

SKF Static Motor Analyzer Baker WinAST

Fully-automated, full-spectrum quality control testers for motor manufacturers



Introduction

SKF designs and manufactures electric motor test systems for original equipment manufacturers (OEMs) that help ensure their motors and coils meet or exceed the quality expectations OEMs wish to set with their customers.

SKF motor quality control (QC) systems include the Baker WinAST automated stator tester, the Baker HV WinAST and the Baker WinTATS traction armature test system. Each incorporates the most effective electric motor test processes into a single automated instrument, and can be customized to meet the specific testing needs of a given manufacturer.

Baker WinAST

The Baker WinAST is a semi-custom, fully-automated, high-volume electric motor testing unit that can test thousands of motors, generators or coils per day, depending upon the size and types of motors, or the testing fixtures used.

This automated stator tester is used to test AC motors ranging in size from fractional on up to 5 000 hp. It is also designed to test DC motors up to about 1 500 hp. Manufacturers of motor windings, stators, coils, alternators, and rotors use the Baker WinAST to avoid shipping dead-on-arrival (DOA) motors, or products that prematurely fail or malfunction after being placed in service.

Baker WinASTs can be configured with a range of additional test capabilities to meet the rigorous quality assurance testing standards required by motor OEMs.

SKF's Baker motor tester brand was built upon a stellar reputation for quality and



The Baker WinAST is a time-tested quality control system for OEM motor manufacturers that is proven to last for many years of rigorous use.

innovation. The Baker WinAST has more than 25 years of innovation built into it, and continues to provide motor OEMs with reliable quality assurance testing.

Every Baker WinAST is built to each customer's specifications using proven, reliable standard components in a cabinet-style rack design.



Automated testing

The Baker WinAST features a Windows 7-based application with an intuitive, menu-driven user interface. The system automates and controls tests, analysis and reports that are configured to meet the specific needs of a manufacturer.

Unlike other volume manufacturing test approaches, this system does not require a master winding to perform routine production tests, nor does an operator need to set test voltages or pass/fail limits when production is switched to another motor model.

All test parameters are programmed into a master, “known-good” data file, an operation that can be performed in minutes. When a master file is created, the user is prompted for all necessary information about a given product to be tested, and when complete, the file is permanently stored within the 160 GB of system storage.

Testing is automatically sequenced according to the master file. Data is saved in XML format for compatibility with common databases. This ability to store so much data helps users adhere to ISO quality standards.

AC and DC hipot tests

The Baker WinAST uses micro-arc detection in both AC and DC hipot tests to detect any breakdowns to ground (the only proven method to accurately detect any such faults). The system also performs a hipot test between phases to locate weak phase to phase insulation. It also has a capacitive compensation capability, which allows it to



Baker WinAST systems are available with optional single- or dual-station motor testing fixtures

measure the resistive portion of any current leakage rather than the total leakage current.

The Baker WinAST also performs a DC hipot test to check the integrity of the insulation system with high DC voltage.

Surge test

The instrument uses a high-voltage impulse test to detect any faults with insulation between turns, coils, and phases of the winding. Surge tests also detect other faults that change the inductance of a winding, such as any improperly annealed lamination steel, or reversed coils. The Baker WinAST uses a line-to-line method to analyze faults. It compares differences in waveforms and calculates the percentage difference relative to the saved master waveform.

Resistance test

The Baker WinAST resistance test can detect erroneous turn counts, poor connections, inaccurate lead labels and incorrect wire sizes. With the use of Kelvin connections, low-resistance winding tests are accurate and repeatable.

Resistance measurements are corrected for temperature to the equivalent resistance value at 25° C or to a customer-specified temperature.

Inductance test

The inductance test is another means of evaluating the motor circuit to ensure quality control. It detects shorts, opens, imbalances and reversed coils. It provides a numerical value of a tested winding to compare to expected inductance values. This test can be preformed using two or up to twelve leads.

Corona test

Variable-frequency drives produce high-voltage pulses that in turn produce corona. When corona effects occur, ozone is created, which deteriorates turn-to-turn insulation.

The Baker WinAST’s surge test simulates a high-voltage inverter pulse. The system measures any corona activity in pico-Coulombs. Pass/fail limits can be programmed to indicate unacceptable levels of corona. This test is particularly useful for quality-testing smaller, random-wound motors.

Rotation-direction test

A rotation-direction test, an option for stator testing and for detecting misconnections, uses both induction and Hall-effect sensors.

Auxiliary relay matrix

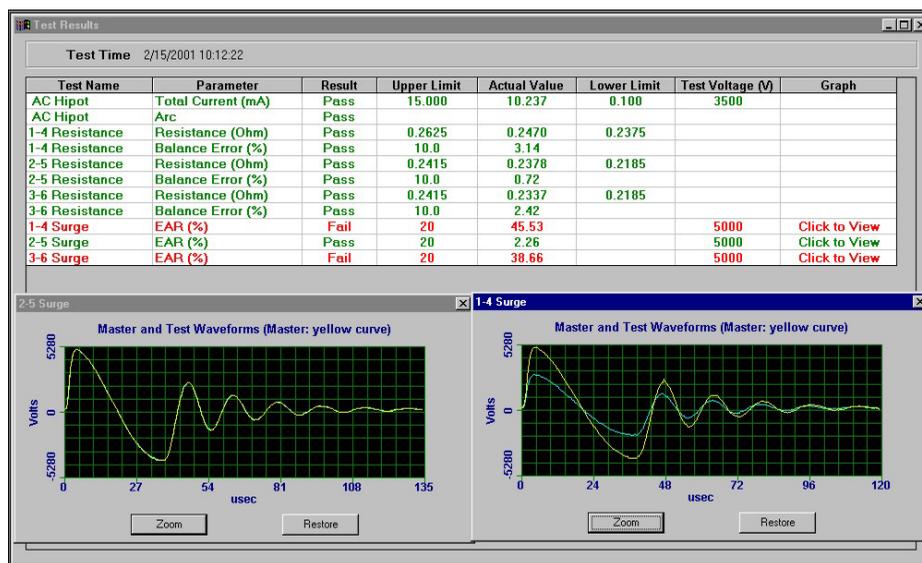
The auxiliary relay matrix automatically connects stator leads for surge and rotation-direction tests. It accommodates different winding configurations, including:

- wye
- delta
- high voltage
- low voltage
- part winding start
- double delta

Data management

Raw test data and pass/fail counts are stored on the Baker WinAST’s hard disk drive, and in XML format, which makes it easy to use in commonly-used database programs such as Microsoft Excel or Access.

Data can be easily transferred to other computers via Ethernet or USB connections, or other portable or networked storage devices.



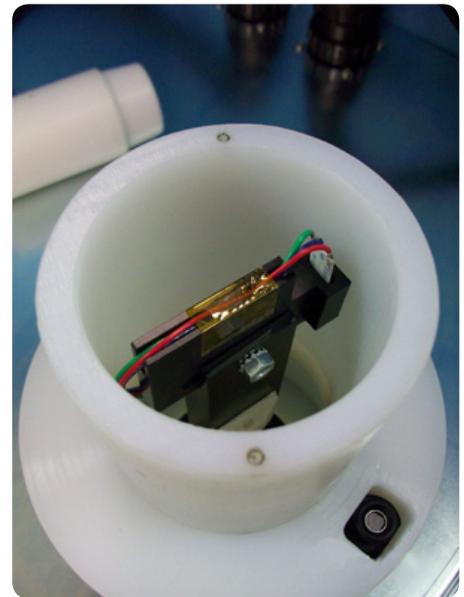
A Baker WinAST operator console screen shot. The WinAST rapidly compares multiple waveforms against a saved reference waveform to consistently and accurately determine if a fault exists.

Field map test

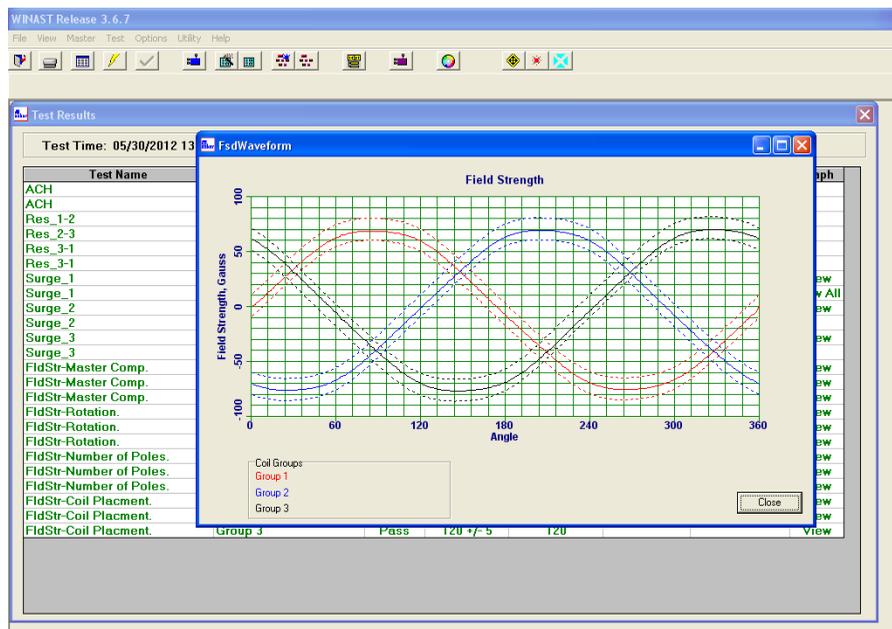
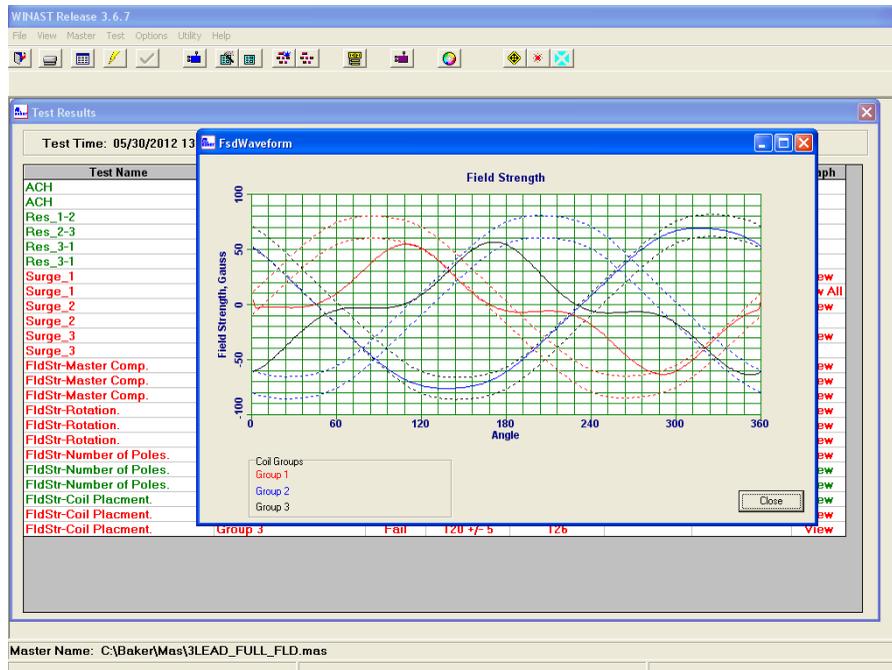
The Baker WinAST captures and analyzes stator field maps for the number of poles, rotation direction, symmetry, absolute amplitude and relative coil placement angle. The system detects mislabeled leads, misplaced coils, turn and pole counts and rotation direction problems using customized probes inserted into a stator bore.

Baker HV WinAST

A high-voltage version of the Baker WinAST is available for conducting tests on low-inductance form coils and motor stators of more than 500 kW, or more than 575 V AC. For specific information about high-voltage system configurations, please contact SKF Condition Monitoring Center - Fort Collins (CMC-Fort Collins) at sales.cmcfc@skf.com.



Baker WinAST field map test accessory



Examples of bad (top image) and good (bottom image) magnetic field map waveforms and limits for a production motor.

Built to last

The Baker WinAST is designed for many years of rugged industrial use. When recalibration is required, the instrument can be calibrated on-site with adjustments to software coefficients via a simple menu (and using ISO procedures).

All Baker WinAST testers have a standard control console, safety interlock switch, and alligator clip terminations (unless an optional test fixture is ordered). A wide variety of single and dual station fixtures are available. In addition, test fixtures can be custom built to specifications.

Customized configurations

Please contact SKF CMC-Fort Collins (sales.cmcfc@skf.com) for information on specific configurations or specifications. Every Baker WinAST system is a unique solution, and can be tailored to meet a wide spectrum of specific application needs.

Baker WinAST specifications

Computer

Windows 7-based, with Ethernet, USB, video, and serial port connections

Peripherals

Display: high-resolution LCD screen
Printer: optional desktop and label maker
Keyboard and mouse

DC hipot

Voltage: programmable 100 to 5 000 V DC in 50 V DC increments, 3% accuracy
Current: 100 μ A maximum, 1 μ A resolution, programmable pass/fail in 1 μ A increments
Duration: programmable in one-second increments

AC hipot

Voltage: programmable 100 to 3 500 V AC in 50 V AC increments, 50/60 Hz, 60 VA or 300 VA, $\pm 5\%$ accuracy
Current: 100 mA/40 mA/13 mA/5 mA resolution, arc detection for improved fault detection, $\pm 5\%$ accuracy
Duration: programmable in one-second increments
Leakage current method installed: "total or absolute leakage current"

Resistance

Auto-ranging
3,5 digit resolution
0,4% of full-scale accuracy in each range
0,2% of full-scale repeatability
Kelvin leads and contacts for bar-to-bar testing
Ambient temperature normally compensated 25 °C or user defined
Infrared temperature sensing (optional)

Resistance range	Current
10 m Ω – 20 m Ω	2 A
20 m Ω – 200 m Ω	2 A
200 m Ω – 2 Ω	200 mA
2 Ω – 20 Ω	20 mA
20 Ω – 200 Ω	2 mA
200 Ω – 2 k Ω	2 mA
2 k Ω – 20 k Ω	2 mA
20 k Ω – 200 k Ω	0,2 mA

Inductance

5-digit resolution
Frequency range: 30 Hz – 1 000 Hz
Kelvin leads

Baker WinAST inductance (typical)

1 μ H - 10 μ H	4%
10 μ H - 100 μ H	2%
100 μ H - 10 mH	1%
10 mH - 100 mH	2%
100 mH - 200 mH	5%

High-voltage impulse (surge)

Voltage: programmable 500 to 5 000 V peak in 50 V increments
3% EAR repeatability
Pulse energy: 0,5 J maximum
Discharge capacitor: 0,04 μ F
Load: Greater than 100 μ H
Digitizing rate: 5, 10 or 20 M sample/second
Programmable pass/fail percentage limit based on the error-area ratio (EAR) calculation

Rotation direction

Senses clockwise or counter-clockwise rotation direction in windings
"Hall sensor effect" method
Single- and multi-phase motor options

Power requirements

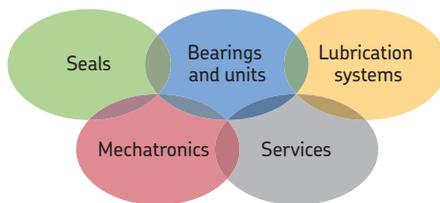
Input voltage: 115 V AC maximum (230 V AC available) at 46 to 67 Hz
Power consumption: 8 A
Overcurrent protection: two-pole magnetic circuit breaker

Temperature compensation

Ambient – standard/infrared – optional

Options

PLC interface package
Barcode scanner
Additional leads (up to 12)
AC hipot
Inductance
Test fixtures



The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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