

SKF Static Motor Analyzer Baker DX-15A

Integrated armature testing capability with up to 15 kV of test voltage



Introduction

Motor service shop professionals need test equipment they can confidently rely upon to find any issues with AC and DC motors. The SKF Static Motor Analyzer Baker DX-15A is specifically designed to perform tests on DC motors and armatures, and AC motors and coils. This 15 kV analyzer can test AC motors and generators up to 5 000 horsepower.

The Baker DX-15A features the added versatility of integrated DC armature testing capabilities. It is available in single- or three-lead configurations, and offers a full range of DC tests, resistance/inductance/capacitance (RLC) tests, coil, surge and rotor bar influence check (RIC) tests. Motor service shop professionals will benefit from the wide range of AC and DC testing capabilities in this portable unit.

Application options

The Baker DX-15A extends the capabilities of the Baker DX family to perform tests on low-impedance DC motors, coils, and armatures. It performs the same high- and low-voltage tests available with other Baker DX analyzers that detect weaknesses or faults in motor winding and ground wall insulation: insulation resistance (IR), polarization index (PI), dielectric absorption (DA), DC step voltage and surge tests to evaluate all the insulation in motors and coils. The motor circuit can be analyzed with resistance, impedance, capacitance, phase angle and dissipation factor/quality factor measurements.

The Baker DX-15A can be configured with

specific sets of tests for an organization's application set. For example, it can be built to perform DC tests, or with just a combination of high-voltage and low-voltage tests.

Baker DX-15A features

- Integrated Baker ZTX technology enables full DC motor test capabilities, including bar-to-bar armature tests
- Tests motors ranging from fractional HP units to about 5 000 HP motors at voltages up to 15 kV
- Modular design with multiple configuration options to meet specific testing needs
- High- and low-voltage testing capability in a single unit for testing motor circuit quality and insulation integrity
- Coil mode for fast analysis of coils, and storage of up to 400 tests in a single record
- Impulse mode enables an operator to quickly apply voltage when testing coils and DC motors
- Rotor influence check (RIC) test for detection of cracked or broken rotor bars
- Intuitive, easy-to-use touchscreen graphical user interface
- USB printer interface enables easy and fast printouts of test results
- Push to test (PTT) lock conveniently and safely holds voltage during DC tests



DC motor testing and analysis

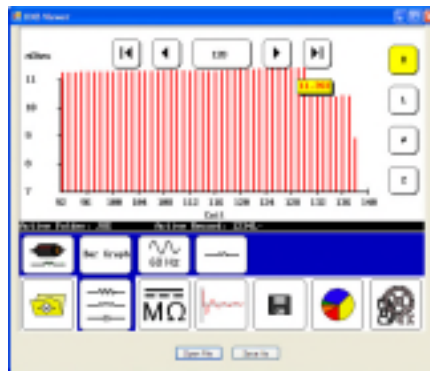
For decades, repair and manufacturing professionals have struggled with the need to perform reliable, accurate and documentable DC motor tests. With the Baker DX-15A, they can overcome the difficulties involved in armature testing and test documentation.

Bar-to-bar tests conduct a thorough analysis of an armature for shorts, opens, unbalances, weak turn-to-turn insulation, unbalances in coils, and damaged or mis-connected equalizers. Baker DX-15A bar-to-bar tests are performed with the analyzer's integrated Baker ZTX technology and accessory connections.

The internal ZTX impedance-matching transformer is the best, most reliable method available for analysis of low-impedance coils in DC motors. With the Baker DX-15A placed in impulse mode, the armature can be tested with the simple touch of the start button. When using the internal ZTX capability to test armatures, the Baker DX-15A automatically indicates to the user when a problem such as turn-to-turn fault exists.



The ATF 5000 DC armature test accessory comes bundled with the Baker DX-15A.



The Baker DX-15A RLZ test screen.

This Baker DX-15A performs inductance, phase angle, and impedance measurements all in a single test to detect such problems as hard-welded shorts between turns, opens, errant turn counts, and inconsistent wire sizes.

The Baker DX-15A automatically records and displays DC test readings for easy analysis. A view of analysis from each of the four measurements can be viewed at the touch of a single button. A test bar chart allows an operator to quickly identify good and bad conditions. Screen controls also make it easy to quickly retest armature bars as needed.

Flexible, modular design

The Baker DX-15A can be built specifically to fit an organization's unique motor maintenance needs. The unit can be configured to perform only armature, surge and DC tests, or armature tests with just the resistance test. If all available tests are desired, the analyzer can be fully bundled with RIC, inductance, impedance, phase angle and capacitance test capabilities to produce one of the most versatile and comprehensive motor test instruments available on the market.

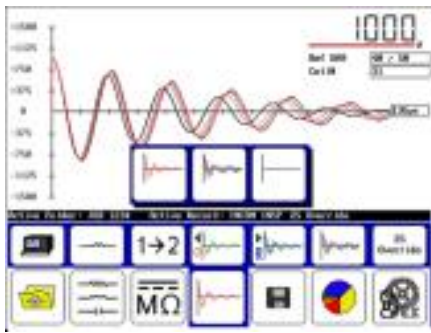
DC motors can also be tested with the Baker DX-15A using the integrated Baker ZTX technology, which includes connections for span test and bar-to-bar fixture accessories (which come with the analyzer).

Multi-language support

The Baker DX-15A's embedded software can be configured by a user to run in one of a number of languages, including English, German, French, Portuguese and Spanish (contact SKF CMC-Fort Collins for information on specific languages not listed).

Tests and capabilities of the Baker DX-15A

| Failure Modes | Winding resistance | IR test | DA/PI test | DC step voltage | DC hipot | Surge | Inductance | Capacitance | Impedance | Phase angle | D/Q | RIC |
|------------------------------|--------------------|---------|------------|-----------------|----------|-------|------------|-------------|-----------|-------------|-----|-----|
| Weak insulation, turn-turn | | | | | | X | | | | | | |
| Weak insulation, phase-phase | | | | | | X | | | | | | |
| Weak insulation, coil-coil | | | | | | X | | | | | | |
| Turn-turn shorts | X | | | | | X | X | | X | X | X | |
| Phase-phase shorts | X | | | | | X | X | | X | X | X | |
| Open coils | X | | | | | X | X | | X | X | X | |
| Reversed coils | | | | | | X | X | | X | X | X | |
| Unbalanced phases | X | | | | | X | X | | X | X | X | |
| Weak ground wall insulation | | X | X | X | X | | | | | | | |
| Dirty windings | | X | X | X | X | | | X | | | | |
| Moisture | | X | X | X | X | | | X | | | | |
| Feeder cables | | X | X | X | X | X | | | | | | |
| Motor lead line connections | X | | | | | | | | | | | |
| Broken/cracked rotor bars | | | | | | | | | | | | X |
| Static eccentricity | | | | | | | | | | | | X |
| Dynamic eccentricity | | | | | | | | | | | | X |



A coil test screen on the Baker DX-15A.

Coil test capabilities

The Baker DX-15A is one of the few motor test instruments on the market with the ability to perform coil tests. An impulse test mode enables swift application of voltage to coils, making it possible to accurately test and store records of hundreds of coils faster than ever before. The analyzer stores and displays as many as 400 waveforms in a single record that is easily retrieved for quick analysis of any tested coil's condition.

SKF's error area ratio (EAR) algorithm calculates waveform differences between coils for quick, accurate analysis of coil test data. The precise EAR calculation reduces operator error by eliminating the need for visual comparisons of waveforms. EAR analysis detects a defective coil when a test result is out of a user-programmed tolerance range of the tested coils.

Users can easily generate, print and analyze reports with graphical representations of the data. The analyzer also produces convenient, concise summaries of results of any specific coil test.

Rotor influence check (RIC)

The Baker DX-15A performs an optional RIC (rotor influence check) test. The RIC test can detect broken or damaged rotor bars that could cause motor failure. Rotor bar issues often reduce motor efficiency, and accelerate insulation degradation. A catastrophic motor failure can occur when a broken bar lifts or moves out of its slot.

User interface and operation

The eight-inch diagonal color display is an industrial, ruggedized touch screen built to handle the rigors of daily operation.

The intuitive graphical user interface on the Baker DX-15A features large icons for easy touch operation, even when working with electrical gloves. The user interface is designed with a logical flow to minimize the number of touches required and make it easy to operate. The analyzer automatically prompts an operator to save any data if or when the save button is not selected, which helps minimize the risk of losing test data.

Safety features

SKF built the Baker DX-15A with user safety in mind. The analyzer successfully passes all safety requirements to achieve CE certification. LEDs on the analyzer indicate to a user when any of the test leads are energized.

The analyzer uses 40 kV test leads to provide the most accurate readings as well as for operator protection. The Baker DX-15A can also be configured with optional safety lights to warn any personnel in the area that tests are being performed and the analyzer is in operation.



The Baker DX-15A as a coil test analyzer.



A Baker DX-15A testing individual stator coils.

Storage and reports

Storage of data at incoming inspection, during winding and at final assembly is easy with the Baker DX-15A's multi-test file storage capabilities. The Baker DX-15A has the ability to store multiple test results within one folder, and it automatically attaches a time and date stamp to the test result. The scroll button makes it easy to review the data quickly and easily.

Nameplate data is entered via the touch screen, and may be printed on a compatible printer via the analyzer's USB port. Company brands (logos) can be loaded in the Baker DX-15A software application so every report has a logo at the top of the page.

Test results can also be exported to a USB memory device for motor owners who would like test data and reports provided in digitized formats.

The Baker DX-15A can store up to 400 surge test results per folder for quick, easy analysis and reporting. The data is also stored in a chart for accurate, easy armature analysis. All interpoles and field coils can be easily analyzed and stored in the Baker DX-15A's multi-result file management system.

Baker DX-15A specifications

Resistance

| | |
|-------------------------|---------------------------------|
| Source voltage, maximum | 3,9 V |
| Source current, maximum | 600 mA |
| 100 to 10 000 Ω | 3% accuracy |
| 0,2 to 100 Ω | 2% accuracy |
| 0,002 to 0,2 Ω | 4%, ± 1 m Ω accuracy |

Capacitance

| | |
|--------------------------------|-------------|
| Source voltage, maximum | 3,9 V |
| Source current, maximum | 600 mA |
| Source frequency | 4 000 Hz |
| 0,04 to 2,6 μ F @ 4 000 Hz | 3% accuracy |
| 2,6 to 26 μ F @ 4 000 Hz | 5% accuracy |

Inductance

| | |
|-------------------------|----------------|
| Source voltage, maximum | 3,9 V |
| Source current, maximum | 600 mA |
| Source frequency | 50 to 4 000 Hz |
| 160 to 5 000 mH @ 60 Hz | 3% accuracy |
| 0,5 to 160 mH @ 60 Hz | 2% accuracy |
| 0,05 to 0,5 mH @ 60 Hz | 3% accuracy |

Impedance

| | |
|---------------------------------|----------------|
| Source voltage, maximum | 3,9 V |
| Source current, maximum | 600 mA |
| Source frequency | 50 to 4 000 Hz |
| 0,15 to 10 000 Ω @ 60 Hz | 3% accuracy |
| 0,01 to 0,15 Ω @ 60 Hz | 3% accuracy |
| Phase accuracy @ 60 Hz | < 2 degrees |

DC tests

| | |
|-------------------------|------------------|
| Voltage accuracy | 3% |
| Maximum resistance | > 100 G Ω |
| Current accuracy | 5% |
| Minimum resistance | 1,0 M Ω |
| Maximum output current | 5 mA |
| Over-current trip | 1,2 mA |
| Automatic arc detection | yes |

Surge

| | |
|-------------------------|---------|
| Capacitor size (nF) | 100 |
| Surge energy | 11 J |
| Short circuit current | ~ 700 A |
| 65 μ H load voltage | 15 kV |
| Surge voltage accuracy | 12% |

| | |
|-----------------------|---------|
| Armature test voltage | 1 500 V |
| Armature test current | 1 800 A |

Note: Surge voltage accuracy meets (based upon) Z540 Standard, four times measurement uncertainty (calibrated within 3 percent)

Model

DX15-DSA1
DX15-DSA3
DX15-RDSA1
DX15-RDSA3
DX15-ZDSA1
DX15-ZDSA3

Description

DC test, surge, armature, single-lead
DC test, surge, armature, three-lead
DC test, resistance, surge, armature, single-lead
DC test, resistance, surge, armature, three-lead
DC test, RLC, surge, armature, single-lead
DC test, RLC, surge, armature, three-lead

Physical specifications

- Weight: 25 kg (55 lbs.)
- Dimensions 406 x 357 x 203 mm (16 x 14 x 8 in.)
- Power requirements: 100 to 240 V AC, 50/60 Hz, 2,5 A
- Internal memory: 2 GB
- Printer interface: USB printer connection
- External connectors: RLC leads, foot switch, remote E-stop safety lights, SKF power pack, ground
- User interface: Color touch screen

Configurations

Standard equipment bundled with the analyzer includes:

- ZTX low-impedance test technology
- RLC leads
- Test clips (ATP02-C)
- Test probes (ATP02-P)
- Bar-to-bar low impedance fixture
- Footswitch
- 2 GB USB flash drive
 - Baker DX user manual
 - 30-day trial version of Surveyor DX desktop report generation software
 - Language management software utility

Optional Baker DX-15A equipment (order separately) includes:

- RIC test
- Surveyor DX desktop report generation software
- Resistance (large Kelvin clip) leads
- Soft padded analyzer case
- Color laser printer

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