

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

Main characteristics:

The Load bench **BICSIN, ELT320** belongs to the Low Voltage (LV) 1500-W range, it is designed for:

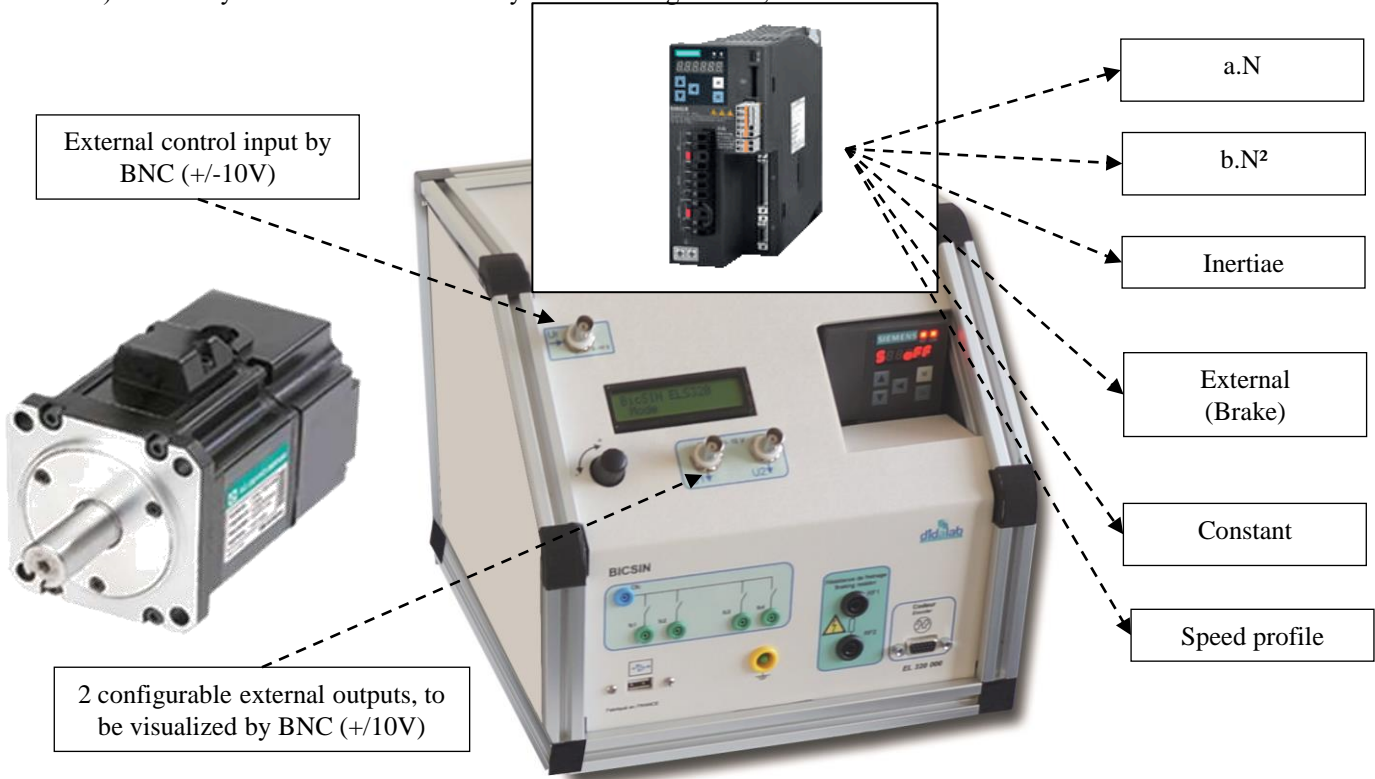
- **ELECTRICAL ENGINEERING**, study of rotating machines characteristics (relation speed/voltage, current/torque, power efficiency, $\cos\phi$...),
- **POWER ELECTRONICS**, compatible with the range EP360 1 ph and 3-ph Rectifier and AC-controller), EP660 (Chopper and 1-ph and 3-ph Inverter), Industrial drives (ex: **Siemens® Sinamics V90**, associated with **brushless motor ref ELT306000**)
- **AUTOMATIC SPEED /POSITION 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** « **Low Voltage**, 170 V_{DC} and 240 V_{AC} »
- **AUTOMATIC CONTROL** Implementation of a control cabinet including various organs (industrial drive 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.

BICSIN-ELT320 – Description:

BICSIN is a system including

- One part for the load generation, made of a brushless motor with its industrial drive,
- 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 1500W 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 ...



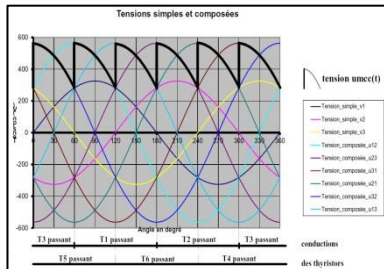
ELT320100, Basic program, creation of loads and acquisition of mechanical variables

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

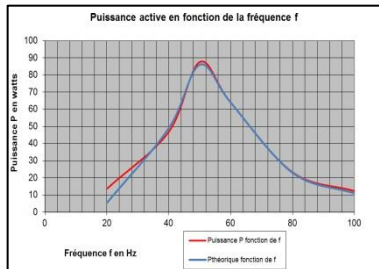
Power electronics:

3ph- Rectifier (EP 3600 000)**

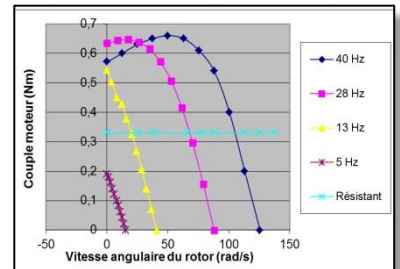
**electrical measurements with the power bridge



P/F ratio (EP 560 000)



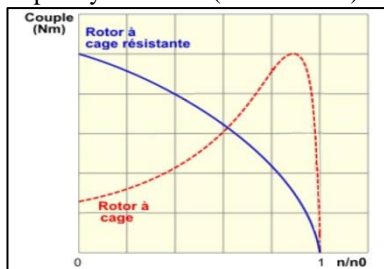
Torque =f(N) for asynchronous motor (EP660 000)



Electrical engineering:

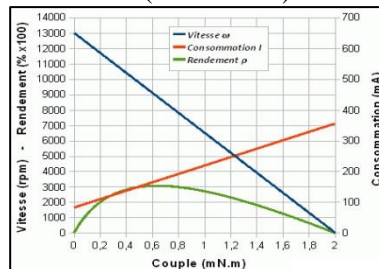
Torque Speed relation

3-ph async. motor (ELT303000)



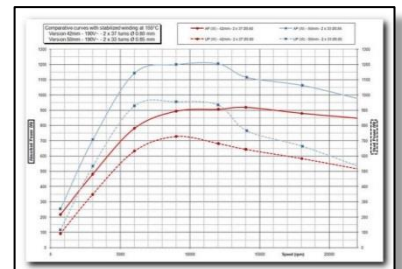
Torque Speed relation

DC motor(ELT302000)



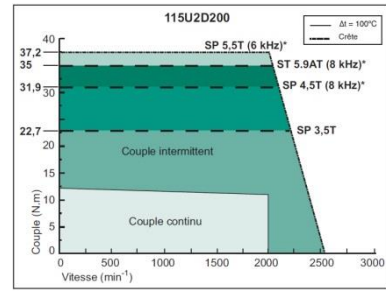
Torque Speed relation

Brushless motor (ELT306000)



Brushless motor (Load) :

- Power supply: 3 x 400 V, 50 Hz,
- Nominal torque 11,9 Nm, peak torque 35,70 Nm, permanent torque at stall 12,4 Nm,
- Nominal speed 2 000 rpm, max speed 3 000 rpm,
- Nominal power 2,5 kW,



EPMonitor, control and acquisition software:

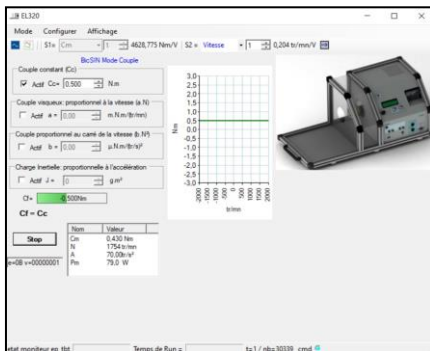
EPMonitor (Power Electronics Monitor) software is supplied with the BICSIN1500.

It has the following advantages::

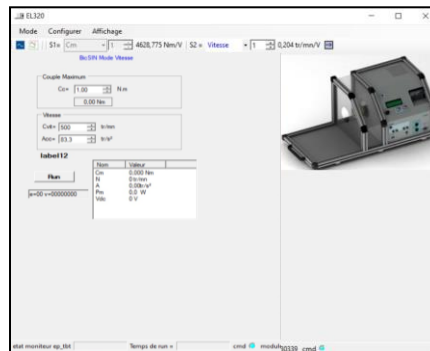
- **Intuitive**, quick to learn,
- **Open**, the images of the curves of result.csv can be recovered for the composition of the reports of TPs,
- **Powerful**, many readings are available, yields, torque function of the slip from nominal speed to stall, then from stall to nominal speed etc...

Operating Mode

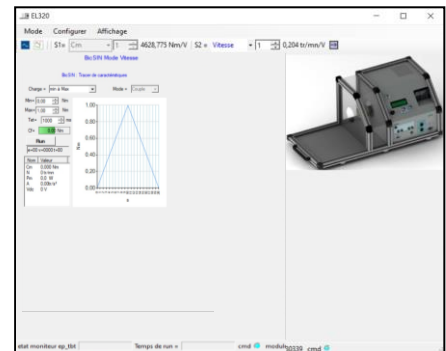
Torque mode



Speed Mode



Plotting Mode



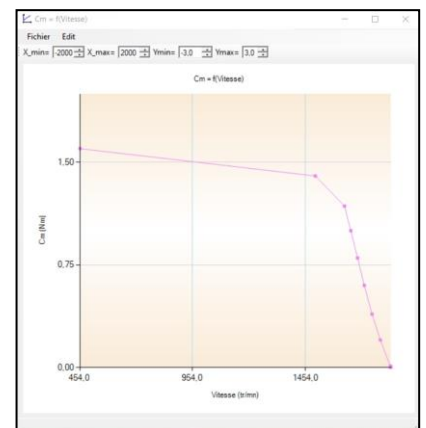
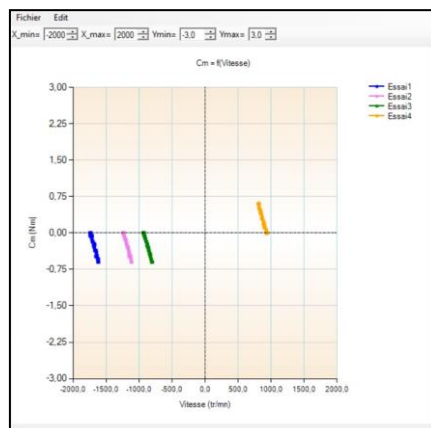
Plotter - Curves

Plotter:EL320

Mode = Auto 1000 ms

Essai1

Cm (Nm)	Vitesse (tr/mn)
0.000	-1731
0.000	-1735
0.000	-1736
-0.050	-1722
-0.060	-1710
-0.170	-1707
-0.220	-1682
-0.240	-1671
-0.360	-1668
-0.400	-1646
-0.470	-1636
-0.530	-1626
-0.590	-1616
-0.600	-1616



Exportable points table in csv format



Real-time plotting (up to 4 trials)

Auto range

ELT 303 000 – 1,5-kW 3-phase asynchronous motor

- Nominal power 1.5 kW, 1 rpm
- PTO probe, double shaft, each supplied with coupling .

Electrical characteristics (at 50 Hz)

Mode	Voltage	Speed	Power	Cos φ	Current
	380 V	1 500 rpm	1,5 kW	0,86	3,40 A
	230 V	1 500 rpm	1,5 kW	0,84	5,50 A



ELT 301 000 – 1-kW DC motor with separate excitation

- Nominal power: approx 0,93 kW
- PTO probe, supplied with coupling

Caractéristiques électriques

Power	Speed	Voltage	Current	Excitation Voltage	Excitation Current
0,93 kW	1 500 rpm	170 V	6,5 A	190 V	0,4 A



ELT 320 900 – Stand with castors



ELT320B: Basic package « DC/AC 1.5 KW MOTORS TEST BENCH, with LOAD GENERATOR, and ACQUISITION" including:

Références	Désignations	Qtés
ELT320000	- LV 1.5-kW test motor bench with load generator ; the load is a brushless motor controlled by a Siemens drive, control electronic board with speed and torque measures Set on a aluminium frame - Brushless motor with with integrated incremental magnetic encoder, - Control system generating load and acquisition of electrical and mechanical quantities, (The load laws that can be activated individually or in combination are: Constant torque loading or driving, function of the speed, square of the speed, generating an inertia, dry friction).	1
ELT320100	Software for load generation & acquisition of mechanical quantities (speed, torque, mechanical power)	1
ELD108000	Dissipation resistance with lamp (recovery materialization)	1
ELT301000	DC motor with separate excitation, operating power approx 1000 W, with setting accessories	1
ELT303000	3-ph asynchronous squirrel motor, 240/400V, operating power 1500W, with setting accessories	1
ELT320900	Stand with castors	1



Suggested Environment:

ELD100B : Electrotechnical table ; **EP360** : Graëtz bridge, AC controller, **EP660** : Chopper, 3-phase inverter.

ELT 303 000 – 3-phase asynchronous motor

- Nominal power 1.5 kW, 1500 rpm approx
- PTO probe, double shaft, each supplied with coupling .

Electrical characteristics (at 50 Hz)

Mode	Voltage	Speed	Power	Cos φ	Current
	380 V	1 461 rpm	1,5 kW	0,7	3,45 A
	230 V	1 461 rpm	1,5 kW	0,74	6.0 A



ELT 302 000 – 1.5-kW DC motor with permanent excitation

- Nominal power: approx 1,5 kW
- PTO probe, supplied with coupling

Caractéristiques électriques

Power	Speed	Voltage	Current
1,5 kW	1 500 tr/min	170 V	11.7A



ELT 301 000 – 1-kW DC motor with separate excitation

- Nominal power: approx 0,93 kW
- PTO probe, supplied with coupling

Caractéristiques électriques

Power	Speed	Voltage	Current	U Excitation	I Excitation
0,93 kW	1 500 tr/min	170 V	6,5 A	190 V	0,4 A



ELT 320 900 – Stand with castors



ELT320B : Basic package « DC/AC 1.5 KW MOTORS TEST BENCH, with LOAD GENERATOR, and ACQUISITION" including::

References	Désignations	Qty
ELT320000	LV 1.5-kW test motor bench with load generator ; the load is a brushless motor controlled by a Siemens drive, control electronic board with speed and torque measures Set on a aluminium frame - Brushless motor with with integrated incremental magnetic encoder, - Control system generating load and acquisition of electrical and mechanical quantities, (The load laws that can be activated individually or in combination are: Constant torque loading or driving, function of the speed, square of the speed, generating an inertia, dry friction).	1
ELT320100	Software for load generation & acquisition of mechanical quantities (speed, torque, mechanical power)	1
ELD108000	Dissipation resistance with lamp (recovery materialization)	1
ELT302000	DC motor with permanent excitation, operating power approx 1500 W, with setting accessories	1
ELT303000	3-ph asynchronous squirrel motor, 240/400V, operating power 1500W, with setting accessories	1
ELT320900	Stand with castors	1
ELT301000	DC motor with separate excitation, operating power approx 1000 W, with setting accessories	Option

Environnement recommandé :

ELD100B : Poste de travail électrotechnique, **EP360** : Pont de gratz, gradateur triphasé, **EP660** : Hacheur onduleur triphasé.