

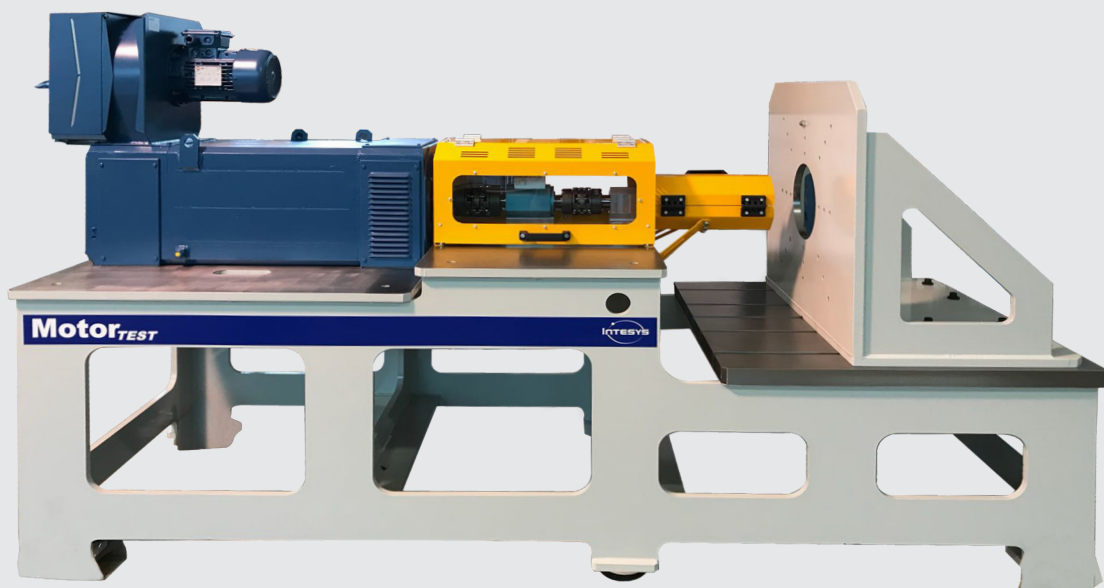
MotorTest

Regenerative Test System for Electric Motors

Complies with IEC 60034-30-1:2014 (IE4)

Motor TestIt is a hardware, software and mechanical system that allows the detection of the electrical and dynamic characteristics of single-phase and three-phase asynchronous electric motors.

Composed of **assembly bench, instrumentation, control system and dedicated software**,It allows precise measurements by exploiting the energy regenerated by the engine itself during tests.



Intesys active regenerative dynamometers use a standard AC motor + inverter as the braking element.

The motor + inverter transform the mechanical energy of the motor under test into electrical energy that can be reused to power the same motor under test or returned to the grid.

- Heavy duty, high precision steel mechanical base, completely free from vibration and deflection
- Vector asynchronous braking motor, suitable for the specific range of motors to be tested
- High precision torque meter 0.05% fs, double scale 1:10
- Regenerative power system that uses the energy generated by the braking motor, with variable voltage 0-450V and frequency 50 and 60 Hz
- National Instruments CompactRIO data acquisition system
- Intesys MotorTEST software based on LabVIEW + instrumentation compliant with IEC 60034-30-1:2014 (IE4) •

Model	Max Speed (RPM)	Max Torque (Nm)	Max Power (KW)
DB3	4000	30	3
DB11	4000	100	11
DB22	4000	200	22
DB45	4000	400	45
DB62	4000	500	62

Data acquisition and control system + Intesys MotorTest software based on National Instruments LabVIEW The data acquisition and control system consists of a Windows-based personal computer and special electronics for controlling the braking system and other servo systems, to acquire values from sensors and instrumentation.

Acquired values:

- Speed, torque, output power
- Voltage, current, input power and apparent power
- Power factor, efficiency, mains frequency
- Temperature increase of the windings, temperatures
- Vibration and vibration frequency analysis, noise

Database of engine ratings and test bench setup parameters

Motor nominal data + parameters used for the automatic setting of the control inverters (braking inverter and any driving inverter).

Empty test:

The motor is not loaded and is powered at a lower voltage in the range 0-100% of the nominal value. Data acquisition is performed.

Locked rotor test:

After setting the current limit, the voltage is varied from 0 to 100% of $V_{nominal}$ and data acquisition is performed at specified intervals.

Automatic variable load test:

The test is performed at constant nominal voltage and frequency, but the load is automatically varied from 0 to 200% of the nominal power.

Maximum torque:

The test is performed at constant nominal voltage and frequency and with torque varying from 0 to C_{max} . The output curve shows the output torque versus the speed deviation.

Temperature rise tests

• **Temperature test type S1:**

It is performed by measuring the change in winding resistance before and after a test run. The operator can set the power or torque applied to the motor.

• **Temperature test type S3:**

A sequence of identical duty cycles, each comprising a period of constant load operation and a rest period. This test is performed so that the starting current does not significantly affect the temperature rise.

• **Temperature test type S6:**

Like S1 but with intermittent load with period setting (e.g. 6 minutes load-on and 4 minutes load-off).

Mechanical characteristic from 0 to RPMmax

The main objective is to track the behavior of torque and power across the entire speed range. The test can show:

Constant torque behavior: With frequency ranging from 0 to F_n (rated frequency) and fixed rated voltage (voltage can be set from 0 to V_n). The output torque is constant and the power increases proportionally to the frequency at a certain supply voltage.

Constant power behavior: With frequency varying from F_n to F_{max} and fixed nominal voltage. Torque is inversely proportional to frequency/speed, and input and output power are virtually constant.

Behavior for speeds/frequencies above F_{max} : At a sufficiently high frequency (to be determined experimentally), torque and power performance decrease significantly for the same energy consumption.

The test is automatic and will monitor the input current (adjustable). The output of this test is a table with the electrical and mechanical values and a graph of power and torque versus frequency.

Report

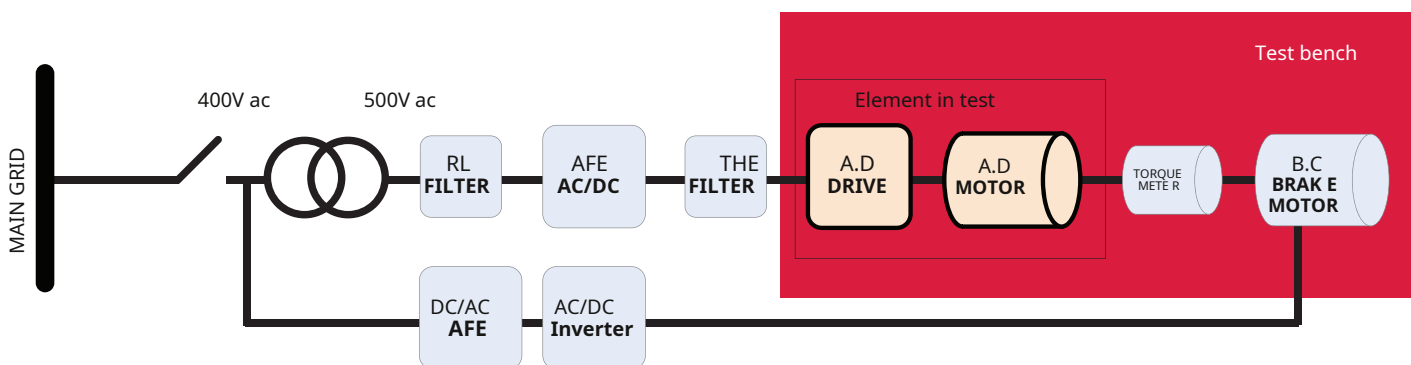
All test results are printed in reports with the engine ratings, dynamometer parameters, and instrumentation used, along with the certification date. The data is presented in graphical and tabular form.

WaveGEN, regenerative power system, 50 and 60 Hz, variable voltage 0-450V

For loaded and unloaded tests powered by inverters, as required by IEC 60034-30-1:2014. The motors under test are powered by an inverter-based system whose output waveform is filtered by a specific, bypassable 50/60 Hz sinusoidal filter and can vary from 0 to 450 V. Power is drawn from the braking inverter via the common DC bus connection. The system also allows for "loaded" and "unloaded" results to be performed in "inverter-powered" mode, as required by IEC 60034-30-1:2014 (IE4).

Certified high-precision power analyzers Coming from Yokogawa or based on hardware and software modules from National Instruments for the detection of electrical and mechanical quantities.

- Basic accuracy: 0.1% of readings
- DC measurements: frequency range 0.5 Hz to 100 kHz
- Measures all AC and DC parameters
- Low current measurements down to 50 micro-Amperes
- Direct high current measurements up to 40 Amps RMS
- High-speed data update (up to 10 readings per second)
- Simultaneous Normal and Harmonic measurements
- Split Phase and Three Phase measurements with the WT300 series
- Simultaneous torque and speed measurements



Intesys - Precision Testing Systems
Viale Pasubio 25/4 - 36030 CALDOGNO (Vicenza) Italy tel +39 444
905440 web: www.intesys-srl.it mail: info@intesys-srl.it