Testing Systems for Electric Motors

MotorTEST is a hardware-software system used to measure electric and dynamic features of single phase, three phase and dc electric motors, compliant with IEC 60034-2-1 and IEEE 112 / 113.

Dynamic Braking Systems

Dynamic Braking Systems use an electric motor controlled by a frequency converter as a braking element instead of using a powder brake or an eddy-current brake element. Braking motor converts mechanical energy of the motor under test in electric energy which can be sent back to the main network. Dynamic brakes are the best solution for every kind of electric motor ranging from 1 to 300 KW and 30000 RPM.

- The energy generated by the motor under test can be sent back to the main network thus allowing energy saving. For example a 50KW motor test requires energy which is typically less then 10KW
- Torque measurements use high precision torque sensors (0.2 class)
- Torque-speed curves range from 0 RPM to 0 Nm
- Dynamic brakes cover a wider range than a conventional dynamometer (1:3)
- They perform measurements of friction and mechanical losses

<table>
<thead>
<tr>
<th>Mod</th>
<th>Max Speed (RPM)</th>
<th>Max Torque (Nm)</th>
<th>Max Power (KW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB3</td>
<td>4000</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>DB11</td>
<td>4000</td>
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<td>400</td>
<td>45</td>
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<tr>
<td>DB62</td>
<td>4000</td>
<td>500</td>
<td>62</td>
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</table>
Data acquisition and control system

MotorTest based on LabVIEW

Data acquisition and control system is made of a Windows-based Personal Computer and special electronics to control the braking system and other servo-systems, to acquire values from sensors and instrumentation.

**Measurements and curves:** RPM, torque, voltages, currents, electric power in, power out, efficiency, power factor, speed shift, frequency, winding temperature gradient (optional), motor temperatures.

**Servo-controls:** constant torque braking motor control, constant speed braking motor control, supply voltage control through a voltage variator, electronic power supply systems control, automatic test cycle control, automatic insertion of capacitors (single phase motors).

**Standard tests:** no load test, load test, locked rotor test, test at reduced voltage.

**Optional tests:** winding temperature gradient (temperature test), electric safety tests (Earth Continuity Test, Insulation resistance tests, Dielectric strength test, Leakage current test).

**MotorTest Software:** Motors main database, Test stand configuration (TA/Shunt range, currents range for temperature tests, etc), Plant synoptic view, Tests execution, Measurement page with tables and overlapping graphics, Measurements database, Curves, Testing reports, Automatic cycle setting and executing, Sensors calibration, Motor heat test, Electric safety test.

**Temperature tests**

Automatic acquisition without temperature’s sensors of windings while motor is powered and loaded. All models are equipped with display and RS232 interface to automate data acquisition and can be configured for 19” rack or stand-alone. Software MotorTest do automatic management of the test: automatic resistance value acquisition and temperature calculation at some time intervals, Automatic test management following service type S1, S3 or S6, display of graphics and/or numerical tables, results storing in a special database, report printing.

**Power Box**

The power box gives main power supply to the motors using network power supply or an external variable power supply system (voltage variator, frequency converter). The connection to the motors is done by no. 2 or 3 plugs in function of max power. Every power line has a contactor, a magnetothermic protection and a set of current sensors. It is connected to the Data acquisition and control system for current and voltage acquisition and to enable power supply to the motors. Available power: 10KW, 20KW, 30KW, 50KW

**Variable power supply systems**

**Electromechanical systems.** They are based on a voltage variator and on a set made of electric motor + alternator coupled in order to obtain 60 Hz power supply frequency

**Electronic systems.** Electronic systems. They are able to supply 3 times the nominal power for 1.5 seconds (suitable for motor starting peak current): available 5, 10, 20KVA nominal power models

**Single and threephase ARON power analyzers**

- Basic accuracy: 0.1% of Reading
- DC measurement: 0.5 Hz to 100 kHz frequency range
- Measures all AC and DC parameters
- Compact design (half-rack size)
- Standard USB, and GPIB or RS232 Interfaces
- Low current measurements down to 50 micro-Amps (WT310 only)
- High current measurements up to 40 Amps RMS (WT310HC only)
- High-speed data update (up to 10 readings per second)
- Simultaneous Normal and Harmonic measurements
- Optional Ethernet interface