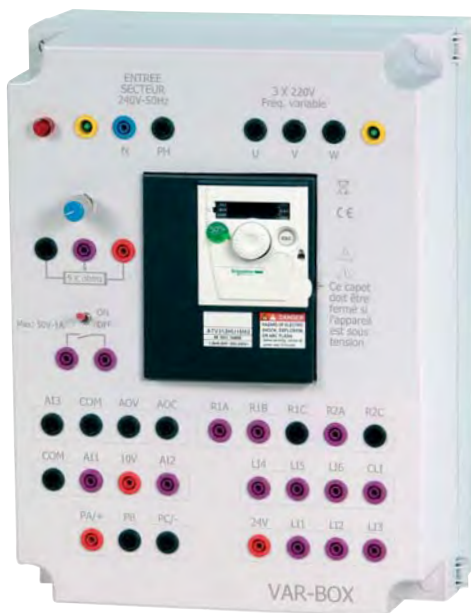


The variators for 1500W and 3000W machines are frequency converters (at constant V/f) for three-phase asynchronous squirrel-cage induction motors. Converters are supplied ready-to-use for most applications. They include a built-in adjusting terminal (4-digit display, 7 segments, and 4 knobs) to customize your application by modifying the settings as required and extend the functions. A potentiometer on the front is used to adjust the converter's sampling frequency, and thus the motor rotation speed. Dimensions: 360 x 270 x 170 mm. Link jump to choose the rotation's direction, except VAR-BOX.



MAIN COMMON FUNCTIONS

Main configurable functions

- Up to 8 preselected speeds
- Rapid stop, freewheel stop, etc.
- Acceleration/deceleration slope
- Default reset
- Sense of rotation choice

Converter protection and safety systems

- Short-circuit protection:
 - on outputs, between phases
- Internal power supply
- On outputs, between phases and earth
- Overheating and overcurrent protection

Motor protection

- Heat protection built into the converter by calculating I^2t
- Phase outage protection

Ref	● ACVAR5	● ACVAR7	● ACVAR6	● VAR-BOX
Motor power	up to 1500W	up to 1500W	up to 3000W	up to 1500W
Power supply	200 to 240V single	200 à 240V single	380 à 400V 3-phase	200 à 240V single
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Output voltage	220V 3-phase	220V 3-phase	380V 3-phase	220V 3-phase
Constant output current	8A	8A	7.1A	8A
Maximum transient current	12A	12A	10,7A	12A
Transient overtorque (60s)	150% torque rating	150% torque rating	150% torque rating	150% torque rating
Emergency stop push button	no	yes	no	no

TECHNICAL SPECIFICATIONS OF VAR-BOX

All inputs and outputs of the frequency converter are present on safety sockets 4mm on the front panel:

Power terminals

- Mains inputs/outputs to the motor
- Output to a brake resistance (PA/+, PB, PC/-)

Control terminals

- Control inputs: 0-10V, 4-20mA, potentiometer (AI3, COM, AOV, AOC, AI1, 10VAI2)
- Relay contacts outputs (R1A, R1B, R1C, R2A, R2C)
- Logic inputs (24C, LI1, LI2, LI3, LI4, LI5, LI6, CLI)

1 potentiometer 5 kΩ, output on 3 sockets

1 On/Off switch, output on 2 sockets

OPTION SOFTWARE

Your computer - using the LOGY-SCH1 option - can controlled these frequency converters by RS232 connection. A complete control panel displayed on your screen is used to monitor and control motor operations.

Full software supplied with converter-computer link cables.

ref. LOGY-SCH1



Variable frequency AC/AC speed controllers



These speed controllers for 1500W and 3000W asynchronous machines are for supplying and programming applications such as belt conveyers, blenders, extruders, pumps, fans and compressors. Putting them into service is rapid and their

programming console makes them very easy to use. Software specific to each make lets you configure and monitor operation of the speed controllers. All speed controller and PLC inputs and outputs are available on the front on Ø4mm safety sockets. A potentiometer lets you adjust the sampling frequency of the speed controller, and the rotation speed of the motor.

Dimensions 390 x 280 x 185mm.

Supplied with operating/programming instructions, software and USB lead.

MAIN FUNCTIONS COMMON TO THE 4 MODELS

Main configurable functions

- Adjustment of the deceleration/acceleration ramp
- Adjustment of the minimum/maximum speed of rotation
- Quick stop/free wheel
- Input configuration to manage the 2 rotation directions, RUN, stop type, preselected speeds, etc.
- USB lead output for PC link
- Software for speed controller setting

Speed controller and motor protection devices

- Output protection against short-circuits between phases
- Protection against overloads
- Protection against heating
- Protection against phase outages

TECHNICAL CHARACTERISTICS SPECIFIC TO ACVAR325 AND 326

All the speed controller's inputs and outputs are available on safety terminals on the box front:

Power terminals

- Mains input / Output to motor
- Output to braking resistance (PA/+, PB, PC/-)

Ref	ACVAR325	ACVAR326	ACVAR425	ACVAR426
Brand / Type	Schneider / ATV32	Schneider / ATV32	Siemens / G120	Siemens / G120
Motor power	up to 1500W	up to 3000W	up to 1500W	up to 3000W
Power supply	200 to 240V single-phase	380 to 500V 3-phase	380 to 480V 3-phase	380 to 480V 3-phase
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Output voltage	3 x 230V	3 x 400V	3 x 400V	3 x 400V
Nominal output current	8A	7.1A	4.1A	7.3A
Software	SoMove	SoMove	Starter	Starter
Bluetooth	Yes	Yes	No	No
Braking resistance output	Yes on terminals	Yes on terminals	Yes on terminals	Yes on terminals
programmation console	Yes	Yes	Yes	Yes
Inputs / Outputs Signals on terminals	6 Input binary 1 Input Analogue - 10-10VDC 1 Input Analogue x...y mA 1 safety input STO 3 binary outputs 1 O Analogue 0-10V or 0-20mA 1 O Logic 30V/100mA	6 input binary 1 input Analogue - 10-10VDC 1 input Analogue x...y mA 1 safety input STO 3 binary outputs 1 O Analogue 0-10V or 0-20mA 1 O Logic 30V/100mA	6 input binary 1 input Analogue - 10-10VDC or x...y mA 2 binary outputs 1 O Analogue 0-10V or 0-20mA 1 O Logic 30V/500mA	6 input binary 1 input Analogue -10-10VDC or x...y mA 2 binary outputs 1 O Analogue 0-10V or 0-20mA 1 O Logic 30V/500mA

Economical AC/AC frequency converters



Variators for three-phase, squirrel-cage asynchronous machines with a power of 300 to 3000W. With their integrated control console, these variators are easy to use.

Speed control by potentiometer Start/Stop button.

From the control unit, the user can configure:

- the motor's rated characteristics, such as rotation speed, current, voltage, and so on
- the rotational direction
- the acceleration ramp
- the deceleration ramp
- resetting of defaults

OPTIONS * : CONTACT US

- 1 brake resistance output
- 1 fault contact output
- 2 programmable inputs
- 1 analog 0-10V input
- 1 analog 4-20mA input

* These options require to fit these ECOVAR-15 & ECOVAR-30 variators in a plastic box



Ref. ECOVAR-15

Ref. ECOVAR-30

Référence	ECOVAR-03	ECOVAR-15	ECOVAR-30
Motor power	Up to 400W	Up to 2200W	Up to 4000W
Supply / Frequency	220V 50/60Hz on safety terminals 4mm	220V 50Hz/Single on 2P+E socket with power cable 2m	400V 3-phase on CEI 3-phase socket with power cable 2m
Output voltage	220V 3-phase on safety terminals 4mm	220V 3-phase on safety terminals 4mm	400V 3-phase on safety terminals 4mm
Constant output current	3A	10A	8,5A
Output frequency possibility to set a maximum frequency	0 – 400Hz	0 – 400Hz	0 – 400Hz
Protection against the short-circuits between phase	Secondary by fuses	Secondary by fuses	Secondary by fuses
Protection against over-current	yes	yes	yes

Instructions manual is supplied with the variator.

Vector speed controller for encoder motor



ref. VCV52

Digital speed controller unit with vector flux control for asynchronous and synchronous motor with max power 2000 W (compatible with our 300 W and 1500 W motors). 8-pin connector for linking a 1024-pt encoder. A cut-out, on the unit front, gives access to the different programming keys and to a screen showing the various settings of the speed controller. A potentiometer adjusts the speed of rotation, while a switch controls motor rotation on/off. A set of security terminals gives access to the cabling of 3 programmable inputs (e.g. motor stopping in 'free wheel', reversal of the direction of rotation, preselected speed), of 2 analogue inputs 0-10 V/4-20 mA and one external braking resistor not supplied.

Features

- vector speed controller 2.2 kW / 3 HP max.
- Power supply 3x400 V AC 50/60 Hz + Earth
- Output 3x400 V + Earth – 5.5 A
- Speed controller output frequency adjustable from 0.1 to 599 Hz.
- Acceleration and deceleration ramp with separate adjustment.
- Vector control of current flux
- Encoder input 1024 pts
- Protection against phase loss, overcurrent, overvoltage, thermal, etc.
- Dim. 210x245x350mm

Variable frequency AC/DC speed controllers



DCVAR2 and DCVAR43 speed controllers control separately excited or permanent magnet DC motors. On the front, the RUN button powers up the speed controller and the potentiometer varies the speed of rotation of the motor. The mains and the motor connect to Ø4mm safety terminals. Supplied with operating instructions. Dim: 390 x 280mm x 185mm.

Speed controller protection and safety devices

- Mains side input protection by 30mA residual current circuit-breaker
- Output protection against short-circuits
- Protection against overloads
- Thermal protection against abnormal temperature rise



Ref	DCVAR2	DCVAR43
Motor power	from 1500W to 3000W	from 1500W to 3000W
Power supply	110-115V, 220-240V or 380-415V single-phase	110-115V, 220-240V or 380-415V single-phase
Frequency	50/60Hz	50/60Hz
Armature output voltage with power supply 240V	180V	180V
Nominal armature current	16A	16A
Field system output voltage with power supply 240V	210V	210V
Field system nominal current	3A max	3A Max
Number of quadrant in operation	1Q	4Q (energy release on mains)

Adjustments on front

- Speed: Max. and Min.
- Current limitation
- Speed stability
- Acceleration/deceleration time 1 to 15s
- Ri compensation
- Zero speed offset

- Speed: Max.
- Current limitation
- Speed stability
- Acceleration/deceleration time 0 to 40s
- Ri compensation
- Speed: Proportional gain
- Speed: Integral gain
- Current: Proportional gain
- Current: Integral gain
- Zero speed offset
- Zero speed limit

Study case for speed controller ATV32

SEE PAGE 182



Converters, loads & supplies

Stand-alone DC and 3-phase power supplies



Transportable variable supplies unit (2000W or 4000W)
 Supply from mains: 3-phase 380V/400V + neutral + earth
 Outputs: 2 variable DC supplies 0-250V
 and 1 variable AC 3-phase supply 0-430V

PROTECTION OF THE USER IN DC

- DC supplies are isolated from mains by an insulation transformer.
- The outputs are protected against surges and short-circuits.

OTHER SPECIFICATIONS

- The DC power supply is delivered from a Graetz bridge (Ripple 4%)
- The DC auxiliary outputs is with a double alternation rectification of which the ripple rate changes with the load
- Emergency stop push button - key reset
- Voltage regulation by two autotransformers
- Power cable with industrial 3-phase plug supplied
- Hard-wearing LED lamps
- Outputs on safety terminals Ø 4mm.
- Dimensions 710 x 600 x 375mm

Ref.	OUTPUT 0-250V DC	OUTPUT 0-430V 3-PHASE	AUXILIARY OUTPUT 0-250V
COMPAK20	8A + voltmeter & ammeter	5A + voltmeter & ammeter	2,5A + voltmeter & ammeter
COMPAK40	16A + voltmeter & ammeter	6A + voltmeter & ammeter	2,5A + voltmeter & ammeter

High power DC and 3-phase power supplies



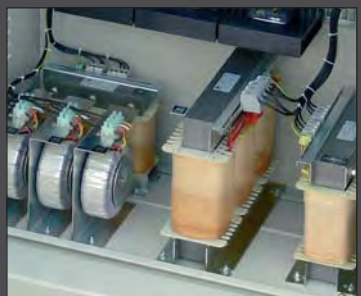
This power supply, which is varied using an autotransformer, can be networked so that it can power other stations. The DC outputs are insulated from the mains, as stipulated in the standard, and monitored by a continuous insulation monitoring device for the safety of users. This monitoring allows the DC output to be networked. The transformer complies with the NFEN6158 norm.

INTRODUCTION AND DESCRIPTION:

- Sheet metal cabinet, fitted on a wheeled base.
- For 3-phase 400V + Neutral + Earth supply from mains
- Voltages can be adjusted using a flywheel.
- One disconnecting switch.
- Hardwearing indicator lights
- One key-operated emergency-stop circuit breaker.
- One ammeter for the DC
- One three-position switch: DC / 0 / three-phase
- Two voltmeters: one for the DC and one for the three-phase
- Outputs: Can be connected in one of two ways – either using an internal terminal for a network cable, or safety terminals for direct use with safety leads.
- Protection: by circuit breakers
- insulation checking by a continuous insulation monitoring device
- UNIT Height: 1000mm / Width: 600mm / Depth: 350mm
- BASE Height: 100mm / Width: 810mm / Depth: 600mm

Ref.	MAX ELECTRIC CURRENT IN DC 0-250V	MAX ELECTRIC CURRENT 3-PHASE AC 0-450V	FOR MAINS SUPPLY	TOTAL POWER
PSY40K	16A monitored	8A	3-PHASE 400V+N+E	4.000VA
PSY60K	24A monitored	13A	3-PHASE 400V+N+E	6.000VA
PSY90K	36A monitored	13A	3-PHASE 400V+N+E	9.000VA
PSY120K	48A monitored	20A	3-PHASE 400V+N+E	12.000VA
PSY150K	60A monitored	20A	3-PHASE 400V+N+E	15.000VA

For safety the DC outputs are separated from the mains by safety isolating transformer





AC/DC portable power supply

Adjustable from 0 to 230V in DC or AC, this power supply delivers a constant current of 3A. Protected by a thermal-magnetic circuit breaker, the safety of users is ensured by the separation of circuits.

- | | |
|---|--|
| <ul style="list-style-type: none"> • Mains input • On/Off • DC variable output • AC variable output • Variable voltage setting • Max current DC or AC • Output displays • Input protection • Output protection • User's safety • DC output smoothing • AC/DC commutation • Connecting • Dimensions / Weight | <ul style="list-style-type: none"> Mains cable General luminous switch 0-240 volts 0-230 volts rotating knob onto the unit 3A 1 voltmeter and 1 ammeter by time delay fuse thermal-magnetic circuit-breaker all outputs are insulated from mains by capacitors, without electronic regulation CC - 0 - CA by rotary switch Safety terminals 4mm 210 x 245 x 350mm / 25kg |
|---|--|

**COMPATIBLE
WITH 300W MOTORS**

ref. ISOSEC1



AC/DC power supply on wheels (10A)

Supply of AC or DC current in 10A max.AC/DC selector switch on the front of the unit. Mains cable of 3 metres with plug

- | | |
|---|--|
| <ul style="list-style-type: none"> • Mains supply • ON/OFF • Emergency stop • DC output • AC output • Adjustment • Max output current • Outputs display • Input protection • Outputs protection • Users protection • Filtering ACDC10 • Filtering DC10 • Switching • Dimensions / Weight • Wheels | <ul style="list-style-type: none"> 230V, single-phase push button + LED lamp with key 0-230V 0-230V by a rotary button on the top 10A 1 voltmeter et 1 ammeter by fuse by circuit breaker by insulation from mains (in DC mode only) no filtering. double alternation rectification with filtering. 5% of residual ripple at 10A. DC - 0 - AC (by rotary switch) H 510 x P 280 x P 330 mm / 40 kg 2 of them have a brake |
|---|--|



ref. DC10

Version without AC output.
For solar system.
Special connections. (P. 132)

ref. ACDC10



Dual DC portable power supply

This power supply includes :

- one variable DC supply with voltmeter & ammeter
- one fixed DC supply

Protection of users is ensured by galvanic insulation of outputs.

- | | |
|--|--|
| <ul style="list-style-type: none"> • Mains : • On/Off : • DC variable output : • DC fixed output : • Input protection: • Output protection : • Smoothing : • Dimensions / weight : | <ul style="list-style-type: none"> Mains cable General switch and light 0-240V / 3A 190V / 1A by time delay fuses by thermal magnetic circuit-breakers by capacitors 210 x 245 x 350mm / 30kg. |
|--|--|

**COMPATIBLE
WITH 300W MOTORS**

ref. ISOSEC2



Mobile inductive loads (single & 3-phase)



- The inductor LH** can vary the power factor continuously from 0.9 to 0.1 in single-phase and 3-phase.

PRINCIPLE

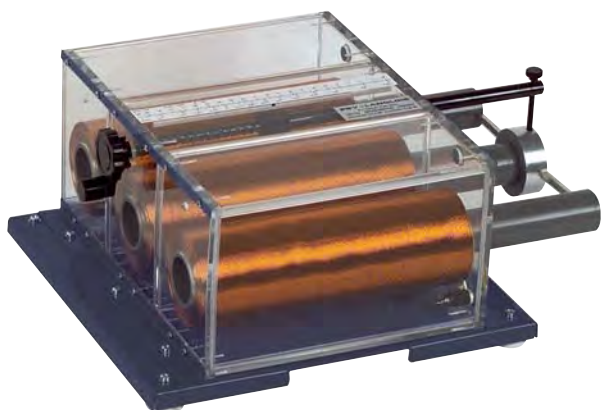
- 3 moving laminated cores made from silicium sheets, are moved by a control wheel through 3 coils.
- The reactive power varies from 0.1 kVAR to the rated power. (ie 4kVAR for LH40)
- It is possible to exceed the rated power during few minutes.

CONNECTION

- 4 (safety) jumps connect the coils to either 3-phase star 400V, delta 240V or single-phase 240V.
- Each phase is protected by a fuse.
- This inductor exists in 3 standard power ratings.
- Dimensions 670 x 400 x 1000mm
- Weight 70kg
- Male earth socket in standard. Female earth socket upon request.
- CEI1010 CATIII 1000Vrms pol2

Ref.	LH20	LH40	LH60
Reactive rated power	2KVAR	4KVAR	6KVAR
Constant current by phase	3A	6A	9A
Resistance of each coil	2.5 Ω	2.5 Ω	1.1 Ω

Variable inductive load (single & 3-phase)



- LH10 is a bench mounted inductive load, single-phase and 3-phase.
- A screw with a handle moves the 3 laminated cores made in silicium sheets in their coils between 2 limits, the safety terminals may be connected to 3-phase star 400V, delta 240V or single-phase 240V
- PVC sealed box with safety terminals
- Dimensions 280 x 270 x 150 mm.
- Weight 16 kg.
- CEI1010 CATIII 1000Vrms pol2

Normal reactive power	1 kVAR
Reactive power for 10 min	1.5 kVAR
Constant current by phase	2A max
Variation of inductance for each phase	3 x 0.1 to 1.4H

ref. LH10

Portable capacitive loads (single & 3-phase)



- The CH is a capacitive load useable from 0 to the rated power.
4 jump leads to plug in safety terminals, connect a bank of capacitors in 3-phase star 400V, delta 240V or single-phase 240V.
- 6 switches 5%, 10%, 15%, 20%, 25%, 25% regulate the load from 0 to the rated power without interrupting the load (ie 0 to 4kVAR for CH40).
- Safety : a discharge resistor is placed at the terminals of each capacitor.
- Male earth socket in standard. Female earth socket upon request.
- Portable unit (in steel)
- Dim. 500 x 300 x 200mm.
- CEI1010 CATIII 1000Vrms pol2

Ref	Power	Nb of switches	Variation in	Type	Weight
CH05	500VAR	6	Steps of 5%	portable	09kg
CH20	2KVAR	6	Steps of 5%	portable	10kg
CH40	4KVAR	6	Steps of 5%	portable	10kg
CH60	6KVAR	6	Steps of 5%	portable	12kg

Mobile resistive loads



- The high quality of loads depends directly of the quality of switches used. All of our loads use ultra fast breaker switches, capable of breaking a DC current with an inductive load, for example the current generated by a 3kW dynamo.
- The resistive elements consist of a wire coil wound onto a ceramic core and have a good life because they are coating against the oxydation.
- The input terminals are double insulated and accept equally Ø4mm standard or safety leads.

Ref	W	Nb of switches	Variation in	Type	Weight
RH20	2kW	6	Steps of 5%	with wheels	44kg
RH40	4kW	6	Steps of 5%	with wheels	44kg
RH40S	4kW	7	Steps of 2.5%	with wheels	44kg
RH60	6kW	6	Steps of 5%	with wheels	50kg
RH80	8kW	6	Steps of 5%	with wheels	50kg

OPERATING MODE

- The selection of the operating mode is by 4 insulated input switches
DC mode or 240V single-phase.
3-phase star 400V.
3-phase delta 240V.
(Exists also for voltages 127/220V in 4kW upon request)

VARIATION

- 6 switches (7 on RH40S model) with the gradation 5%, 10%, 15%, 20%, 25%, 25% allow a continual progression without a break of the load from 0 to 100% in steps of 5% (2.5% on the RH40S).
- All of the intermediate values are obtained by turning 1 or 2 switches which can be made simultaneously using 2 hands.
- Male earth socket in standard. Female earth socket upon request.

WHEELED UNITS

- Robust construction with furnace baked epoxy paintwork. Excess heat is vented by natural convection through a grid which prevents contact with any voltages.
- Dimensions: 660 x 400 x 880mm
- CEI1010 CATIII 1000Vrms pol2



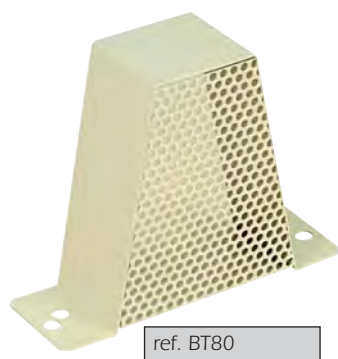
Compact resistive loads (single & 3-phase)



- Using the same switches and resistors as the other models, this load is intended for use on the laboratory bench.
- The ultra fast switches and operating mode jump leads are found on the front panel.
- DC and single-phase 240V mode/3-phase delta 240V/ 3-phase star 400V.
(Exists also for voltages 127/220V in 4kW - upon request)
- Dimensions: 500 x 220 x 400mm
- Male earth socket in standard. Female earth socket upon request.
- CEI1010 CATIII 1000Vrms pol2

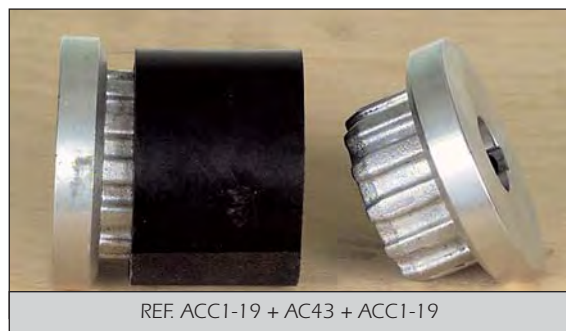
Ref	W	Nb of switches	Variation in	Type	Weight
RHP05	0.5kW	6	Steps of 5%	portable	5kg
RHP20	2kW	6	Steps of 5%	portable	11kg
RHP40	4kW	6	Steps of 5%	portable	11kg

Protective covers for machine coupling

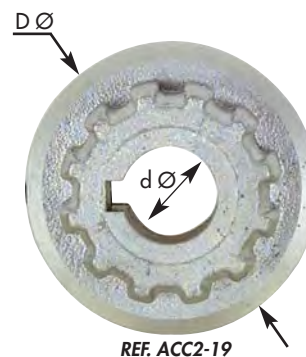


Ref.	Power	Protection length	Height	Specifications
CART300W/80	300W	80mm	125mm	Intermediate housing between 2 machines
CART90	300W	95mm	125mm	Intermediate housing between 2 machines
BT300	300W	60mm	125mm	Housing for unused end of shaft
BT80	1500W	80mm	185mm	Housing for unused end of shaft
CART80	1500/3000W	80mm	185mm	Intermediate housing between 2 machines
CART120	1500/3000W	126mm	185mm	Intermediate housing between 2 machines
CART140	1500/3000W	140mm	185mm	Intermediate housing between 2 machines
CART812	1500/3000W	from 80 to 115mm	185mm	Length-adjustable intermediate housing
VS300	300W	/	/	Screw + Washers + Special Nut
VS10	1500/3000W	/	/	Screw + Washers + Slide Nut

Replacement couplings



These are spare parts, the rotating machines are fitted with their original couplings.
A complete set of spare part couplings comprises 2 metal hubs and a rubber sleeve (3 references in total)



These are spare parts, as the rotating machines are fitted with their original couplings.

Ref.	Specification	For machine of power	d Ø	D Ø
ACC1-14	HUB	300W	14mm	42mm
ACC1-17	HUB	300W	17mm	42mm
ACC1-19	HUB	300W	19mm	42mm
AC-43	SLEEVE	300W	sleeve	45mm
ACC2-19	HUB	1500W	19mm	52mm
ACC2-24	HUB	1500W	24mm	52mm
AC-56	SLEEVE	1500W	sleeve	56mm
ACC3-19	HUB	3000W	19mm	69mm
ACC3-24	HUB	3000W	24mm	69mm
ACC3-28	HUB	3000W	28mm	69mm
AC-66	SLEEVE	3000W	sleeve	74mm

Fault finding in motor

This complete kit on casters, comprising two back-to-back units and an asynchronous squirrel cage motor and a parking brake, can be used to simulate the faults which occur most frequently. The principle and the instructions have been devised by teachers who want to propose a method for diagnosing faults.

PRINCIPLE

Faults are recreated when the teacher rotates a single switch. Students can take measurements or perform tests in complete safety, regardless of the fault type. Faults can be looked for inside the student unit and in the motor terminal. The unit is isolated from the mains by means of an insulation transformer. In addition, a TT earthing system is recreated on the secondary for safety reasons. Therefore, even isolation faults are detected by a 30mA differential mechanism. All safety measures are implemented in order to protect individuals and equipment. (See the faults in the description of the teacher unit)

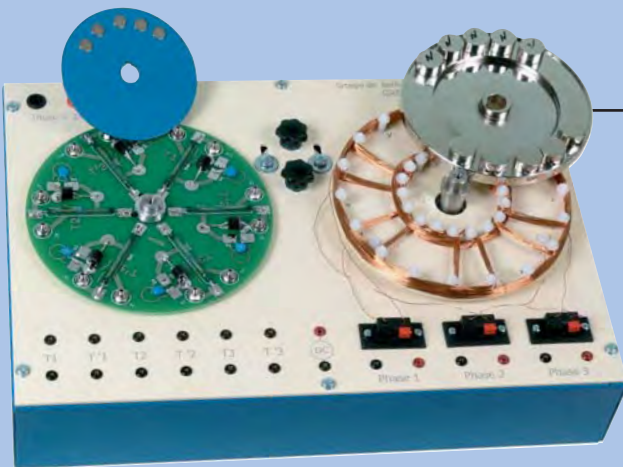
See Page 180



Automatically controlled synchronous machine

In contrast to the black box form of an industrial machine, MICROMAG is completely open and can be dismantled. Students can learn to identify all of its components, create one or more windings themselves and adjust the switch. This switch uses only dry contacts (with no complex electronic circuit) so that its operation is accessible to everyone. Using this model, students discover little by little the various-components of an automatically controlled synchronous machine and, more generally, of a motor, via a theoretical and practical approach. The theoretical approach can be accessed at three study levels: secondary school leaving qualification targeting immediate employment, Institute of Technology or vocational diploma or engineering school.

See Page 178

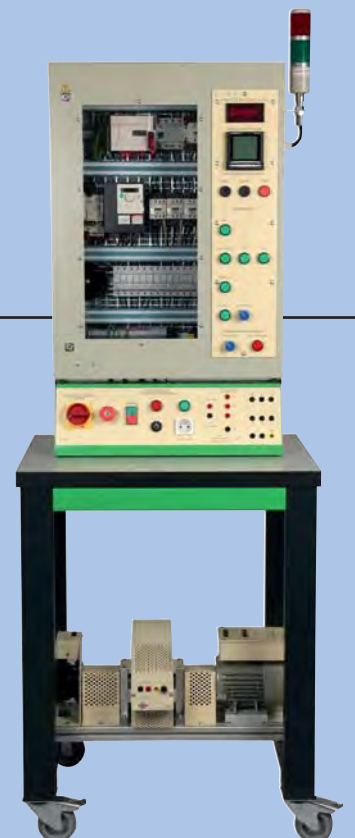


Motor start-up studies

System for studying the start-up of asynchronous motors. For this completely stand-alone system, all you have to do is connect it to a 3-phase 400V mains socket. Selection of the required motor start-up type via push-buttons at the front of the electrical cabinet:

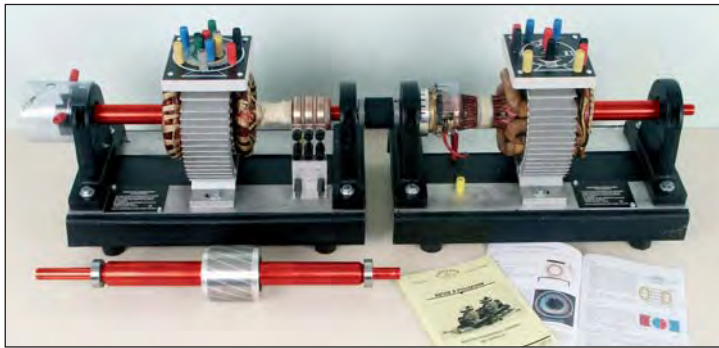
- Direct start-up
- Star/delta start-up
- Start-up by means of starter/decelerator
- Start-up by means of a frequency converter

See Page 181



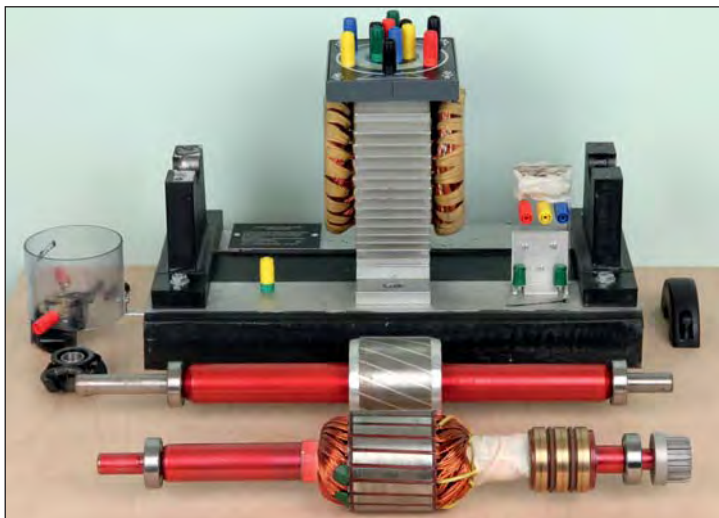
Plug & play motor

Demo plug & play motor (AC or DC)

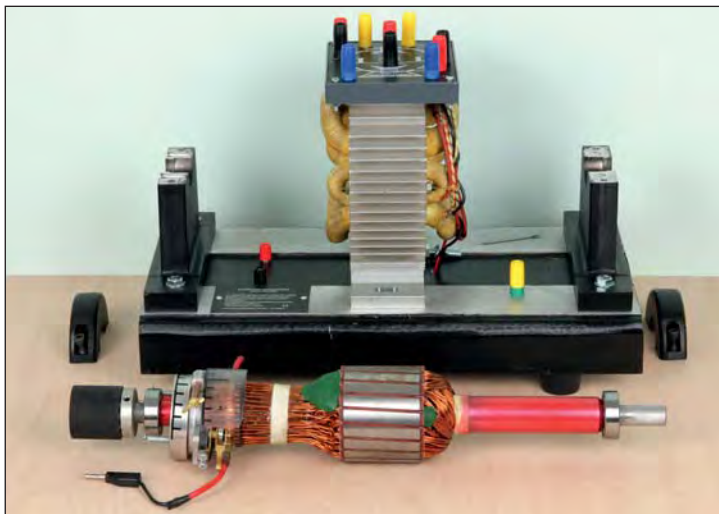


The dismantled motors are electric motors with open housing that can be mechanically and electrically configured for creating various electrical motors and generators, without the use of specific tools. The various functions can be obtained by simple coupling, perfectly explained in the instructions.

Although powered by non-hazardous voltages ($< 50\text{VAC}$ / $< 100\text{VDC}$), the powering up of these products is restricted to authorised staff due to the lack of protective housing.



ref. DEMO-AC



ref. DEMO-DC

DEMO-AC: 48V ALTERNATING CURRENT

Works with the 3-phase variable 0-48V 15A power supply (not included).

See Ref. ALI-DEMO.

Presentation: The interconnection of the windings on to a didactic terminal box provides a visual understanding of the coil of the various electrical machines and their functions. Users are able to see the position of the brushes and their movement. It is powered by 48 volt ELV. A full user manual is provided with the motor/alternator.

TECHNICAL DESCRIPTION

- Open frame.
- An alternating current stator.
- An aluminium base.
- Two aluminium bearings for supporting the motor shaft.
- Possibility for studying 8 different motors, with safety terminal connections
 - Single-phase motor with capacitors
 - 2-pole star connection three-phase motor
 - 4-pole delta connection three-phase motor
 - Star-delta three-phase asynchronous motor
 - Dahlander connection asynchronous squirrel cage motor
 - Three-phase slip-ring motor
 - Synchronous three-phase motor
 - Three-phase alternator
- Extension shafts.
- One squirrel cage rotor.
- One slip ring rotor. Enables the functioning of the motor and the alternator.
- One rotating brush holder.
- One brush holder mount.
- Three brushes for the slip-ring motor.
- Half coupling.
- A rotating centrifugal contact.
- A user manual.

DEVELOPED PRACTICAL WORK

- Single-phase alternating motor.
- Alternating motor theory.
- Repulsion-induction motor with auxiliary wiring.
- Capacitor motor.
- Capacitor start and run motor.
- Three-phase alternating motor theory.
- 2-pole star motor.
- 4-pole delta motor.
- Slip-ring motor.
- Alternator theory.
- Three-phase alternator functions.
- Synchronous motor.

DEMO-DC: 48V DIRECT CURRENT UNIT

Works with the 3-phase variable 0-48V 15A power supply (not included).

See Ref. ALI-DEMO.

Presentation: The interconnection of the windings on to a didactic terminal box provides a visual understanding of the coil of the various electrical machines and their functions. Series poles can be added or removed to/from the shunt poles to create a compound machine. Users are able to see the position of the brushes and their movement. It is powered by 48 volt ELV. A full user manual is provided with the motor/alternator.

TECHNICAL DESCRIPTION

- Open frame.
- A direct current stator.
- An aluminium base.
- Two aluminium bearings for supporting the motor shaft.
- Possibility for studying 14 different motors, with safety terminal connections
 - DC shunt motor/DC shunt motor with commutating poles
 - DC series motor/DC series motor with commutating poles

Dismantled motor

- Long shunt compound generator
- Long shunt compound generator with commutating poles
- Short shunt compound motor
- Short shunt compound motor with commutating poles.
- Separately excited shunt motor
- Universal motor without commutating poles/Universal motor with commutating poles
- Repulsion motor
- Series generator with commutating poles.
- Separately excited series source rotor generator
- Separately excited series source stator generator
- Self-excited long shunt compound generator
- Self-excited short shunt compound generator
- An armature
- Half coupling.
- A user manual.

DEVELOPED PRACTICAL WORK

- Direct current motor theory.
- Armature reaction.
- Winding polarities.
- DC shunt motor
- DC shunt motor with commutating poles.
- Speed control.
- Long shunt compound DC motor.
- Long shunt compound DC motor with commutating poles.
- Short shunt compound DC motor.
- Short shunt compound DC motor with commutating poles.
- DC shunt motor, separately excited.
- DC generator theory.
- DC shunt generator.
- Separately excited generator.
- Series DC generator with commutating poles.
- Series-excitation generator.
- Compound generator.
- Long shunt compound DC generator.
- Short shunt compound DC motor.



ref. MAS-DEM

MAS-DEM educational objective is theoretical research into, and discovery of, the three-phase asynchronous squirrel-cage motor. Presented in a case containing the following items:

- The motor carcass with stator wiring, fitted with a terminal block.
- The squirrel-cage rotor.
- The left and right flanges + fan.
- Screws + screwdriver kit

The 370W motor can be assembled and disassembled depending on needs. This provides a better understanding of three-phase motor technology. The instructions cover all theoretical research into the operation and technology involved in the three-phase squirrel-cage motor

FEATURES OF THE CASE

- Dim. 534 x 427 x 182mm
- Weight: 13Kg

SIEMENS

Power supply bench DEMO-AC & DC



Workbench for the study of motors ref. DEMO-AC and DEMO-DC.
Fitted with a 1200 x 750mm worktop and a 250mm width electrical cabinet.
High mechanical and high temperature resistance stratified worktop.

The lateral console delivers below outputs:

- variable 3-phase + N 0-48V / 15A per phase, usable in two-phase.
- variable DC 0-48V / 6A
- 12V DC / 4A
- 2 x 230V power sockets (2P+E)

Common features for all outputs:

- Hard-wearing LED lamp, without maintenance
- Emergency key release stop button, and start/stop push button
- Each output is controlled independently
- Outputs protected with circuit breakers or auto-protection with auto reset
- Outputs with voltmeter and ammeter
- Electrical drawing available on request.

ref. ALI-DEMO



MOBILE VERSION WITHOUT TABLE

Power supply on wheels.
Consult us.

Rheostats with safety terminals 4mm

MODELS 320W - 640W - 1300W - 1900W

3-PHASE RHEOSTAT (3 RESISTANCES)



ECO1/2

ECO1



Rheostats 320W

Ref.	VALUES
ECO1/2-1	0 to 1Ω / 18A
ECO1/2-3.3	0 to 3,3Ω / 10A
ECO1/2-10	0 to 10Ω / 5.7A
ECO1/2-15	0 to 15Ω / 4.5A
ECO1/2-22	0 to 22Ω / 3.8A
ECO1/2-33	0 to 33Ω / 3.1A
ECO1/2-47	0 to 47Ω / 2.6A
ECO1/2-68	0 to 68Ω / 2.2A
ECO1/2-100	0 to 100Ω / 1.8A
ECO1/2-150	0 to 150Ω / 1.5A
ECO1/2-220	0 to 220Ω / 1.2A
ECO1/2-330	0 to 330Ω / 1A
ECO1/2-470	0 to 470Ω / 0.8A
ECO1/2-680	0 to 680Ω / 0.7A
ECO1/2-1000	0 to 1000Ω / 0.6A
ECO1/2-3300	0 to 3300Ω / 0.3A

Dim. : 270 x 92 x 163mm / 1,9kg

ECO2

Rheostats 1300W

Ref.	VALUES
ECO2-0.5	0 to 0,5Ω / 50A
ECO2-1.6	0 to 1,6Ω / 28A
ECO2-5	0 to 5Ω / 16A
ECO2-11.5	0 to 11,5Ω / 10A
ECO2-16.5	0 to 16,5Ω / 8.7A
ECO2-23.4	0 to 23,4Ω / 7.2A
ECO2-33	0 to 33Ω / 6A
ECO2-50	0 to 50Ω / 5A
ECO2-106	0 to 106Ω / 3.3A
ECO2-165	0 to 165Ω / 2.8A
ECO2-325	0 to 325Ω / 1.9A
ECO2-500	0 to 500Ω / 1.6A
ECO2-1650	0 to 1650Ω / 0.9A
ECO2-5000	0 to 5kΩ / 0.5A

Dim. : 470 x 164 x 163mm / 5,5kg

Rheostats 640W

Ref.	VALUES
ECO1-1	0 to 1Ω / 25A
ECO1-3.3	0 to 3,3Ω / 14A
ECO1-4.7	0 to 4,7Ω / 12A
ECO1-6.8	0 to 6,8Ω / 10A
ECO1-10	0 to 10Ω / 8A
ECO1-15	0 to 15Ω / 6,5A
ECO1-25	0 to 25Ω / 5A
ECO1-33	0 to 33Ω / 4.4A
ECO1-50	0 to 50Ω / 3.6A
ECO1-68	0 to 68Ω / 3A
ECO1-100	0 to 100Ω / 2.5A
ECO1-150	0 to 150Ω / 2A
ECO1-210	0 to 210Ω / 1.7A
ECO1-330	0 to 330Ω / 1.4A
ECO1-470	0 to 470Ω / 1.2A
ECO1-650	0 to 650Ω / 1A
ECO1-1000	0 to 1000Ω / 0.8A
ECO1-1500	0 to 1500Ω / 0.65A
ECO1-2200	0 to 2200Ω / 0.54A
ECO1-3300	0 to 3300Ω / 0.44A
ECO1-4700	0 to 4700Ω / 0.37A
ECO1-6800	0 to 6800Ω / 0.31A
ECO1-10000	0 to 10kΩ / 0.25A

Dim. : 470 x 92 x 163mm / 3kg

ECO3

Rheostats 1900W

Ref.	VALUES
ECO3-0.33	0 to 0,33Ω / 76A
ECO3-1.1	0 to 1,1Ω / 42A
ECO3-3.3	0 to 3,3Ω / 24A
ECO3-11	0 to 11Ω / 13A
ECO3-33	0 to 33Ω / 7.6A
ECO3-110	0 to 110Ω / 4.2A
ECO3-333	0 to 333Ω / 2.4A
ECO3-1100	0 to 1100Ω / 1.4A
ECO3-3300	0 to 3300Ω / 0.76A

Dim. : 470 x 248 x 163mm / 8,3kg

Rheostats 1900W

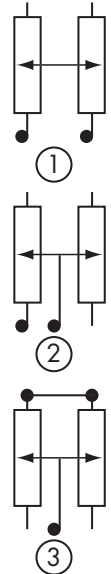
Ref	VALUES
ECOTRI-1	0 to 3 x 1Ω / 3 x 25A
ECOTRI-3.3	0 to 3 x 3,3Ω / 3 x 14A
ECOTRI-10	0 to 3 x 10Ω / 3 x 8A
ECOTRI-33	0 to 3 x 33Ω / 3 x 4.4A
ECOTRI-100	0 to 3 x 100Ω / 3 x 2.5A
ECOTRI-330	0 to 3 x 330Ω / 3 x 1.4A
ECOTRI-1000	0 to 3 x 1kΩ / 3 x 0.8A
ECOTRI-3300	0 to 3 x 3,3kΩ / 3 x 0.44A
ECOTRI-10000	0 to 3 x 10kΩ / 3 x 0.25A

Dim. : 470 x 248 x 163mm / 8,3kg

- There are 3 resistors inside this rheostat all insulated from each other
- One button allows the varying of the resistance of all of them simultaneously.
- Connected in star or delta, these rheostats act as a balanced 3-phase load.
- 9 safety terminals + 1 earth terminal.

Rheostats with 3 ranges according to the coupling

Ref.	MODE 1	MODE 2	MODE 3
SPECO-2	0 to 2Ω / 25A	0 to 1Ω / 25A	0 to 0.5Ω / 50A
SPECO-6	0 to 6.6Ω / 14A	0 to 3.3Ω / 14A	0 to 1.6Ω / 28A
SPECO-20	0 to 20Ω / 8A	0 to 10Ω / 8A	0 to 5Ω / 16A
SPECO-50	0 to 46Ω / 5A	0 to 23Ω / 5A	0 to 11.5Ω / 10A
SPECO-66	0 to 66Ω / 4.4A	0 to 33Ω / 4.4A	0 to 16.5Ω / 8.8A
SPECO-100	0 to 92Ω / 3.6A	0 to 46Ω / 3.6A	0 to 23Ω / 7.2A
SPECO-136	0 to 132Ω / 3A	0 to 66Ω / 3A	0 to 33Ω / 6A
SPECO-200	0 to 200Ω / 2.5A	0 to 100Ω / 2.5A	0 to 50Ω / 5A
SPECO-420	0 to 420Ω / 1.7A	0 to 210Ω / 1.7A	0 to 105Ω / 3.4A
SPECO-660	0 to 660Ω / 1.4A	0 to 330Ω / 1.4A	0 to 165Ω / 2.8A
SPECO-1,3K	0 to 1.3kΩ / 1A	0 to 650Ω / 1A	0 to 325Ω / 2A
SPECO-2K	0 to 2kΩ / 0.8A	0 to 1kΩ / 0.8A	0 to 500Ω / 1.6A
SPECO-6K	0 to 6.6kΩ / 0.44A	0 to 3.3kΩ / 0.44A	0 to 1.6kΩ / 0.9A
SPECO-20K	0 to 20kΩ / 0.25A	0 to 10kΩ / 0.25A	0 to 5kΩ / 0.5A



Standard transformers

From 63 to 160VA transformers are moulded.
For higher power, transformers are covered (steel protective cover).
Summary table of the single-phase transformers the most frequently sold.



Ref.	Type	Power	Primary 230V	Secondary
MN00-10	single-phase steel-covered	40VA	■	2 x 12V ■
MN00-11	single-phase steel-covered	40VA	■	230V ■
MN00-15	single-phase moulded	40VA	■	12V ■
MN01-02	single-phase moulded	63VA	■	24V ■
MN01-11	single-phase steel-covered	63VA	■	230V ■
MN01-13	single-phase moulded	63VA	■	2 x 12V ■
MN02-02	single-phase moulded	100VA	■	24V ■
MN02-03	single-phase moulded	100VA	■	2 x 12V ■
MN02-13	single-phase moulded	100VA	■	2 x 12V ■
MN03-01	single-phase steel-covered	160VA	■	230V ■
MN03-02	single-phase moulded	160VA	■	24V ■
MN03-11	single-phase steel-covered	160VA	■	230V ■
MN03-12	single-phase moulded	160VA	■	24V ■
MN03-13	single-phase moulded	160VA	■	2 x 12V ■
MN07-03	single-phase steel-covered	400VA	■	2 x 12V ■
MN08-00	single-phase steel-covered	500VA	■	230V ■
MN10-00	single-phase steel-covered	750VA	■	230V ■
TR10-07	3-phase steel-covered	750VA	3 x 230V on separate coil terminals	6 x 127V on ZIG-ZAG terminals



Single-phase transformers



Insulation transformers which conform to standard NFEN61558 with protective cover (contact us regarding bare models).

- Tolerance 10%
- Value at 100Hz (or 50Hz in fullwave)

CONNECTION METHOD

To be specified when ordering

- Primary : $\varnothing 4\text{mm}$ safety terminals or mains cable 2P+E (please select).
- Secondary : $\varnothing 4\text{mm}$ safety terminals or fitted power socket (2 pins)

SAMPLE OF ORDER
LABORATORY SINGLE-PHASE TRANSFORMER

POWER _____ 750VA (see selection table opposite)

REF. _____ MN-10 (see selection table opposite)

PRIMARY _____ 230V (SELECT)

CONNECTION METHOD _____ MAINS CABLE
or _____ SAFETY TERMINALS

SECONDARY _____ 24V (SELECT)

CONNECTION METHOD _____ SAFETY TERMINALS
or _____ POWER SOCKET (2P)

Ref.	Power (VA)	Type
MN00	40	Moulded
MN01	63	Moulded
MN02	100	Moulded
MN03	160	Moulded
MN04	200	Covered
MN05	250	Covered
MN06	300	Covered
MN07	400	Covered
MN08	500	Covered
MN09	630	Covered
MN10	750	Covered
MN11	1000	Covered
MN12	1600	Covered
MN13	2500	Covered
MN14	3000	Covered
MN15	4000	Covered

Covered single-phase induction coils (safety terminals)

	1mH	3mH	10mH	30mH	100mH	300mH	1H	3H
0,1A	/	/	/	/	/	/	L101	L301
0,5A	/	/	/	L30M05 (4,70 Ω)	L100M05 (11 Ω)	L300M05 (10,3 Ω)	L105 (23 Ω)	L305 (30,8 Ω)
1A	L1M1 (0,25 Ω)	/	L10M1 (0,6 Ω)	L30M1 (1,74 Ω)	L100M1 (2,27 Ω)	L300M1 (2,80 Ω)	L11 (8 Ω)	L31 (18,00 Ω)
2A	/	/	L10M2 (0,5 Ω)	L30M2 (0,80 Ω)	L100M2 (1,40 Ω)	L300M2 (4,00 Ω)	L12 (4,70 Ω)	L32 (8,30 Ω)
3A	/	L3M3 (0,24 Ω)	L10M3 (0,34 Ω)	L30M3 (0,66 Ω)	L100M3 (1,00 Ω)	L300M3 (0,90 Ω)	L13 (4,30 Ω)	L33 (6,40 Ω)
4A	L1M4 (0,16 Ω)	L3M4 (0,20 Ω)	L10M4 (0,29 Ω)	L30M4 (0,44 Ω)	L100M4 (0,85 Ω)	L300M4 (4,10 Ω)	L14 (2,00 Ω)	/
5A	L1M5 (0,09 Ω)	L3M5 (0,13 Ω)	L10M5 (0,19 Ω)	L30M5 (0,20 Ω)	L100M5 (0,52 Ω)	L300M5 (1,70 Ω)	L15 (2,30 Ω)	/
6A	L1M6 (0,09 Ω)	L3M6 (0,13 Ω)	L10M6 (0,19 Ω)	L30M6 (0,40 Ω)	L100M6 (0,60 Ω)	L300M6 (0,90 Ω)	L16 (1,60 Ω)	/
8A	L1M8 (0,04 Ω)	L3M8 (0,07 Ω)	L10M8 (0,12 Ω)	L30M8 (0,15 Ω)	L100M8 (0,30 Ω)	L300M8 (0,66 Ω)		
10A	L1M10 (0,04 Ω)	L3M10 (0,066 Ω)	L10M10 (0,15 Ω)	L30M10 (0,16 Ω)	L100M10 (0,40 Ω)	L300M10 (0,51 Ω)		
15A	L1M15 (0,021 Ω)	L3M15 (0,041 Ω)	L10M15 (0,07 Ω)	L30M15 (0,13 Ω)	L100M15 (0,30 Ω)	L300M15		
20A	L1M20 (0,019 Ω)	L3M20 (0,03 Ω)	L10M20 (0,06 Ω)	L30M20 (0,09 Ω)	L100M20	L300M20		



3-phase transformers



Insulated transformers which conform to standard NFEN61558, with protective cover.
Contact us regarding bare model

Ref.	Power (VA)
TR05	250
TR08	500
TR09	630
TR10	750
TR11	1000
TR12	1600
TR13	2500
TR14	3000
TR15	4000

SAMPLE OF ORDER

LABORATORY 3-PHASE TRANSFORMER

POWER _____ 1000VA (see selection table above)

REF. _____ TR11 (see selection table above)

PRIMARY (choice of couplings and voltage)

STAR TYPE

SEPARATE TYPE

DELTA TYPE

CONNECTION TO SAFETY TERMINALS

SECONDARY (choice of couplings and voltage)

STAR TYPE

SEPARATE TYPE

DELTA TYPE

Zig-Zag transformers



PRINCIPLE

Our primary zig-zag transformer comprises three windings, whereas the secondary one comprises six half-windings. All of these windings are galvanically isolated from each other. Students practise wiring the primary winding into a star or delta, and the secondary winding into a star, delta or zig-zag. In total, this is six schematics: Yy, Yd, Yz, Dy, Dd, Dz.

The coils are designed in such a way that the voltage outputs always correspond to the 230/400V standard. The section of the wire is calculated in such a way that the rated power in the secondary is available regardless of the connection schematic used.

Interconnections are made using safety cables, directly on the terminal board. The following are symbolised on the terminal board:

- the coils
- with a point, the direction of the coil
- with upper case letter, the terminals of the primary transformer
- with lower case letters, the terminals of the secondary transformer.
- the safety conductor

Comprehensive instructions with Fresnel diagrams explain how the combination of coils alters the phase-to-ground and composite voltages. They explain how to determine the time index.

A method shows how to find out the direction of the coils in an unmarked zig-zag transformer.

REF	POWER	All couplings	
	Secondary	Primary	Secondaire
ZIG11	1000VA	230/400 V	230/400 V
ZIG12	1600VA	230/400 V	230/400 V
ZIG13	2500VA	230/400 V	230/400 V
ZIG14	3000VA	230/400 V	230/400 V
ZIG15	4000VA	230/400 V	230/400 V

Variable autotransformers

These variable autotransformers are available in 3 designs.

- 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.



TRT8N

BARE DESIGN - SINGLE PHASE

Ref	Power in kVA	Primary V	Secondary V	Secondary A	Weight kg	Dimensions mm
ALT5N	1.250	220/240V	0-250V	5	5.4	151x151x123
ALT7N	1.850	220/240V	0-260V	7	7.9	175x175x123
ALT13N	3.380	220/240V	0-260V	13	14	233x233x123
VAR92N	5.200	220/240V	0-260V	20	16	294x294x145

BARE DESIGN - 3-PHASE

Ref	Power in kVA	Primary V	Secondary V	Secondary A	Weight kg	Dimensions mm
TRT5N	3.720	380/400V	0-430V	5	20	155x155x407
TRT8N	6.230	380/400V	0-450V	8	28	181x181x407
TRT13N	10.13	380/400V	0-450V	13	46	233x233x422
3VAR92N	15.60	380/400V	0-450V	20	48	310x310x402



TRT30A

COVER DESIGN - SINGLE PHASE

Ref	Power in kVA	Primary V	Secondary V	Secondary A	Weight kg	Dimensions mm
ALT5A	1.250	220/240V	0-250V	5	6	Ø170 x 157
ALT7A	1.850	220/240V	0-260V	7	9	Ø202 x 157
ALT13A	3.280	220/240V	0-260V	13	15.5	Ø268 x 157
ALT15A	3.900	220/240V	0-260V	15	17	286x286x200
VAR92P	5.200	220/240V	0-260V	20	19	350x320x550

COVER DESIGN - 3-PHASE

Ref	Power in kVA	Primary V	Secondary V	Secondary A	Weight kg	Dimensions mm
TRT8A	6.230	380/400V	0-450V	8	32	200x200x468
TRT13A	10.13	380/400V	0-450V	13	51	286x286x468
TRT30A	23.38	380/400V	0-450V	30	80	450x450x700



TRT8PE

COVERED WITH CIRCUIT BREAKERS AND LIGHT - SINGLE-PHASE

Ref	Power in kVA	Primary V	Secondary V	Secondary A	Weight kg	Dimensions mm
ALT5-PE	1.250	220/240V	0-250V	5	5.4	230x140x250
ALT7-PE	1.850	220/240V	0-260V	7	7.9	230x140x250
ALT13-PE	3.280	220/240V	0-260V	13	14	230x140x250

COVERED WITH CIRCUIT BREAKERS, LIGHT AND WHEELS - 3-PHASE

Ref	Power in kVA	Primary V	Secondary V	Secondary A	Weight kg	Dimensions mm
TRT5-PE	3.720	380/400V	0-430V	5	23	280x340x510
TRT8-PE	6.230	380/400V	0-450V	8	34	280x340x510
TRT13-PE	10.13	380/400V	0-450V	13	53	280x340x530
3VAR92P	15.60	380/400V	0-450V	20	62	350x360x600

MADE TO
MEASURE



ALT5N



ALT5A



ALT15A



ALT5-PE

Training model of single-phase transformer



ref. ETM140

ETM140 allows the study of a single phase transformer. It is made up with a portable console which includes:

- 1 X 140VA single phase transformer
- **Primary:** 230V power supply. Use: 240V protected by fuses and output on safety terminals.
- **Secondary:** 1 x 15V/3.6A winding, 2 x 12V/3.6V independent windings, fuses protected and output on safety terminals.
- 3 displays on the primary (Current – Voltage – Power) show the absorbed electric values.
- 6 displays on the secondary (2 x Current – 2 x Voltage – 2 x Power) show electric values of secondary outputs.
- 1 variable single phase autotransformer, 0-240V 2.5A output, fuses protected, with safety terminals, can supply the transformer primary.
- 1 set of Ø4mm safety test leads.

User's manual includes: A theoretical study about single phase transformer and practical works with the 140VA transformer.

Specifications:

- Dimensions: 1000x160x180mm + handle
- Weight: 13kg
- Supply: 230V mains cable

Variable transformer (insulated)



TRANSFORMERS ISOLATED FROM THE MAINS

- The case contains one insulation transformer and one variable autotransformer.
- The primary is powered by the mains supply (230V)
- The secondary can be connected by secure terminals of Ø4mm.
- 2 powers available.
- Dimensions : 210 x 245 x 350mm.

Ref.	SEC1	SEC2	SEC3	SEC4
Output voltage	0-240V	0-240V	0-48V	0-48V
Current	2,5A	5A	12,5A	25A
Weight	20kg	25kg	20kg	26kg

Rheostats, Transformers & Inductances

Safety variable inductance (in a transparent insulated case)



Inductor equipped with safety terminals. The whole unit is double insulated. The inductance coil is fitted in a transparent case. **The handle and moving parts are metal.**

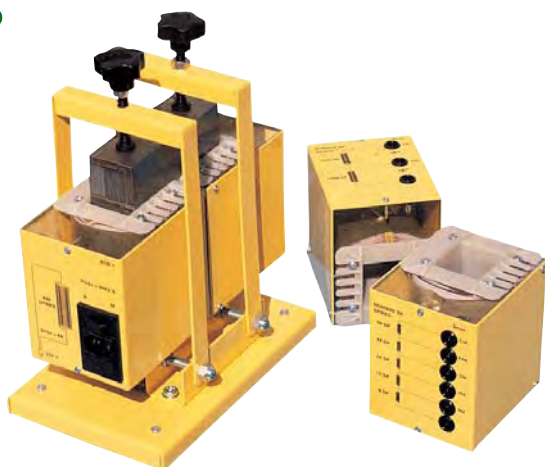
- Inductance: progressively adjustable from 0.1 to 1.4H.
- Resistance: 10Ω
- Max. current: 2A
- Overvoltage factor: 22
- Core made with a stacking of silicon sheets
- Graduated in Henry and in centimetres.
- Dimensions: 280 x 150 x 90mm
- Weight: 6.5kg

ref. PSYJR


CEI1010 CATIII 1000Vrms pol2

Safety dismantled transformer

MAGNETIC CIRCUIT




ref. MAG800

User safety is maintained by SAFETY TERMINALS and a double insulation unit. 

- Stacking of silicon sheet in U-shape.
- H: 200mm.
- L: 120mm.
- 40 x 40mm section
- The magnetic circuit is fixed onto a 230 x 150mm base with rubber feet.
- Two quick gripping clamps hold the head, closing the magnetic circuit.

SECONDARY COIL

- consists of 2 windings in series, each one with 220 turns, 3.6A.
- When empty, this coil delivers 220V, with a mid-point of 110V.
- Outputs to safety terminals.
- Double insulation 
- Dimensions: 115 x 115 x 95mm

ref. BOB4



PRIMARY COIL

- 230V power supply.
- 800V AC power
- 440 turns max. I = 4A
- Supplied with a power lead, an On/Off button, a safety fuse
- Dimensions. : 115 x 115 x 95mm

ref. BOB1




PRIMARY COIL

- 230V power supply.
- 800V AC power
- 440 turns max. I = 4A
- Connexion on safety terminals
- Dimensions. : 115 x 115 x 95mm

ref. BOB6



SECONDARY COIL


- consists of 5 windings in series.
- Outputs to safety terminals.
- Double insulation 
- Dimensions: 115 x 115 x 95mm

Nb of turns	6	12	24	48	96
Current in A	50	25	13	6,6	3,3

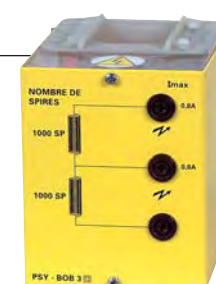
ref. BOB2



SECONDARY COIL

- consists of 2 windings in series, each with 1000 turns, 0.8A.
- Warning - when empty, this coil delivers 1000V.
- Outputs to safety terminals.
- Double insulation 
- Dimensions. : 115 x 115 x 95mm

ref. BOB3



Housing components

These components of buildings are wired into small boxes and connected to safety terminals to be used with safety test leads. Features are indicated on each box, with a no-deteriorating hardwearing engraving.

RECEIVER EQUIPMENT

Ref	Characteristics	Nb of terminals	Dimensions
CIA-DIV17	Single-phase bell. 24V-50Hz	2	130x80x85mm
CHT-REC	Radio receiver for lighting control. A switch can be connected for local lighting control. 230V-100W contact on compact fluo lamps or 300W contact on incandescent lamps. Power supply 230V-AC-Ph+N. Requires transmitter (Ref. CIA-EM - Page 126).	6	130x80x85mm
CHT-REVO	Radio receiver for roller shutter control. A roller shutter control can be connected for local up and down control. Contact 230V-1A Max. Power supply 230V-AC-Ph+N	7	130x80x85mm
CIA-T24	Single-phase transformer 230V-24VAC. 120VA	4	125x125x100mm
CHT-P4	2P + E socket 16A/250V-AC	3	150x73x57mm
CHT-V10	Mobile heater on feet, with power 2000W. Equipped with safety terminals for mains supply. 230V-50/60Hz.	2	660x400x115mm
CHT-VOLET	Mobile roller shutter on feet 230VAC with up and down stop adjustments	6	1200x500mm
CHT-SP24	Spot LED 230VAC Culot GU10LED spotlight 12V- base GU5.3 with transformer 230V/12V-AC	2	200x200x130mm
CHT-SP	LED spotlight 230VAC base GU10	2	125x125x100mm
CHT-VE27	60W wall light. E27 bulb	2	170x115x100
CHT-FLUO	Striplight + fluorescent tube 230VAC-18W	2	660x50mm
CHT-V5	White light 230VAC – Lamp 5W	2	150x73x57
CHT-V54	White light 24VAC – Lamp 5W	2	150x73x57
CHT-V6	Red light 230VAC – Lamp 5W	2	150x73x57
CHT-V64	Red light 24VAC – Lamp 5W	2	150x73x57
CHT-V7	Green light 230VAC – Lamp 5W	2	150x73x57
CHT-V74	Green light 24VAC – Lamp 5W	2	150x73x57



ref. CHT-REC



ref. CHT-VOLET



ref. CHT-SP24



ref. CHT-VE27



ref. CHT-V10



ref. CHT-V5



ref. CHT-V74



ref. CIA-P4

Electrical components

Housing components

PRODUCTION EQUIPMENT (SETTINGS AND CONTROLS ACCESSIBLE WITHOUT OPENING THE BOXES)

Ref	Characteristics	Nb of terminals	Dimensions
CIA-DB500	Connection circuit breaker DB90 – 2 poles - 45 A – with differential 500 mA - 250 V 50 Hz AC	6	280x190x135mm
CIA-ID64	Instantaneous residual current circuit protection switch 25A - 30mA Classe AC	4	125x125x100mm
CIA-ID65	Instantaneous residual current circuit protection switch 40A - 30mA Classe AC	4	125x125x100mm
CIA-ID66	Instantaneous residual current circuit protection switch 40A - 30mA Classe A	4	125x125x100mm
CIA-ID67	Instantaneous residual current circuit protection switch 63A - 30mA Classe A	4	125x125x100mm
CIA-MT46	Modular circuit breaker Multi 9 Déclit 1 pole + E, 2 A curve C	4	130x80x85mm
CIA-MT47	Modular circuit breaker Multi 9 Déclit 1 pole + E, 10 A curve C	4	130x80x85mm
CIA-MT48	Modular circuit breaker Multi 9 Déclit 1 pole + E, 16 A curve C	4	130x80x85mm
CIA-MT49	Modular circuit breaker Multi 9 Déclit 1 pole + E, 20 A curve C	4	130x80x85mm
CIA-MT50	Modular circuit breaker Multi 9 Déclit 1 pole + E, 25 A curve C	4	130x80x85mm
CIA-MT51	Modular circuit breaker Multi 9 Déclit 1 pole + E, 32 A curve C	4	130x80x85mm



ref. CIA-DB500



ref. CIA-ID66



ref. CIA-MT49

CONTROL EQUIPMENT

Ref	Characteristics	Nb of terminals	Dimensions
CHT-B3	Push button 10A/250V-AC	2	150x73x57mm
CHT-B4	Double push button 10A/250V-AC	3	150x73x57mm
CHT-C1	2 way switch 10A/250V-AC	3	150x73x57mm
CHT-S2	Simple switch 10A/250V-AC	2	150x73x57mm
CHT-S3	Double switch 10A/250V-AC	3	150x73x57mm
CHT-D8	Changeover switch for "stairwell" mounting 10 A/250 V AC	4	150x73x57mm
CHT-R5	Control for roller shutter Up - Down 10A/250V-AC	3	150x73x57mm
CIA-EM	Radio transmitter for lighting or roller shutter control. For changing the mechanical action of a switch to radio waves. Very simple setting. Powered by integral button battery. Requires radio receiver (see page 111).	3	130x80x85mm



ref. CHT-B3



ref. CHT-S3



ref. CHT-R5



ref. CHT-S2

MANAGEMENT EQUIPMENT (SETTINGS AND CONTROLS ACCESSIBLE WITHOUT OPENING THE BOXES)

Ref	Characteristics	Nb of terminals	Dimensions
CIA-DIV5	Dusk switch with photocell. Power supply 230 V - 50/60 Hz. Two-way contact 10 A – 230 V AC. Sensitivity adjustment on front.	5	125x125x100mm
CIA-DIV6	'Stairwell' timer 230 V - 50/60 Hz. Timing adjustable from 0.5 to 10 min on front. Manual forced operation contact. Output on contact 250 V AC – 16 A at $\cos \varphi=1$	4	130x80x85mm
CIA-DIV7	Single pole remote control switch. Coil 24 V - 50/60 Hz. Forced operation button on front. Contact 10 A – 230 V AC.	4	130x80x85mm
CIA-DIV72	Single pole remote control switch. Coil 230 V - 50/60 Hz. Forced operation button on front. Contact 10 A – 230 V AC.	4	130x80x85mm
CIA-DIV8	Time switch. Time period adjustment on front. Coil power supply 230 V - 50/60 Hz. Contact 16 A – 230 V AC.	4	130x80x85mm
CIA-DIV9	Single phase consumption indicator. For showing the number of kilowatt-hours consumed by part of an electrical installation and especially intended for heating and hot water circuits. Digital display and adjustment button on front. Power supply 230 V – 50 Hz. Nominal I from 2 A to 30 A resistive. Electrical energy supplier remote data bus input. Dry contact input HP/HC	8	125x125x100mm
CIA-DIV10	Single phase circuit contactor/load shedder. Integral core. 230V-50/60Hz. 2 channels. Load sheds or picks up 2 non-priority circuits in cascade. Forced load shedding input. Thresholds 5-10-15-25-30-40-45-50-60-70-75-90A. Load shedding signalled by LED. I _{max} : 30 A	9	280x190x135mm



ref. CIA-DIV10

ref. CIA-DIV5

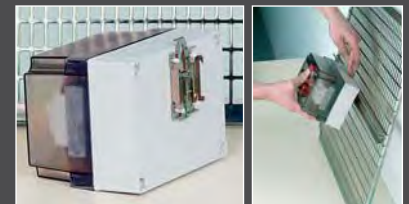


ref. CIA-DIV72

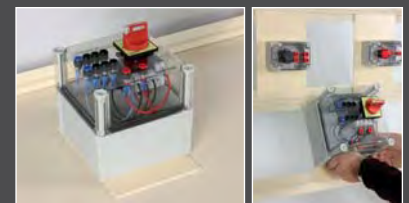
ref. CIA-DIV6

ref. CIA-DIV8

OPTION FOR HANGING COMPONENTS



**OPTION:
HANGING ON
RAILS.
SEE PAGE 117**



**OPTION:
HANGING
ON PLATES
SEE PAGE 117**

CONTROL AND SIGNAL UNITS

Ref	Characteristics	Comments
CIA-ORG1	Black pushbutton with NO contact	/
CIA-ORG2	Black pushbutton with NO+NO contact	/
CIA-ORG3	Black pushbutton with NO+NC contact	/
CIA-ORG4	Red pushbutton with NC contact	/
CIA-ORG5	Trigger action emergency stop pushbutton - NC contact	Turn to release
CIA-ORG6	Trigger action emergency stop pushbutton - NC contact	Key to release
CIA-ORG7	Double headed pushbutton NO+NC	/
CIA-ORG8	ON pushbutton OFF pushbutton, 24V LED	3 units in 1 box
CIA-ORG9	Double headed pushbutton NO+NC	With pilot light 24V
CIA-ORG10	2 positions selector switch NO	0 – 1 Positions
CIA-ORG11	3 positions selector switch NO+NO	1 – 0 – 1 Positions
CIA-ORG12	3 positions selector switch NO+NC	1 – 0 – 1 Positions
CIA-ORG13	Pilot light with green LED	24V– 50 Hz
CIA-ORG14	Pilot light with red LED	24V– 50 Hz
CIA-ORG15	Pilot light with white LED	24V– 50 Hz
CIA-ORG16	Pilot light with yellow LED	24V– 50 Hz
CIA-ORG17	Pilot light with blue LED	24V– 50 Hz



ref. CIA-ORG13



ref. CIA-ORG14



ref. CIA-ORG15



ref. CIA-ORG16



ref. CIA-ORG17



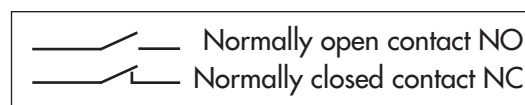
ref. CIA-ORG9



ref. CIA-ORG8



ref. CIA-ORG6



ref. CIA-ORG7



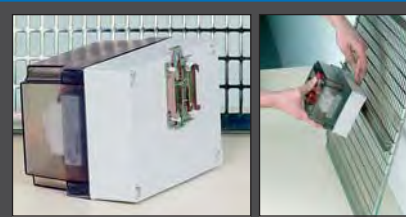
ref. CIA-ORG12



ref. CIA-ORG3

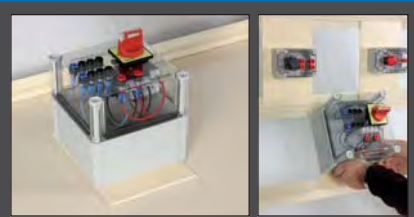


ref. CIA-ORG4



OPTION FOR HANGING COMPONENTS

OPTION:
HANGING ON
RAILS.
SEE PAGE 117



OPTION:
HANGING
ON PLATES.
SEE PAGE 117

SETTINGS AND CONTROLS ACCESSIBLE WITHOUT OPENING THE BOXES



ref. CIA-C212



ref. CIA-C12



ref. CIA-RT40



ref. CIA-R22



ref. CIA-R31



ref. CIA-MT92



ref. CIA-MT38



ref. CIA-MT21

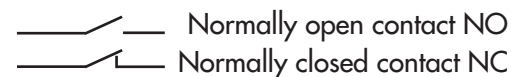
These components are in plastic cases with a transparent cover.

Characteristics are engraved on the cover.

Connection is made with 4mm safety terminals.

Control circuit in red.

Main circuit or power circuit in black.



POWER CONTACTOR

Ref	Type	Current AC1	Power AC3	Auxiliary	Coil(s) voltage
CIA-C12	standard	25A	5.5kW / 400V	2 NO + 1 NC	24V-50/60Hz
CIA-C25	standard	40A	11kW / 400V	2 NO + 1 NC	24V-50/60Hz
CIA-C212	reversing contactor	25A	5.5kW / 400V	1 NC + 1 NC	24V-50/60Hz
CIA-CT212	Star / Delta	25A	5.5kW / 400V	1NC+1NC+tempo	24V-50/60Hz

The reversing and star/delta contactor sets are mechanical locking of positions.

Other voltage upon request.

AUXILIARY CONTACT BLOCKS FOR CONTROL CIRCUITS (10A MAX)

Ref	NO Contacts	NC Contacts	Tempo delay	Coil Voltage
CIA-R40	4	0	NO	24V - 50/60 Hz
CIA-R31	3	1	NO	24V - 50/60 Hz
CIA-R22	2	2	NO	24V - 50/60 Hz
CIA-R42	4	2	NO	24V - 50/60 Hz
CIA-R44	4	4	NO	24V - 50/60 Hz
CIA-R62	6	2	NO	24V - 50/60 Hz
CIA-RT40	4	0	NC + NO work	24V - 50/60 Hz
CIA-RR40	4	0	NC + NO stand by	24V - 50/60 Hz
CIA-RT43	4	3	NC + NO work	24V - 50/60 Hz
CIA-RR43	4	3	NC + NO stand by	24V - 50/60 Hz

Other voltage upon request.

AC THERMAL-MAGNETIC CIRCUIT BREAKERS

Ref	TYPE	Rating current	Curve	Breaking capacity	230V/30mA residual current circuit breaker
CIA-MT36	2-pole	6A	C	6000A	YES
CIA-MT37	2-pole	10A	C	6000A	YES
CIA-MT38	2-pole	16A	C	6000A	YES
CIA-MT97	2-pole	2A	C	6000A	NO
CIA-MT99	2-pole	4A	C	6000A	NO
CIA-MTD8	2-pole	4A	D	10 000A	NO
CIA-MT20	2-pole	6A	C	6000A	NO
CIA-MT21	2-pole	10A	C	6000A	NO
CIA-MT92	2-pole	16A	C	6000A	NO
CIA-MT10	3-pole	2A	C	6000A	NO
CIA-MT12	3-pole	4A	C	6000A	NO
CIA-MTD9	3-pole	4A	D	10 000A	NO
CIA-MT13	3-pole	6A	C	6000A	NO
CIA-MTD1	4-pole	6A	C	6000A	YES
CIA-MT23	4-pole	2A	C	6000A	NO
CIA-MT25	4-pole	4A	C	6000A	NO
CIA-MTD3	4-pole	4A	D	10 000A	NO
CIA-MT27	4-pole	6A	C	6000A	NO

Industrial automation components

3-POLE THERMAL OVERLOAD RELAYS

Ref	TYPE	Relay setting range	Auxiliary
CIA-T3	Compensated	0.25 to 0.40A	1NC
CIA-T4	Compensated	0.40 to 0.63A	1NC
CIA-T5	Compensated	0.63 to 1A	1NC
CIA-T6	Compensated	1 to 1.60A	1NC
CIA-T8	Compensated	2.5 to 4A	1NC

Other voltage upon request.

INSTANTANEOUS RESIDUAL CURRENT CIRCUIT PROTECTION SWITCHES

Ref	TYPE	Rating max	Sensitivity AC	Voltage rating
CIA-ID64	2-pole	25A	30mA	240V
CIA-ID92	4-pole	25A	30mA	400V

DISCONNECTING SWITCHES

Ref	TYPE	Number of poles	Rating current	Auxiliary
CIA-SE0	Emergency stop switch	3	25A	/
CIA-SE1	Emergency stop switch	4	25A	/
CIA-SE3	Emergency stop switch	4	25A	1NO

SAFETY TRANSFORMERS

Ref	Power	TYPE	Primary	Secondary
CIA-T24	120VA	single-phase	230V	24V
CIA-T220	300VA	single-phase	230V	230V
CIA-TT400	250VA	3-phase	400V	3x24V

OTHERS COMPONENTS

Ref	Description	Comments
CIA-DIV1	Single pole + neutral fuse switch disconnector	without cartridge fuse
CIA-DIV2	3-pole + neutral fuses switch disconnector	without cartridge fuse
CIA-DIV3	bridge, single pole (4 diodes)	35A
CIA-DIV4	Diodes bridge, 3-phase (6 diodes, Graetz bridge)	50A

other voltage upon request



ref. CIA-T6



ref. CIA-ID92



ref. CIA-SE0



ref. CIA-T24



ref. CIA-DIV1



ref. CIA-DIV4

Starter & retarder



This unit starts up and decelerates squirrel-cage asynchronous, single-phase and three-phase motors smoothly with a low current. All settings can be performed without opening the unit. These settings are: acceleration time, deceleration time and torque. Lamps indicate the "On" and "rated speed" operating statuses.

- Supply voltage: 400V three-phase
- Control: On/Off operated using a built-in push-button.
- Acceleration adjustment: from 1.1 to 5 seconds
- Deceleration adjustment: from 0 to 5 seconds
- Torque adjustment: from 20% to 65% of the breakaway torque of the direct motor
- Maximum current: 6A

ref. DEMELEC

THERMAL-MAGNETIC CIRCUIT-BREAKERS FOR MOTOR

Ref	Control	Power rating of 3-phase motor	Setting range of thermic trip
CIA-DM3	Internal pushbutton	90W / 400V	0.25 to 0.40A
CIA-DM6	Internal pushbutton	370W / 400V	1 to 1.60A
CIA-DM8	Internal pushbutton	1200W / 400V	2.5 to 4A

other current upon request



ref. CIA-DM8

BENCHTOP MOTORS

Ref	Type	Voltage
CIA-MO220	Single-phase	220V
CIA-TR924	3-phase	3 x 24V
CIA-TR690	3-phase	400V / 690V



ref. CIA-TR690

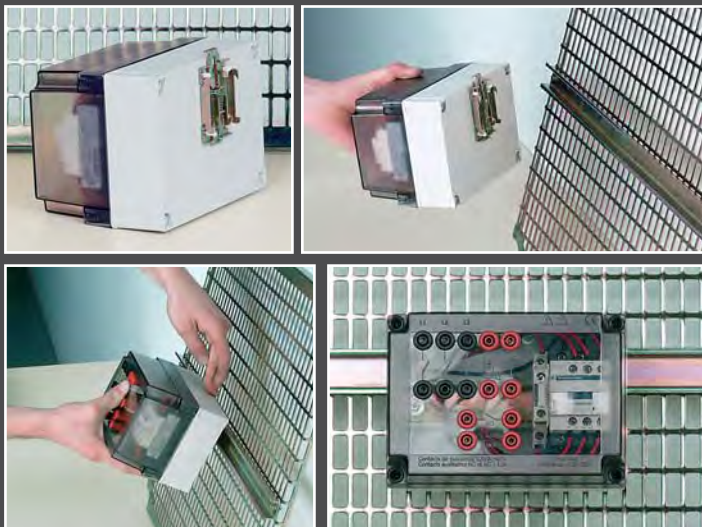


ref. CIA-A4

MOBILE POWER SUPPLY BOX

Ref	Type	Input power cable	Control	Outputs	Protection
CIA-A2	Single-phase	With blue socket	On/Off+emergency stop	Terminals	Circuit-breaker
CIA-A4	3-phase	With red socket	On/Off+emergency stop	Terminals	Disjoncteur

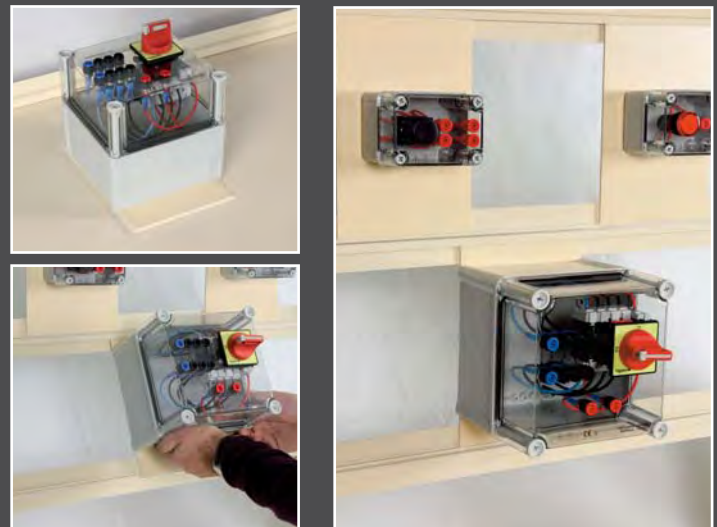
Option for hanging components on rails



Example of industrial component (Ref. CIA-C12) with hanging option for fast attachment onto a universal rail. In this way, you can attach your various industrial components onto a grid in order to make wiring and testing easier.

This option is available for all industrial components on pages 111 to 117. To order this option, simply add -FIX to the end of the reference for the selected component. (e.g. CIA-C12-FIX)

Option for hanging components on plates



Example of industrial component (Ref. CIA-SE3) with hanging option for fast attachment onto a PVC plate (250mm high). All modules are therefore compatible with the frame, ref. CADRE-FT and the IFTI LABO-FT station (see page 35).

This option is available for all industrial components on pages 111 to 117. To order this option, simply add -PLA to the end of the reference for the selected component. (e.g. CIA-SE3-PLA)

Living area wiring kit



Wiring kit for the main electrical equipment, type HOUSING in units, to complete an electrical installation similar to a 35m² apartment. Each module has 4mm dual chamber safety terminals for the various connections. The kit is supplied with the wiring and architectural diagrams as well as instructions for the various components. Your kit can be customised upon request. Please contact us.

ref. KT-2



This kit is also available with each industrial component fixed on a PVC plate (250mm high). In this version, all wiring kit units described above are fixed onto a PVC plate. All modules are therefore compatible with the frame, ref. CADRE-FT and the IFTI LABO-FT station (see page 35).

ref. KT-2PLA

The kit comprises

- 1 DB90 connection circuit breaker unit with 500mA residual current type
- 1 25A class AC two-pole 30mA residual current circuit breaker unit
- 1 40A class A two-pole 30mA residual current circuit breaker unit
- 1 2A C curve thermal magnetic circuit breaker unit
- 2 10A C curve thermal magnetic circuit breaker units
- 5 20A C curve thermal magnetic circuit breaker units
- 1 32A C curve thermal magnetic circuit breaker unit
- 1 220V single pole remote control switch unit
- 1 2000W staircase timer unit
- 1 2F manually controlled Off-peak contactor unit
- 5 viewing ports with 60W E27 Bulbs
- 2 230V colourless indicator lights
- 2 230V red indicator lights
- 1 movable convector on a stand with a power of 2000W- 230V
- 1 manual control unit for roller blinds
- 2 single switch units
- 2 two-way switch units
- 3 push button units
- 5 2P+E – 230V socket units
- 1 Set of safety leads in several colours and lengths to wire all components

Wiring kit to start an asynchronous motor



Wiring kit for industrial electrical equipment in housings to start-up a 300W asynchronous motor. Various diagrams are proposed: Direct, Star/Triangle, reversal of the direction of rotation... Each component unit has 4mm dual chamber safety terminals for the various connections.

The Kit is supplied with diagrams and instructions for the components. Option to complete this kit at a later date with for example, a speed controller, a starter/decelerator, etc. Your kit can be customised upon request. Please contact us.

ref. KT-1

The kit comprises

- 1 three phase power supply unit with circuit breaker, emergency stop and On/Off
- 4 power contactor units
- 2 single-pole + neutral circuit breaker units
- 1 25A – 30mA differential four-pole switch unit
- 1 4A D curve four-pole thermal magnetic circuit breaker unit
- 2 auxiliary contactor units for a 2F+2O control circuit
- 1 auxiliary contactor unit for a 4F+3O-time O+F work control circuit
- 1 emergency stop switch/disconnector unit with 4 25A contacts
- 1 0.4 to 0.63A + 1O three-pole thermal relay unit
- 1 230V/24V single phase 120VA safety transformer unit
- 1 24V green LED indicator light unit
- 1 24V red LED indicator light unit
- 1 24V white LED indicator light unit
- 2 black push-button units with 'F+O' contact
- 1 red push-button unit with 'O' contact
- 1 emergency stop unit with 'O' contact, key override
- 1 double push-button unit with 'F+O' contact and 24V indicator light
- 1 set of safety leads in several colours and lengths to wire all components.

FAN OPTION



Protection grid removed for photo purposes only

ref. KT-1M

The KT-1 kit can be completed by a fan.

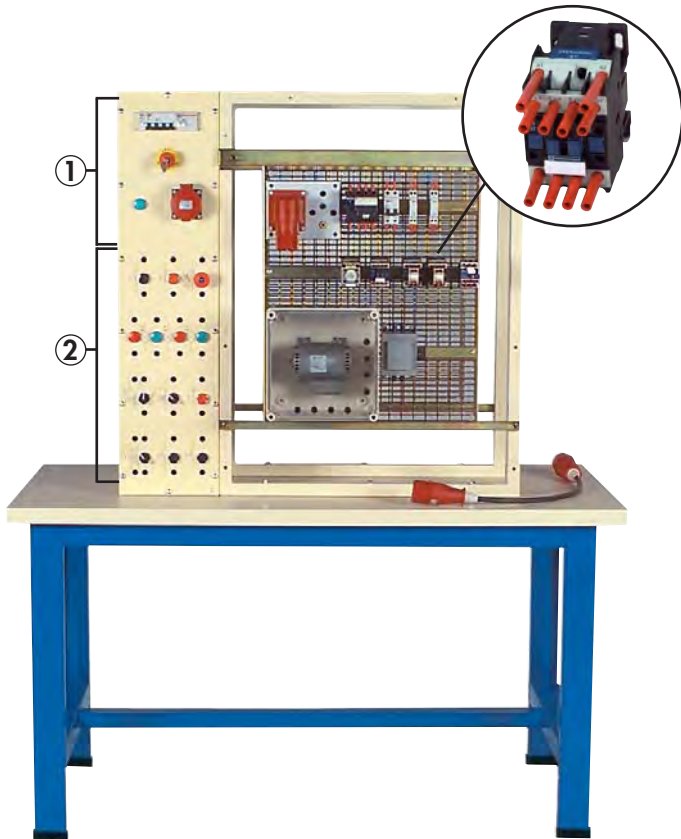
- 300W 400/690V three-phase fan.
- Rated speed 1500 rpm
- Power supply through 4mm dual chamber safety terminals

This kit is also available with each industrial component fixed on a PVC plate (250mm high). In this version, all wiring kit units described above are fixed onto a PVC plate. All modules are therefore compatible with the frame, ref. CADRE-FT and the IFTI station ref. LABO-FT (see page 35).

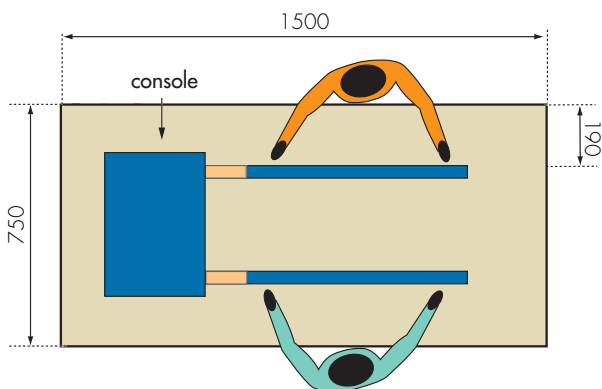
ref. KT-1PLA



Station for jumper wire assembly



ref. LABOFIL-2



The bench has a 1500 x 750mm high-temperature, stratified top and a single-leg assembly. This double-sided station for two students enables you to quickly test the fittings using the "jumper wire" technique. Each component is fitted with $\varnothing 4$ mm safety sockets which are compatible with fixed sheath safety leads. Thanks to this design, interconnections can be made very quickly and in complete safety. The side unit encloses actuators behind two engraved front sections. Each user has the same parts on each side. This unit is also used to switch on and protect the study grid, and to switch it off in the case of an emergency.

DESCRIPTION OF THE SIDE BOX

① TOP SECTION

- A 30mA residual four-pole circuit breaker
- An emergency stop button
- An undervoltage trigger to ensure positive safety
- An hard-wearing "power on" lamp
- An industrial power outlet for distribution to the wiring grid.

② BOTTOM SECTION

Each actuator is identified by a standard symbol engraved on the front surface. Each polarity is attached to a safety terminal set into the front surface.

- One red stop button ("NO" contact)
- One black start button ("NC" contact)
- One key-operated emergency stop button ("NC" contact)
- Two red warning lamps with IN-24 volt bulbs
- Two green warning lamps with IN-24 volt bulbs
- One three-position turning knob ("NO" + "NO" contacts)
- One two-position turning knob ("NC" contact)
- One red-topped push-button ("NO" contact)
- One two-position turning knob ("NO" + "NC" contacts)
- Two black-topped push-buttons ("NC" contact)

DESCRIPTION OF WIRING GRID

The components are fitted with female safety sockets which allow rapid connection using $\varnothing 4$ safety leads. These safety sockets make every IP2X part safe for the user. The following equipment can be found on this grid:

- One junction box with rapid connection to the supply from the side box
- One 230/24V transformer for the control circuit
- One circuit breaker switch with four-pole fuse
- One DPN 4A/C circuit breaker
- Two fused PH/N circuit breakers
- One three-phase 12A switch – 24V coil – "NC" + aux. "NO" + "NC" contacts
- One three-phase 12A switch – 24V coil – "NC" contacts – one time-delayed "work" addition
- One 12A inverter switch – 24V coil – each with "NO" contact – mechanical locking
- A thermal relay with its mounting (size tailored to the motor) – "NO" contact
- One "modified" low-power 400/660V three-phase motor.

The following accessories are supplied: one cable for connecting the side power supply to the wiring plate. All the components described above. Technical dossier with instructions, parts list and a few wiring diagrams.

QUALITY OF STRATIFIED TOP



SHOCK
RESISTANT



ABRASION
RESISTANT



SCRATCH
RESISTANT



CHEMICAL
RESISTANT



EASY
TO CLEAN



Uniformly
distributed

QUALITY OF STEEL



- 5 EPOXY PAINT LAYER 2
- 4 EPOXY PAINT LAYER 1
- 3 ELECTROGALVANIZED LAYER
- 2 UNOXYDISISED STEEL
- 1 PVC BASE