

DBV

REGENERATIVE TEST BENCH FOR TRACTION MOTORS, AC and BRUSH DC, SPEED VARIABLE

Max 50 KW, 10000 RPM

Meeting testing requirements for European High Efficiency standards
IEC 60034-2-1 and USA standards IEEE 112/113



Main features

- Full performance testing of speed variable traction electric motors, from 0 RPM up to maximum speed, of torque, speed, current, voltage, power factor, input power, output power, efficiency, direction of rotation, winding temperature
- Wide power and torque range: 2 to 50 KW / 6 to 100 Nm (100 Nm at 3000 RPM)
- Variable voltage and frequency power supply: 0 – 200 Vac / 20 – 300 Hz
- Direct measurements of efficiency and friction + mechanical losses (IE2 directive)
- Braking energy regenerated to motor under test
- S1, S3 and S6 temperature tests

Mechanics, braking motor, torque sensor

Iron frame, anti-vibration, height adjustable foot. Dim.LxDxH 3500x1000x900H mm

Plate surface, motorized height fine-adjustable with height digital display for precision alignment control of the motor shaft. In order to clamp the motor under test the surface has threaded holes and a mobile iron bridge anchored to the side of the base and equipped with a fixing manual screw (see picture)

Torque sensor, max 12000 RPM, double precision, 1st scale = 100 Nm / 0.1%accuracy, 2nd scale = 15 Nm 0.2% accuracy, with speed TTL output signal.

Torque sensor support: couplings, bearing support for proper alignment, bench-to-motor high-speed universal flexible joint

Carter for protection of the rotating elements (couplings, torque transducer, cardan)

Locking rotor blocking equipment for peak test on starting and at reduced voltage

Braking element composed by a 62 KW ac vectorial motor

Control and power supply equipment for braking motor, motor under test and display torque and RPM values

Panel supply: 400V +20 / -10% 50 Hz

Voltage for auxiliary controls: 110V 50Hz

Operating temperature: 0 to 40 ° C

Relative Humidity: 90%

IEC standards

Variable frequency electronic drive for DC traction motors under test with voltage and frequency independent control capabilities

Vector inverter 62 KW, 400 V, 50 Hz controlled in torque and in speed/frequency, variable output voltage 0-400V, EMI Filter 400 V

Variable frequency electronic drive for DC traction motors under test

DC motor electronic drive for DC brush motors

Variable frequency electronic drive for AC braking motor

Vector inverter 62 KW, 400 V, 50 Hz controlled in torque and in speed, EMI Filter 400 V connected to the drive for traction motor (see above) to allow reuse of braking energy

Torque and speed display

No 1 digital display of torque, No 1 digital display for speed, dim. 48 x 96, 4.5 digit

Operator's controls on the door of the panel

Mains manual switch, indicator lights for power, machine state, emergency button, reset button

Within the panel:

No. 1 75 KW door-locking main switch

No. 1 three-pole contactor for variable frequency drives line insertion

No. 1 special contactor for milliohmeter insertion to allow temperature winding test

No. 1 series of automatic circuit breakers for auxiliary circuits and services, panel fans, motor fan.

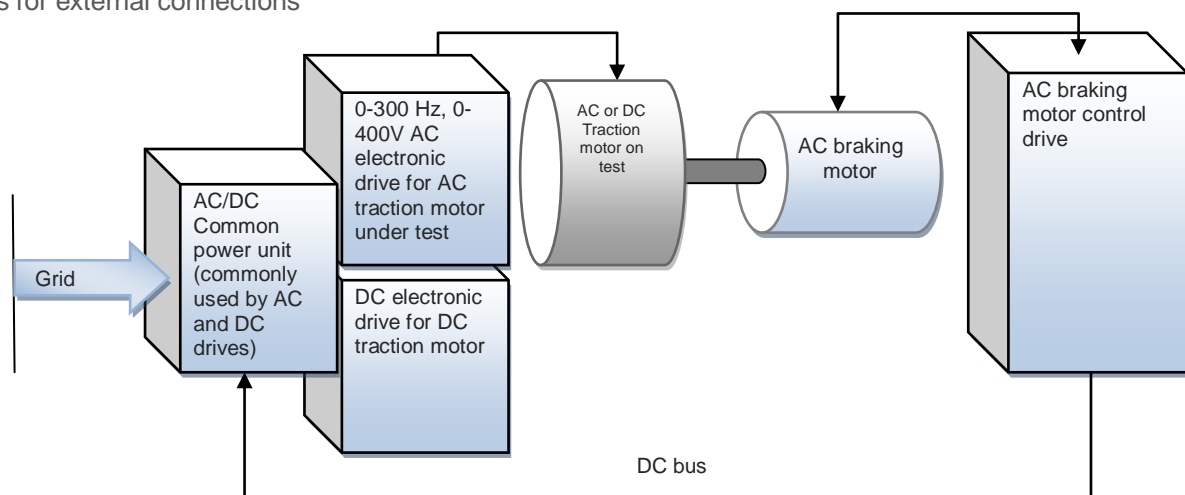
No. 1 series of limit switches on the panel door with flashing power-on signaling

No. 1 power transformer for auxiliary controls, services, etc..

No. 1 temperature sensor for panel inside temperature

No. 1 set of fuses for protection and various auxiliary services

Terminals for external connections



Data acquisition and control system

Personal computer desktop

Data acquisition and control system based on National Instruments CompactDAQ with following signal handling capability

- No 1 analog input from torque sensor
- No 2 counter input from RPM sensor (encoder or torque sensor)
- No 8 thermocouple temperature sensors, type J or K
- No 2 analog output for braking motor torque and speed control
- No 1 analog output for controlling of the speed of the motor on test
- No 1 analog output for supply voltage adjustment to the motor on test
- No 24 digital 24 Vdc input + No16 digital 24 Vdc output
- No 4 RS 232 highly insulated ports for connection with instrumentation

LCD 19" standard mMonitor

Keyboard and Mouse on a sliding keyboard enclosure

Pushbuttons and switches for manual control: Start/Stop/Emergency

Instruments (optional, see below)

MotorTEST software, english version, for tests and curves for torque, speed, current, voltage, input power, output power, power-factor, efficiency, direction of rotation, winding temperature (see description below)



MotorTest LabVIEW Software

Motor nominal values database and test bench setting parameters:

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

No-load test. The motor is not loaded and it is powered at a lower voltage in the range 0 – to 100% of nominal value. Data acquisition is performed

Blocked rotor test. After setting current limit, voltage is varied 0 to 100% of Vnominal and data acquisition is performed at determined intervals

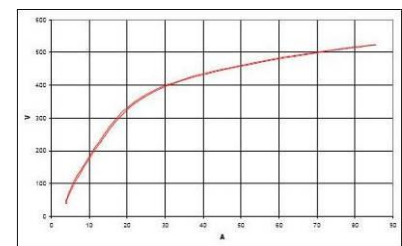
Automatic load varying test. The test is executed at constant nominal voltage and frequency but the load is automatically varied from 0 to 200% of nominal power.

Max torque. The test is performed at constant nominal voltage and frequency and with torque varying from 0 to max torque Cmax. Output curve shows output torque Vs speed drift

Temperature test type S1: this test is done by measuring winding resistance variation before and after a duty test. Operator can set power or torque applied to the motor.

Temperature test type S6: as per S1 but with an intermittent load with period setting (Es. 6 minutes load-on e 4 minutes load-off).

Mechanical characteristic from 0 to RPMmax. Main target is plot torque and power behavior along the complete speed range. The test can show type of behavior

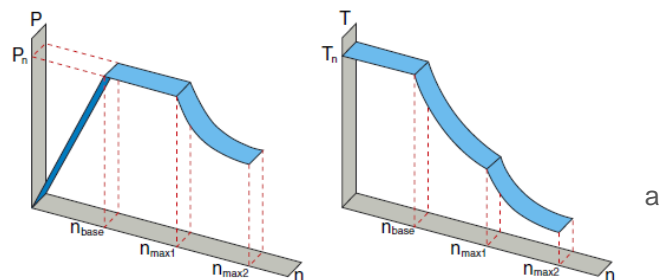


Constant torque behavior. With frequency ranging from 0 to Fn nominal frequency and fixed nominal voltage (voltage can be set fro 0 to Vn). Output torque is constant and the power rises proportionally with the frequency at a certain supply voltage.

Constant power behavior. With frequency ranging from Fn nominal frequency to Fmax and fixed nominal voltage. Torque is inversely proportional to frequency/speed and output and input power are virtually constant.

Behavior for speed/frequency higher than Fmax: at high enough frequency (to be experimentally determined) performance of torque and power significantly decrease at the same power consumption.

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



Reports

All test values are printed in letterhead reports with motor nominal values, dynamoter parameters and the used instrumentation with certification date. Data are in graphical and tabular form

Winding temperature test

Milliohmmeter, max 1 A sinking current

Milliohmmeter for very low resistance measurements with automatic result and serial interface. For laboratory and production line. To be installed inside the control pulpit

Accuracy: 0.05%

Range: 0.001mOhm - 1.9999MOhm (9 scales)

Minimum resolution: 1 microOhm

Current range: 1 microA to 1 A

4 1/2 digit display

Result indicators: High, Low and Pass (with red alarm)

Handler standard interface

RS232-C standard interface

With external reference temperature probe

Electric circuit modification to allow automatic insertion of milliohmmeter

Procedure and software:

The test is automatically performed: the instrument measures coils resistance before the load test and after the alternator has stopped

The data acquisition system is connected via RS232 port

The software calculates the temperature rise from the resistance variation



Power analyzers

Yokogawa WT230, 3 channels, high accuracy power analyzer

Professional, laboratory power analyzer, 100 KHz bandwidth, with input port for external AT or shunt, with harmonic analysis module

Direct inputs:

- 15/30/60/150/300/600 Vrms
- 0,5/1/2/5/10/20 A

Performances

- Bandwidth: from DC & 0,5 Hz to 100 KHz
- 0,1% accuracy
- Connectivity: RS232 or GP-IB ports



Yokogawa WT1800, 3 or 4 channels, 300 KHz high accuracy power analyzer

The WT1600 is power meter designed for measurement of extremely small currents in energy-saving equipment, as well as measurement of large currents for evaluating large-sized loads. It is equipped with color TFT display and has an accuracy 0.1%, bandwidth DC, from 0.5 Hz to 300KHz, V Max 1000 V Input, 20 A max direct input, up to 4 input modules (4V + 4 I). Because it can accept signal inputs for up to six phases, a signal WT1600 unit can measure I/O signals on inverters.

