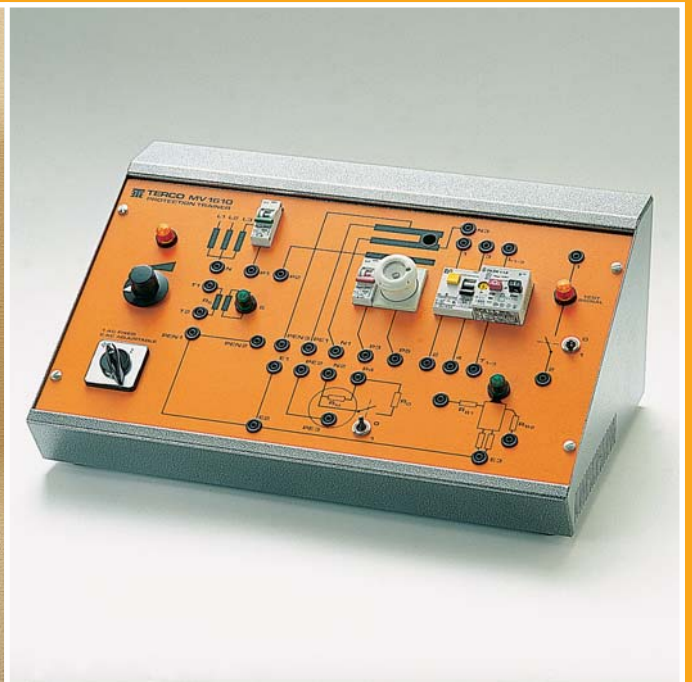


## Electrical Installation Laboratory



# Electrical Installation Laboratory

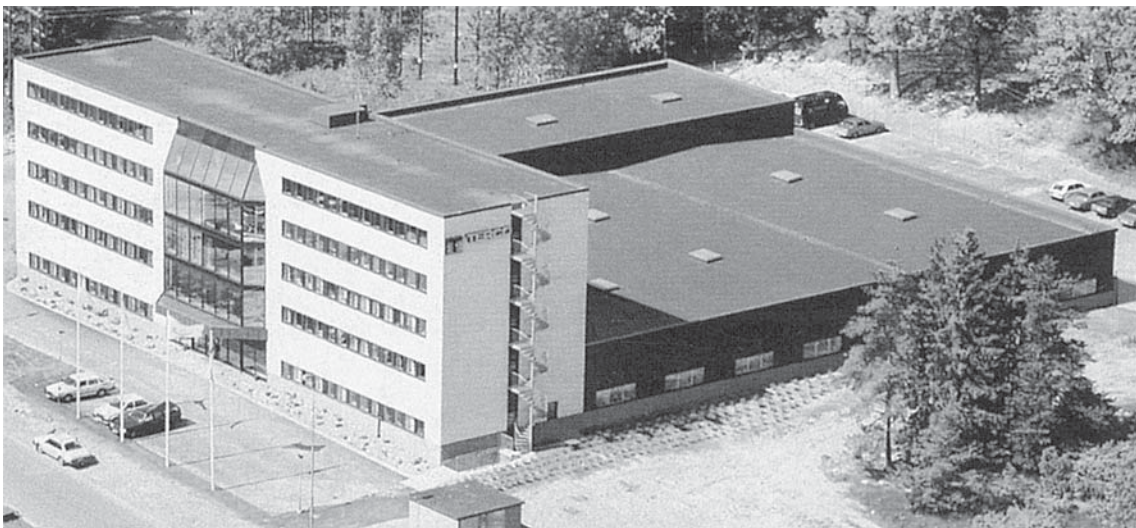
TERCO AB was founded in 1963 with the aim of producing and supplying practically oriented equipment for technical education.

TERCO develops, manufactures and markets advanced equipment and systems for technical education. These equipment are used at various levels for training and continuation courses in vocational schools, universities, organisations and industrial learning centres all over the world.

TERCO has delivered equipment to more than 65 countries throughout the world.

TERCO AB – one of the leading companies in technical education world-wide.

## Terco Headoffice



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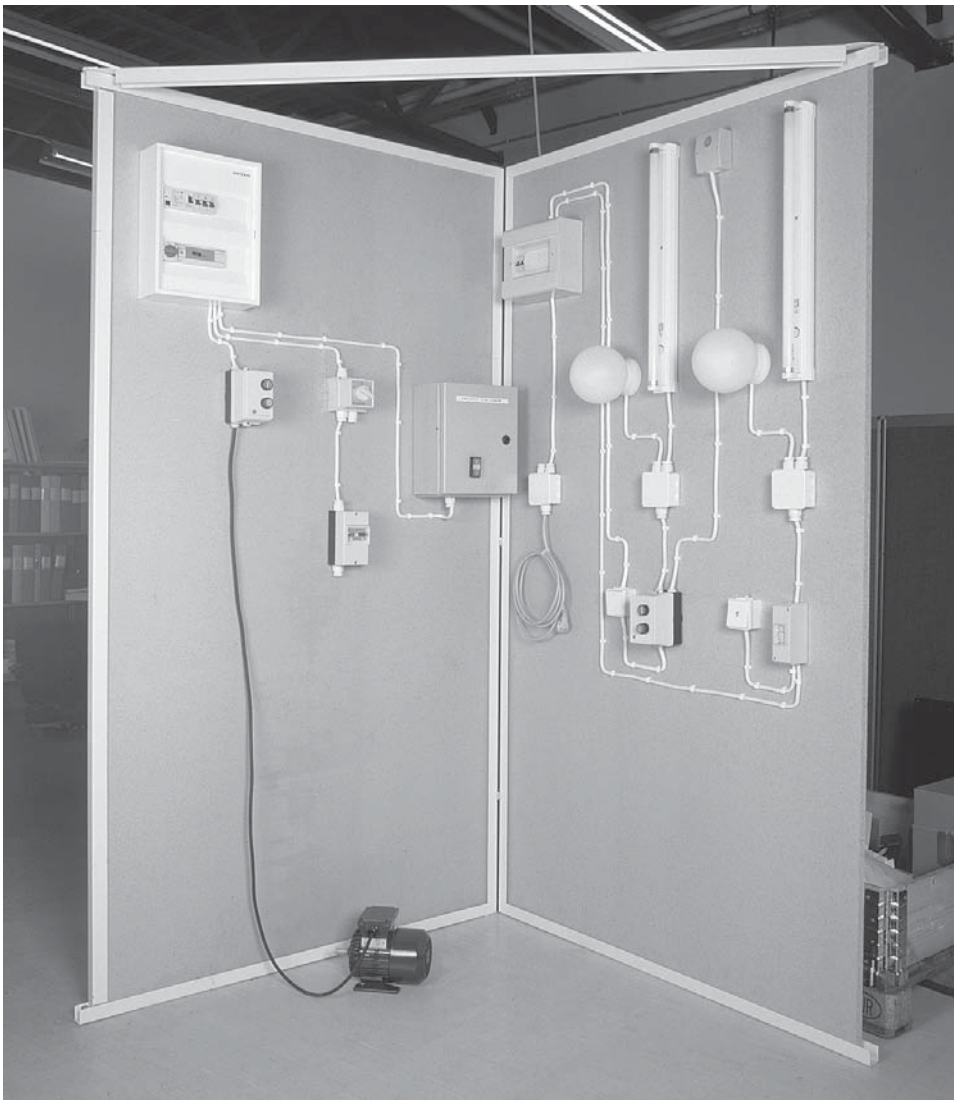
## Installation Training

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:

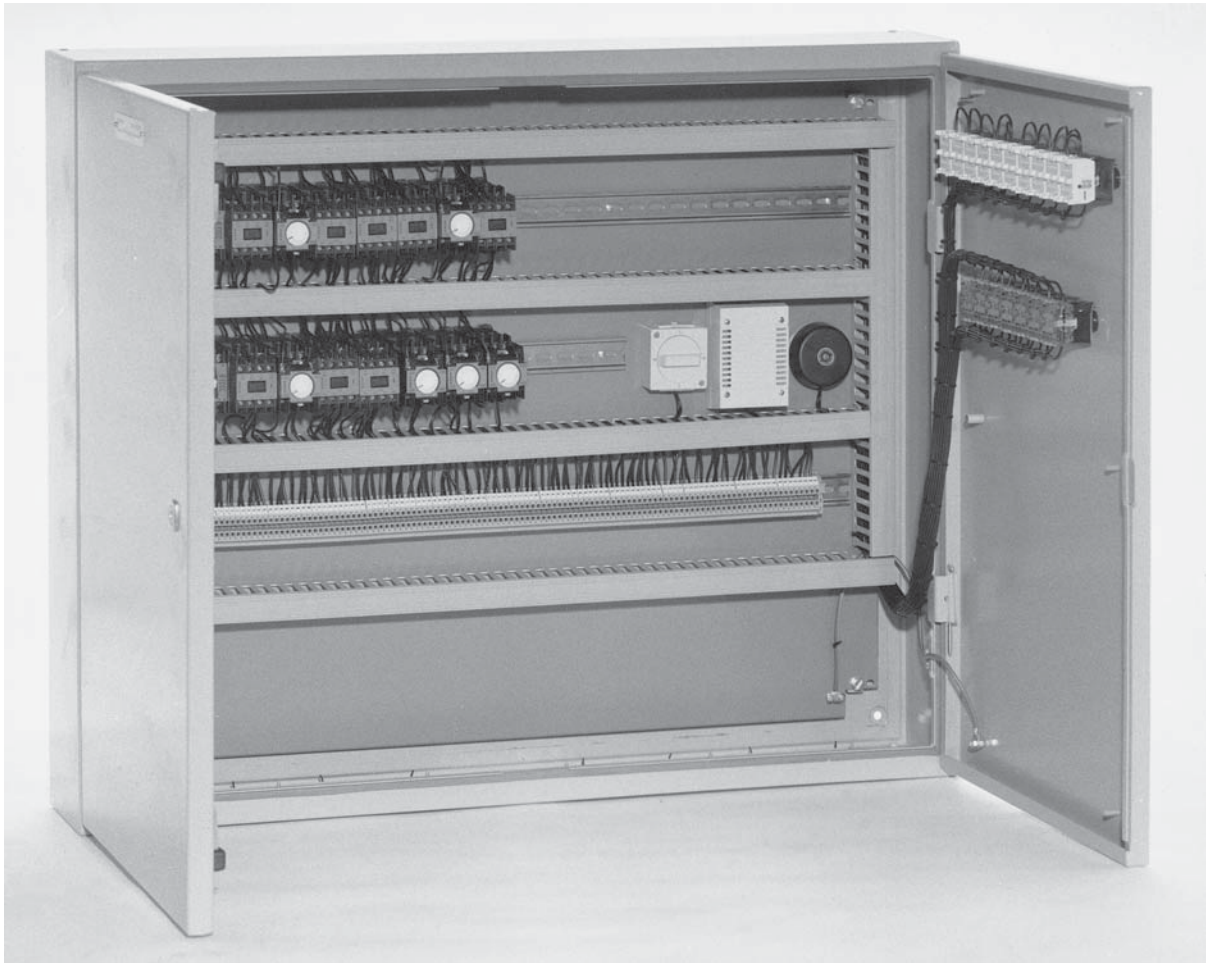
- a) Training objectives must be clearly defined before starting any training.
- b) The requirements of the electrical regulations must be observed.
- c) Safety must be an integral part of training.
- d) Course planning and breakdown of actual practical and theoretical projects must be completed.
- e) 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.



*Rack with different installation kits.*

## Fault Finding Equipment



### MV 1609 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.

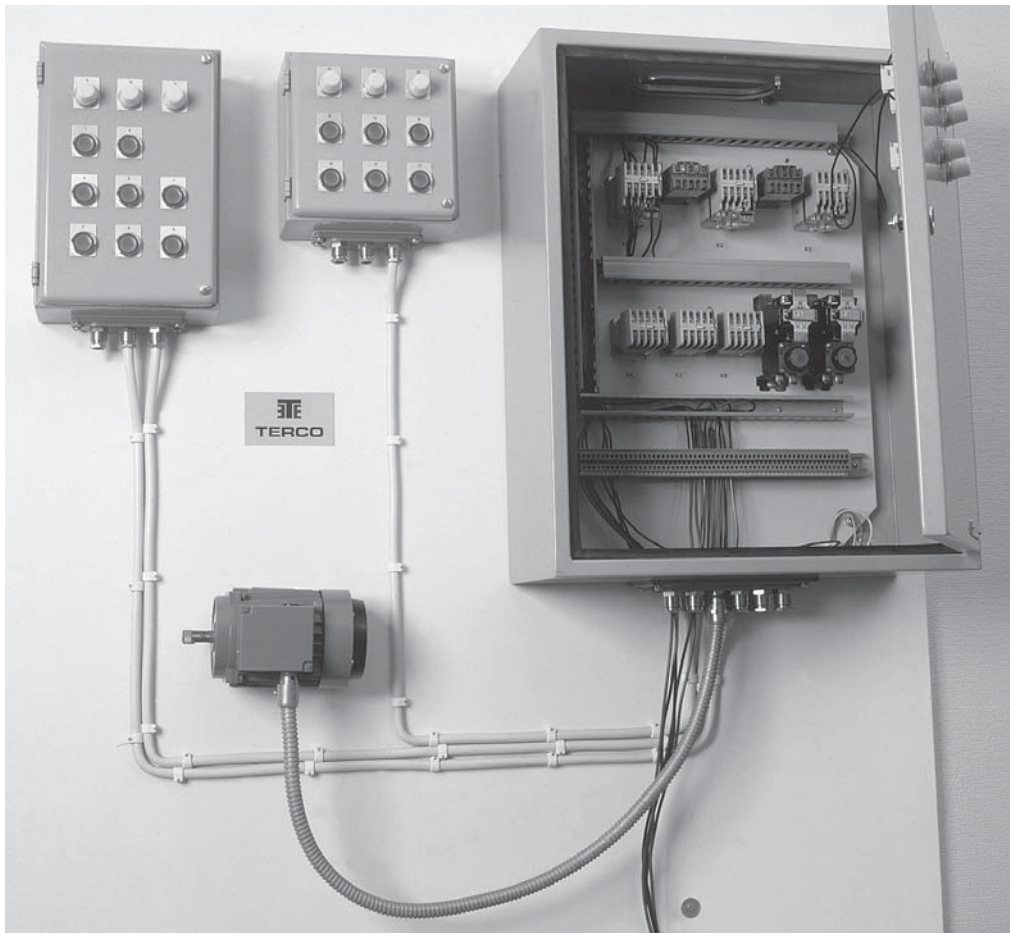
Exercise Manual: Order. No. MV 5043-2.

#### 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.

# Installation Training Equipment



## MV 1608 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 5044-2. 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

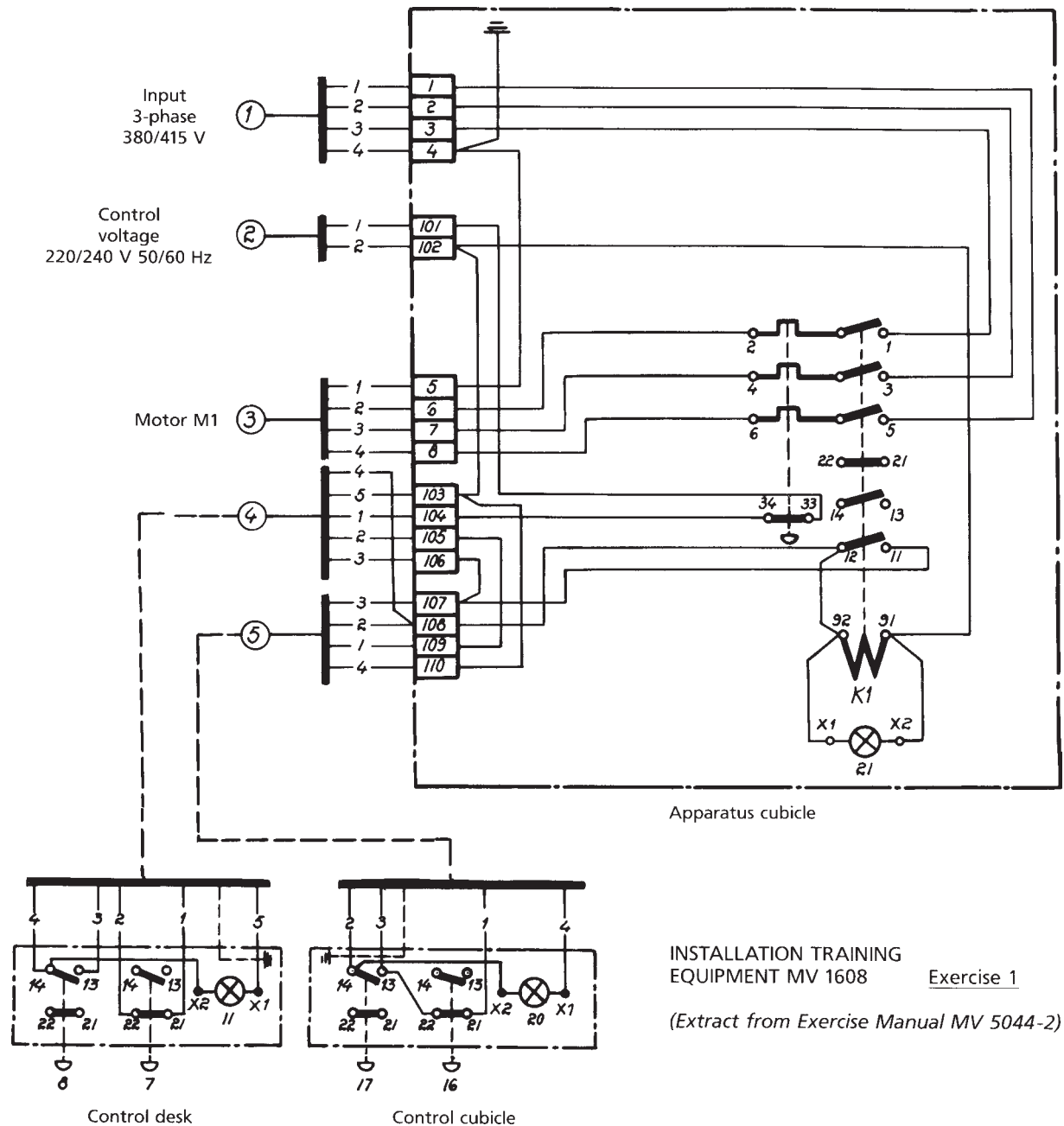
### Additional Equipment

#### MV 1628 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)

#### MV 1680 Assembly Kit

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



**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.

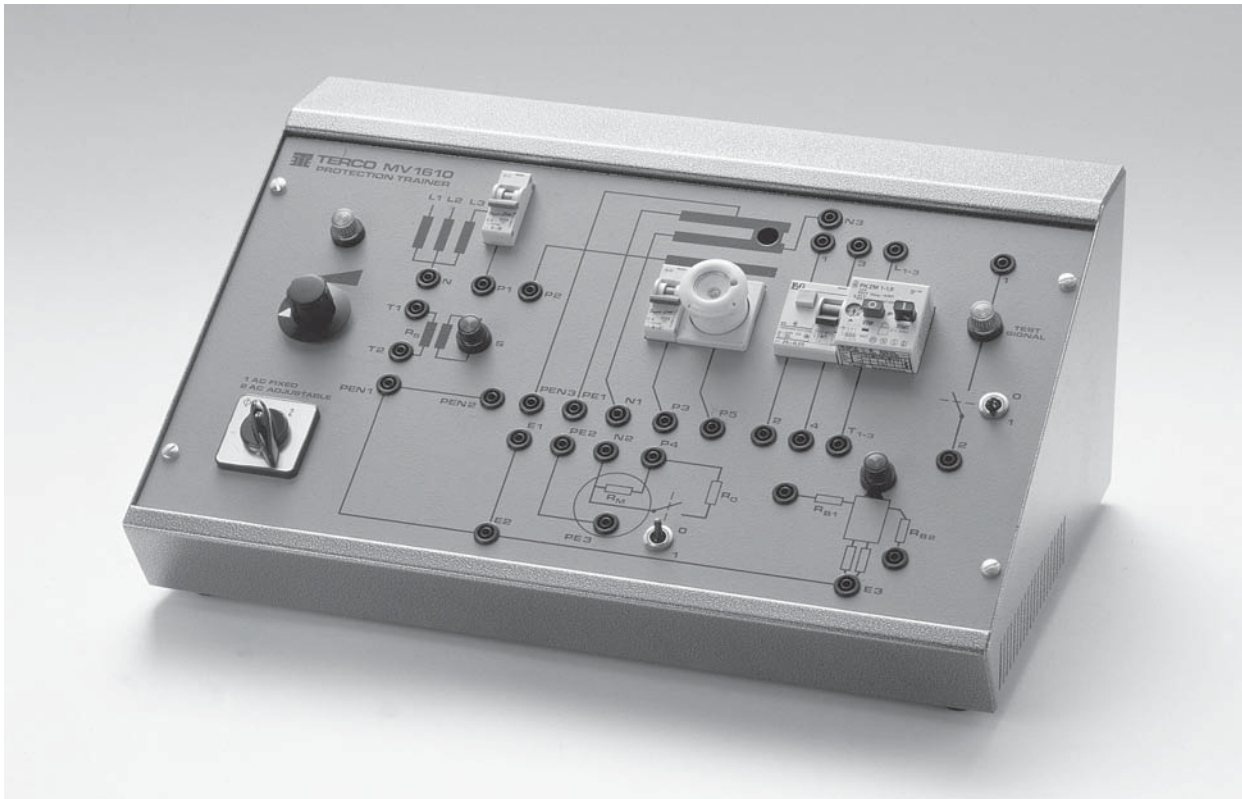
**Student's task**

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.

# Electrical Safety System and Installation Protection



## MV 1610-2 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

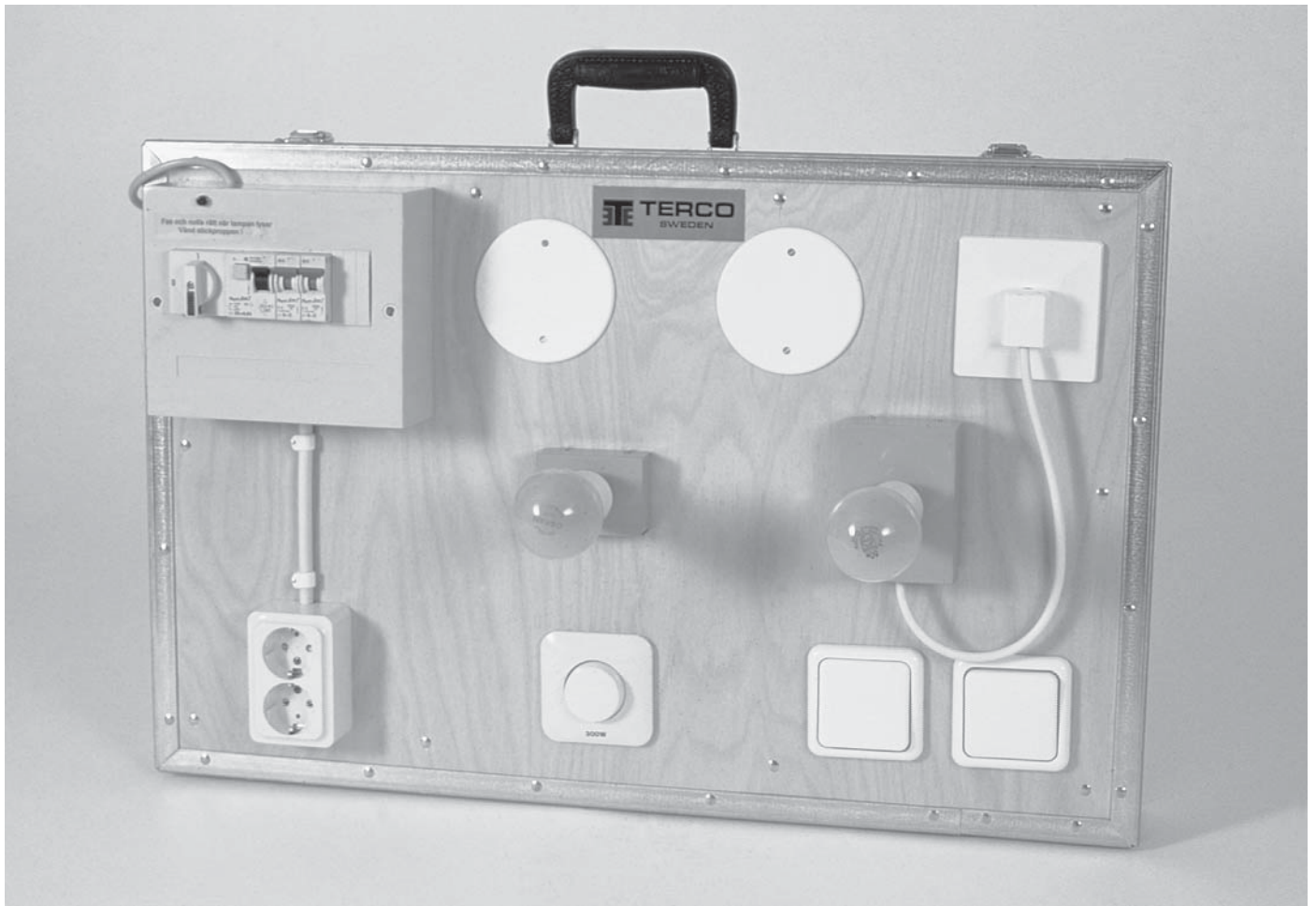
## Additional equipment as below is required to complete the experiments:

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

## Electrical Installation Kits



### MV 1624 Electrical Installation Unit, 1-phase

This is a single-phase set with the distribution panel and electrical installation components mounted on a plywood case.

The wiring and the connections have to be done by the students.

An installation manual is enclosed.

The power to the Electrical Installation Unit is connected by TERCO with a single-phase cable with plug.

The PVC-tubes between the distribution panel, junction boxes and terminal mounting boxes are ready installed and the wiring cables are drawn through.

#### General Data

Power supply	220-240 V, 1-phase, 50-60 Hz
Dimensions	720 x 470 x 80 mm
Weight	9 kg

The Electrical Installation Unit consists of:

1 pc	Plywood box
1 pc	Distribution panel
1 pc	Main switch
1 pc	Earth fault switch
2 pcs	MCB (micro circuit breaker)
1 pc	Wall socket, double, with earth
3 pcs	Switch, one way/double (stair case) combined
1 pc	Dimmer
1 pc	Terminal socket for lamp
1 pc	Lamp holder with cable and plug
1 pc	Lamp holder, E27, porcelain
2 pcs	Junction box
3 pcs	Terminal mounting box
2 pcs	Blanking plate
1 pc	Main cable with plug, single phase
Enclosed are also cables, screws, clips etc	

## Electrical Installation Kits

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.



### MV 1605 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 70 kg

### MV 1606 Assembly Boards

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

## Electrical Installation Kits

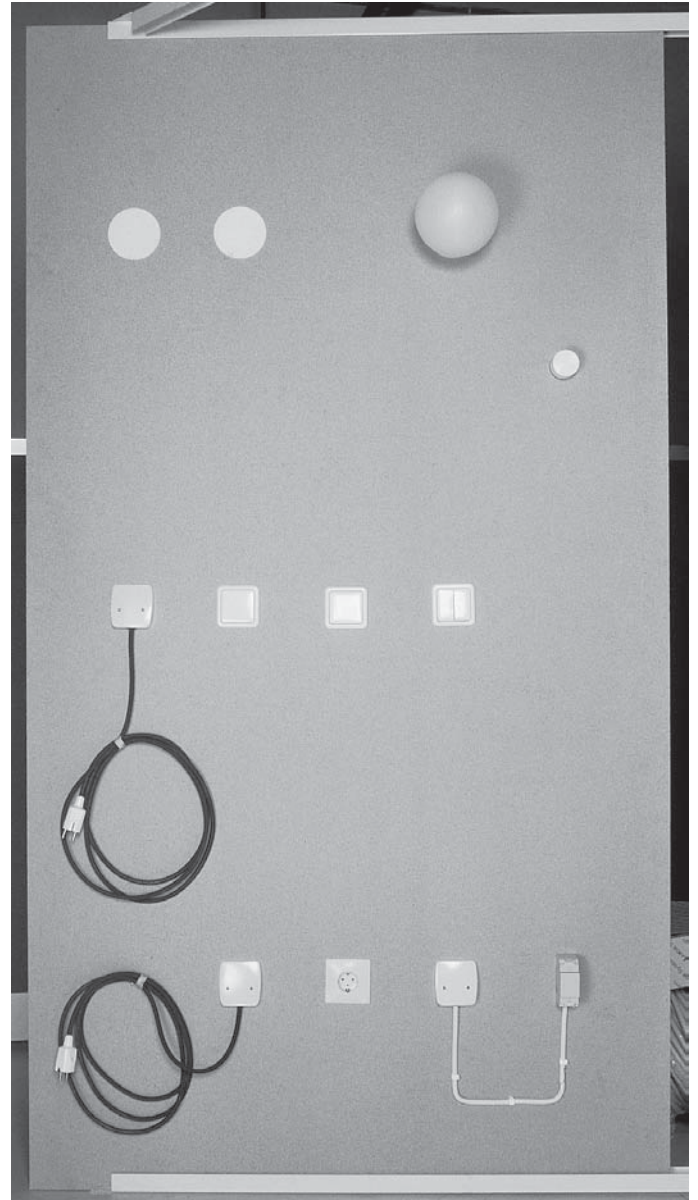
### MV 1600 PVC Conduit Installation Kit

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
20 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.



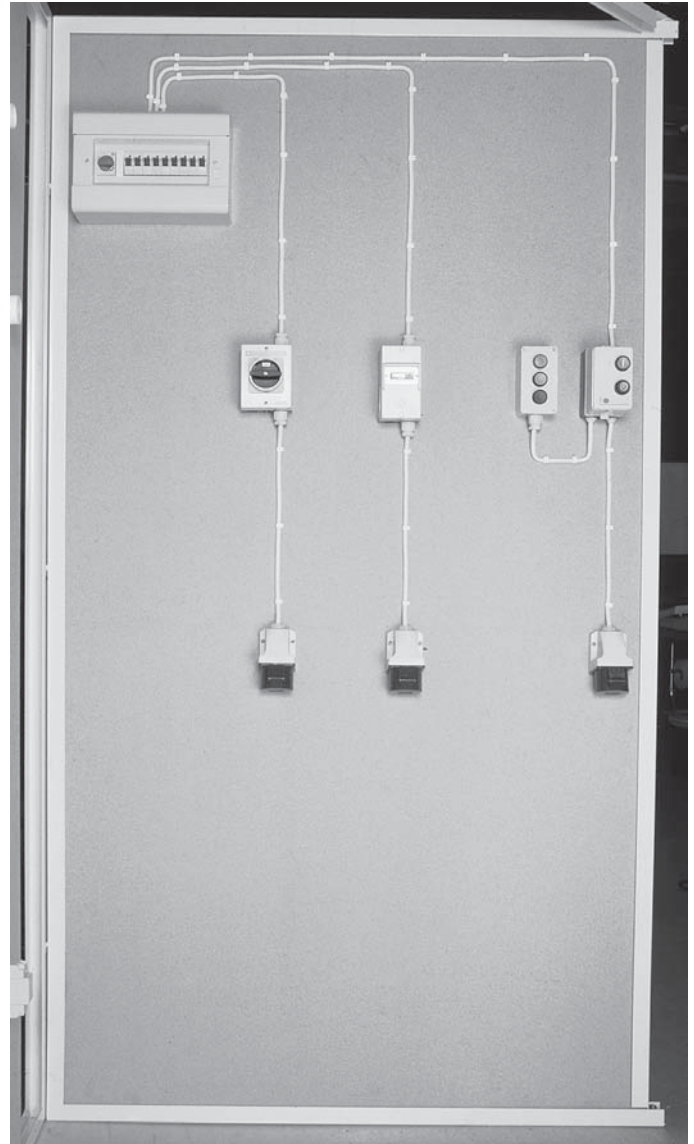
## Electrical Installation Kits

### MV 1601 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 pcs 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 (1/2 x 6)
- 100 pcs Wood screws (4.15 x 25)
- 1 pc Plastic bin



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## Electrical Installation Kits

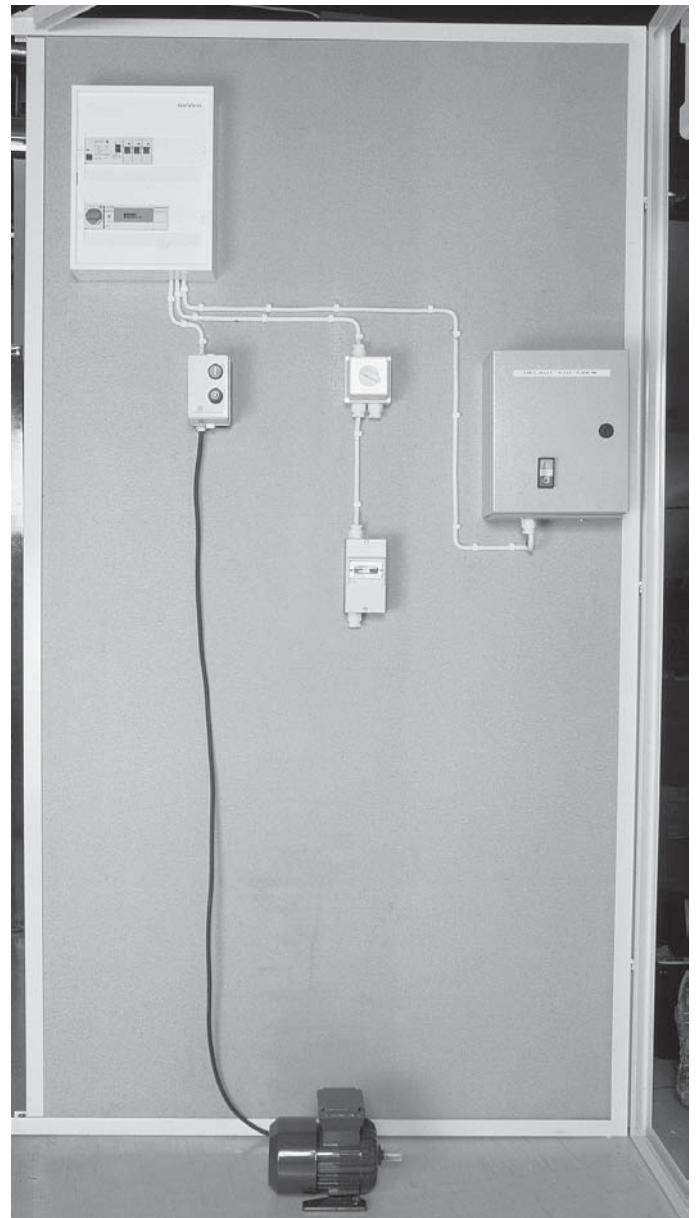
### MV 1603 Three-phase Motor Wiring Kit

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 starting 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 (4.15 x 19)
- 1 pc Plastic bin



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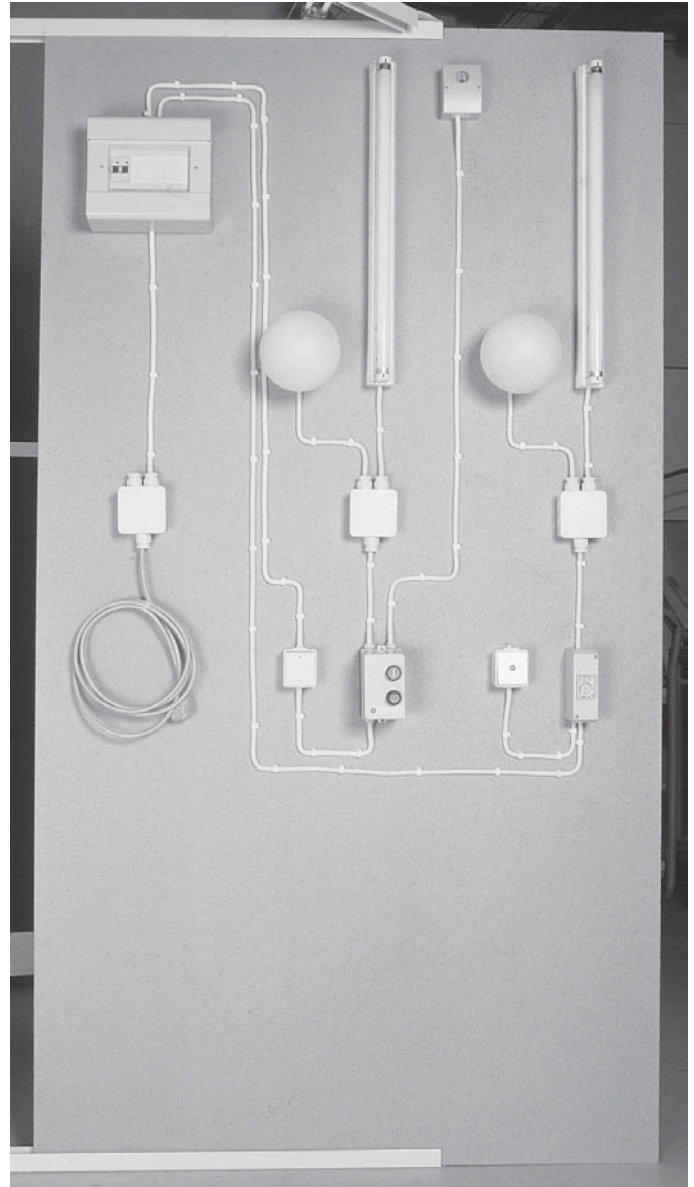
## Electrical Installation Kits

### MV 1604 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 (4.15 x 19)
100 pcs	Wood screws (4.15 x 25)
1 pc	Plastic bin



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# Electrical Installation Kits

## MV 1665 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 1.5
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
15 m	PVC tubing flexible
1 pc	Switch, one way, double
6 pcs	Switch, two way (stair case)
1 pc	Wall socket, two way, no earth
100 pcs	Clips, JR 16
100 pcs	Wood screws (4.15 x 9)
100 pcs	Wood screws (1 <sup>1</sup> / <sub>4</sub> x 8)
6 pcs	MBC 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-Stripper
1 pc	Screwdriver 5/150
1 pc	Particle board with layout of a flat

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# Electrical Installation Kits

## Installation Kits for Alarm-, Control-, and Safety Systems

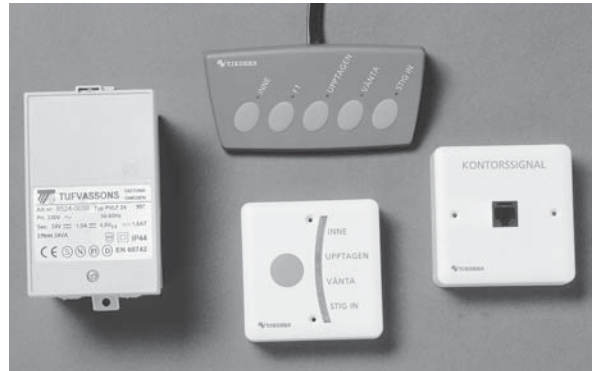
Vocational and Technical Schools which cater for Alarm-, Control- and Safety systems training, low voltage training, must have practical assignments to complete the course of study. The following list of training kits which are designed to meet with syllabus requirements and to eliminate wastage of planning and issue time. Each kit is complete with cables, screws and accessories required for the exercise. These are stored in a plastic bin to simplify storage and issue. The components are of standard type as used for normal installations. The manual or instruction handbook included, is prepared for the student to proceed with a project with a minimum of supervision. On completion and check of the installation the system can be energised and made operational. The kits are mostly suited for mounting on wooden panels e. g. chipboards MV 1606 on the frame MV 1605 or similar training surfaces.

### MV 1616 Office Signalling Installation

Kit for installation practice with self-teaching instructions.  
Supplied in strong plastic bin.

The kit includes:

1 pc Transformer	1 pc Indicating contact
1 pc Master station	Cable, clips, pins, screws
1 pc Indicator panel	1 pc Handbook
	Weight 3 kg

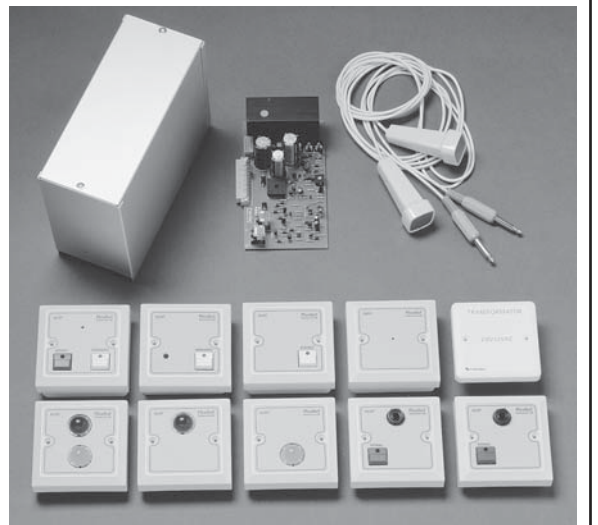


### MV 1620 Visual Nurse Call System

Kit for installation practice with self-teaching instructions.  
Supplied in strong plastic bin.

The kit includes:

1 pc Transformer	1 pc Presence indicating unit with sound alarm
1 pc Central unit	Cable, clips, screws, LEDs
1 pc Calling units	1 pc Handbook
1 pc Resetting unit	Weight 5 kg
1 pc Presence indicating unit	



### MV 1622 Automatic Fire Alarm

Kit for installation practice with self-training instructions.  
Supplied in a strong plastic bin.

The kit includes:

1 pc Master Station	1 pc Alarm pushbutton
1 pc Heat detector	1 pc Bell
1 pc Optional smoke detector	Plug, cable and screws, etc.
	Handbook
	Weight 3 kg



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## Electrical Installation Kits

### MV 1621 Entrance Telephone Installation

Kit for installation practice with self-training instructions.  
Supplied in strong plastic bin.

The kit includes:

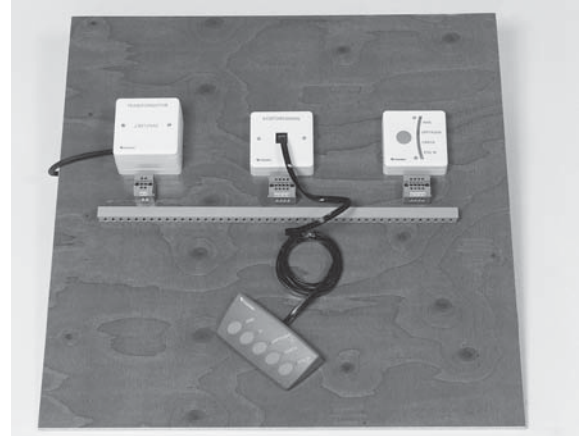
- 1 pc Transformer
  - 1 pc Front door, phone with code
  - 1 pc Apartment unit
  - 1 pc Solenoid lock
  - Plug, cable, clips and screws
  - 1 pc Handbook
- Weight 5 kg



### MV 1616 M Office Signalling Installation, Fixed on a Base Plate

The same apparatus as in MV 1616, but the components are fixed on a base plate and all apparatus/components are ready wired to a marked terminal beside each apparatus. The student connects the cables between the different terminals according to instructions.

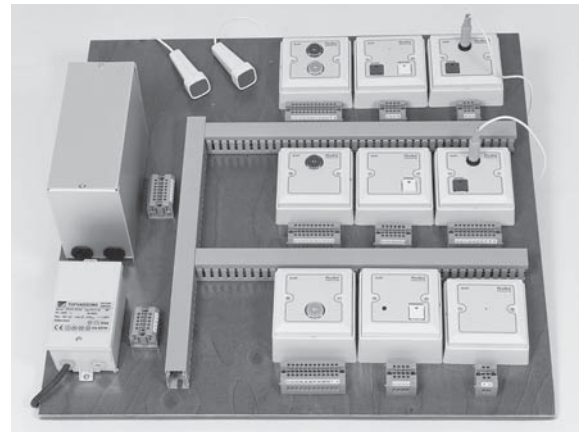
- Weight 4 kg  
Dimensions 600 x 600 mm



### MV 1620 M Visual Nurse Call System, Fixed on a Base Plate

The same apparatus as in MV 1620, but the components are fixed on a base plate and all apparatus/components are ready wired to a marked terminal beside each apparatus. The student connects the cables between the different terminals according to instructions.

- Weight 6 kg  
Dimensions 600 x 600 mm



### Additional IR equipment to MV 1620 M

#### MV 1620 M1 IR Equipment

The infrared equipment comprises of:

- 1 pc Micro IR-transmitter (battery operated)
- 1 pc IR-receiver
- 1 pc Terminal

These above units are fixed on the board where the rest of the MV 1620 M equipment is mounted. The IR-receiver is in the ward and the transmitter is carried by the patient.

- Weight 1 kg



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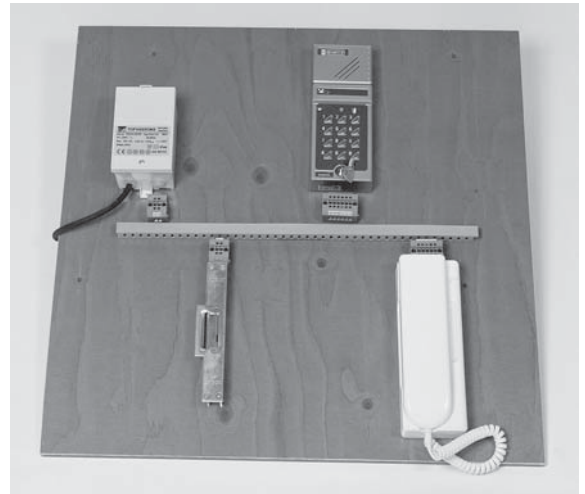
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## Electrical Installation Kits

### MV 1621 M Entrance Telephone Installation, Fixed on a Base Plate

The same apparatus as in MV 1621, but the components are fixed on a base plate and all apparatus/components are ready wired to a marked terminal beside each apparatus. The student connects the cables between the different terminals according to instructions.

Weight 6 kg  
Dimensions 600 x 600 mm



### MV 1622 M Automatic Fire Alarm, Fixed on a Base Plate

The same apparatus as in MV 1622, but the components are fixed on a base plate and all apparatus/components are ready wired to a marked terminal beside each apparatus. The student connects the cables between the different terminals according to instructions.

Weight 4 kg  
Dimensions 600 x 600 mm



### MV 1635 Sheet-metal cabinet

MV 1635 is a sheet-metal cabinet. The cabinet serves partly to deposit the base plates, partly as a worktable during the installations for the units MV 1616 M, MV 1620 M, MV 1621 M and MV 1622 M. MV 1635 has four wheels mounted below, which makes it very flexible.

Weight 32 kg  
Dimensions 635 x 600 m x 1140 m



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# Electrical Installation Technologies

Work frames and power supplies for civil and industrial electrical equipment.

Terco has developed frames and power supplies for work places to perform practical exercises on low voltage electrical plants.

The work place can be combined as:

1. Frame with power supply horizontal under the frame.
2. Frame with power supply vertical besides the frame or between two frames.

Each frame can have different boards fixed to the frame for mounting civil and industrial installation equipment. Terco can deliver two ready made boards prepared for easy fixing to the frame:

1. Laminated wooden board.
2. Perforated metal board.

This solution is universal and flexible. The customer can of course use own boards and fix them to the Terco frame.

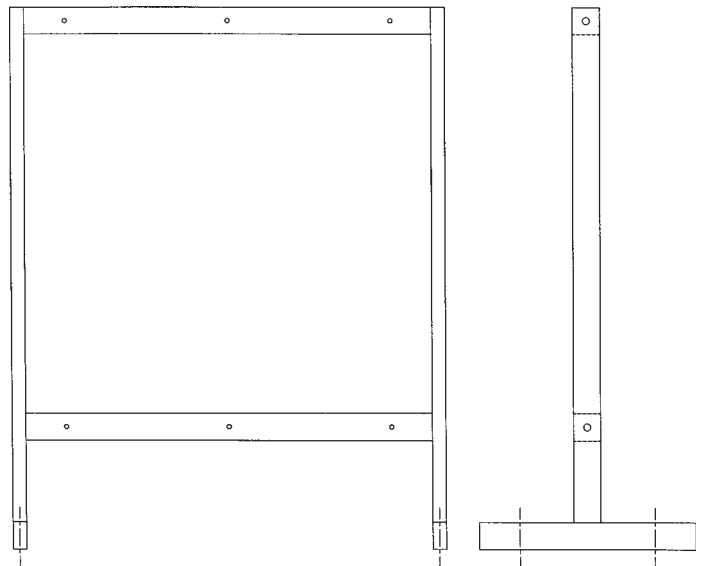
## MV 1650 Frame

The frame has a firm construction, made of steel and varnished in white.

This frame has the possibility to have a power supply unit e.g. MV 1653 placed horizontally under the frames.

The profile dimension of the steel bars is 25 x 50 mm.

Dimensions 800 x 1000 x 400 mm



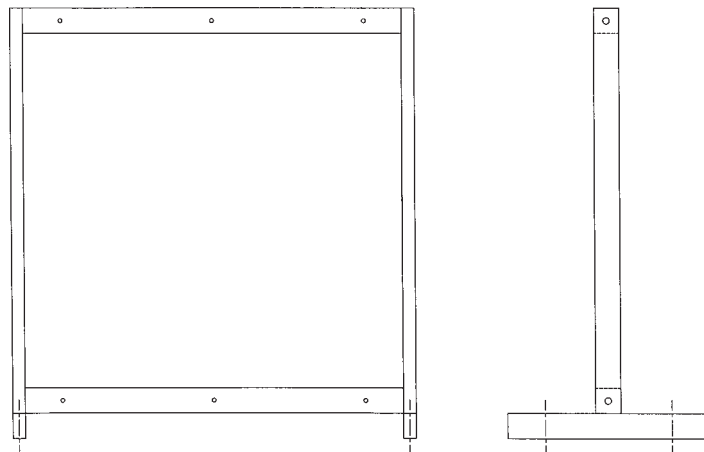
## MV 1651 Frame

The frame has a firm construction made of steel and varnished in white.

A power supply panel e.g. MV 1652, is suitable to be placed vertically besides the frame or between two frames.

The steel dimension of the steel bars is 25 x 50 mm.

Dimensions 800 x 850 x 400 mm



# Electrical Installation Technologies

## MV 1652 Power Supply Panel

The power supply panel is manufactured in sheet metal, varnished in white. It is constructed so it can be placed vertically besides the frame MV 1651 or between two frames.

All electrical wiring and connections inside the power supply unit are made by Terco, you need only to connect the incoming 3-phase cable to the marked terminal.

The panel comprises :

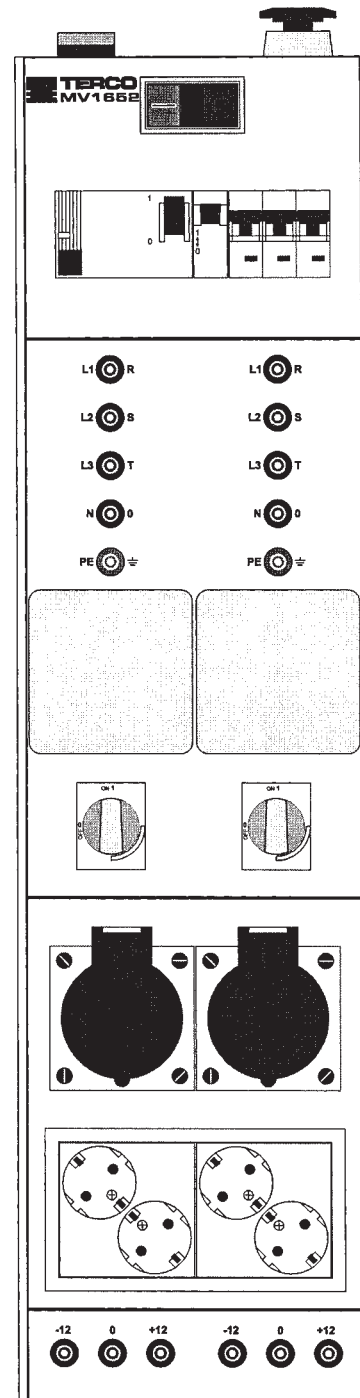
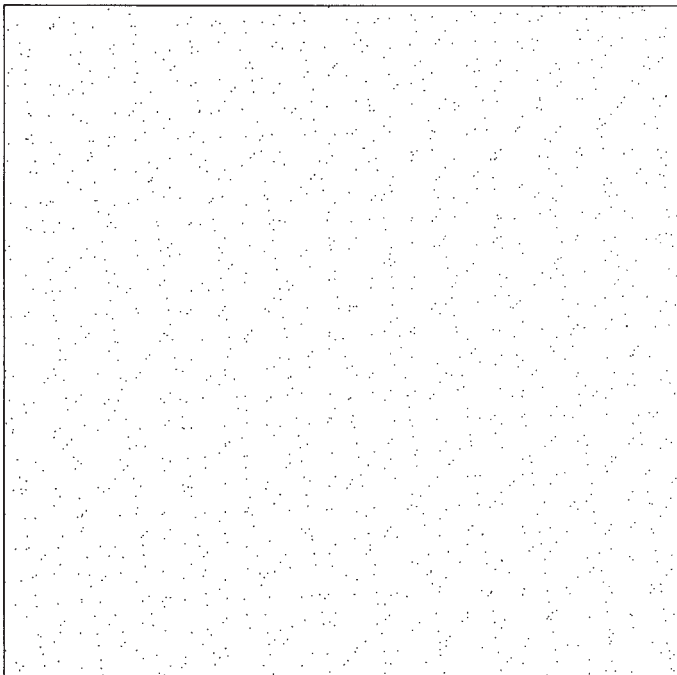
- 1 pc Main switch
- 1 pc Indicator lamp
- 1 pc MCB, single-phase
- 1 pc MCB, three-phase
- 1 pc Earth fault circuit breaker
- 1 pc Emergency stop
- 2 pcs Three-phase terminals L1, L2, L3, N, PE
- 2 pcs Connection box
- 2 pcs Switch for terminals and connection box
- 2 pcs Three-phase socket 400 / 230 V
- 2 pcs 2-pole, 2-way earthed socket 230 V
- 2 pcs Power supply 0 - ± - 12 V DC

Dimensions 700 x 185 x 180 mm  
(excl. emergency stop).

## MV 1654 Laminated Wooden Board

To be mounted and fixed to the frames MV 1650 or MV 1651.

Dimensions 800 x 800 mm

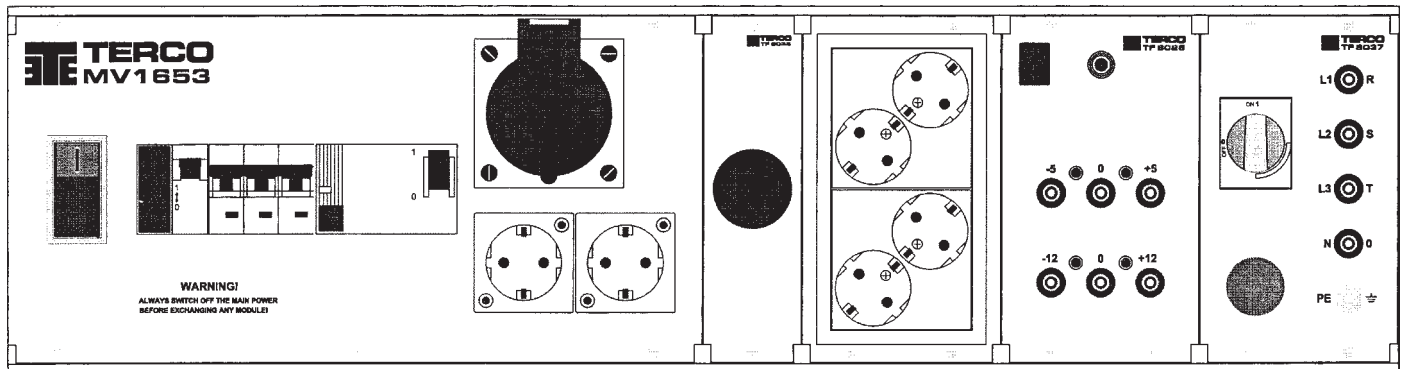


# Electrical Installation Technologies

## MV 1653 Power Supply Panel

The power supply panel is manufactured in sheet metal, varnished in white. It is constructed to be placed horizontally under the frame MV 1650.

All electrical wiring and connections inside the power supply unit are made by Terco, you need only to connect the incoming 3-phase cable to the marked terminal.



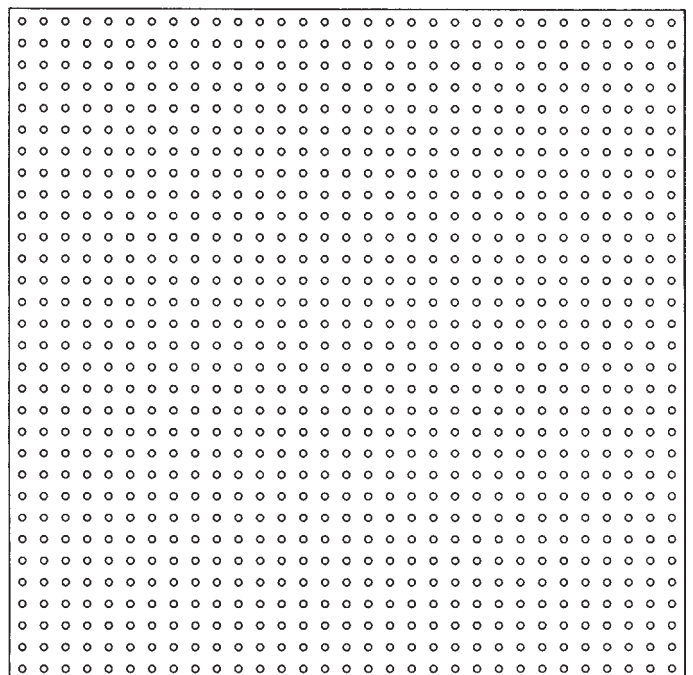
The panel comprises:

- |       |                                   |            |   |
|-------|-----------------------------------|------------|---|
| 1 pc  | Main switch                       | 1 pc       | Power supply 0 - ± 5 V DC and 0 - ± 12 V DC |
| 1 pc  | Indicator lamp                    | 1 pc       | Three-phase terminals L1, L2, L3, N, PE     |
| 1 pc  | MCB, single-phase                 | 1 pc       | Switch and indicator lamp                   |
| 1 pc  | MCB, three-phase                  | Dimensions | 700 x 185 x 180 mm                          |
| 1 pc  | Earth fault circuit breaker       |            |   |
| 1 pc  | Three-phase socket 400 V / 230 V  |            |   |
| 6 pcs | 2-pole earthed wall sockets 230 V |            |   |
| 1 pc  | Emergency stop                    |            |   |

## MV 1655 Perforated Metal Board

To be mounted and fixed to the frames MV 1650 or MV 1651.

Dimensions 800 x 800 mm



## Power Distribution System increases Safety in School Laboratories

Terco's Power Distribution System consists of a distribution board which is installed near the classroom. Each circuit is protected by a MCB, making energising and isolating a simple process for the teacher. There is also a protection device which breaks the voltage in the event of accidental disturbance in any phase. An emergency stop is placed in a prominent position in the classroom and will break all supplies when operated.

### TF 1251 Distribution Board

The distribution board is used for separate distribution of power to each lab. group (Student Panel). Contains 3-pole 16 A miniature circuit breakers, earth fault circuit breaker, indicator lamp and control keys. The distribution board breaks the supply voltage when a current  $\geq 4\text{mA}$  flows in the protection lead.

Order No.	Weight kg	Dim. mm
TF 1251 for 12 groups	10	480 x 330 x 60



### TF 1252 Student Panel

Student panel for mounting on wall or table.  
 One 3-pole switch 16 A.  
 Miniature circuit breaker.  
 Three 2-pole, 2-way earthed wall sockets.  
 One 3-phase socket.  
 One protective earth terminal.  
 Junction Line for distribution of any AC or DC voltage.  
 The 4 junction line terminals are marked from 1 to 4.  
 The intention is to connect all terminals marked "1" to each other, all "2" to each other etc. on respective student panel in the entire laboratory.  
 By doing the above installation you can e.g. supply 30 V between terminals 1 and 2 on one of the student panels and all other student panels in the lab will also have 30 V between terminals 1 and 2.

Order No.	Weight kg	Dim. mm
TF 1252	7	600 x 120 x 75

### TF 1253 Transformer

Connection voltage 3-phase 380-415 V + / - 5 % 50-60 Hz  
 Connection Delta/Star-0  
 Secondary 3-phase 380-415 / 220-240 V 50-60 Hz

Order No.	Power	Weight kg	Dim. mm
TF 1253	10 kVA	85	420 x 250 x 420



### TF 1229 Contactor with Thermal Protector (enclosed)

Intended for transformer above.

Order No.	For Transformer	Weight kg	Dim. mm
TF 1229	TF 1253	1	142 x 115 x 112



### TF 1211 Emergency Stop

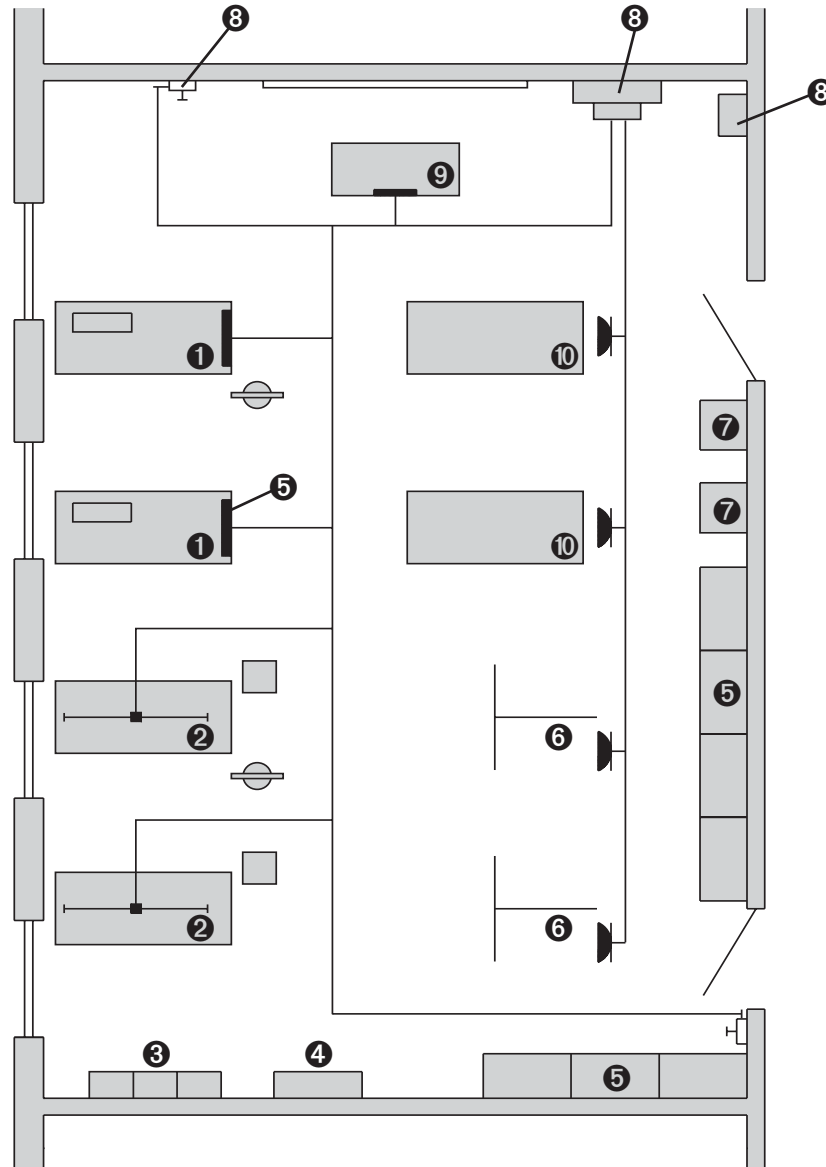
Emergency stop including emergency sign (in English).

Order No.	Weight kg	Dim. mm
TF 1211 enclosed Surface mounting	0.4 kg	70 x 80 x 50



## Laboratory Layout

The layout is most important when designing a functional laboratory. It is of great importance that equipment and furniture are taken into account early in the planning stage. A standard solution for planning a laboratory for 16 students can be seen below. If the space of the laboratory has been determined already, the standard solution may not be applicable. Our engineers will be pleased to advise on any individual requirements. See also our brochures for power supplies and furniture.



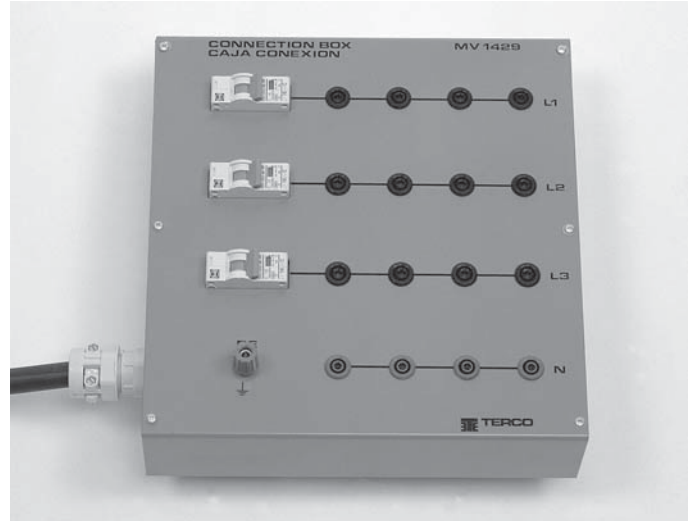
- ❶ Two benches with the Protection Trainer complete with accessories such as power supply and flex stands with flexes.
- ❷ Lab. stations including Power Supply Units for Electrical Installation Equipment.
- ❸ One set of the Installation Training Equipment MV 1608.
- ❹ One Cubicle for Fault Finding MV 1609.
- ❺ Cabinets for instruments, tools and accessories.
- ❻ Assembly Frame MV 1605.
- ❼ Sheet-metal cabinets serving partly to deposit the base plates for MV 1616 M, MV 1620 M-MV 1622 M, partly as a worktable during the installation.
- ❽ Terco Safety Power Distribution System with key-operated central, transformer, student-panels and emergency stops.
- ❾ Teacher desk.
- ❿ Two benches for experiments such as MV 1616 (M), MV 1620 (M), MV 1621 (M) or MV 1622 (M).

## Accessories

### MV 1429 Terminal Board

The box has outlets for laboratory leads with 4 mm diameter plug pins. These outlets are connected to a 5 x 2.5 mm<sup>2</sup> cable of 1.5 m length and cable connection for a diameter of 5.5 mm. The connection box is equipped with miniature circuit breakers for 20 A.

Dimensions	250 x 240 x 75 mm
Weight	2.0 kg



### MV 1104 Variable Transformer 1-phase

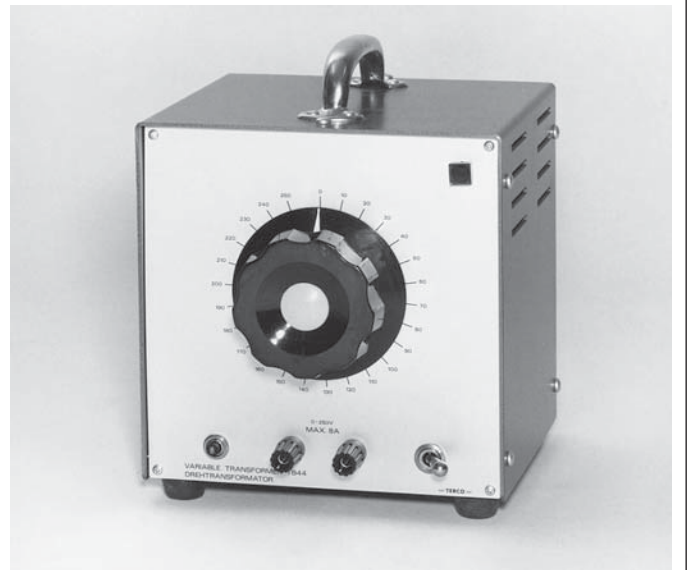
The core of the variable transformer is of high alloy transformer sheet with small losses. The contact point on the winding, which is wound for a constant current obtained throughout the entire range, is provided by a carbon contact.

Thermal overload protector.

Switch with pilot lamp. Rubber pedestals at the bottom and rear for convenient placing in the most suitable position at any time.

#### General Data

Input	220 V +/- 5 %
Output-maximum	0-250 V, 8 A
Dimensions	200 x 190 x 205 mm
Weight	9 kg



### MV 1103 Variable Transformer 3-phase

Supplied with a scale showing output voltage. Thermal overload protection for the three output phases are placed on the front panel.

Same technical data as MV 1104 above.

Input	3 x 400 V, 8 A
Output	3 x 0-450 V, 8 A
Dimensions	280 x 300 x 470 mm
Weight	32 kg

### MV 1103-415 Variable Transformer 3-phase

As MV 1103 above but with the following voltages and currents.

Input	3 x 415 V, 8 A (maximum values)
Output	3 x 0-415 V, 8 A



## Tool Kits

### MV 1613 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

### Test Instrument

GDM 350	Multimeter
MX 355	Clip-on ammeter

### MV 1614 Electrical Workshop Tools

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
3 pcs	Water pump pliers

## Guarantee & Terms

All overseas deliveries are dispatched in special, custom designed wooden crates, extremely sturdy and damage resistant.

The guarantee is valid for 12 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 world-wide 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.

## Cross Reference List

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# Terco Headoffice



Terco headoffice and factory outside Stockholm, Sweden.

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