 mm
Weight: 2.2 kg

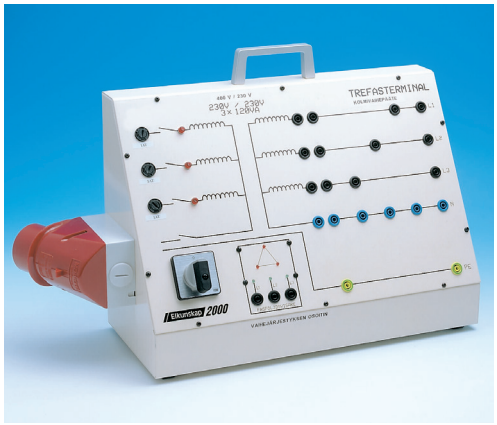


ELE102236 Motor/Generator Model

This model consists of 3 coils which can be connected in Y or D. The coils have iron cores which are easily removed. The unit is complete with two rotors, one magnetic and one of metal plate. The 3 phase simulator is used to supply this model.

General data

Dimension: 290 x 265 x 60 mm
Weight: 2.5 kg



ELE102232 Three Phase Terminal

The AC-motor can be connected to a 3-phase net by a 3-phase terminal with a 5-pole 16 A electrical output as to standard CEE17. Inside the terminal panel there is a control device for the 3-phases and the neutral line. The different phases are fused and in the terminal box is an insulation transformer (1:1) as well.

The terminal panel is equipped for current- and voltage measuring on all phases and includes a phase sequence display where LED indicate the phase sequence. The connection from the 3-phase terminal panel to the AC-motor is done with lab leads, directly or via the Contactor Unit. Only 4 mm safety lab sockets are used.

General data

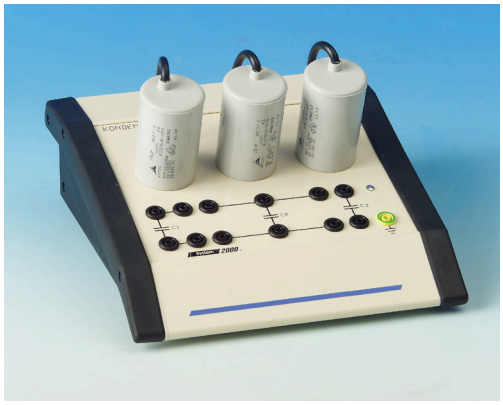
Supply voltage: Prim. 5-pol. 400/230 V 3-ph, 50 - 60 Hz, 2,5A
Sec. 5-pol 400/230 V 3-ph, 50-60 Hz, 2,5 A
Dimensions: 510 x 190 x 320 mm
Weight: 8.3 kg

ELE102233 3-Phase Power Load Unit

The 3 phase power load unit contains load components R, L, and C for use on supply voltage of 230/240 V. Connection is made via touch protected sockets.

General data

Dimension: 350 x 250 x 180 mm
Weight: 8.5 kg

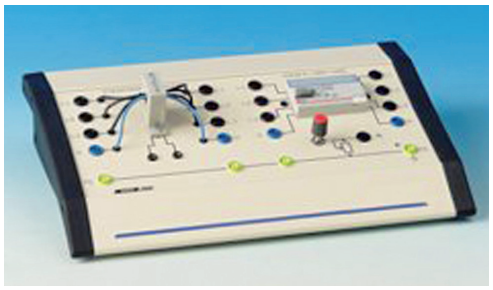


ELE102237 Capacitor Box

Three motor capacitors are mounted on a podium box. Connection is via touch protected sockets. The capacitors can be conneceted in series or parallel.

General data

Capacitance:	3 x 15 µF
Voltage:	450 V
Dimension:	240 x 220 x 150 mm
Weight:	2 kg



ELE102238 Current Transformer/ Earth Leakage Circuit Breaker

This unit consists of a current transformer and an automatic circuit breaker mounted on a pulpit box. Connection is via touch protected sockets.

General data

CT measuring range:	0.5 - 5A AC
Output Voltage:	0.1 - 4 V
ELCB 4 pole	
Dimension:	390 x 260 x 140 mm
Weight:	3 kg

ELE102239 Heating Centre

Two single phase outlets and a metal pipe are mounted on a pulpit box. The pipe is used to simulate a water pipe which can cause stray currents. Connection is via touch protected sockets.

General data

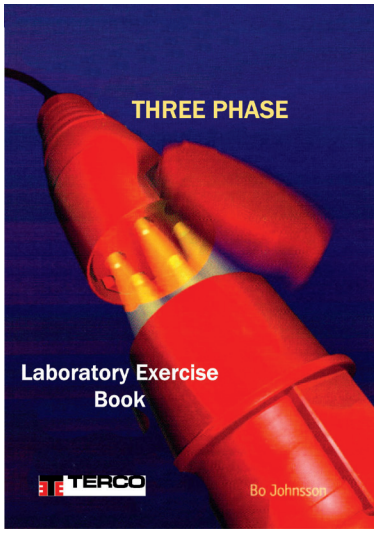
Dimension:	260 x 220 x 90 mm
Weight:	1.5 kg

ELK102240 3-Phase Asynchronous Motor with Baseplate

A 3ph asynchronous motor having a suitable baseplate for connection to the brake unit. It can also be used in the course for motor control.

General data

Power:	250 VA
Voltage:	230/400 V
Dimension:	280 x 220 x 180 mm
Weight:	9 kg



Technical Literature 3-phase

BOK102212 Laboratory Exercise Book
Contents:

- Measuring instruments
- Supply voltage and 3 Phase
- Balanced loads
- Unbalanced loads
- Phase shift
- Power measurement
- Phase compensation
- The transformer
- Motors
- Fault finding

ORDER DETAILS BASIC PRINCIPLES OF 3-PHASE AC			
Item	**Description**	**Pcs**	**Page**
Simulated 3-Phase 14V			
ELE102000	Base Unit 2000	1	5
ELE102230	3-Phase Simulator	1	5
4ELE102231	3-Phase Load Unit Low Voltage	1	5
ELE102234	3-Phase Transformer	1	6
ELE102236	3-Phase Motor/Generator Module	1	6
LEY500590	Safety Jumpers, black, Set of 10 pcs, 4mm	1	24
3-Phase Voltage 400 / 230V			
ELE102232	3-Phase Terminal	1	6
ELE102233	3-Phase Power Load Unit	1	6
ELE102237	3-Phase Box for Condensators	1	7
ELE102238	CurrentTransformer / Earth Leahage Circuit Breaker	1	7
ELE102239	Heating Centre	1	7
ELK102240	3-Phase Asynchronous motor with Base Plate	1	7
LEY500590	Security Jumper (black), Set of 10 pcs, 4 mm	1	24
Instruments & Accessories			
MX24B	Digital Multimeter TRMS (AC + DC)	6	25
MN12	Clip-on Ammeter 0.5-240 A 2 V AC	1	25
MX1	Analogue Multimeter, moving coil	1	25
XDO2040	GDS-1102A-U(CE) - Oscilloskop 2x100 MHz 25 GS/s	1	25
Books			
BOK102212	Three-Phase AC, Laboratory Exercises	1	8
Optional			
MV1830-HF	Lab Flex Set, Safety Plugs	1	24

Ref. 427

Installation Training

In order to be successful in the training of electrical installation, it is necessary to observe many important details. These details can vary from place to place depending on local installation regulations, installation systems adopted, trainees background and levels of training.

A few of the points to be considered, which are common to most training situations, are:

a) Training objectives must be clearly defined before starting any training.
b) The requirements of the electrical regulations must be observed.
c) Safety must be an integral part of training.
d) Course planning and breakdown of actual practical and theoretical projects must be completed.
e) Material and equipment used must be to the standards, robust to withstand heavy treatment from beginners, compiled in such a way that the training follows a pedagogic sequence, and should follow normal installation practice as far as it is possible.
f) Control and storage of training items must be easy to execute.

The training equipment listed in this brochure has been designed with these points in mind. Each unit is compact,

sturdy, possible to use over and over again, and delivered with training instruction manual.

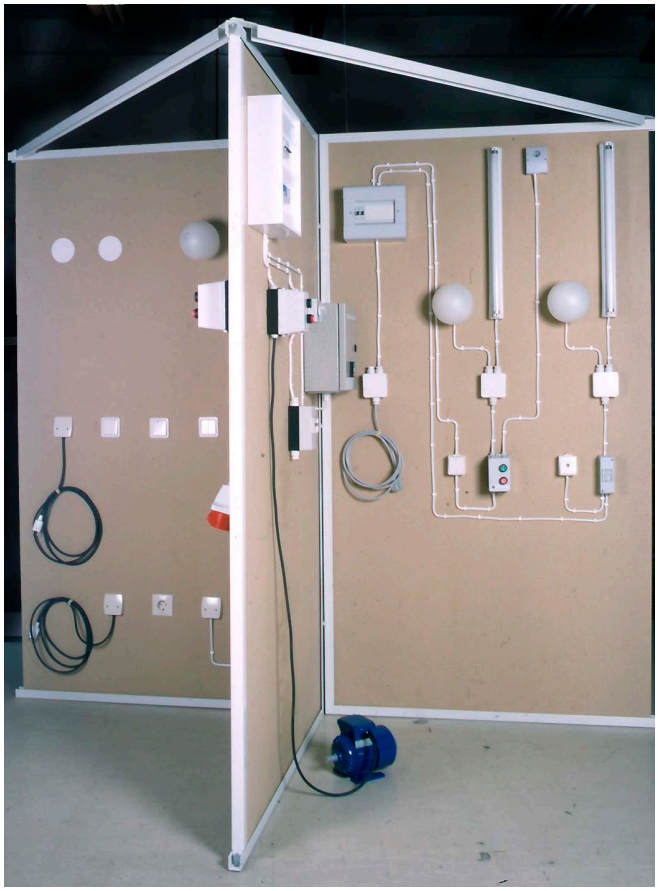
Electrical distribution systems and equipment must be correctly installed and maintained in accordance with accepted electrical engineering standards and practices, as stipulated in the publications of theInternational Electrotechnical Commission (IEC).

All of our products described in this manual are manufactured and tested in accordance with the relevant IEC standards.

Each kit is complete with cables, clips, screws, joint boxes, plugs and necessary electrical accessories ready to install.

Installation instruction and circuit diagrams are prepared in pedagogical sequence thus ensuring easy installation and correct function.

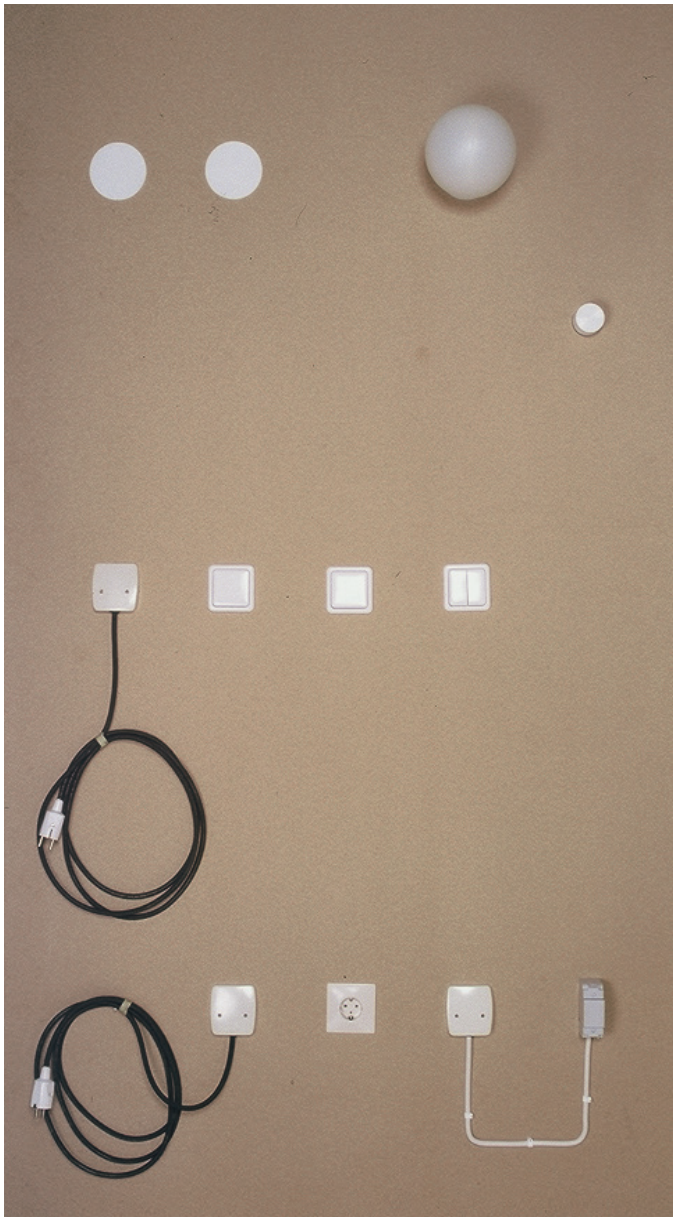
These training kits are designed to be installed on assembly boards which are placed in special frames. The boards can be removed from the frames and stored in a rack built for this purpose.



Low Voltage

MV1600 PVC Conduit Installation Kit

Installation practice using PVC conduit in concealed conditions, complimented with different wiring circuits including intermediate switching and socket circuits.



The kit consists of:

10 m	Cable REV 3x1.5 mm sq
100 m	Conduit cable FK 1 x 1.5 mm sq, white
100 m	Conduit cable FK 1 x 1.5 mm sq, black
100 m	Conduit cable FK 1 x 1.5 mm sq, blue
100 m	Conduit cable FK 1 x 1.5 mm sq, yellow/green
4 pcs	Junction box
9 pcs	Terminal mounting box
4 pcs	Blanking plates, diameter 100 mm
100 pcs	Cable connectors
50 m	PVC tubing flexible, approx. 15 mm diameter
1 pc	Earth plug
2 pcs	Switch, one way
1 pc	Switch, one way, double
2 pcs	Switch, two way (stair case)
1 pc	Switch, intermediate
3 pcs	Wall socket, one way, with earth
100 pcs	Wood screws (4.15 x 19)
30 pcs	Wood screws (for mounting boxes)
3 pcs	Lamp holder, complete
5 pcs	Bulbs
1 pc	Plastic bin
1 pc	Hole cutter T 70 (diameter 74 mm)
1 pc	Hole cutter T 80 (diameter 84 mm)
1 pc	Set of drills for wood
1 pc	Draw spring

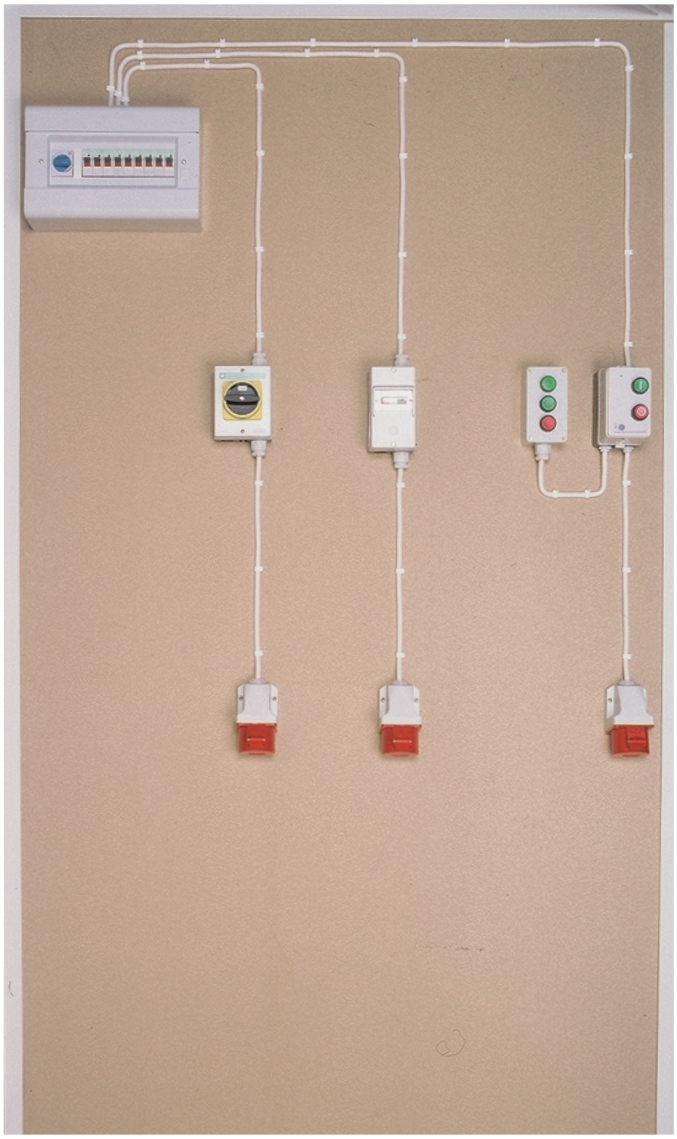
Some of the electrical components change design almost every year, so there can be changes in the specification above.

Complete with:

- Installation instruction manual incl. Installation plan with wiring diagram.
- Components/material box.

MV1601 Installation Kit for Surface Wiring

To be used for developing skills in clipping, bending and setting of surface mounted wires and cables, making circuit connections from a fuse experiment panel to single and three phase outlets, circuit breakers, controllers, etc.



The kit consists of:

1 pc	Distribution panel, complete with MCB 10 A 1-pole (9 MCB's)
1 pc	Main switch
1 pc	Motor starter / circuit breaker with contactor and overload relay
1 pc	Push button control box
1 pc	Safety switch
3 pcs	3-phase outlets
1 pc	Direct-on-line starter (manual)
100 m	Cable EKK 5 x 1.5 mm sq.
200 pcs	Clips TC 10-14
100 pcs	Wood screws (4 x 16)
100 pcs	Wood screws (4 x 24)
1 pc	Plastic bin

Some of the electrical components change design almost every year, so there can be changes in the specification above.

Complete with:

- Installation instruction manual incl. Installation plan with wiring diagram.
- Components/material box.

MV1603 Three-phase Motor Wiring Kit

To be used for practical exercise in realistic full size wiring of industrial type of motor controls in accordance with wiring standards.

A three-phase motor is connected to the mains supply via a starter, fuseboard, earth leakage circuit breaker and kWh meter. PVC surface cable is used throughout except for the connection between the motor and terminal box where flexible conduit PVC single cable is used. Direct on line, manual, star delta and automatic star delta staring can be connected into the circuit. Isolated earthing is necessary on the motor circuit for correct operation of the ELCB.

The kit consists of:

1 pc	3-phase AC motor
1 pc	Distribution panel complete with three MCB 10 A 1-pole and main switch
1 pc	kWh-meter, 3-phase,
1 pc	Earth leakage protection device
1 pc	Motor starter / circuit breaker with contactor and overload relay
1 pc	Direct-on-line starter (manual)
1 pc	Manual Y / D starter
1 pc	Automatic Y / D starter,
100 m	Cable EKK 5 x 1.5 mm sq.
200 pcs	Clips TC 10-14
100 pcs	Wood screws (4 x 16)
1 pc	Plastic bin

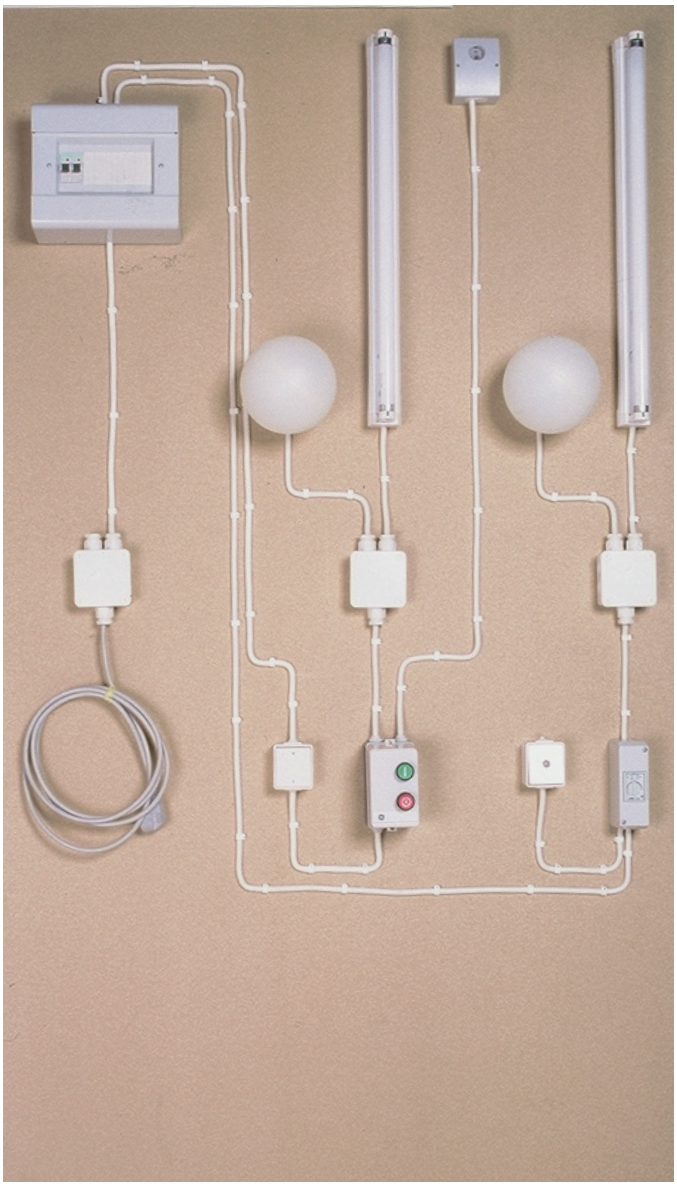
Some of the electrical components change design almost every year, so there can be changes in the specification above.

Complete with:

- Installation instruction manual incl. Installation plan with wiring diagram.
- Components/material box.

MV1604 Installation Kit for Lighting Wiring

To be used for the student to practice in wiring of lighting control circuits with fluorescent and incandescent lamps. Two lighting control circuits are incorporated in this module. In circuit No. 1, a fluorescent lamp and an incandescent lamp are controlled by an automatic system using a photo-cell operated relay. In circuit No. 2, a fluorescent lamp and an incandescent lamp are controlled by a manual pushbutton which operates a timing circuit.



The kit consists of:

1 pc	Pushbutton box with contactor
1 pc	Distribution panel with two MCB, 10 A, 1-pole
1 pc	Photo cell operated relay
1 pc	Staircase relay
1 pc	Switch, 2-pole
100 m	Cable EKK 3 x 1.5 mm sq.
25 m	Cable EKK 4 x 1.5 mm sq.
1 pc	Main cable
3 pcs	Junction box
2 pcs	Fluorescent lamp holder with choke and starter
2 pcs	Fluorescent lamps
2 pcs	Lamp holder, complete
2 pcs	Bulb
500 pcs	Clips TC 7-10
100 pcs	Wood screws (4 x 16)
100 pcs	Wood screws (4 x 25)
1 pc	Plastic bin

Some of the electrical components change design almost every year, so there can be changes in the specification above.

Complete with:

- Installation instruction manual incl. Installation plan with wiring diagram.
- Components/material box.

MV1665 Residential Wiring Trainer Kit

Residential Wiring Trainer (Kit) for instruction in principles and schematic diagrams of electric wiring in apartments. The trainer consists of complete modules, representing a typical floor plan of an apartment. The trainer utilises, as much as technically possible, full size electrical components as switches, circuit breakers, receptacles, light fixtures and lamps.
Supply voltage: 24 V AC, 3-phase system from an overload protected power supply, simulating a 220-240 V 3-phase system. The trainer is equipped with an energy meter.

Complete with:

- Set of components to meet residential wiring curriculum requirements.
- Wire package set
- Hand tool set necessary for wiring.
- Student Work Book.
- Laboratory manual describing residential wiring fundamentals such as:
  Wiring material components and equipment conductors and overload protection wiring circuits, designing and wiring of a complete electrical system, installation of cables, raceways and trouble-shooting.

The kit consists of:

5 m	Cable REV 5 x 2.5
200 m	Cable FK 1.5, black
200 m	Cable FK 1.5, blue
100 m	Cable FK 1.5, brown
200 m	Cable FK 1.5, yellow/green
1 pc	Junction box
8 pcs	Terminal mounting box
100 pcs	Cable connectors
50 m	PVC tubing flexible
1 pc	Switch, one way, double
5 pcs	Switch, two way (stair case)
1 pc	Wall socket, two way, no earth
100 pcs	Clips, JR 16
100 pcs	Wood screws (4 x 16)
100 pcs	Wood screws (4 x 30)
1 pc	Distribution Panel
6 pcs	MCB 10 A, 1-pole
1 pc	3-ph PERILEX socket
1 pc	Wall socket
1 pc	Wall socket, Stromfors
6 pcs	Bulbs, 24 V, 60 W
6 pcs	Lamp holder, porcelain
1 pc	3-ph transformer
1 pc	Main switch
1 pc	kWh-meter
1 pc	Plastic bin
1 pc	Cutter
1 pc	Stripper
1 pc	Screwdriver 5/150
1 pc	Screwdriver Poz no 2
1 pc	Particle board with layout of a flat

Some of the electrical components change design almost every year, so there can be changes in the specification above.

MV1605 Assembly Frame

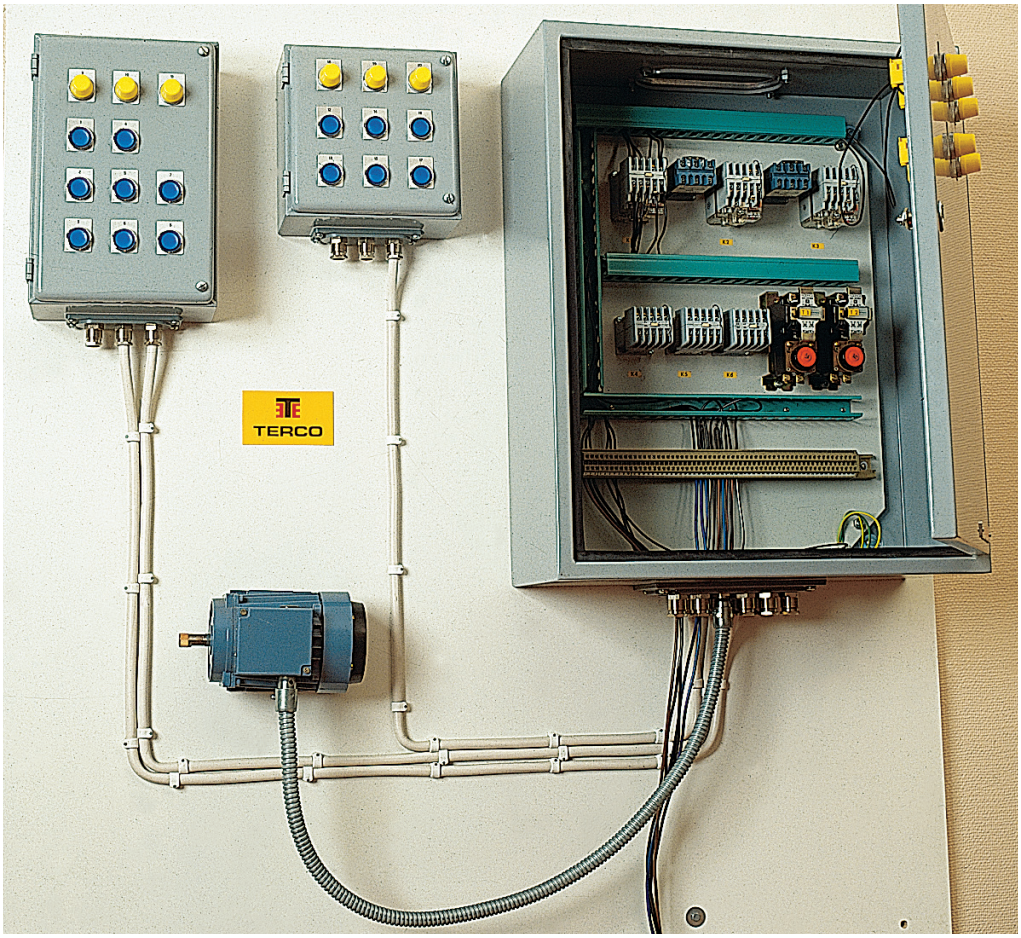
Easily assembled and disassembled. Can be free standing or fixed to the floor or to a work bench. Plasterboard, chipboard or wood can be fitted to this frame providing total thickness is not more than 30 mm. The T-shaped assembly takes 3 boards each of the area 1200 x 2200 mm.

Weight	30 kg

MV1606 Assembly Boards

Chipboard	Set of 3
Dimensions	1200 x 2200 x 22 mm (each board)
Weight	114 kg (3 pcs)

Installation Training Equipment



MV1608 Installation Training Equipment

The equipment consists of three units, the equipment cabinet, the control cabinet, and the control desk.
The equipment cabinet is fitted with contactors, relays, signal lamps, terminal blocks and wiring channels.
The illustration shows the equipment cabinet interconnected with the control cabinet and control desk having pushbuttons and signal lamps.

With the aid of various types of wiring diagrams, circuit diagrams and operating instructions, the student can install
and test run various systems and practice in meter reading and measurement.
Detailed instructions for 14 exercises are supplied with the equipment, order no. MV 1608-012. The motor and all
cables shown on the picture are not included in the order no. MV 1608 but can be ordered as additional equipment. (see below).

General Data

Three-phase voltage:	380-415 V, 50-60 Hz	
Control voltage:	220-240 V, 50-60 Hz	
Control Cabinet:	215 x 120 x 215 mm	4 kg
Equipment Cabinet:	540 x 240 x 660 mm	30 kg
Control Desk:	215 x 120 x 325 mm	5 kg

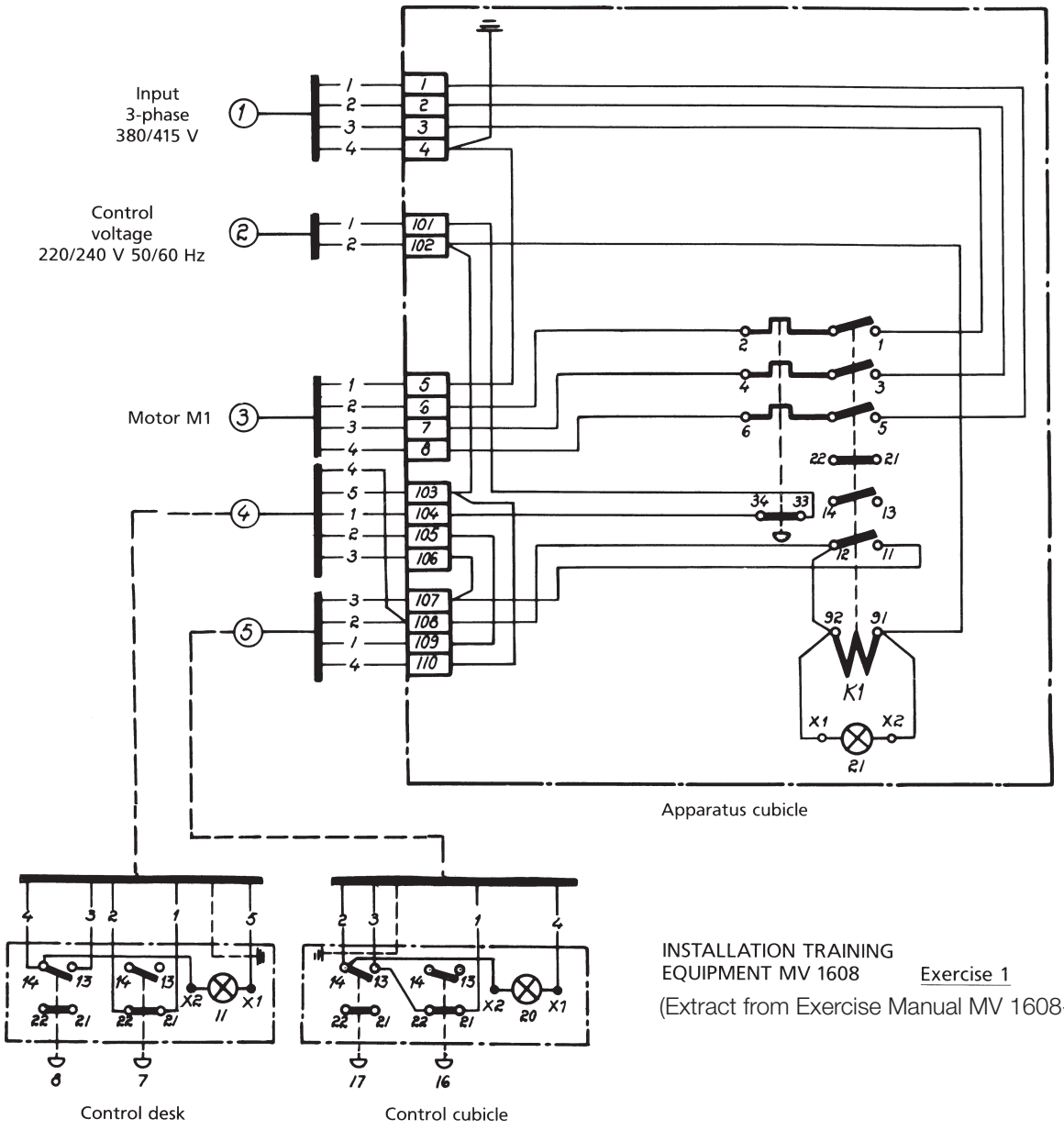
Additional Equipment

MV1628 Induction Motor 3-phase

Power	0.37 kW
Speed	1400 rpm 50 Hz, 1680 rpm 60 Hz
Current	1.3 A (Star 380-415 V)
	2.25 A (Delta 220-240 V)

MV1680 Assembly Kit

25 m	Cable EKK-S 4-core and earth, 1.5 mm^2
10 m	Cable EKK-S 6-core and earth, 1.5 mm^2
10 m	Cable RK, PVC single, 1.5 mm^2 yellow-green
100 m	Cable RK, PVC single, 1.5 mm^2 black
1 set	Cable markers
2 m	Flexible conduit, PVC-covered
2 pcs	Glands for flexible conduit
100 pcs	Fixing clips



INSTALLATION TRAINING
EQUIPMENT MV 1608 Exercise 1

(Extract from Exercise Manual MV 1608-012)

Exercise 1

1. The motor M1 shall be controlled and protected by the direct-on-line starter K1.
   The control shall partly be done from the control cubicle M, partly from the control desk P.
   When the motor M1 is started, signal lamps in the apparatus cubicle, in the control cubicle and on the control desk shall light.

2. The apparatus shall be connected according to the wiring diagram.

Student´s task

Mounting of the apparatus and connection according to the wiring diagram.

3. After testing and control of the function, the following currents shall be measured:
   a) Current through lamp no. 11.
   b) Current through the coil for the contactor K1.

After the above stated measurements are completed, the student shall note to which of the terminals the instruments
have been connected and also, if other steps must be taken to get the desired measurement values, to be noted as well.

Fault Finding Equipment

MV1609 Cubicle for Fault Finding

In order to trace faulty conditions and to perform assembly control, special equipment for use in vocational and technical schools has been designed. The equipment consists of contactors, pushbuttons, signal lamps, time-lag relays and an acoustic signal assembled in an apparatus cubicle.

By making connections on the joint connection block, a number of different functions can be obtained.

There is a circuit diagram for each exercise (function).

Before starting a fault tracing exercise, the teacher has to carry out preparation work as follows:

1. Choose an exercise with suitable degree of difficulty.
2. Perform required connections on the connection block according to the instruction belonging to the chosen exercise.
3. Arrange for one or more faults (for instance broken lead, short circuit).

The equipment is now ready, and the student can start the fault tracing exercise as follows:

1. Study the circuit diagram and determine the function of the circuit.
2. Connect the equipment to the mains and test it.
3. State probable fault causes and encircle the fault on the circuit diagram.
4. Carry out fault tracing measurements with a buzzer and a voltmeter and correct faulty circuits.
5. Test the fault-free equipment and compare its function with the expected under item 1.

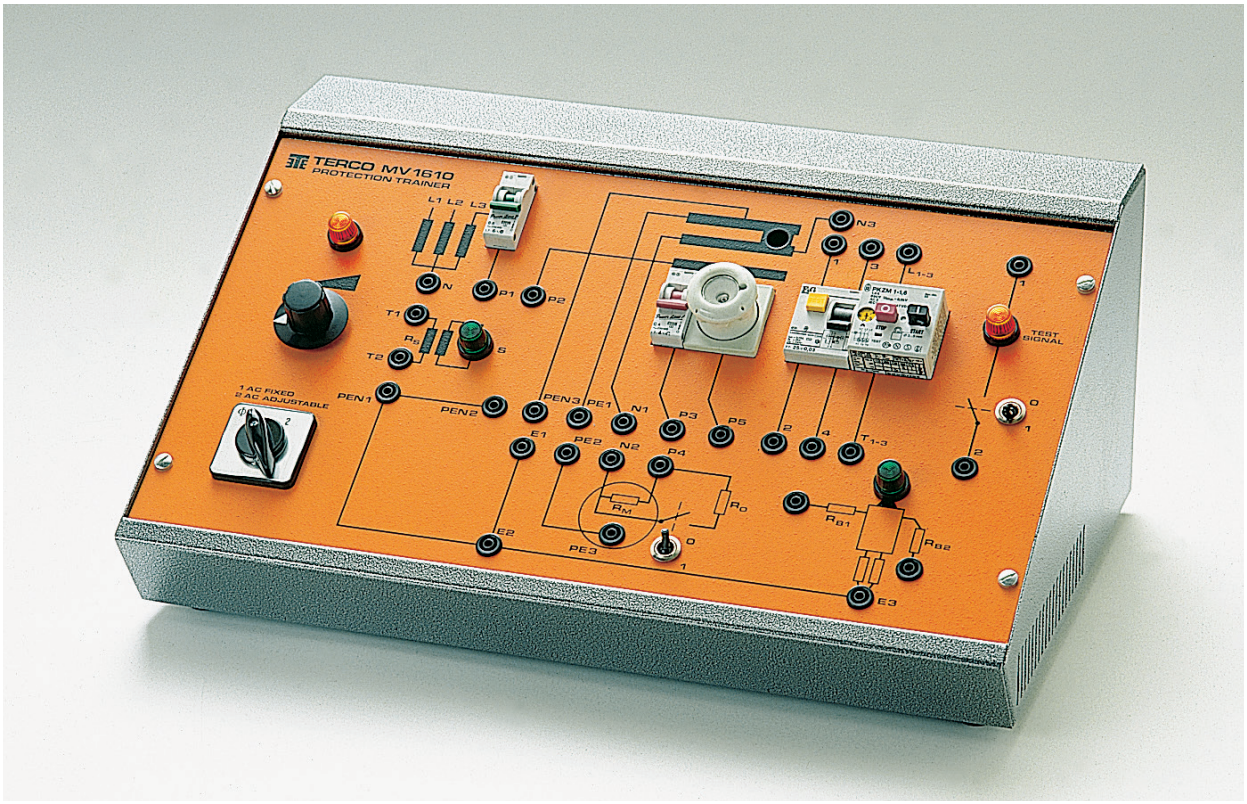
Exercise Manual: Order. No. MV 1609-012.

General Data

Coil voltage of the contactors: 230V 50/60 Hz
(other voltages available on request)

Dimensions	1020 x 270 x 720 mm
Weight	68 kg.

Electrical Safety System and Installation Protection



MV1610-2 Protection Trainer

Designed for study of dangers arising in electrical installations and equipment used in the protection against
such dangers. The equipment is complete and comprises also earth fault circuit breaker and motor circuit breaker.

The Protection Trainer consists of:

- Directly earthed system
- Indirectly earthed system
- Network forms
- Installation measurements
- Transformer
- Distribution board
- Diazed fuse
- Micro circuit breaker
- Motor circuit breaker
- Earth leakage circuit breaker
- Model for human body
- Model for electrical motor
- Resistances for earthing
- Conductors
- Protected earth
- Signal lamp
- Switch

Additional equipment as below is required to complete the experiments:

MV 1810-HF	Laboratory leads, black (Set of 10)
MV 1809-HF	Laboratory leads, blue (Set of 10)
MV 1811-HF	Laboratory leads, green/yellow (Set of 10)
	Multimeter (5 pcs)
	Stop watch (1 pc)

General Data

Power supply	220-240 V, 1-phase AC, 50-60 Hz
Dimensions	485 x 200 x 315 mm
Weight	15 kg

Installation Tool Kits

MV1613 Electrical Student Tool Kit

Contents:

1 pc	Tool box
1 pc	Screwdriver set
1 pc	Flat nose pliers
1 pc	Diag. cutting nippers
1 pc	Wire stripper
1 pc	Hammer, cross pein
1 pc	Hacksaw frame
1 pc	Water pump pliers
1 pc	Woodworkers knife
1 pc	Measuring tape
1 pc	Adjustable wrench
1 pc	Voltage tester
1 pc	Brad awl
1 pc	Round-nose pliers
3 pcs	Water pump pliers

Test Instrument

Digital Multimeter
Clip-on ammeter

MV1614 Electrical Workshop Tools

Contents:

1 pc	Storage cabinet
1 pc	Screwdriver set
2 pcs	Plumb-Bob
12 rolls	Plumb-Line
2 pcs	Level
2 pcs	Carpenters hammer
2 pcs	Drill brace
2 pcs	Center bit, 10 mm
2 pcs	Center bit, 16 mm
2 pcs	Center bit, 22 mm
2 pcs	Center bit, 25 mm
1 pc	Portable electric drill (Percussion)
2 sets	Masonry drills set 5-10 mm
2 sets	Drill set MAXI-Box
100 pcs	Hacksaw blade RS 1218
100 pcs	Hacksaw blade RS 1224
100 pcs	Hacksaw blade RS 1232
1 set	Set of ring spans 2-100 6-32 mm
1 set	Open ended spanner
2 pcs	Soldering pen, earthed
2 pcs	Soldering pen W61
2 pcs	Soldering pen W101
2 pcs	Hand file
2 pcs	Square file
2 pcs	Three sq. file
2 pcs	Half-round file
60 pcs	File handle
1 set	Tool kit 135 PC

Measuring and Data Acquisition for PC

MV1939 AC Power Energy Meter

MV1939 AC Power Energy Meter is a practical solution for the study of 1, 2 and 3-Phase AC power systems up to 500VAC/10A.

The Power Energy Meter enables the measurement and visualization of a wide range of parameters in the study of symmetrical as well as non-symmetrical networks, such as: phase voltages, phase-to-phase voltages, line currents, mean three-phase current, mean three-phase voltage, mean phase-to-phase voltage, three-phase active, reactive and apparent powers, mean three-phase power factors.

The visualization of parameters is distributed over several pages (default preset to display five pages) where each page simultaneously displays four parameters.

Technical Specifications

Power supply	220-240VAC, 50/60Hz
Measurement ratings:	
Voltage / Current	500VAC max / 10AAC max
Reactive / Active Power	5 kVAr / 5 kW
Cos Phi	0-1-0
Communications:	
Serial interface	RS485
Transmission protocol	Modbus RTU8N2
Baud Rate	19200kB
Dimension	255 x 205 x 335mm
Weight	10kg

MV1943 Analog Output Module

The MV1943 Analog Output Module integrates the communication interface functionalityof an USB to RS-485 adapter, with a 3-channel Modbus controlled 0-10V DC source in one compact unit.

Coupled with the MV2658 PWM Control unit, the MV1943 provides both communication between Terco measuring units and a PC, as well as simultaneous motor control.

The 3-channel analog output is controlled via PC using the Terco Data Acquisition Software and enables additional futures such as fully automatic data acquisition.

Technical Specifications

Power supply	220-240VAC, 50/60Hz
Communication:	
Interface	USB plug and play
Operating system	7/Vista/XP
Field interface	RS485
Maximum devices	32 devices
Power source	USB port

Voltage output:	
Channels	3
Channel output	0-10 V
Resolution	12 bit (2.5 mV)
Isolation	1500 Vac, Field to Logic
Control system	Terco MV2609 Data Acquisition Software
Dimensions	105mm x 147mm x 167mm
Weight	300g

MV2609 Data Acquisition and Control Software

Acquisition functions
Data is read into the PC via Modbus to USB link and presented in real-time in both tabular and graph form. Data may be acquired using one of 4 possible acquirement modes: Single, Timed, Semi-Automatic and Full Automatic*. The saved data can then be exported in Excel format for further investigation.

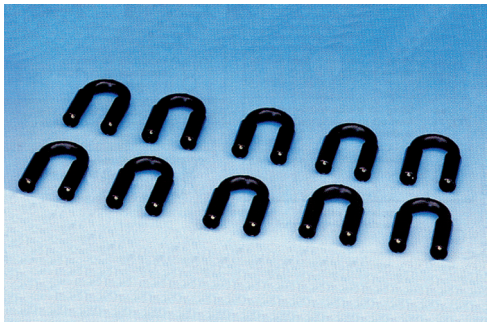
Pre-configured experiment setups
are included but the experiment presentation window is fully customizable, allowing the user to select available hardware, define data columns and set up graph parameters such as data sources and titles. The software is designed to work with Terco Modbus instruments but may be set up to communicate with many Modbus devices.

TERCO offers comprehensive manuals for each product upon delivery. On request we can also offer them in digital form.

ORDER INFORMATION ELECTRICAL INSTALLATION LABORATORY			
Item	**Description**	**Pc**	**Page**
Low Voltage (LV)			
MV1600	Installation Kit, PVC Conduit	2	10
MV1601	Installation Kit Surface Wiring	2	11
MV1603	Installation Kit, 3-ph Motor	1	12
MV1604	Installation Kit, Light Control	2	13
MV1665	Residential Wiring Trainer (Kit)	2	14
MV1605	Assembly Frame	2	15
MV1606	Assembly Boards, Chipboard, set of three.	2	15
MV1608	Installation Training Equipment	1	10
MV1628	Induction Motor 3-ph Sq.Cage 50-60 Hz	3	10
MV1680	Assembly Kit for MV 1608	1	10
MV1609	Fault Finding Equipment	1	18
MV1610-2	Distribution Protection Trainer	2	19
Tools			
MV1613	Tool Kit, Student, for electrician	8	20
MV1614	Tool Kit, Workshop	1	20
Measuring and Data Acquisition for PC			
MV1939	AC Power Energy Meter	1	21
MV1943	Analogue Output Module	1	21
MV2609	Data Collecting Software for MV Machines	1	22

Ref. 501

Instrument & Accessories

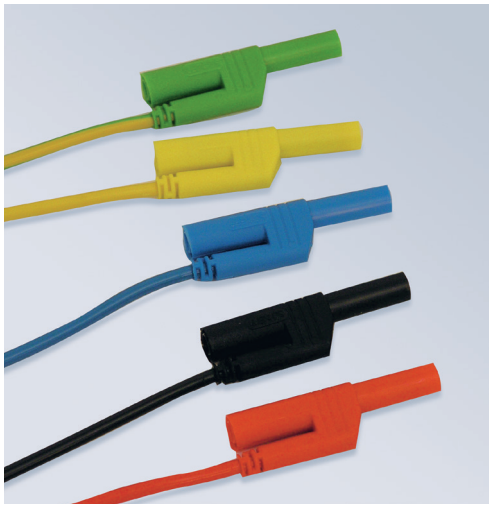


LEY500590 Safety Jumpers

Short circuiting 4 mm black jumpers used for connecting motors etc

General data

Dimension:	38 x 26 x 8 mm
Weight:	0.05 kg.

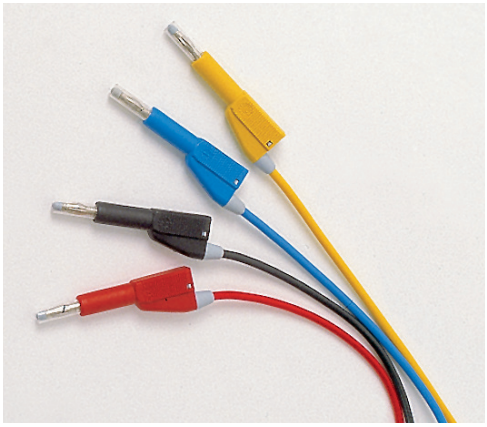


MV1830-HF Lab Flex Set, Safety Plugs

A stiff protection socket covers the plug.

Set of 100 leads in 5 different colours,red, yellow, blue and yellow/ green. 5 each of 4 different lengths, 25, 50, 100 and 200 cm.

Area: 1.5 mm^2



MV1830-H Laboratory Flexes with Safety Plugs, Retractable Shroud

Set of 100 leads in 5 different colours,red, yellow, blue and yellow/ green. 5 each of 4 different lengths, 25, 50, 100 and 200 cm.

Area: 1.5 mm^2

ELE102002 IK Storage Rack

A system Storage Rack for lab modules. The Storage Rack will protect the Lab Cards against electrical and mechanical damage.

General data

Dimensions:	180 x 180 x 355 mm
Weight:	1.4 kg

MX 24B Digital Multimeter

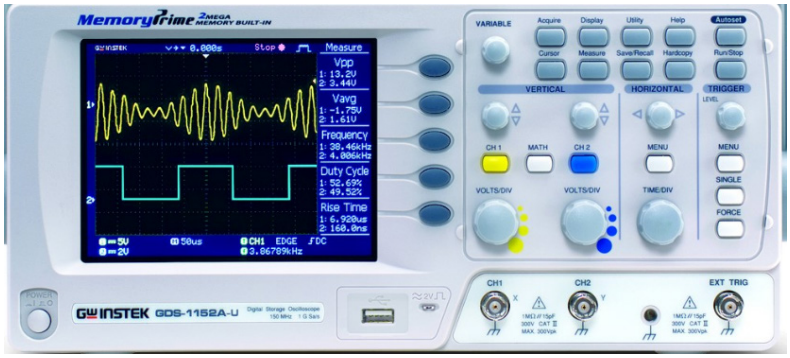
20A ac 750V ac 20A dc
1000V dc

MX1 Analogue Multimeter

200A ac 1.5kV

MN12 AC Current Probe

0,5A...240A, 1A/10mV AC. 4mm safety connections for laboratory flex



GDS-1102A-U - Digitalt oscilloskop

2 channels, 100 MHz, 1 GSPS, 2 Mpts, 3.5 ns

Item-Index

Alphabetical-Index

TECHNICAL EDUCATION WORLDWIDE

TERCO

TERCO AB was founded in 1963 with the aim of producing and supplying practically oriented equipment for technical education.

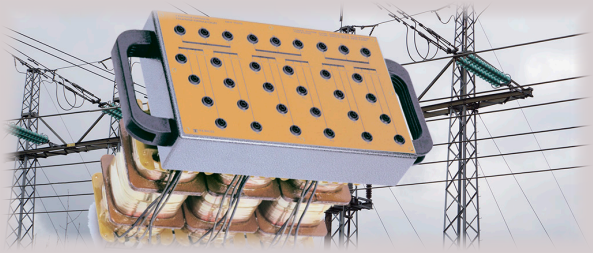
TERCO develops, manufactures and markets advanced equipment and systems for technical education. TERCO is today represented in more than 50 countries world wide.

TRAINING FOR TOMORROW´S WORLD

Electrical Machines & Drives

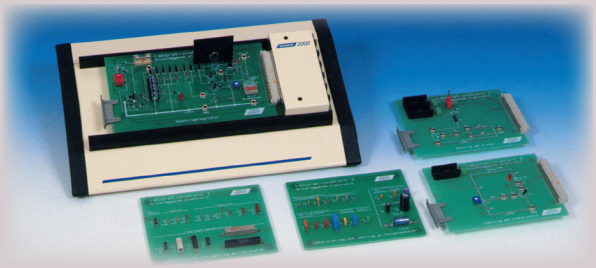
High Voltages lab

Power Systems



Transmission

Process, Control & Servo System



Electronics & Mechatronics

Automotive Electronics

Material Testing

Power Distribution & Furniture for Lab

TERCO

P.O Box 5014
SE-141 05 HUDDINGE

Office/Works: Pyramidbacken 6
SE-141 75 KUNGENS KURVA
STOCKHOLM

Tel 08-506 855 00
export@terco.se

SS-EN ISO 9001

worlddidac member

2020-0130