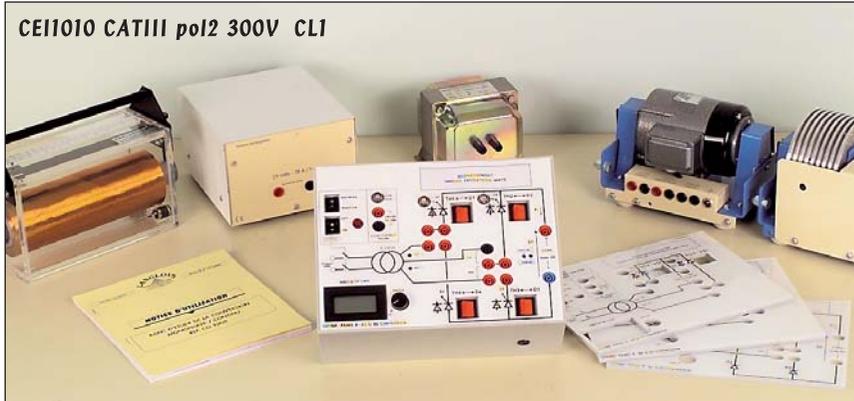




Conversion test benches

SINGLE-PHASE / DIRECT CURRENT CONVERSION TEST BENCH

CO-1000 is supplied with 4 moveable front panels, instruction book included practises



CEI1010 CATIII pol2 300V CL1

ref. CO-1000

ACCESSORIES FOR CO-1000

- | | |
|-----------------|--|
| Ref. ECO1/2 10Ω | Rheostat ECO1/2 10Ω (P.94) |
| Ref. SH90/24 | Motor 90W (P.50-52) |
| Ref. FR90 | Powder brake FR90 (P.51-53) |
| Ref. PSYJR | Variable coil (P.100) |
| Ref. CO-104 | Smoothing coil 40mH - 3A
advised option |
| Ref. CO-105 | Smoothing coil 20mH - 3A |
| Ref. CO-108 | Smoothing coil 60mH - 3A |
| Ref. CO-106 | 12V/24V battery |

All types of practical tests on the rectification of controlled and uncontrolled single-phase current can be carried out with this single box, which comprises built-in supplies (including a power supply), a probe for measuring the AC+DC current output, an ignition angle display, and four switches to change from the diode assembly to the rectifier assembly.

The test bench is supplied with four movable front panels. Each one is a specific mask, with holes for the indicator lights, input/output terminals, and switches required for a particular set of tests. Each panel is printed with the instructions for just those tests.

None of the components are directly accessible to avoid short circuits. Rectifiers and diodes are specially mounted to facilitate maintenance and are visible behind a movable, transparent cover.

The 30V x 6A output is capable of running a powerful motor (electrical power: 150W, mechanical power: 90W) connected to a brake, making it possible to observe the influence of braking on the conduction angle.

The instruction book supplied with the test bench explains the tests listed below for each front panel.

RECTIFIER CONTROL

The ignition angle is controlled by a potentiometer and displayed.

The control pulses, applied to the trigger through separation pulse transformers, are output via BNC to the oscilloscope.

CURRENT PROBE

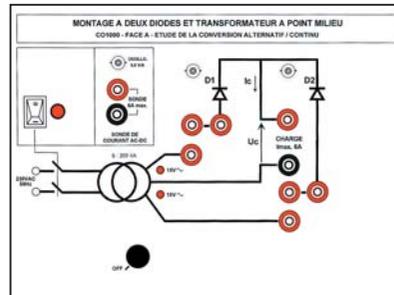
This probe consists of a Hall-effect sensor and is connected in series, like an ammeter. The current image is a voltage of 0.5 V/A available via BNC .

INDICATOR LIGHTS

LEDs indicate which rectifiers and diodes have been selected, which transformer windings are connected to the power supply, and the rectifier / inverter mode.

BUILT IN 200VA POWER SUPPLY

2 mid-point reactors: 2 x 15 Vrms
Power supply: 220VAC 50Hz 250VA
Dimensions: 670x370x170mm. Weight: 3.8kg

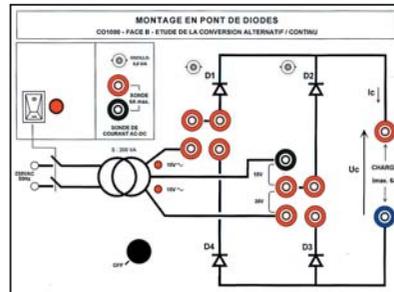


PANEL A: ASSEMBLY WITH TWO DIODES AND MID-POINT TRANSFORMER

Return to single half-wave rectification and switching to double half-wave rectification by simply adding jumper straps.

Experiment 1 Power flow on resistive load (R)

Experiment 2 Power flow on inductive load (R,L)



PANEL B: DIODE BRIDGE CIRCUIT ASSEMBLY

Experiment 1 Power flow on resistive load (R)

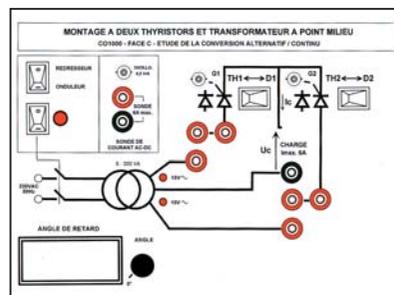
Experiment 2 Power flow on inductive load (R,L)

Experiment 3 Power flow on active load (E,R)

Experiment 4 Power flow on active inductive load (E,R,L)

Experiment 5 Application to a DC motor power supply

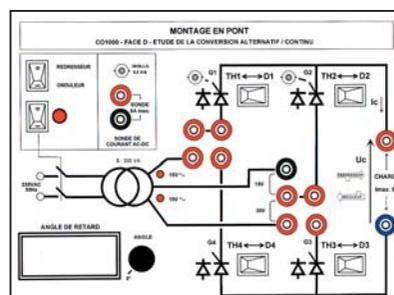
Any of these 4 diodes can be replaced by a rectifier at any time, simply by throwing the appropriate switch. This facilitates comparisons between all-diode, all-rectifier, symmetrical mixed, and asymmetrical mixed assemblies.



PANEL C: ASSEMBLY WITH TWO RECTIFIERS AND MID-POINT TRANSFORMER

Controlled single- and double-wave rectification.

The tests on panel A may be used again for comparison.



PANEL D: BRIDGE CIRCUIT ASSEMBLY (ALL RECTIFIERS OR MIXED)

Comparative studies of diode / rectifier / mixed assemblies

Experiment 1 Power flow on active inductive load (E, R, L)

Operates as a static convertor

Operates as a grid-interactive inverter

Experiment 2 Application to a DC motor power supply (DCM)

Mixed bridge-circuit ssembly

Experiment 3 Power flow on active inductive load (E, R, L)

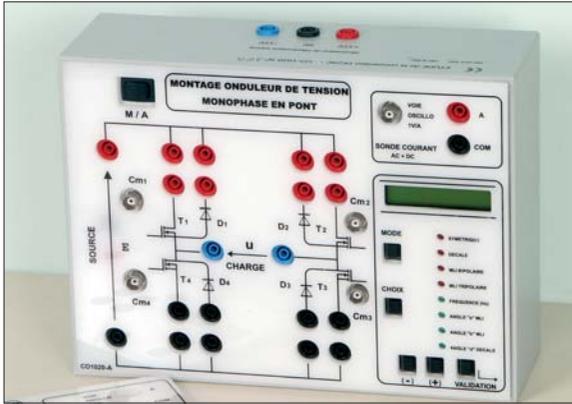
Experiment 4 Application to a DC motor power supply (DCM)



Conversion test benches

SINGLE-PHASE CONTINUOUS/ALTERNATING CURRENT CONVERSION TEST BENCH

CO-1000 is supplied with 2 moveable front panels, instruction book included practises



ref. CO-1020

ACCESSORIES POUR CO-1020

Ref. ECO1/2 10Ω	Rheostat ECO1/2 10Ω (P.94)
Ref. ECO1/2 15Ω	Rheostat ECO1/2 15Ω (P.94)
Ref. ECO1/2 22Ω	Rheostat ECO1/2 22Ω (P.94)
Ref. ECO1/2 33Ω	Rheostat ECO1/2 33Ω (P.94)
for an optimal use, low resistance loads are better	
Ref. PSYJR	Variable coil (P.100)
Ref. CO-106	12V/24V battery
Ref. CO-107	Single-phase transformer 12V - 230V with its lamp 230V - 40W
Ref. CO-109	Load made up of a 400W machine with 12V/220V transformer

This bench is suitable for all types of tests on independent, single-phase static voltage converters. It has 2 detachable front panels, with holes forming a mask that reveals the layout diagram for the specific type of test to be carried out. The choice of layout (consisting of MOS power transistors) is thus determined by the front panel slotted into the casing:

PANEL A: "Single-phase, static, half-bridge voltage converter (two switches)"

PANEL B: "Single-phase, static, bridge voltage converter (four switches)"

The system includes a control panel offering the following options: (SYMMETRICAL, OFFSET, BIPOLAR PWM, and THREE-POLE PWM), a display (frequency and offset angles), indicator lights (control mode selection and adjustment parameters), and an AC+DC current probe for measuring and displaying all the current in the layout. It runs both on batteries and the laboratory continuous power supply and has reinforced safety systems (for reversed polarity and shutdown of unused transistors). The output ($I_{MAX} = 3A$) is sufficient to run a motor of significant power and, in particular, to study the U/F control.

TRANSISTOR CONTROL PANEL:

This flexible, easy-to-use control panel is entirely managed by micro-controller and is capable of all variable frequency controls.

CONTROL MODE

The control mode is selected by pressing the "MODE" key:

- SYMMETRICAL
- OFFSET
- BIPOLAR PWM
- THREE-POLE PWM

A LED indicates which mode has been selected.

SELECTING ADJUSTMENT PARAMETERS:

Adjustment parameters are selected by pressing the "SELECT" key:

- FREQUENCY (Hz)
- OFFSET ANGLE
- 1st ANGLE "a" IN PWM
- 2nd ANGLE "b" IN PWM

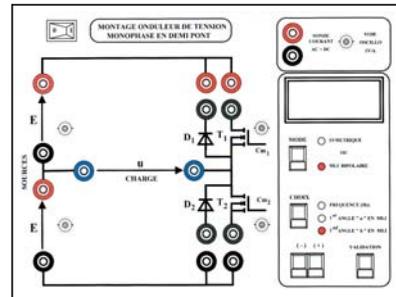
A LED indicates which parameter has been selected.

In PWM mode, the signal pattern is determined by the size of the angle (a, b) selected (which amounts to setting the pulse width).

Depending on the values of these angles, it is possible to eliminate the 3rd- and 5th-rank harmonics to obtain a spectrum with fewer harmonics, closer to the sinusoid curve.

CURRENT PROBE

This probe measures AC, DC, and AC + DC current and is connected in series, like an ammeter, in the circuit to be measured. A BNC terminal displays an image of the current intensity at a voltage of 1 V/A.



PANEL A "SINGLE-PHASE, STATIC, HALF-BRIDGE VOLTAGE CONVERTER (TWO SWITCHES)"

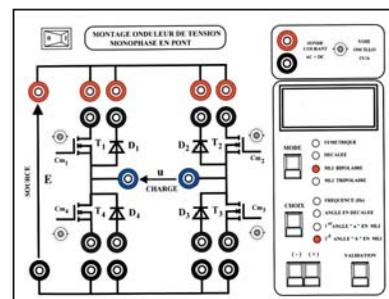
The diode and power transistor operate by cross-barring
Presentation of symmetrical control

Presentation of the Pulse-Width Modulation control: Bipolar PWM wave

Experiment N°1: Throughput over resistive load (R)

Experiment N°2: Throughput over inductive load (R, L)

Experiment N°3: Throughput over resonant load (R, L, C)



PANEL B "SINGLE-PHASE, STATIC, BRIDGE VOLTAGE CONVERTER (FOUR SWITCHES)"

Presentation of offset control

Presentation of the Pulse-Width Modulation control: Three-pole PWM wave

Experiment N°1: Throughput over resistive load (R)

Experiment N°2: Throughput over inductive load (R, L)

Experiment N°3: Throughput over resonant load (R, L, C)

Application to induction heating
Experiment N°4: Application to speed variations in an alternating current motor

Application to a backup power supply
Using the "CO-1000 alternating/continuous current converter" test bench as a charger.