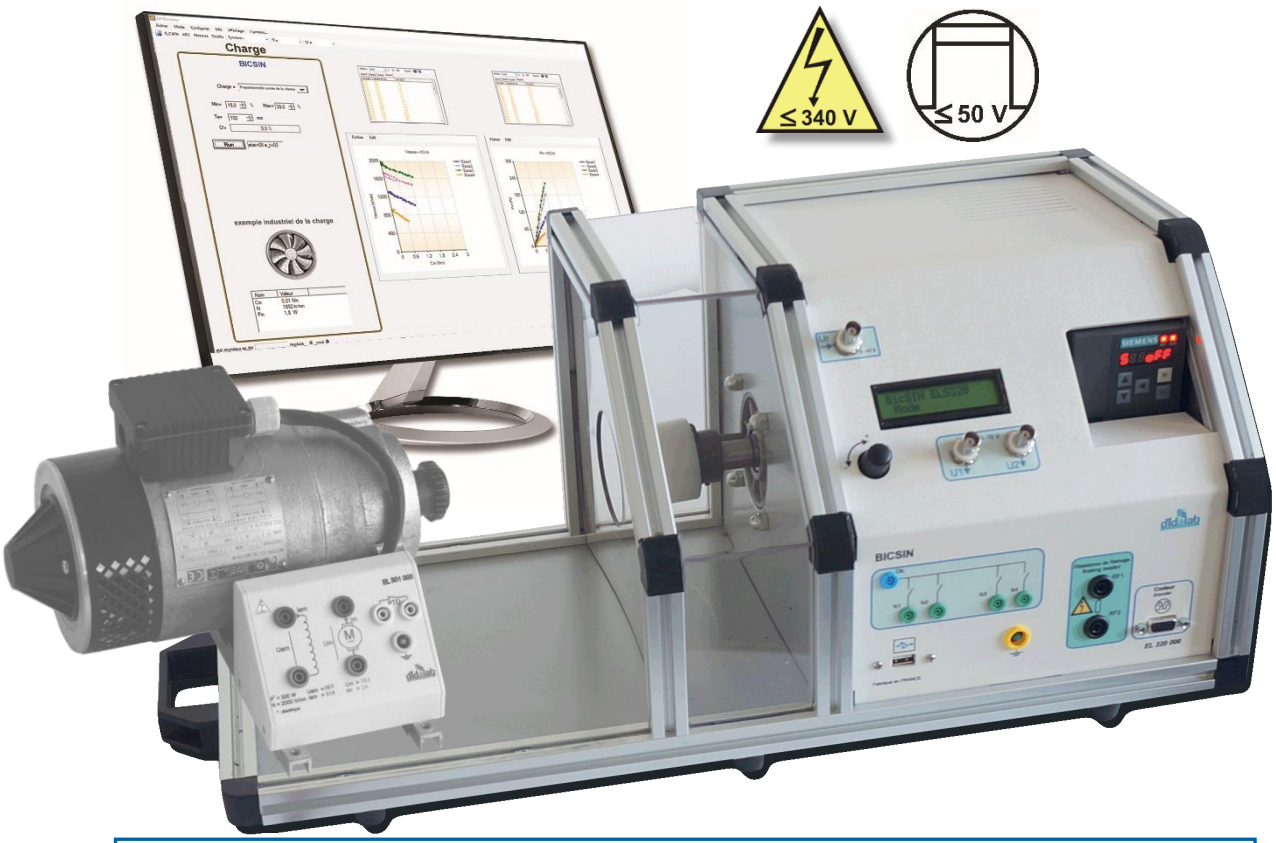
Power Electronics



BICSIN – EL(S)320

Instrumented Load Bench with active load and Simulation of Digital Industrial Systems

Main features:

The load bench **BICSIN, EL320** belongs to the Low Voltage (LV) and Safety Extra Low Voltage (SELV) 300-W ranges, it is designed for:

- **ELECTROTECHNICS, study of rotating machines characteristics (relation speed/voltage, current/torque, power efficiency, cosineφ…),**
- **POWER ELECTRONICS**, compatible with the range EP(S)1x0 EP(S)2x0, SELV or LV power converters (rectifiers, AC controllers, inverters...)
- **AUTOMATIC CONTROL,** creation of a programmable mechanical load:
  - Passive load (braking load, linear or not linear) (Ventilator, drill, travel of a load with friction, vehicle in circulation; acceleration, slowing down with energy recovery ……)
  - Driving load, linear or not linear (overhead crane, fast elevator, steering wheel implying lively phases and energy recovering phase,
  - The load generator is instrumented, which enables to read in real-time the mechanical variables from the experimented machine (speed, torque, power)
  - It works, in accordance with the standard **LV** « **L**ow **V**oltage, 30/340 V_{DC} and 240 V_{AC} »….
- **AUTOMATIC SPEED / POSTION CONTROL** Implementation of a control cabinet including various organs (industrial variator associated with its brushless motor, PLC, HMI.) to pilot an emulated automatism (enslaved digital axis, ventilator, barrier of parking lot). This solution has the immense advantage to allow a work of the student in complete safety

AREAS OF APPLICATION:

Technical/Vocational training sectors, Prep schools, Universities, Engineering schools

Packing:

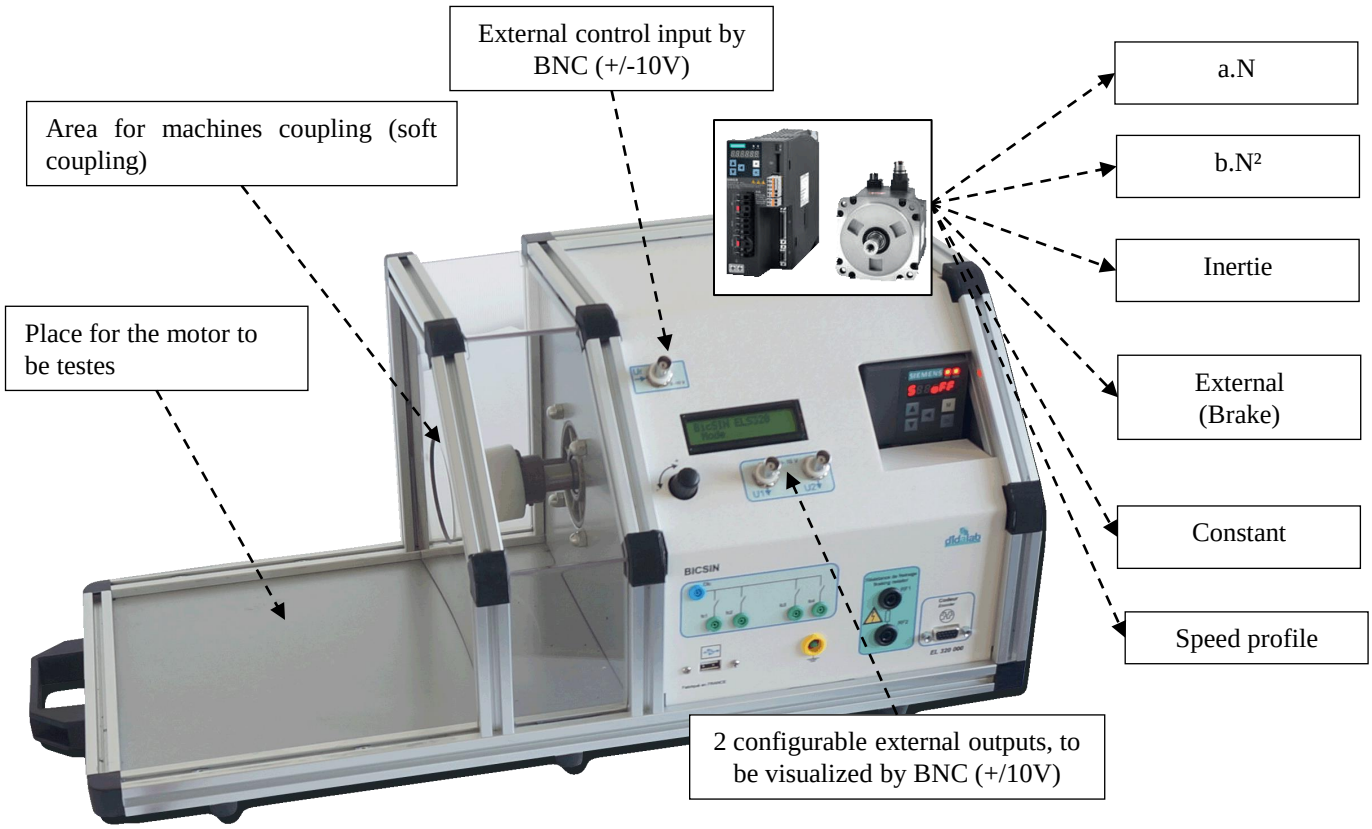
Net : 20 kg, Dimensions (Lx l x h) 80x30x30cm
Gross : 25 kg, Dimensions (Lx l x h) 100x40x38cm.

BICSIN-EL(S)320 – Description:

BICSIN is a system which can be put on a table ; :it includes

- One part for the load generation, made of a brushless motor with its industrial variator,
- A embedded 1-phase power supply
- A PC interface board (via USB),

It is the ideal tool to study not only all the characteristics of 300W electric motors (DC, 3-ph AC , brushless motors..), to put a load on various types of power bridges (1 phase or 3 phase Graetz bridges, choppers, 1-phase / 3-phase inverters) and finally to emulate an industrial system like a digital axis, an elevator …



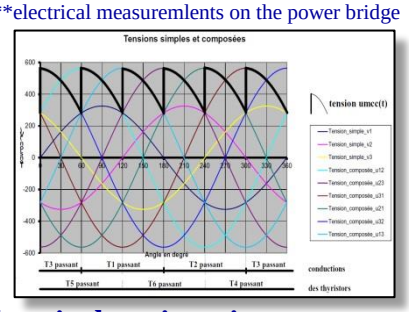
EL(S)320100, Basic program, creation of loads and acquisition of mechanical variables

It is used to set the condition of the loads' creation, the data acquisiton for the response curves (speeds, torques, voltages ….) and the display of these responses

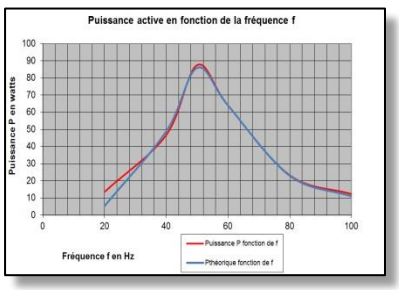
Power electronics:

3-phase rectification(EP(S)130000)**

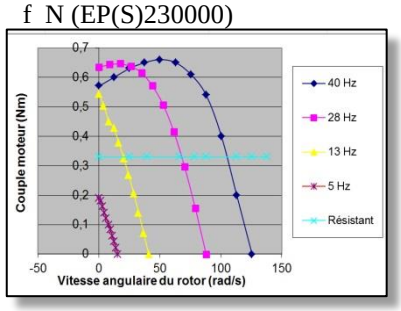
**electrical measuremlents on the power bridge



P/F ratio (EP(S)210000)

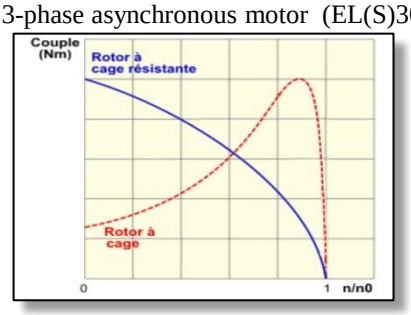


Torque for asynchronous motor f N (EP(S)230000)

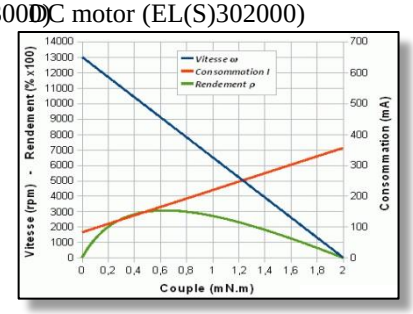


Electrical engineering:

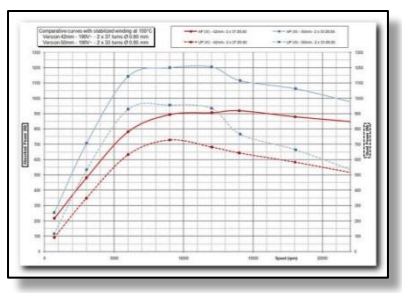
Torque Speed relation 3-phase asynchronous motor (EL(S)303000)



Torque Speed relation DC motor (EL(S)302000)



Torque Speed relation Brushless motor (EL(S)306000)



Motors, for Low Voltage range (LV) :

You can put several motors on the bench. Usually, we suggest the following 6 motors in the LV range and 4 for the SELV range (at the bottom of the page).
For other motors, please ask us.

EL 302000 : 300-W DC motor, with permanent excitation

MOTOR CHARACTERISTICS	Value	Units
Power voltage	170	Vdc
Speed (for nominal current)	2000	rpm
Mechanical power	300	W
Nominal current	2,1	A
Efficiency	77	%

EL 303000 : 300-W 3-phase Asynchronous motor

MOTOR CHARACTERISTICS	Value	Units
Power voltage	240	3xAC
Speed (for nominal current)	1500	rpm
Mechanical power	300	W
Nominal current	2	A
Cos φ	0,74	

EL 301000 : 300-W DC motor, with separate excitation

MOTOR CHARACTERISTICS	Value	Units
Power voltage	170	Vdc
Speed (for nominal current)	2000	rpm
Mechanical power	300	W
Nominal current	2,1	A
Excitation current	0,52	A

EL 306000 : 300-W Brushless motor, 230Vac, 310Vdc

MOTOR CHARACTERISTICS	Value	Units
Power voltage	230	Vac
Speed (for nominal current)	2000	rpm
Mechanical power	300	W
DC voltage power supply (trapezoïd)	310	Vdc

EL 307000 : 1-ph, 3-ph asynchronous motor, 300 W

MOTOR CHARACTERISTICS	Value	Units
Power supply	240	Vac
Speed (synchronism)	1500	rpm
Electrical power	370	W
Nominal current	2,1	A
Cos φ	0,74	

EL 305000 : 3-ph Synchronous motor / generator, 300 W

MOTOR CHARACTERISTICS	Value	Units
Power supply	230	Vac
Speed (for nominal current)	1500	rpm
Mechanical power	300	W
Nominal current	0,9	A
Efficiency	77	%

Motors for Safety Extra Low Voltage range (SELV):

ELS 301000 : 300-W DC motor, with separate excitation

MOTOR CHARACTERISTICS	Value	Units
Power supply	48	Vdc
Speed (for nominal current)	2000	rpm
Electrical power	412	W
Nominal current	6,5	A
Excitation current	1,4	A

ELS 303000 : 300-W 3-phase Asynchronous motor

MOTOR CHARACTERISTICS	Value	Units
Power supply	24/42	Vac
Speed (for nominal current)	1500	rpm
Operating power	180	W
Nominal current	11,5/6,6	A
Efficiency	0,68	%

ELS 302000 : 300-W DC motor, with permanent excitation

MOTOR CHARACTERISTICS	Value	Units
Power supply	48	Vdc
Speed (for nominal current)	2000	rpm
Electrical power	321	W
Courant nominal	6,7	A

ELS 306000 : 300-W Brushless motor, 23Vdc

MOTOR CHARACTERISTICS	Value	Units
Sine voltage power supply	23	Vac
Speed (for nominal current)	2000	rpm
Mechanical power	300	W
DC voltage power supply	35	Vdc

BICSIN : Example of complete sets for Automatic control study

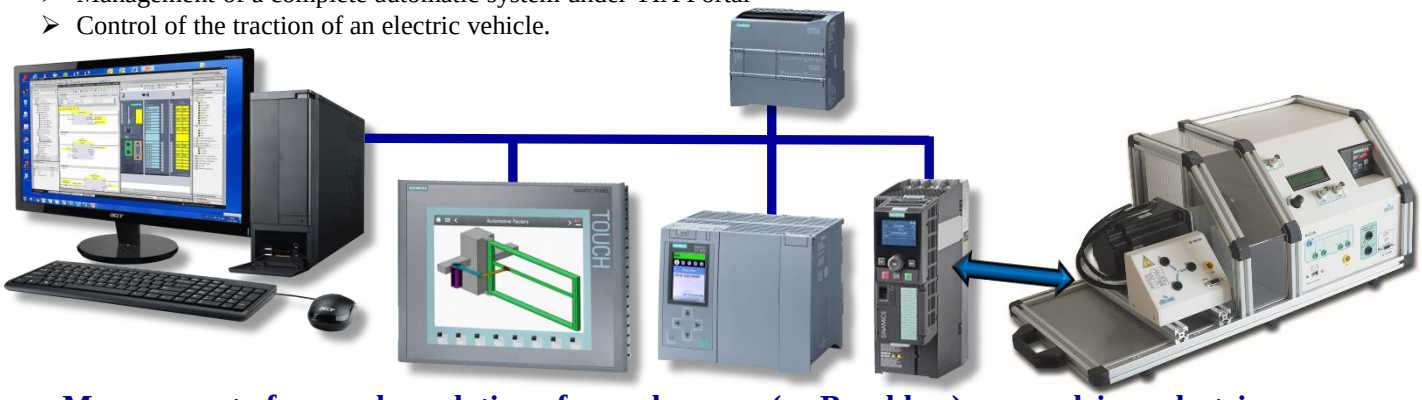
Contol of a PLC/speed control with HIM

The BICSIN load bench allows the creation of scenarios representative of an industrial system. The example below is based on the BICSIN structure described at the beginning of this document, on which a SIMOTICS S1FL6 400W motor associated with its drive is implemented.

Didalab partner with SIEMENS®

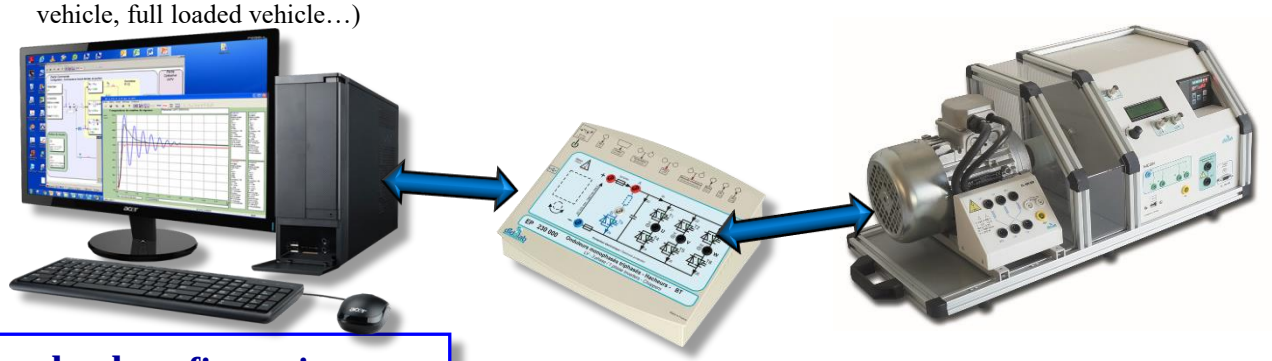
Lot of experimetns can be carried out with this solution:

- Basic control of a brushless motor with an industrial motor drive,
- Management of an automation sequence by PLC associated with a drive,
- Management of a complete automatic system under TIA Portal
- Control of the traction of an electric vehicle.



Management of a speed regulation of asynchronous (or Brushless) power-driven electric vehicle

- Characterization of an open-loop system (time constant, inertia, determination of the order)
- Management of the starting up with control of acceleration, speed regulation by PI,
- Regulation of the speed of a vehicle by PI in various situations of traffic (On plain road, in rise, in descent,, empty vehicle, full loaded vehicle…)



Standard configurations:

Ref	Ref 32_ B	Description
BICSIN, Banc Instrumenté de Charge & émulation de Systèmes Industriels Numériques incluant :		
EL(S)	320000	Test motor bench with active load (the load is a brushless motor controlled by a SINAMICS V90 drive), control electronic board with speed and torque measures Set on a aluminium frame with carrying handles
EL(S)	320100	Basic program, creation of loads and acquisition of mechanical variables (speed, torque, power)
		Motors :
EL(S)	302 000	300-W DC motor, with permanent excitation
EL(S)	303 000	300-W 3-phase asyncronous motor
EL(S)	306 000	300-W Brushless motor,
EL(S)	30X 000	Ohter motors : please ask
		Optional extra (still under development):
EL(S)	320 200	System for real time simulation for industrial processes

Example of setting:

EL326B, **BICSIN 320**, configured with : active load (brushless motor) and mechanical measurements and a brushless motor (**C=6**).

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Maj du : 10/03/2021