

Baker EXP4000 Dynamic Motor Analyzer

Megger[®]
Power on



Baker EXP4000

Dynamic Electric Motor Analyzer

Introduction

Maintenance professionals need to minimize repair costs associated with unexpected motor failures and production downtime. The Baker EXP4000 Dynamic Motor Analyzer is a motor system monitoring and troubleshooting tool that helps maintenance personnel to minimize failures and maximize the uptime of the machine systems that drive their businesses.

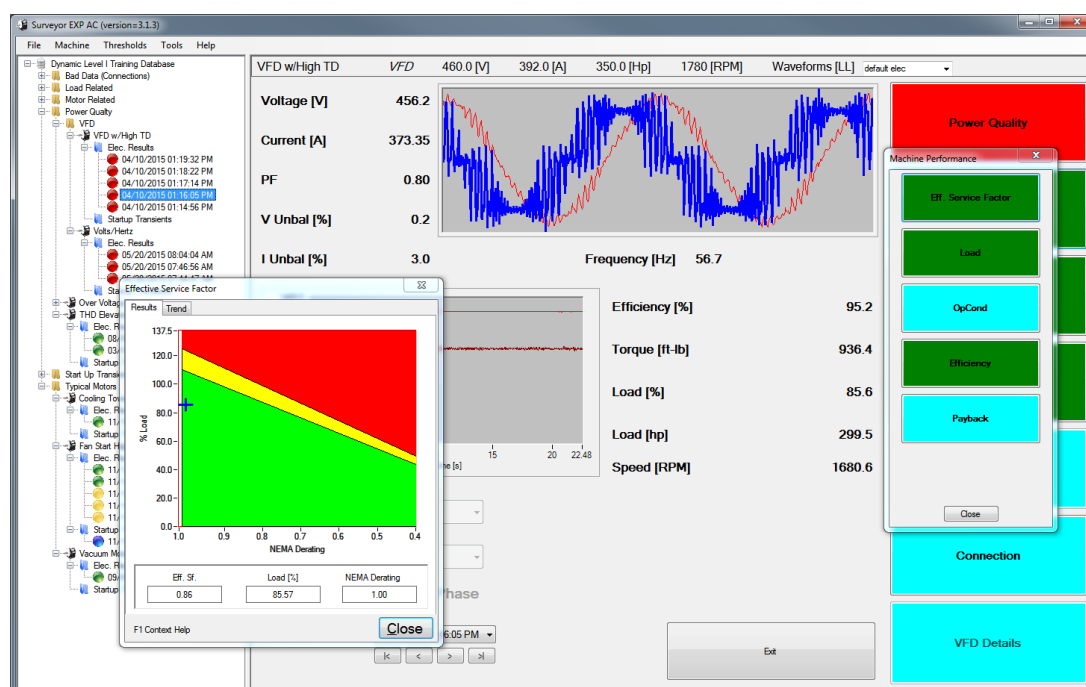
The EXP4000 uses advanced software algorithms to monitor and assess conditions across a motor/machine system that impact the health and performance of the motor. It evaluates the quality of power fed to a motor, assesses motor performance indicators, and examines the amount and condition of the load. This insight makes the EXP4000 a powerful predictive maintenance and troubleshooting solution.

The EXP4000 is designed for rigorous use by maintenance personnel in the field. Whether plugged into a power source or running on its batteries, it can be taken into

industrial environments to monitor motors while they are in operation. The analyzer can be connected at a motor junction box, at the instrumentation cabinet, inside a motor control cabinet (MCC), or from the outside of an MCC equipped with an EP1000 Dynamic Motor Link.

It's often hard to determine whether the root cause of a given motor problem is electrical or mechanical. The EXP4000 is an effective troubleshooting tool, and clearly detects when a problem is electrical (e.g., when it involves an issue within the motor, or power quality) or mechanical (such as an over-load, or poor application of the motor). It is also a powerful predictive maintenance tool that tracks multiple parameters to identify trends that indicate potential problems. Such trends can also be used to troubleshoot an issue to avoid any recurrence of the problem with the same machinery.

The bottom line is that the EXP4000 can help maintenance organizations avoid costly repairs and unnecessary downtime.



The user interface of the Baker EXP4000 dynamic motor analyzer features an at-a-glance summary of power, motor and machine condition.



Portable, battery-powered and rugged, the Baker EXP4000 is perfect for predictive maintenance or troubleshooting.

Test domains

The Microsoft Windows-based Baker EXP4000 acquires data in several testing domains. These include:

- Power quality
- Machine performance
- Current
- Spectrum
- Torque
- Variable-frequency drives
- Continuous monitoring
- Transient analysis
- Efficiency

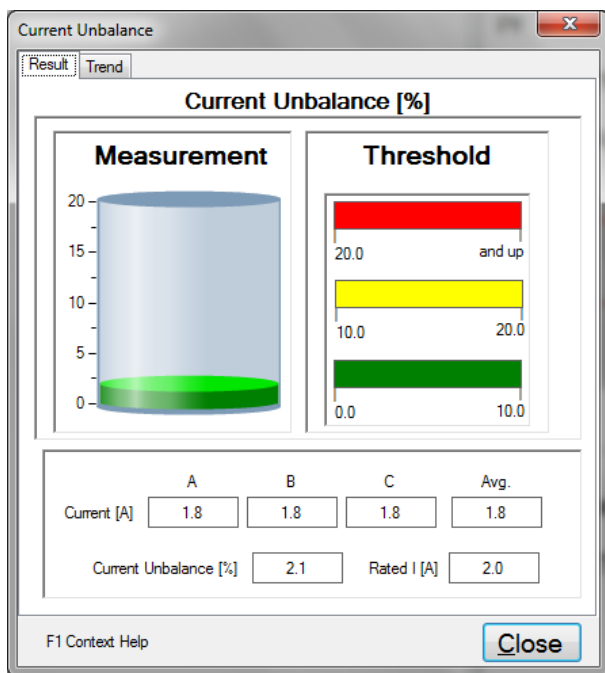
Collected test data can be captured and stored for use in reports, maintenance records and trend analysis. The standardized database format (Microsoft Access) is compatible with a wide range of report generation and retrieval tools used by maintenance organizations. Records of multiple motors with data from multiple EXP4000 reports are easily created on the analyzer itself, and can be combined with other reports that can be shared with other

users on desktop and laptop PCs. Reports are easy to print with connection to any Windows-compatible, plug-and-play printer.

The EXP4000 hardware and software are designed for intuitive use. Software features include graphically-displayed data such as phasor diagrams, three-phase currents and voltages, instantaneous voltage and symmetrical components. This provides an operator with valuable power information as well as the means to ensure the analyzer is properly connected. The analyzer simplifies the monitoring process using test thresholds to provide at-a-glance red-yellow-green results for the following test domains: current, power quality, machine performance, spectrum, torque and VFD.

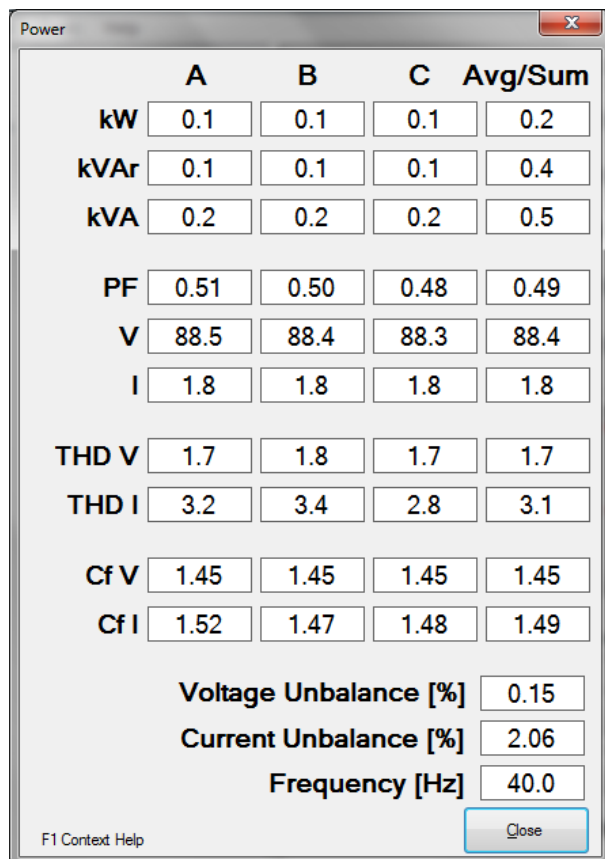
Current

Problems such as over-loading, poor connections, misconnections, iron saturation and miswound motors are difficult to detect without the right equipment. The EXP4000 evaluates current and current imbalances to assess the overall electrical condition of the motor/machine system.



The EXP4000 provides views of various measurements with user-defined thresholds.

The EXP4000 gives a detailed power analysis view.



Power quality

The EXP4000 identifies power quality problems that can stress a motor, such as distortion, imbalances or improper levels. The instrument monitors power, voltage and current levels/imbalances, and total as well as harmonic distortion. These can identify such problems as:

- improper tap settings on supply transformers
- poorly-distributed single-phase loads
- VFDs without proper filtration
- excessive non-harmonic frequencies on a given VFD
- improper filters
- missing or open power-factor correction capacitors
- high-resistance connections
- Machine performance

Maintenance staff often do not detect problems with operating equipment that could lead to motor failure, such as thermal overloads or machine degradation that puts undue stress on a motor. The EXP4000 evaluates the operational health and performance of a motor, and identifies stress-inducing problems at their source. The instrument analyzes effective service factor, load, operating conditions and efficiency.

Spectrum

Hard-to-detect issues such as broken rotor bars or bearing faults can be detected with the instrument's spectrum analysis capabilities, including demodulated spectrum, harmonics and rotor bar tests, which help to determine mechanical vs. electrical issues. These capabilities are enhanced by zoomable, high resolution spectrum plots, and high sample rate. The user can set frequency markers on a graph that are specific to a given machine system's design.

Time waveforms

Time waveforms are essential for swift identification of underlying causes of warning or caution level parameters and transient conditions. They graphically represent voltage, current and torque vs. time.

Torque

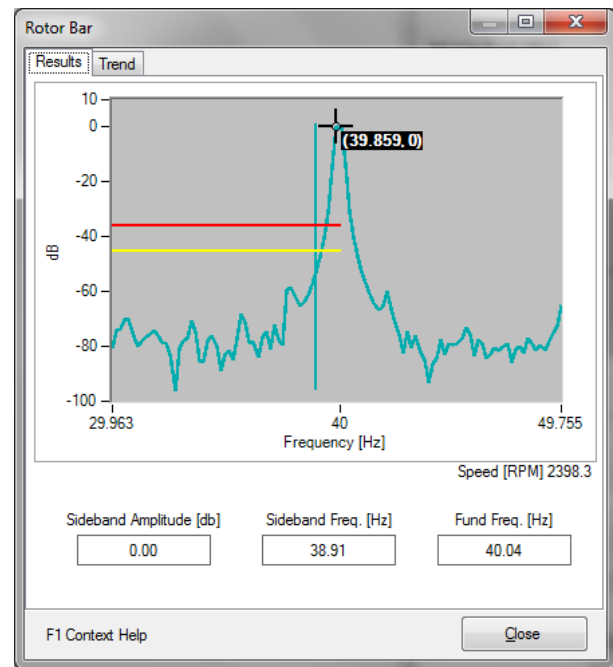
The innovative torque analysis capabilities within the EXP4000 can expose torque-related problems. The torque time and spectrum signatures are used to diagnose mechanical problems, and to clearly identify transient conditions. Users can accurately identify such issues as over-torque, over-load, cavitation, bearing problems, mechanical imbalances, eccentricities, misaligned shafts and more.

Transient startup

Accurately troubleshooting any motor system issues at start-up and diagnosing timing issues involves discerning if a problem is with the power fed to the motor, the motor itself, or the load. The EXP4000 monitors and displays 6000 samples per second for all three phases of current and voltage, and torque. The user can zoom in, pan and move a cursor to read values from specific points on the graphs. Common uses are setting relay points, viewing soft start stages, identifying over-torquing with heavy loads, and identifying which phase tripped on startup (V or I).

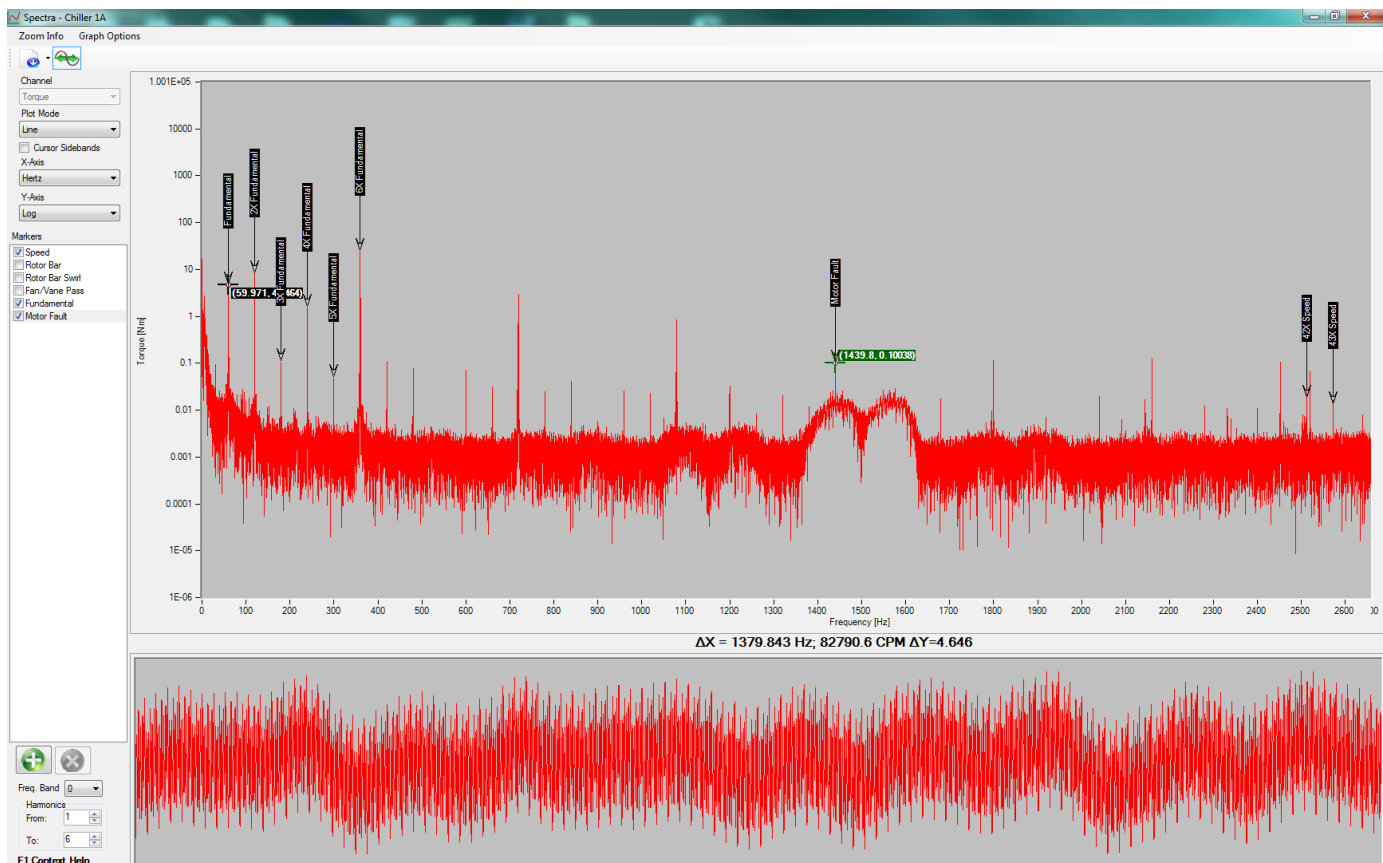
VFD monitoring

VFDs pose a unique set of challenges for maintenance professionals. The EXP4000 can monitor and effectively troubleshoot this increasingly popular motor drive type. The analyzer displays the V/Hz relationship with respect to time, as well as real-time speed and torque, which means that short-duration problems can be caught and analyzed. The EXP4000 also exposes flaws in the loop design between the VFD and load sensors, and can help optimize the switching speed settings to minimize harmonics (heat) and maximize low current and high efficiency. These capabilities are valuable for setup, commissioning and troubleshooting.



The EXP4000's rotor bar spectrum analysis graph.

Torque spectrum and time waveform are just two of the EXP4000's many powerful graphical representations of machine health and performance.





A technician using an EXP4000 analyzer connected to an EP1000 port at an MCC.

Continuous monitoring

Machine system issues that occur infrequently are easy to miss with short-term or route-based monitoring. The EXP4000 can continuously monitor machine systems for several days to capture these events using event triggers on up to 41 parameters.

DC monitoring

The EXP4000 provides the means to monitor voltages and currents in a DC motor's operational environment. Spectrum analysis of these signals helps identify issues that are otherwise hard to detect or assess.

Efficiency

The ability to identify under-performing motors has become increasingly necessary with today's focus on energy

conservation and efficiency. The EXP4000 identifies poorly performing motors with accurate assessments of efficiency within their current applications. This is especially valuable for motor replacement decision support.

Full-spectrum PdM

The EXP4000 gives industrial maintenance organizations a powerful tool to troubleshoot problems and avoid issues that would result in costly repairs and unplanned downtime. When coupled with Megger's static motor analyzers such as the Baker AWA-IV, maintenance professionals can minimize unexpected failures while maximizing uptime of motors and the machinery they depend upon. Contact your local representative for a demonstration, or to learn how the EXP4000 can improve your organization's predictive motor maintenance program.

Service

Megger provides worldclass global technical support for its motor test and monitoring equipment. You can always call our technical support team at no charge on +1 800-752-8272 (in the US) or +1 970-282-1200 from outside the USA, or send email to baker.tech-support@megger.com.

From routine calibration to repairs and upgrades for static or dynamic analyzers, our experienced technicians will return your equipment in top condition with fast turnaround and courteous service. Contact Megger's motor test and monitoring product service at +1 970-282-6079, or email our service team at baker.service@megger.com.

Training

Want to get the most out of your investment in your electric motor analyzer? Megger provides training on dynamic motor test and monitoring methods at its training center in Fort Collins, Colorado, USA, or at customer locations on-site, around the globe. Training courses include introductory and advanced seminars on dynamic motor testing that allow you to get the most out of your EXP4000. For more information, or for reservations, call +1 970-282-1200 or send an email to baker.sales@megger.com. You can also check out our training schedule at www.megger.com/baker.

Product Support Plans

Maximize your EXP4000 analyzer's uptime and performance with Megger electric motor analyzer Product Support Plans (PSPs). These plans assure the fastest turnarounds for repairs and calibration beyond the standard warranty. For more information about PSPs, contact your local Megger sales representative. In the U.S. call +1 970-282-1200; for global contacts, visit the electric motor test and monitoring solutions website www.megger.com/baker to find a country representative, or send an email to baker.sales@megger.com.

Baker EXP4000 specifications

Input power	110 - 250V AC, 50/60 Hz. Integrated power supply.
Maximum rated measurement/test voltage	1000V AC, 500V DC (existing PTs and CTs are used for high voltage applications)
Current transformers (portable)	10A, 40A / 400A (switchable), 150A, 1000A, 3000A
Connections (Amphenol military twist type)	Power entry module Portable voltage connection (1) Portable current connection (1) EP port (1)
Dimensions (case)	Width: 44.5 cm (17.5 in) Length: 29.2 cm (11.5 in) Height: 22.2 cm (8.75 in)
Weight	6.8 kg (15 lb)
Computer specifications	500 GB hard drive 4 GB memory Battery and AC power Microsoft Windows 10 operating system USB port
Industrial standards	NEMA MG-1, IEEE 519, EN61000-2-2, EN61000-2-7, VDE 839-2-2

Related products

EP1000 Dynamic Motor Link

The EP1000 is a permanently installed interface which makes it safe, easy and quick to connect the EXP1000 analyzer to a motor. Installed in an MCC, the EP1000 includes a low-voltage front panel connector which allows a technician to use the EXP4000 without opening the cabinet.



Baker NetEP On-Line Motor Analysis System

The Baker NetEP is a permanently installed motor system monitoring solution that works continuously to acquire health and performance data on up to 32 electric motors and the rotating machine systems they operate. With the NetEP, maintenance professionals can gather performance data on critical motors around the clock, 365 days a year, and monitor the condition of their rotating equipment from the convenience and safety of a central office or remote location.



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