Baker Static and Dynamic Motor Analyzers

Megger

Power on

About us

Megger designs and manufactures portable electrical test equipment. Megger products help you install, improve efficiency, reduce cost and extend the life of your or your customers' electrical assets.

Established in the late 1800s, the company has been designing and making test and measurement instruments that perform electrical measurements for preventative maintenance, troubleshooting and commissioning for decades. Megger products have supported customers all over the world to improve their facilities' efficiency, reduce costs, extend the life of apparatus and through trending and analysis, anticipate equipment failure and future performance. It now has local offices in many locations with technical support teams and distributors all over the world. Manufacturing plants are located in Germany, Sweden, the UK, and USA.

AVO | Biddle | Megger | Multi-Amp | Pax | PowerDB | Programma | SebaKMT | STATES | Baker

Service

Megger provides world class global technical support for its motor test and monitoring equipment. 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 team at sachin.narayankar@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 Mumbai, India or at customer locations on-site across the nation. Training courses include introductory and advanced seminars on dynamic motor testing that allow you to get the most out of your Baker products. For more information, email us at ankit.porwal@megger.com

Product Support Plans

Maximize your Baker product 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.

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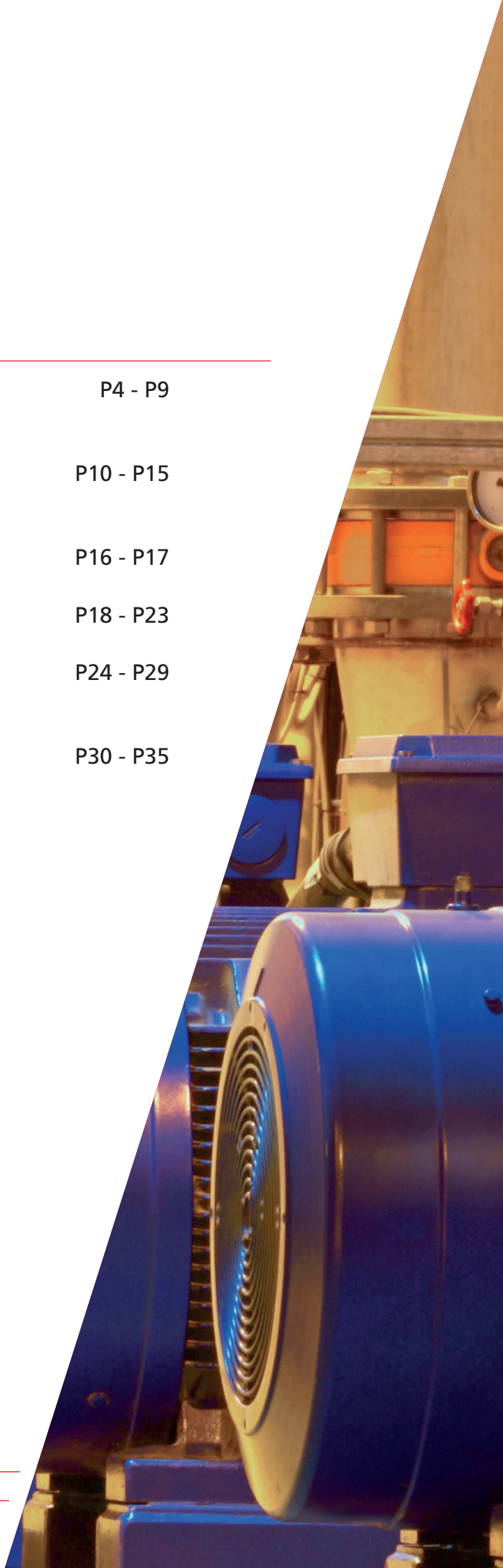


Baker AWA-IV Series
Static Electric Motor Analyzers

Introduction

Baker AWA-IV static motor analyzers are the go-to instruments for motor repair, reliability and maintenance professionals who need to understand the electrical condition of motors their organizations depend upon.

Weak motor insulation often degrades to the point of causing premature and unexpected motor failure, which in turn can result in costly unplanned downtime of production machinery. The Baker AWA-IV is a fully-automated motor analyzer that performs repeatable, user-programmable tests to thoroughly assess the condition of a motor's insulation and circuit. It is also used to assure quality of motor rebuilds or new production motors before they are placed into service.

The Baker AWA-IV is a simple-to-use instrument with an intuitive, touch-screen user interface. It delivers accurate, repeatable results regardless of the operator's skill level, and easily detects problems that low-voltage testers cannot find by performing a comprehensive set of both high- and low-voltage tests. Results are presented in simple, easy-to-understand graphs and reports that give motor maintenance professionals the information they need to minimize costs and unplanned downtime.

Improve test reliability

The Baker AWA-IV is a Microsoft Windows 10-based instrument that can be programmed to perform a specific set of tests on a given motor. Unique user-programmed attributes can be saved for future use over the life of the same motor, including:

- tests and sequences that are performed
- target test voltage
- pass/fail criteria
- motor nameplate information

This programmed repeatability ensures the same tests are conducted in the same order on a specific motor, weeks, months or even years after the tests were initially programmed and performed, regardless of who uses the analyzer on subsequent tests. An operator merely needs to select the motor from the analyzer's database, make the appropriate connections, then press the test button. Any variation in results would be accurate and not prone to operator error or variations in how each of the tests were previously performed.

When tests are completed, the analyzer automatically indicates which tests have passed or failed. Graphical information and analysis for each motor is stored and can be reviewed on the analyzer's screen to identify trends that may indicate potential problems. Analysis does not need to occur in the field: data can also be saved to a server or PC database for later retrieval on a desktop or laptop computer.

Wide range of analyzer models and features

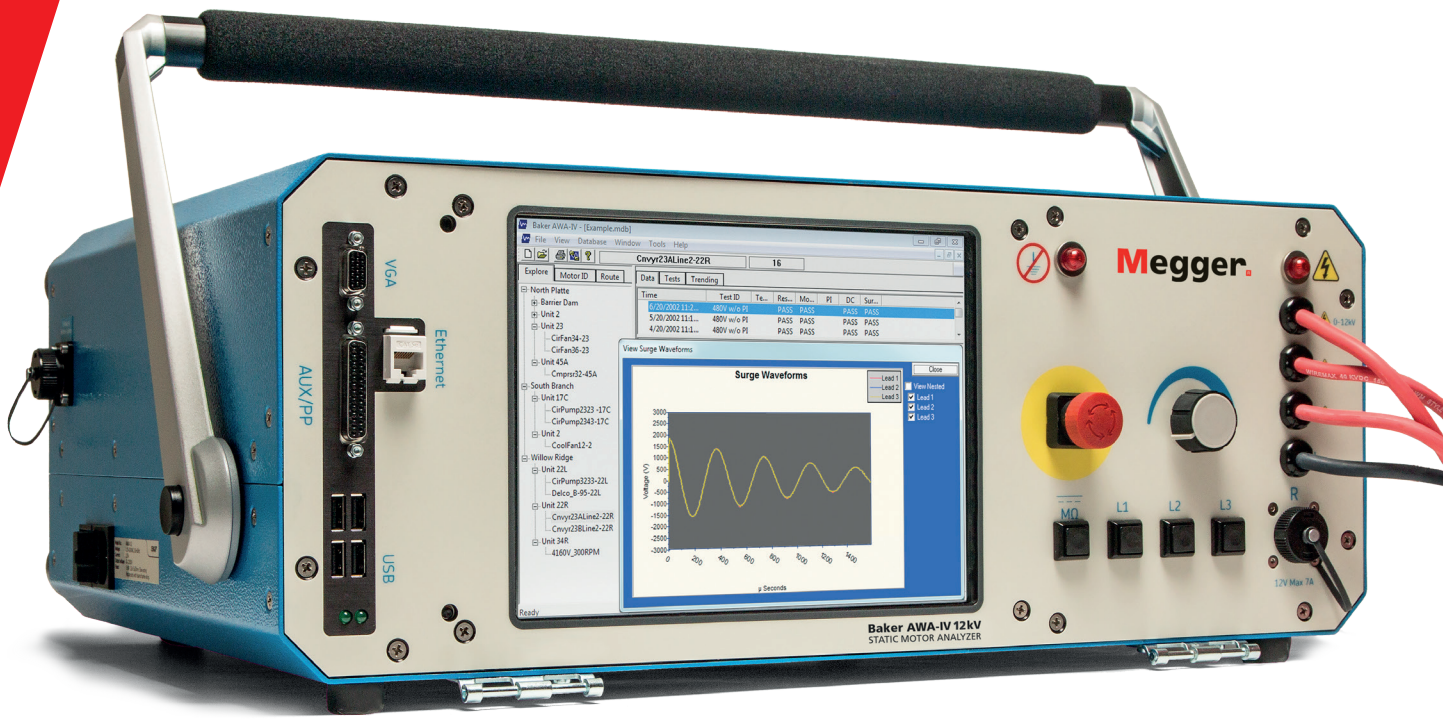
The Baker AWA-IV family includes models designed to perform tests at maximum voltages from 2 000 up to 12 000 volts. Models include 2 kV, 4 kV, 6 kV, 12 kV and 12 kV HO (high output). These analyzers can be coupled with Baker Power Packs to boost test voltages to 24 or 30 kV for tests on large motors and generators.

Baker AWA-IV series analyzers perform the following tests:

- winding resistance
- insulation resistance
- dielectric analysis (DA)
- polarization index (PI)
- DC step-voltage
- DC continuous ramped
- DC hipot
- surge

Baker AWA-IV features

- Megohm, PI, DA, DC step-voltage, DC hipot test capabilities
- USB ports for data transfer and printing with Windows 7 plug-and-play printers
- Wireless networking capability
- RJ-45 ethernet port for wired local-area network connections
- 12 kV HO (high-output) version for performing surge tests on large motors
- Power pack compatibility (6kV, 12kV, and 12kV HO versions only)
- Solid-state disk drives standard
- Windows 10 operating system
- IEEE- and IEC-compliant surge test



The Baker AWA-IV 12kV analyzer. The 6kV and 12kV HO (high output) models share this form factor.

Rigorous, safe testing

The Baker AWA-IV offers the most advanced inter-turn test capabilities offered with a portable electric motor analyzer. The surge test safely applies voltages that a motor typically experiences hundreds of times over its working life, such as the voltage spikes that occur each time a motor is powered off/on. The Baker AWA-IV's step-voltage test can also be applied time after time with no adverse impact on a motor.

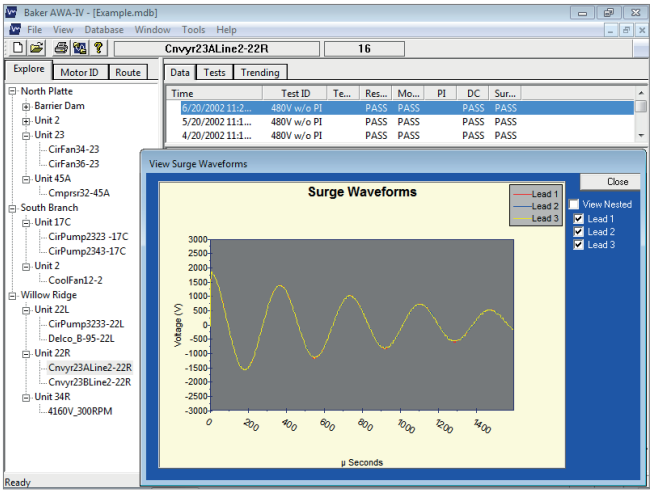
The Baker AWA-IV's computer control and waveform monitoring also provide major advantages over other motor testing devices on the market. The small number of pulses applied by the Baker AWA-IV during a test are digitized to produce a waveform that can be compared to previous pulse waveforms for detection of insulation weakness among winding turns. A pulse-to-pulse EAR (error area ratio) calculation is applied to compare waveform differences not easily detected by eye; this PP-EAR is sensitive to less than one percent of variance between waveforms. Shorts among parallel windings, which are often very difficult to identify with visual inspections of the waveforms, are also easy to detect thanks to the calculations performed by this PC-based analyzer.

After tests are completed and no turn-to-turn weaknesses are detected, the final pulse waveform data is stored for future reference and comparisons to other phases. This waveform can serve as the motor's unique reference waveform for several years, until it is rebuilt or decommissioned.

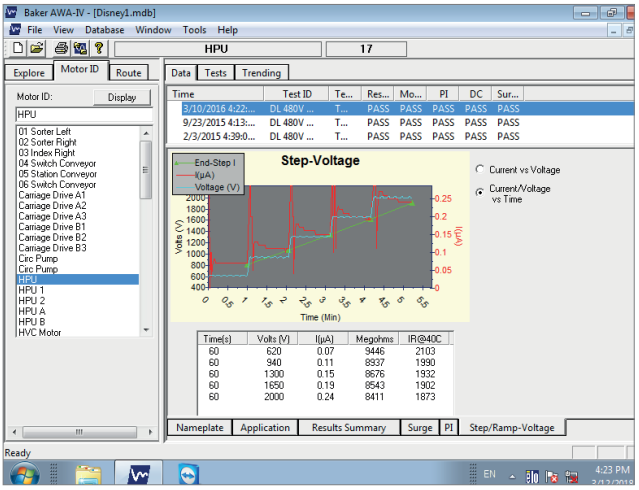
Test data collection, storage and reporting capabilities

All test results can be saved and stored on the Baker AWA-IV, but they can also be backed up or copied to a server or a desktop PC. The analyzer can connect by wire or wirelessly to a local-area network (LAN) to store test results in a relational database (e.g., Microsoft Access). Once stored, results are easy to retrieve for generating reports to share with colleagues and customers. Test results can be presented in context with historical data to identify and monitor trends with a given motor's condition.

Printed motor test reports are valuable for maintenance record-keeping, to provide customer warranty information, or to manage insurance records. The Baker AWA-IV's Windows 7 operating system enables a wide selection of compatible plug-and-play USB printer options.



Baker AWA-IV surge test results screen



DC step voltage test results screen

Large motor test capabilities

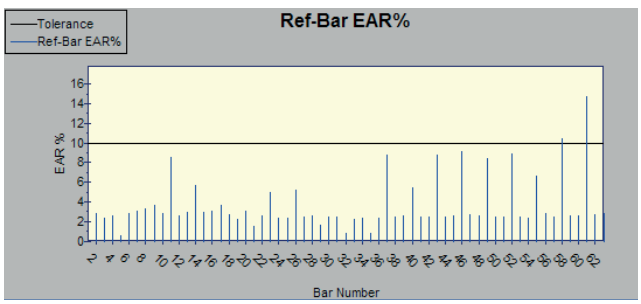
Increase the test capability of the Baker AWA-IV by coupling it with a power pack. The Baker PPX 30, Baker PPX 30A and Baker PPX 40 power packs are high-voltage test systems that enable testing of high-voltage windings. The output voltage is controlled by a variable transformer that produces up to 40 000 volts. Power packs perform both surge and DC hipot tests when used with a Baker AWA-IV as the controller, recorder and display unit.

The AWA-IV combined with a PPX Power Pack

Low impedance testing

Bar-to-bar armature tests on low-impedance coils are possible with the use of the Baker ZTX bar-to-bar test accessory or Baker PP85 or PPX 30A power packs. The Baker ZTX accessory reduces the voltage applied while increasing current to enable accurate tests on DC motor armatures as well as other low-impedance windings. The ATF 5000, a hand-held device that comes with the Baker ZTX , improves the speed, accuracy and ease of testing armatures bar-to-bar.

Testing an armature using the ZTX accessory and the ATF5000 commutator probe.



Bar-to-bar test results screen

Test Date	5/14/2012	4/4/2011	4/30/2009	5/14/2008	4/30/2007
Test Time	2:14:02 PM	8:11:29 AM	4:17:23 PM	4:44:44 PM	5:07:13 PM
Temp Status	Tested	Tested	Tested	Tested	Tested
Temp (°C)	22.3	19.3	20.9	22.3 RH 53%	20.9 RH 70%
Resiist Status	PASS	PASS	PASS	PASS	PASS
BAL L1 (Ohms)					
BAL L2 (Ohms)					
BAL L3 (Ohms)					
L1-L2 (Ohms)	1.348	1.177	1.356	1.348 Corr: 1.362	1.356 Corr: 1.377
L2-L3 (Ohms)	1.36	1.176	1.37	1.36 Corr: 1.37	1.37 Corr: 1.39
L3-L1 (Ohms)	1.350	1.175	1.36	1.350 Corr: 1.364	1.36 Corr:1.38
Max Delta R %	0.890	0.170	1.030	0.890	1.030
Coil 1 (Ohms)	0.669	0.588	0.673	0.669 Corr: 0.676	0.673 Corr: 0.684
Coil 2 (Ohms)	0.68	0.589	0.68	0.68 Corr: 0.69	0.68 Corr: 0.69
Coil 3 (Ohms)	0.681	0.587	0.69	0.681 Corr: 0.688	0.69 Corr: 0.70
Megohm Status	PASS	PASS	PASS	PASS	PASS
VOLTS (V)	2500	2520	2500	2500	2500
I(µA)	0.25	0.80	0.22	0.25	0.22
Resist	10042	3150	11325	10042	11325
At 40 °C	2951	749	3011	2951	3011
PI Status	PASS	PASS	PASS	PASS	PASS
Volts (V)	2520	2520	2500	2520	2500
DA Ratio	2.2	4.6	2.1	2.2	2.1
PI Ratio	2.8	6.7	2.4	2.8	2.4
DC Status	PASS	PASS	PASS	PASS	PASS
Test Type	HiPot	HiPot	HiPot	Step-Voltage	Step-Voltage
Volts (V)	10500	10500	10500	10500	10500
I(µA)	1.40	2.30	1.50	1.40	1.50
Resist	7500	4565	7000	7500	7000
At 40 °C	2204	1085	1861	2204	1861
Surge Status	PASS	PASS	PASS	PASS	PASS
Peak Volt(V) L1	9360	9360	9360	9360	9360
Peak Volt(V) L2	9360	9360	9360	9360	9360
Peak Volt(V) L3	9360	9360	9360	9360	9360
Max P-P EAR(%)	No Test	No Test	No Test	3.0/3.0/3.0	3.0/3.0/3.0
EAR 1-2/2-3/3-1(%)	No Test	No Test	No Test	1/1/0	1/1/0

Comprehensive test results summary screen

What's in the box

- Power cord
- USB flash drive with desktop software
- User manual (on USB flash drive)
- Test leads
- Keyboard with integrated mouse

Optional accessories

- Baker Power Pack PPX 30, PPX 30A, PPX 40
- Baker ZTX low-impedance test accessory
- USB plug-and-play printer
- USB wireless network adapter
- Rugged transport case

The more compact 2kV and 4kV models are ideal for smaller motors and coils.

Baker AWA-IV series specifications

	Baker AWA-IV/12 HO	Baker AWA-IV/12	Baker AWA-IV/6	Baker AWA-IV/4	Baker AWA-IV/2
Surge test					
Output voltage	0 to 12000 V	0 to 12000 V	0 to 6000 V	0 to 4250 V	0 to 2160 V
Max output current	800 A	600 A	250 A	450 A	250 A
Pulse energy	7.2 J	2.88 J	0.72 J	0.9 J	0.2 J
Storage capacitance	0.1 µF	0.04 µF	0.04 µF	0.1 µF	0.1 µF
Sweep range	2.5 to 200 µs/Div	2.5 to 200 µs/Div	2.5 to 200 µs/Div	2.5 to 200 µs/Div	2.5 to 200 µs/Div
Volts per division	250 / 500 / 1000 / 2000	250 / 500 / 1000 / 2000	250 / 500 / 1000 / 2000	250 / 500 / 1000 / 2000	250 / 500 / 1000
Repetition rate	5 Hz	5 Hz	5 Hz	5 Hz	5 Hz
Voltage measurement and accuracy	± 12% [1]	± 12% [1]	± 12% [1]	± 12% [1]	± 12% [1]
DC Hipot test					
Output voltage	0 to 12000 V	0 to 12000 V	0 to 6000 V	0 to 4000 V	0 to 2000 V
Max output current	10 mA	5 mA	5 mA	5 mA	10 mA
Current resolution	0.1, 1, 10, 100 µA/Div	0.1, 1, 10, 100 µA/Div	0.1, 1, 10, 100 µA/Div	0.1, 1, 10, 100 µA/Div	0.1, 1, 10, 100 µA/Div
Over-current trip settings (factor @ 0.8)	1, 10, 100, 1000 µA	1, 10, 100, 1000 µA	1, 10, 100, 1000 µA	1, 10, 100, 1000 µA	1, 10, 100, 1000 µA
Full scale voltage and current measurement and accuracy	± 5%	± 5%	± 5%	± 5%	± 5%
MΩ accuracy	± 10%	± 10%	± 10%	±10%	± 10%
Max MΩ reading	>50 GΩ	>50 GΩ	>50 GΩ	>50 GΩ	>50 GΩ
Resistance measurements					
	1 mΩ to 800 Ω	1 mΩ to 800 Ω	1 mΩ to 800 Ω	1 mΩ to 100 Ω	1 mΩ to 100 Ω
Physical characteristics					
Weight kg (lb)	22.7 kg (50 lb)	19 kg (42 lb)	19 kg (42 lb)	8.2 kg (18 lb)	8.2 kg (18 lb)
Dimensions, cm (inches)	40.6 x 20.3 x 53.3 (16 x 8 x 21)	40.6 x 20.3 x 53.3 (16 x 8 x 21)	40.6 x 20.3 x 53.3 (16 x 8 x 21)	38.1 x 20.3 x 20.3 (15 x 8 x 8)	38.1 x 20.3 x 20.3 (15 x 8 x 8)
Power requirements	85 to 264 V AC 50/60 Hz at 2.5 A	85 to 264 V AC 50/60 Hz at 2.5 A	85 to 264 V AC 50/60 Hz at 2.5 A	85 to 264 V AC 50/60 Hz at 2.5 A	85 to 264 V AC 50/60 Hz at 2.5 A

Baker DX Series
Static Electric Motor Analyzers

Introduction

Electric motors will fail, sooner or later. Nearly half of all industrial motor failures result from internal electrical shorts caused by degraded insulation. In order to maximize a motor's uptime and service life, the condition of its winding and groundwall insulation must be tested regularly.

The Baker DX Static Motor Analyzer provides the industry's most comprehensive set of tests to analyze a motor's entire insulation system. Portable, powerful, and configurable to meet the specific needs of motor shops, industrial maintenance teams and motor OEMs, the Baker DX series offers the best value in motor test equipment available today. These analyzers deliver superior test capabilities in an easy-to-use instrument.

Early, reliable problem detection

Baker DX series analyzers detect every common electrical problem with industrial motors. In both random and form wound coils and windings, a Baker DX can identify incorrect numbers of turns, wire gauges or wire material. It also detects open, reversed or unbalanced coils.

These analyzers find early indications of insulation weakness and faults in windings, between phases, coil-to-coil and in groundwall insulation. They can identify if contamination by chemicals, moisture, dust or dirt is impacting insulation strength. Additionally, they detect problems with motor connections such as feed cable insulation weaknesses, imbalances, opens or high resistances.

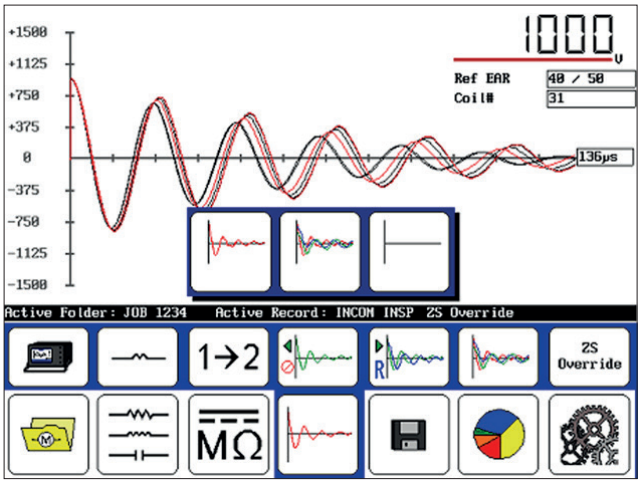
Value-packed versatility

The Baker DX series comes in a wide range of configurations and can be ordered with just the test capabilities needed, including winding insulation tests, groundwall insulation tests, low-voltage winding construction tests, maximum test voltage and number of leads. Additional options include a partial discharge (PD) surge test, low-impedance coil testing and connections which enable high voltage testing with Baker Power Packs, such as the new Power Pack PPX.

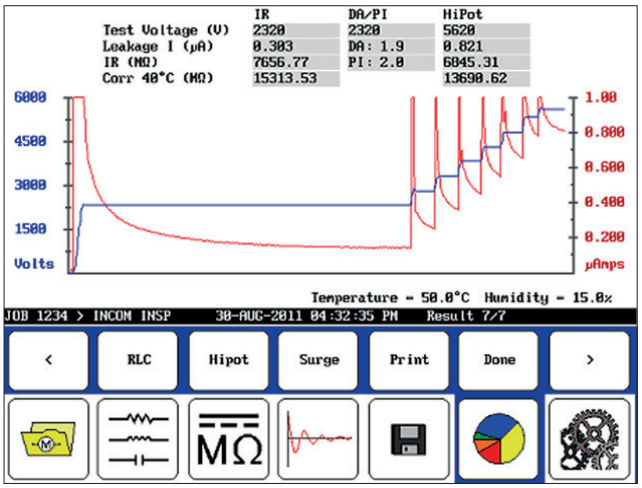
Ease of use

The Baker DX has an intuitive touch-screen user interface that makes it easy to perform any test. The lightweight, portable design enables use in the field as well as the shop. Reports are easy to generate and print via the USB interface.

These analyzers implement a unique coil-test mode that enables rapid testing of hundreds of coils. Up to 400 coil test results can be saved in a single record.



Surge test on multiple coils



DC test results

Baker DX Physical Specifications

- Internal memory: 2 GB
- Internal storage: 16 GB SD card
- Printer interface: USB/PCL 3 type printer
- External connectors: RLC leads, foot switch, remote E-stop safety lights, Baker power pack, ground
- User interface: 8-in color VGA touch screen

What's in the box

- Power cord
- USB flash drive with trial Surveyor DX desktop PC software
- User manual (on USB flash drive)
- Test leads

Optional accessories

- Surveyor DX report generation software (for use on personal computers)
- Baker PPX 30, 30A and 40 power packs
- Baker ZTX low-impedance test accessory
- ATF5000 bar-to-bar armature test fixture
- Foot switch and Extension leads
- USB compatible printer
- Durable fabric backpack case
- Safety lights

Baker DX 6kV High Output model

A full toolkit of tests

The Baker DX finds all common problems with an industrial motor's insulation or electrical systems. The industry-leading, standards-compliant range of tests includes:

- Winding resistance
- Inductance
- Capacitance
- Impedance
- Phase angle and D/Q
- Insulation resistance
- Dielectric absorption (DA)
- Polarization index (PI)
- Step voltage
- DC hipot
- Surge
- Surge PD (partial discharge)
- Rotor influence check (RIC)

Note that some tests require optional features (see the table on the next page).

These analyzers feature:

- 4 to 40kV max test voltages to perform tests on a full spectrum of motor and coils (fractional horsepower motors up to multi-megawatt generators)
- High- and low-voltage test capability in a single instrument to test motor circuit and insulation systems
- Intuitive graphical user interface with large, glove-friendly touch screen
- USB printer and flash drive interface for easy report printing and data transfer
- Coil mode enables rapid testing of coils and storage of all data

Comprehensive motor analysis with the Baker DX series

The Baker DX analyzer provides a comprehensive array of tests which can expose a wide range of issues with motors. The table below shows which tests are applicable for each type of problem. Some tests require optional modules for the DX analyzer.

Failure modes	Winding resistance[1]	Induc-tance[2]	Capac-itance[2]	Impe-dance[2]	Phase angle[2]	D/Q[2]	IR test	DA/PI test	DC step voltage	DC HiPot	Surge	Surge PD[3]	RIC[4]
Weak insulation turn-turn											■	■	
Weak insulation phase-phase						■					■	■	
Weak insulation coil-coil						■					■	■	
Turn-turn shorts	■	■		■	■						■		
Phase-phase shorts	■	■		■	■						■		
Open coils	■	■		■	■	■					■		
Reversed coils		■		■	■						■		
Unbalanced phases	■	■		■	■						■		
Weak ground wall insulation							■	■	■	■			
Dirty windings			■				■	■	■	■			
Moisture			■				■	■	■	■			
Feeder cables							■	■	■	■	■		
Motor lead line connections	■			■	■	■					■		
Form coil defects		■		■	■	■					■	■	
Rotor bar													■

1) Requires Winding Resistance option

2) Requires Inductance / Capacitance option

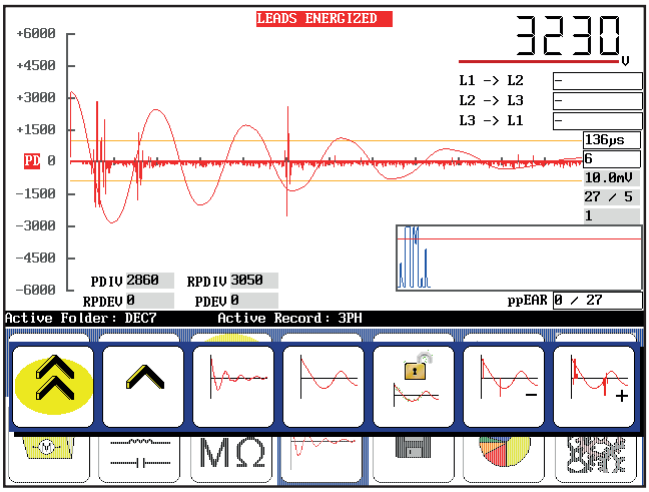
3) Requires PD (partial discharge) option

4) Requires RIC (rotor influence check) option

Partial discharge

High voltage equipment can suffer from partial electrostatic discharge, where localized corona or breakdown discharge can damage insulation, leading to progressive degradation and eventual circuit breakdown.

Winding insulation defects of this type can be found early with the optional Baker DX Surge PD capability, which captures inception, repetitive inception, repetitive extinction and extinction voltages of partial discharge (PD) in accordance with the IEC 61934 standard. PD waveforms and data are included in reports generated by the Baker DX and the Surveyor DX desktop PC software application.

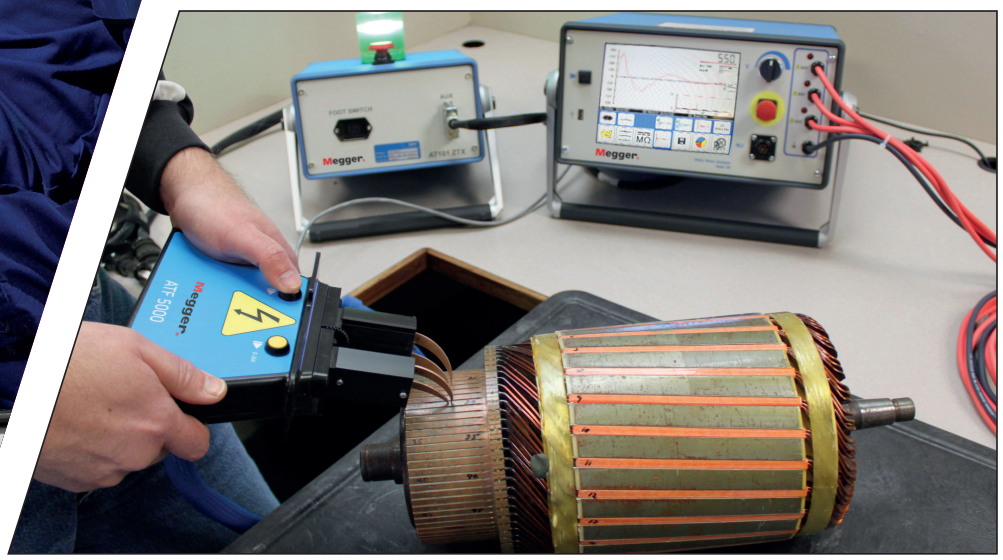


Partial Discharge (PD) test results. The spiky trace that accompanies the surge waveform indicates that partial discharge is occurring.

DC motor testing

DC motor testing is quick and accurate using the Baker DX. The tester includes an armature test mode user interface and reporting function. Interpole and field coil test results are specially labelled. Bar-to-bar and span tests can be performed on a DC armature to thoroughly analyze for shorts, open circuits, weak turn-to-turn insulation, unbalances in the coils, and damaged or misconnected commutator risers and equalizers. For the best armature diagnostics, the Baker DX can be used with the Baker ZTX low-impedance test accessory, which enables bar-to-bar testing on most DC armatures. The Baker ZTX lowers the maximum surge test voltage and increases the available surge current for testing very low impedance coils.

The Baker DX-15A features integrated ZTX technology built into the instrument.



Performing armature tests is easy with the ATF5000 and Baker ZTX low-impedance component test accessories

Fully document test results

Storage of test results data is easy with the Baker DX series' multi-test storage capabilities. The instrument has the ability to store multiple test results within a single folder. The scroll function button makes it easy to quickly review all data.

Reports, including motor nameplate data, can be printed on compatible printers via the USB port. Company logos can be imported and saved in the Baker DX software so every report has a logo of the user's choice at the top of the page. Test results are exportable to USB flash memory for data transfers, and for report generation or data storage on a PC using the optional Surveyor DX software.

Baker DX series specifications

Model-specific tests	4 and 6kV models	6kV HO model	12kV model	12kV HO model	15kV models
DC tests					
Voltage accuracy	3%	3%	3%	3%	3%
Maximum resistance[1]	> 25 / 50 GΩ	> 50 GΩ	> 75 GΩ	> 75 GΩ	> 100 GΩ
Current accuracy	5%	5%	5%	5%	5%
Minimum resistance	1 MΩ	1 MΩ	5 MΩ	5 MΩ	5 MΩ
Maximum output current	5 mA	5 mA	5 mA	10 mA	8.3 mA
Over-current trip	1.2 mA	1.2 mA	1.2 mA	1.2 mA	1.2 mA
Surge					
Capacitor size	40 nF	100 nF	40 nF	100 nF	100 nF
Surge energy	0.32 J / 0.72 J	1.8 J	2.88 J	7.2 J	11.25 J
Short circuit current	280 A / 340 A	450 A	600 A	800 A	700 A / 2000 A
65 µH load voltage	4 kV / 6 kV	6 kV	12 kV	12 kV	15 kV / 1.5 kV
Surge voltage accuracy[2]	12%	12%	12%	12%	12%

1) Test current must be greater than 100 nA, and test voltage must be less than 75% of maximum voltage

2) Surge voltage accuracy meets / based on Z540 Standard, four times measurement uncertainty (calibrated within 3%)

Tests (all models)			
Surge PD (option)			
Inception and extinction voltages (PDIV, PDEV)		Measured per IEC 61934	
Repetitive inception and extinction voltages (RIPDV, REPDV)		Measured per IEC 61934	
Programmable PD threshold range		1.0 mV – 999 mV	
PD time resolution (per pixel)		10 nS – 50 µs	
Resistance		**Inductance**	
Source voltage, maximum	3.9 V	Source voltage, maximum	3.9 V
Source current, maximum	600 mA	Source current, maximum	600 mA
100 to 10 000 Ω	3% accuracy	Source frequency	40 to 4 000 Hz
0.2 to 100 Ω	2 % accuracy	1 000 to 5 000 mH at 120 Hz	15% accuracy
0.002 to 0.2 Ω	4% ± 1 mΩ	100 to 1 000 mH at 120 Hz	8% accuracy
		0.05 to 100 mH at 1 kHz	5% accuracy
Capacitance		**Impedance**	
Source voltage, maximum	3.9 V	Source voltage, maximum	3.9 V
Source current, maximum	600 mA	Source current, maximum	600 mA
Source frequency	4 000 Hz	Source frequency	50 to 4 000 Hz
0.04 to 2.6 µF at 4 000 Hz	3% accuracy	0.15 to 10 000 Ω at 60 Hz	3% accuracy
2.6 to 26 µF at 4 000 Hz	5% accuracy	0.01 to 0.15 Ω at 60 Hz	3% accuracy
		Phase accuracy at 60 Hz	< 2 degrees
Physical specifications	4/6/12 kV, 6/12 kV HO models	DX-15 model	DX-15A model
Dimensions	42 cm x 20 cm x 45 cm (16.5 in x 8 in x 17.7 in)	47 cm x 20 cm x 56 cm (18.5 in x 8 in x 22 in)	47 cm x 20 cm x 56 cm (18.5 in x 8 in x 22 in)
Weight	15.4 kg (34 lbs)	22.7 kg (50 lbs)	25 kg (55 lbs)
Compliant with IEEE 43, 96, 118, 522; also with IEC 34, 60034, 61934 (as applicable)			

Baker Surveyor DX software

Introduction

Motor maintenance professionals, service and repair shops and manufacturers all need to assure their customers that the motors they sell or put into service will perform as expected. They require reliable motor test and analysis equipment that can determine if a motor was properly wound, or if any weaknesses in the insulation exist that would lead to premature failure.

Motor tests performed on static (i.e. off line, unpowered or out-of-service) motors often require the use of portable static motor test equipment such as the Baker DX Static Motor Analyzer. Users rely on the analyzer's large front-panel touch screen user interface to view results, or they can print and export reports via the unit's USB connection to a compatible printer.

Surveyor DX software enables Baker DX operators to use a personal computer to store more test data, generate and view reports across the full spectrum of Baker DX tests, and share and compare analysis with other maintenance personnel using data from multiple analyzers.

With Surveyor DX, maintenance professionals can elevate quality assurance to new levels. The software stores and displays all surge waveforms for a complete armature, or for individual form-wound coils in an AC motor, and provides comprehensive details that prove a given motor was thoroughly tested. Surveyor DX makes it very easy to analyze hundreds of coils or bar-to-bar tests on a given armature, which instils confidence in operators about the quality of motor rewind work. Users can analyze trends to identify motors at risk of failure.

From analyzer to desktop

Surveyor DX is a software application that provides users the option to use a Microsoft Windows-based desktop or laptop computer to easily generate, view, print and archive Baker DX motor test results from an office or with a laptop in the field.

Results include data analysis from the following types of tests:

- low-voltage RLC (resistance, inductance, capacitance)
- phase angle, impedance and D/Q
- DC tests (meg-ohm, polarization index, dielectric absorption, DC hipot and step voltage)
- surge tests of motors, coils and armatures

How Surveyor DX works

Surveyor DX imports Baker DX test data saved on a USB drive and stores it in a database. Data from multiple Baker DX analyzers can be stored in the same database. The data is accessible to multiple users to view, share, organize and archive any specific set of test data, results or analysis acquired from any Baker DX unit.

Quick view results

Surveyor DX provides representative views of printed reports for selected results. For DC test and surge graphs, the application includes a zoom feature and a cursor with x,y readout (on DC graphs).

Export compatibility with XML

Surveyor DX can generate reports in XML format that make them cross-compatible with other XML applications, such as Word and Excel.

In addition to the Baker DX serial number and date/time stamp for each test result type, the test data includes all scalars and DC test tables. Data for graphs is also exported, and includes surge graph data and DC test graph data.

Database support

Surveyor DX currently works with Microsoft Access database. Future versions are planned to support SQL databases such as SQL Express RT2. Surveyor DX database files will have a .dxdb extension.

Surveyor DX reports

Surveyor DX generates the following types of reports, depending on the source data collected from the tester:

- Low-voltage/RLC: resistance, inductance, capacitance, D/Q, impedance, phase angle
- DC tests: meg-ohm, PI, DA, DC high potential (hipot),
  step-voltage with DC graph
- Surge, three-phase: surge waveform, LL and pulse-to-pulse EAR, partial discharge
- Surge, coil/armature/span: reference vs. test EAR bar chart, thumbnails of each coil/bar vs. reference surge waveforms

Supported software

Surveyor DX works on the following 32-bit and 64-bit Microsoft OS platforms:

- Windows XP with Service Pack 3
- Windows Vista
- Windows 7
- Windows 10

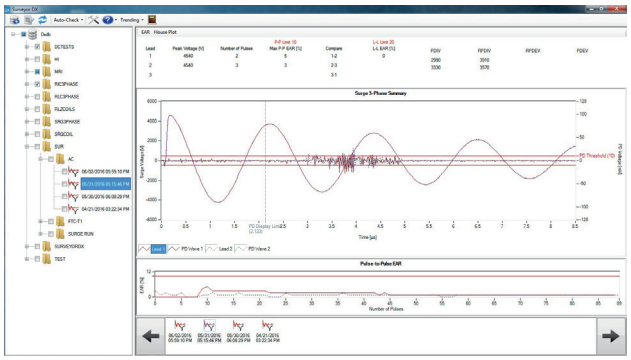
The application is compatible with Internet Explorer 8 (or later) for opening mhtml files, and with Microsoft Word 2003 or later for creation of reports.

Languages supported

English, German, French, Spanish and Portuguese.

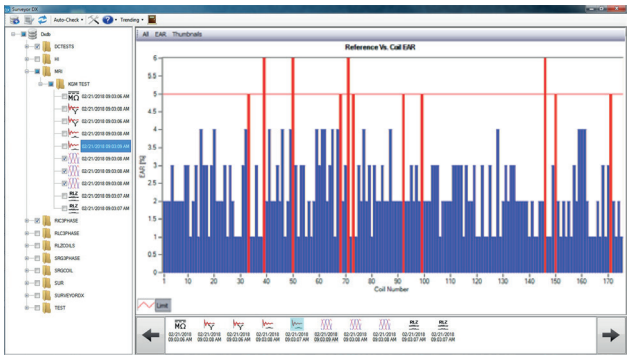
Report formats

Reports can be saved in Web format (html, htm), Web archive (mhtml, mht), MS Word 2003 (doc), 2007 and later (docx), and XML.



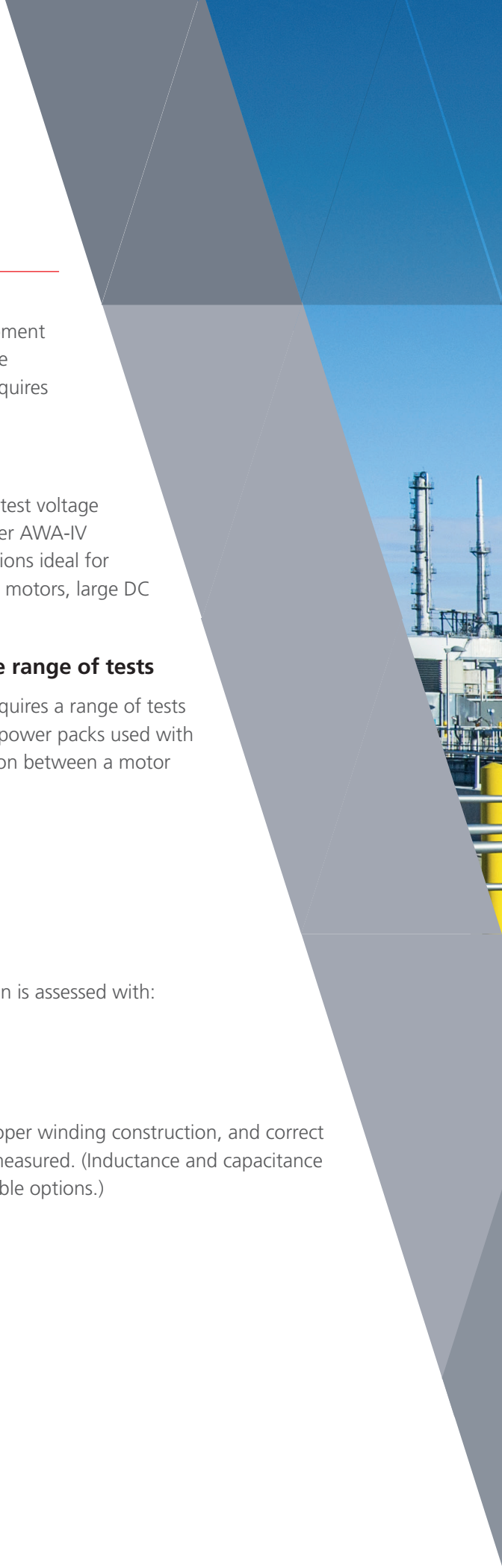
Surge test results with Partial Discharge (PD)

DC test results



Results for multiple coils

Baker PPX Power Packs
Static Motor Analyzer Booster



Introduction

High-voltage motors and generators are critical to the operation of industrial plants and power generation facilities. Testing of this equipment during the manufacturing process, or in a plant as part of a predictive maintenance program, or in a motor shop before and after repair, requires equipment that can perform tests at voltages as high as 40 kV.

Finding large motor issues and faults: no problem

The Megger Baker Power Packs PPX30 and PPX40 provide increased test voltage ranges for our static motor and coil analyzers (the Baker DX and Baker AWA-IV series), up to 40 kV. This makes these power pack/analyzer combinations ideal for assessing insulation condition on form-wound coils, high-voltage AC motors, large DC motors and transformers.

Accurately assess high voltage windings with a complete range of tests

Effective testing of medium and high voltage apparatus insulation requires a range of tests to characterize and locate insulation weaknesses and defects. Baker power packs used with Baker static motor analyzers thoroughly test the ground wall insulation between a motor stator's core and windings by combining multiple tests, including:

- Megohm test
- Step and ramp voltage tests
- High-potential (hipot) test
- Polarization index (PI) and dielectric absorption (DA) tests

The condition of winding (turn-to-turn) and phase-to-phase insulation is assessed with:

- Surge test
- Pulse-to-pulse error-area ratio (PP-EAR) analysis

Coil resistance and inductance measurements are made to assure proper winding construction, and correct assembly of the coils into the motor. Capacitance to ground is also measured. (Inductance and capacitance tests require a Baker DX or Baker Power Pack Controller with applicable options.)

Improve worker safety

To minimize the risks of working with high-voltage motor test equipment, Baker power packs feature:

- Test leads that exceed power pack maximum test voltages (60 kV rated)
- Highly visible, easy-to-reach equipment stop (e-stop) buttons
- Available remote e-stop switches and safety lights

To further increase safety, all power packs require deliberate, multiple actions to initiate a test (e.g. combined use of a foot switch and a front panel button). Also, tests can't begin unless the test voltage is set to zero volts (can be overridden), or if an open (AC power) ground lead is detected. Finally, external contacts for light curtains or other third-party safety devices are available.

Choose the model that meets your needs

- Baker PPX30: Provides up to 30 kV of test voltage and has three switchable test leads for simple connections to three-phase apparatus.
- Baker PPX40: Single-lead tester that performs tests at voltages up to 40 kV.
- Baker PPX30A: Features an internal armature test circuit for testing large DC motors and components. When in armature mode, the test voltage is limited to 2 100 V; however, the available test current is extended to 7 000 Amps.

The Baker PPX cabinet features large 8 inch (203 mm) pneumatic wheels for easy transport to testing areas, an AC outlet for the host static motor analyzer and a storage area for power pack leads.

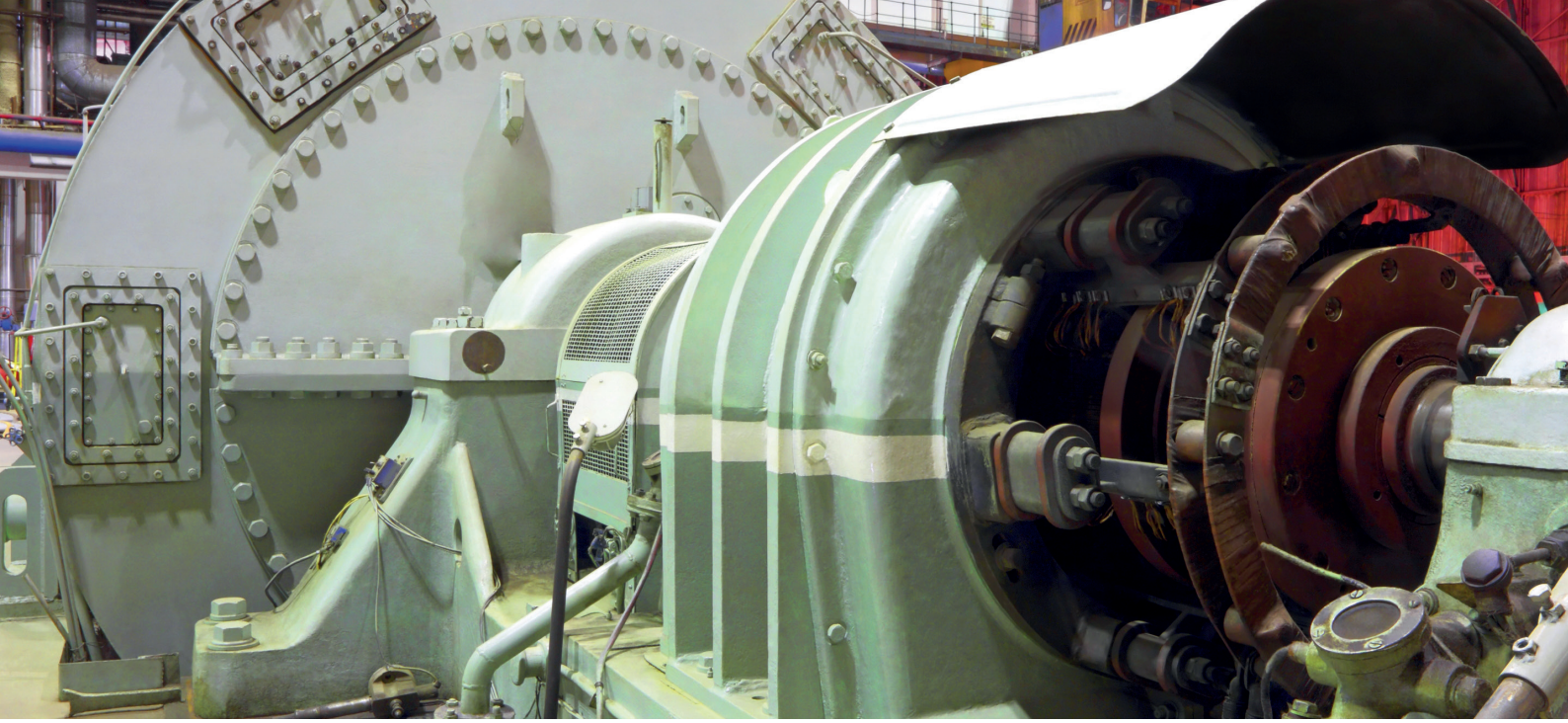
Benefits

- Provide extended test voltage ranges for static motor analyzers
- Accurately test large apparatus and coils
- Minimize unexpected motor failures
- Optimize productivity
- Improve worker safety
- Easy transport to testing areas

Features

- Regulated test voltages from 0kV to 40kV (with host unit)
- Complete range of tests
- Multiple safety features
- Large pneumatic wheels for mobility
- AC outlet and storage area for leads
- Arc detection
- Over-current detection
- User-settable voltage ramp rate eliminates nuisance trips and improves repeatability
- Fast, clearly reported HV coil testing mode (with Baker DX or Power Pack Controller)
- Professional results reporting

The Baker PPX30 Power Pack shown with the Baker DX static electric motor analyzer

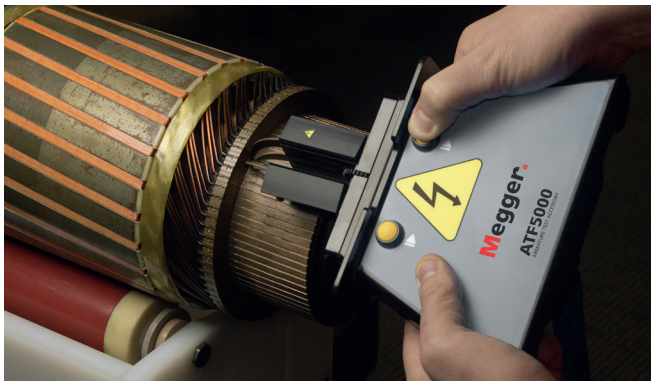


Motor repair shops

Megger's Baker DX static motor analyzer is the ideal controller for the Baker Power Pack PPX series in the context of a motor repair shop, allowing a range of winding insulation and ground wall condition tests to be run on motors on arrival and after repair.

Offering a full suite of manually-operated tests, the combination of DX and PPX makes a formidable tool for troubleshooting insulation issues on medium and high voltage apparatus, including ground wall, turn-to-turn and phase-to-phase insulation integrity, RLC and coil construction. Then, once the repair work is complete, a further round of quality assurance tests ensures that the equipment is ready to go back into service.

The PPX30A adds armature test functionality to the 30kV power pack, allowing rapid and efficient testing of large DC motors.



The ATF5000 armature test accessory makes testing armatures with many coils and commutator segments easy and fast

Predictive maintenance

For route-based, repeatable equipment testing as part of a predictive maintenance program in an industrial plant or power generation facility, the Baker AWA-IV static analyzer is the best choice for a controller for the Baker PPX family.

A maintenance supervisor can create a route for the technician, which includes predefining the set of tests and test parameters for each motor in the route. Results are captured in the AWA-IV and can be analyzed for motor condition trends, either on the analyzer itself, or exported to the supervisor's desktop or laptop computer.

The Baker AWA-IV in combination with the Baker PPX power pack is also a powerful troubleshooting tool when issues arise with high-voltage motors, generators or transformers. It can expose insulation weaknesses and circuit imbalances, leading to informed decisions regarding repair or replacement.

Coil & motor manufacturers

The Baker PPX Power Packs are ideal for quick and efficient QA testing of large coils and motors during the manufacturing process, with each coil's results saved.

Standards-based testing

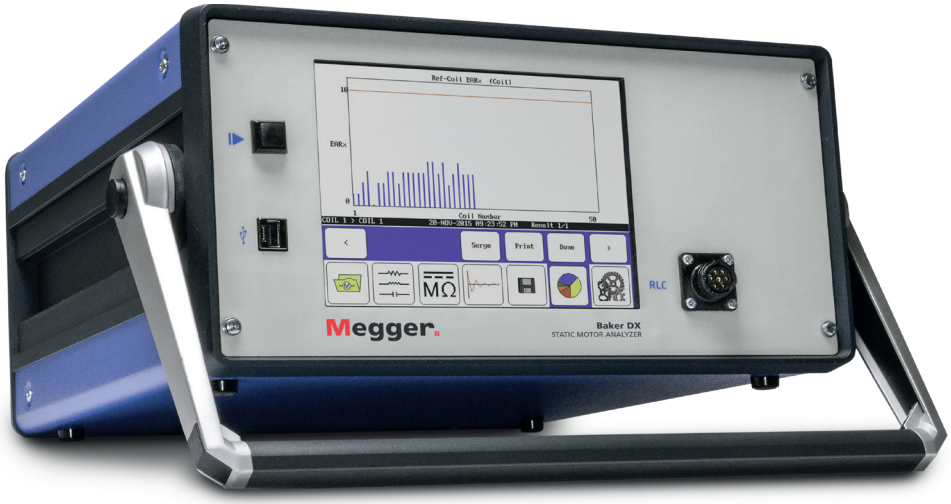
The Power Pack PPX's suite of high-voltage surge and HiPot tests complies with a range of industrial standards, including IEEE 43, 95, 522; NEMA MG-1; IEC 34-15; EASA AR-100; NFPA 79 and others.

Baker PPX Power Pack series specifications

	Baker PPX30	Baker PPX40	Baker PPX30A
Surge test			
Maximum output voltage	30 000 V	40 000 V	30 000V
Max output current (leads shorted)	1 400 A	2 600 A	1 400 A
Maximum impulse energy	45 J	120 J	45 J
Accuracy	12%	12%	12%
DC high potential test			
Maximum output voltage	30 000 V	40 000V	30 000 V
Voltage accuracy	3%	3%	3%
Maximum output current	10 mA	9 mA	10 mA
Current accuracy	5%	5%	5%
Overcurrent trip	12/120/1 200 µA	12/120/1 200 µA	12/120/1 200 µA
Current scales (per division)	1/10/100 µA	1/10/100 µA	1/10/100 µA
Armature bar-to-bar test (Baker PPX30A only)			
Maximum voltage	-	-	(no load) 2 100 V
Maximum current	-	-	7 000 A
Maximum impulse energy	-	-	45 J
Maximum test inductance	-	-	20 µH
Minimum test inductance	-	-	0.4 µH
Physical characteristics			
Weight	310 lbs (141 kg)	290 lbs (132 kg)	321 lbs (146 kg)
Power requirements	100/220 V, 50/60 Hz, 1 000 W	100/220 V, 50/60 Hz, 1 000 W	100/220 V, 50/60 Hz, 1 000 W
Test leads	3	1	3+1 (armature)
Dimensions	Without handle and cable storage (W x H x D): 24 x 48 x 26 in (610 x 1 219 x 660 mm) With handle and cable storage (W x H x D): 24 x 48 x 33 in (610 x 1 219 x 838 mm)		
Operates with	Baker AWA-IV, DX, Controller	Baker DX, Controller	Baker AWA-IV, DX, Controller

Baker Power Pack Controller

The Baker Power Pack Controller is a low-cost option designed to operate the Baker PPX30, Baker PPX40 and Baker PPX30A high-voltage power packs. It is used when performing DC hipot and surge tests to record and display the results. This controller can only be used when attached to a Baker power pack; it is not a stand-alone analyzer.



Benefits

- Displays surge test waveforms
- Displays DC hipot results
- Displays hundreds of coil waveforms for quick analysis
- Stores reference waveforms when coil testing for future reference
- Fast waveform analysis
- Automatic indication of faulty coils
- Fast, efficient coil test function can store up to 400 coil results in a single record
- EAR bar chart analysis for quick identification and reporting of defective coils
- Easily print results directly from controller
- Export results to Surveyor DX desktop report software
- Master / reference waveform for coil test
- Zero start override

Report storage and analysis

The Baker Power Pack Controller can store multiple test results in a single folder and automatically attach a time/date stamp. Data is quickly and easily reviewed using the scroll button on the analyzer's touch screen inter-face. Nameplate data is easy to enter, and can be sent directly to a printer through the front-panel USB port. Keep your company's or client's brand in front of customers by easily adding a logo to reports and screens. Test results with company logos can be exported to our Surveyor DX desktop report generation software on a PC.

Ease of use

The controller's large, 8-inch diagonal touch screen is an industrial-grade, ruggedized color display designed to withstand the rigors of daily use in shop and field motor testing environments. The user interface features large, intuitive icons for easy touch operation, even when an operator is wearing insulated electrical gloves.

Options

The Power pack controller is available in three versions:

- Power Pack Controller
- Power Pack Controller with resistance test
- Power Pack Controller with RLC tests

Baker Power Pack Controller specifications

Power requirements	100 to 240 V AC, 50/60 Hz, 2,5 A
Dimensions	40,6 cm x 35,6 cm x 20,3 cm (16 in x 14 in x 8 in)
Weight (all configurations)	15,4 kg (34 lbs)
VGA touch screen display	17,0 cm x 12,7 cm (6,7 in x 5,0 in)
Optional accessories	USB printer, foot switch, remote equipment stop safety lights, RLC probes, Surveyor DX software

Baker EXP4000
Dynamic Electric Motor Analyzer

Introduction

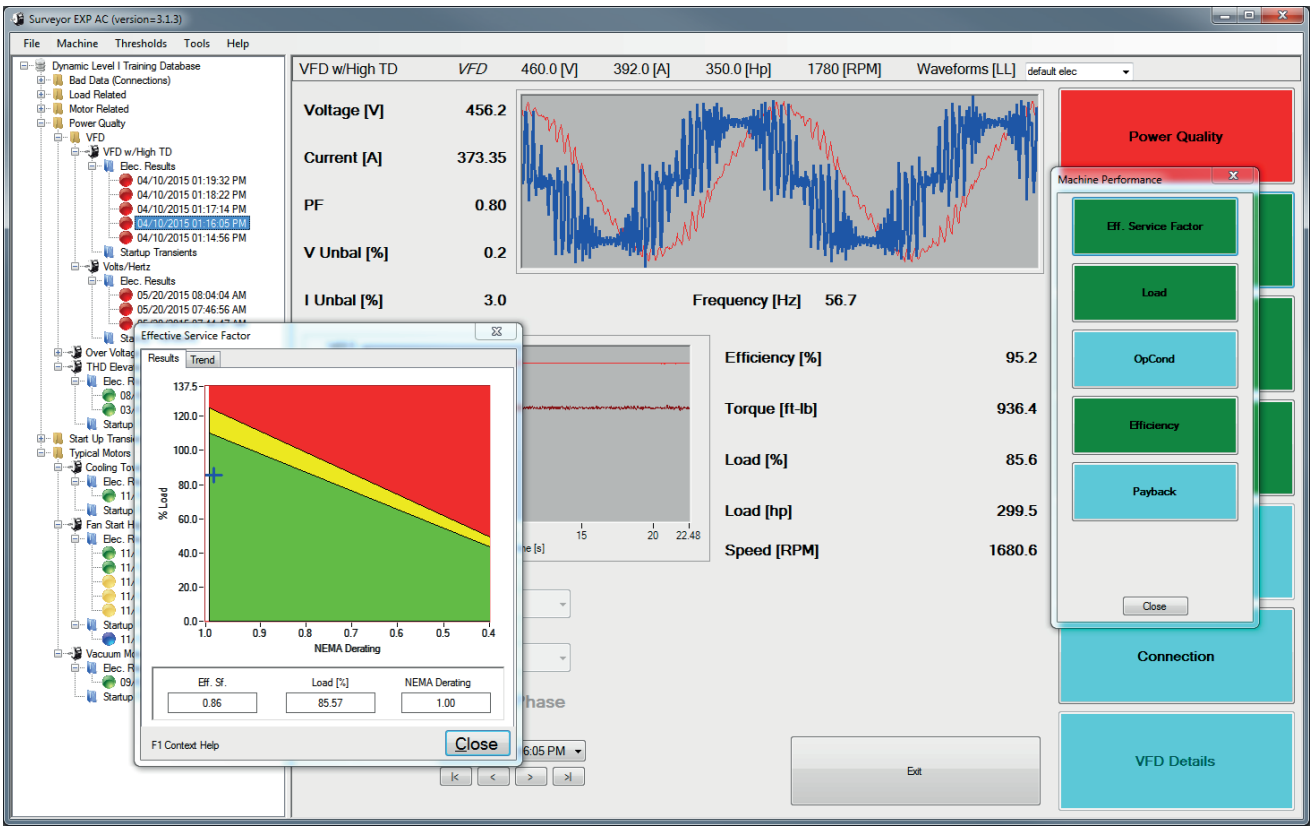
Maintenance professionals need to minimize repair costs associated with unexpected motor failures and production downtime. The Baker EXP4000 Dynamic Motor Analyzer is a motor system monitoring and troubleshooting tool that helps maintenance personnel to minimize failures and maximize the uptime of the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

Baker EXP4000 Related Product

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.

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:

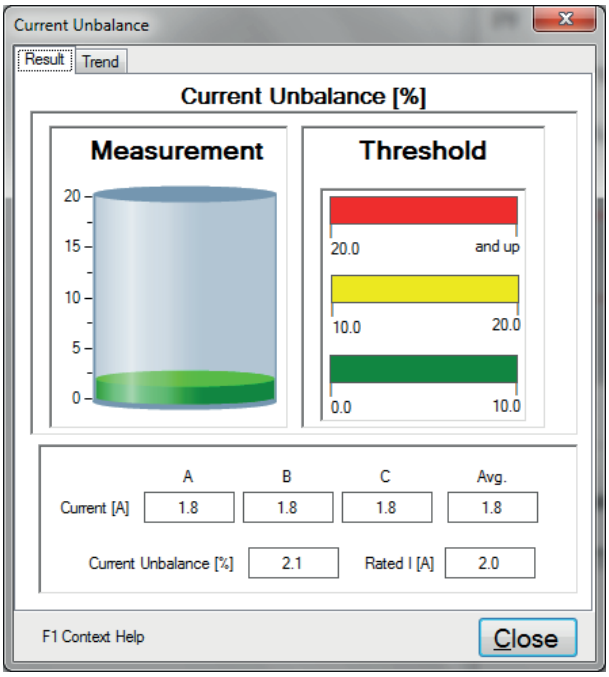
- Power quality
- Machine performance
- Current
- Spectrum
- Torque
- Variable-frequency drives
- Continuous monitoring
- Transient analysis
- Efficiency

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.

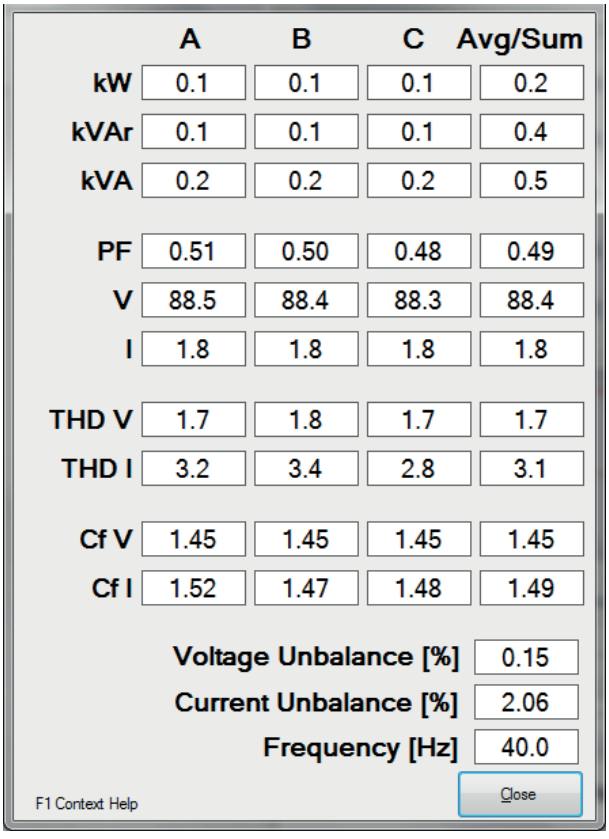
The EXP4000 hardware and software are designed for intuitive use. Software features include graphically-displayed data such as phasor diagrams, three-phase currents and voltages, instantaneous voltage and symmetrical components. This provides an operator with valuable power information as well as the 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

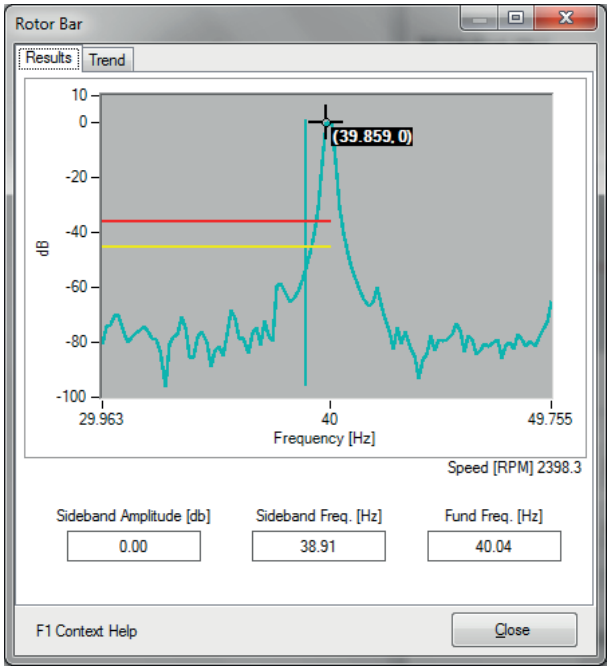
The innovative torque analysis capabilities within the EXP4000 can expose torque-related problems. The torque time and spectrum signatures are used to diagnose mechanical problems, and to clearly identify transient conditions. Users can accurately identify such issues as over-torque, over-load, cavitation,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

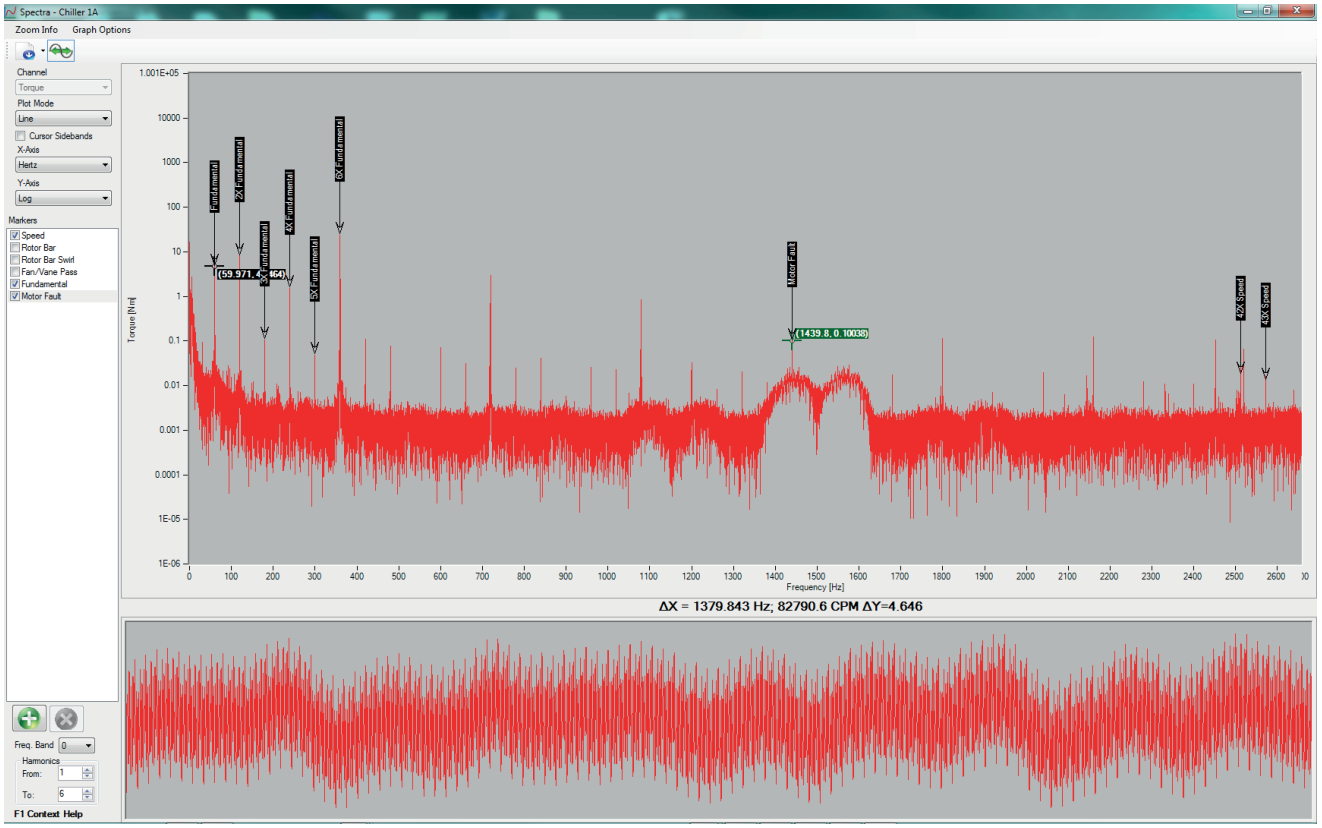
VFD monitoring

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.

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

Baker NetEP
On-line Motor Analysis System

Introduction

The Baker NetEP On-line Motor Analysis System is a permanently-installed motor system monitoring solution that continuously acquires health and performance data on electric motors and the rotating machine systems they operate.

With the NetEP, maintenance professionals can gather performance data on critical motors around the clock, and monitor the condition of their rotating equipment from the convenience and safety of a central office – or from anywhere with access to the internet. The system can help to substantially reduce or eliminate costly downtime by providing information that improves maintenance decision-making and planning.

The NetEP represents a new paradigm in predictive maintenance for rotating equipment. It essentially enables an organization's critical motor assets to communicate when they are malfunctioning or experiencing a problem that could lead to failures or downtime. Motor maintenance programs are too often characterized by reactive approaches to motor failures, and rely upon testing to troubleshoot a given motor's condition. These snapshots can help determine if a motor requires replacement or repair, but the data acquired often doesn't reveal transient or infrequent motor system issues that impact motor performance or lead to failure.

The NetEP goes beyond what portable testing does by providing data that shows trends over time. This maximizes visibility into motor system health and performance. It is not designed to replace route-based maintenance tests using portable equipment. Instead, it complements the use of portable motor analyzers such as the Baker AWA-IV or Baker EXP4000 to minimize catastrophic motor failures and costly unplanned downtime. It can also be used to supply motor system data to an OPC standard server for use with an organization's unique maintenance management and asset analysis systems.

How NetEP works

Motor systems include three fundamental elements: the power source, the motor, and the mechanism that

places a load on the motor, such as a pump or fan. The NetEP monitors motor systems for any degradation of performance, poor power quality and adverse load conditions. It generates alerts, such as excessive current which could indicate a problem.

The NetEP tracks motor on/off cycles, determines load mismatches and identifies any adverse load oscillations or overloads. Performance data and problem notifications are promptly delivered to the operator console.

Built upon the proven technologies of the Baker EXP4000 Dynamic Motor Analyzer, the NetEP features proprietary data collection mechanisms that are coupled with standardized computer server and network protocols. A single NetEP an collect data from up to 32 motors using any combination of up to seven different voltage busses. Multiple NetEPs can be connected to a single computer server over Ethernet, enabling users to monitor hundreds of motors from a central location, anywhere in the world.

The NetEP operates with a single voltage measurement connection per voltage bus, and current sensors installed at each motor being monitored. Two data

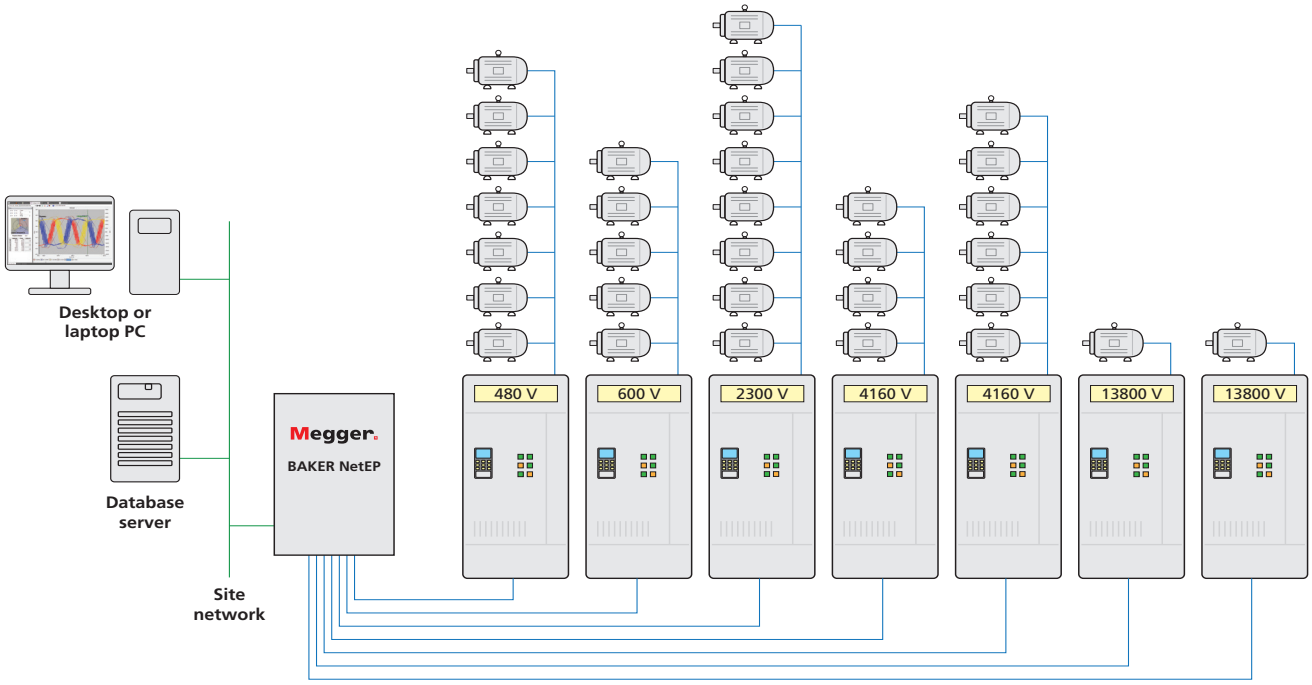
acquisition methods are provided: power quality (acquired every ten seconds) and time waveforms (acquired once per hour). The unit analyzes more than 100 electrical parameters; for 28 of these, it generates alerts if user-defined threshold limits are crossed.

The NetEP monitors all three phases of voltage and current at 20,000 samples per second.

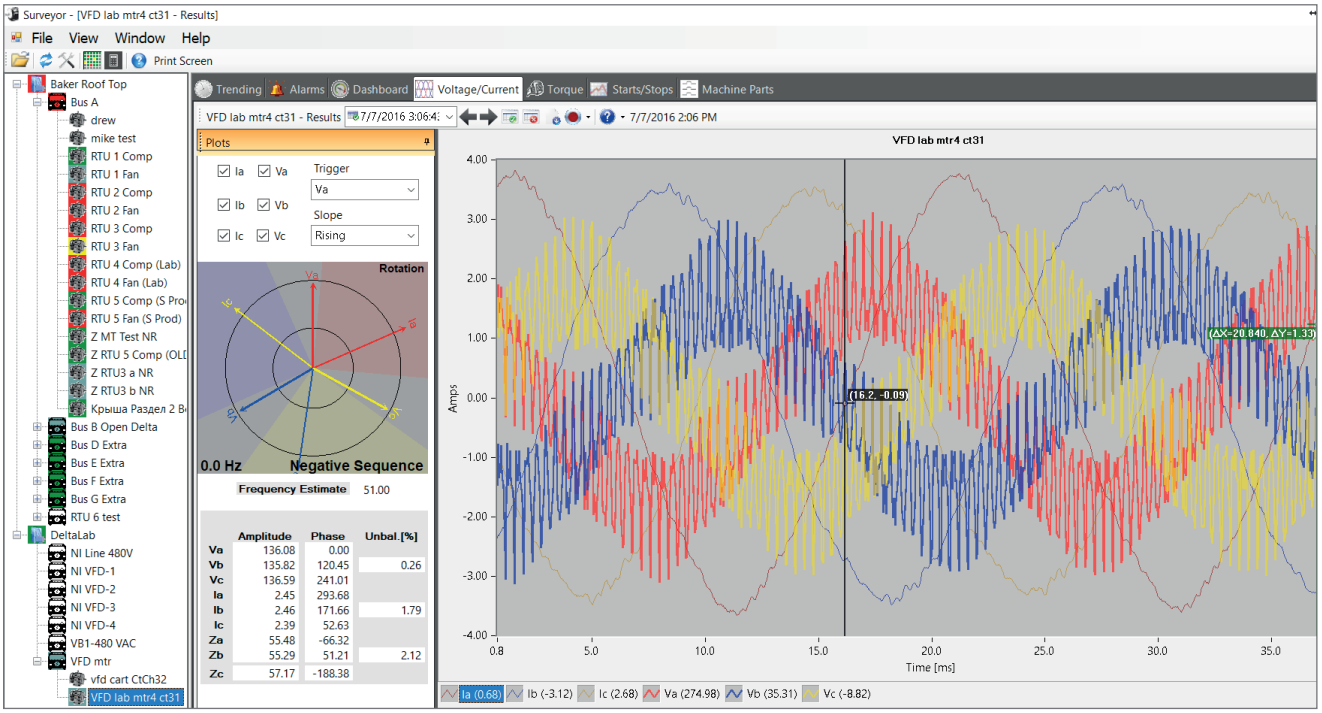
NetEP architecture overview

The NetEP device (cabinet) is the measurement engine. It connects to an Ethernet network for data transfer to the server.

The NetEP server manages data storage and communication to networked computing resources (i.e. the customer's computer network, data storage resources, and the user interface client). This server,



A diagram showing an example of a NetEP installation. The NetEP can monitor up to seven voltage buses, with up to 32 motors in total.



A time waveform plot of a VFD-driven motor, showing voltage and current, with a phasor diagram.

which is supplied by the customer, must run an SQL database.

Megger Motor Condition Surveyor NetEP is the user interface client.

Surveyor NetEP software

The Surveyor NetEP software constitutes the operator console. It's a Windows PC application which connects to the database that holds data from the NetEP devices.

The software automatically compares collected data to user-defined limits, and indicates the condition of the motor system via five status levels. The condition of each motor is displayed in an alarm view using a color-coded scheme, which is consistently used throughout the software, including the motor tree, for easy identification of motor status.

The motor tree view displays maps of voltage buses and machine hierarchy within the facility or plant. The multi-motor view allows a user to monitor the status of motors connected to each NetEP from a single desktop or laptop screen. The software's markers, cursors, box zoom function, scale sliders and other tools make it easy to navigate through large amounts of data quickly, confirm alarms, and make informed decisions about machine maintenance and operational processes.

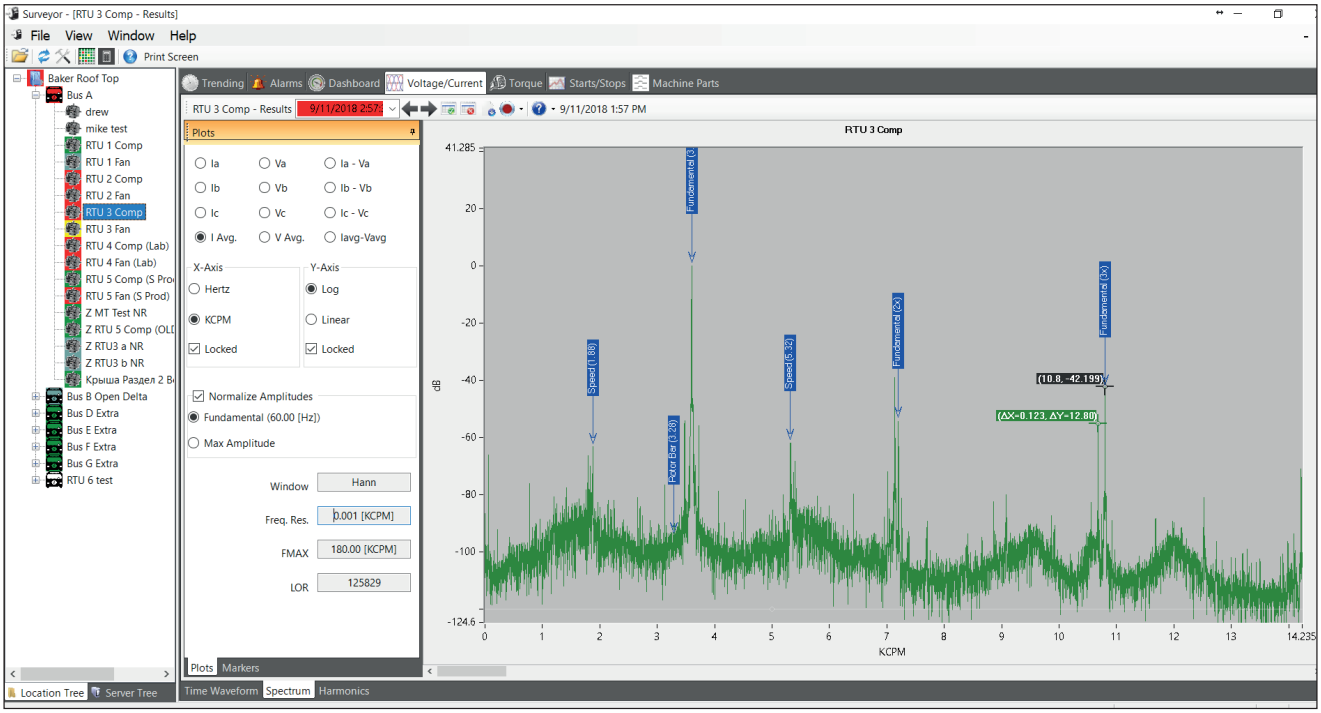
Because the NetEP works continuously, a series of watch, caution and warning flags are employed to alert maintenance professionals that a machine condition needs attention. The software also allows an operator to mark and analyze a motor's rotor bar condition by automatically locating rotor bar signatures. An integrated database of 30,000 bearings helps to identify potential bearing faults.

Variable Frequency Drive (VFD) Monitoring

The NetEP can monitor any three phase induction motor or generator. In addition, it will capture the activities of motors in VFD applications, allowing for analysis of behavior and performance. VFD drives have often created problems for maintenance professionals and for the first time comprehensive diagnosis of motor problems are facilitated even under the most demanding VFD operations.

Data collection, management and trend analysis

The Surveyor NetEP software delivers data at regular intervals on more than 100 motor condition parameters, and can be set with alarms on up to 38 of them. Some parameters can be set to acquire trend data every ten seconds, while others can be set to gather data once per hour.



A spectrum plot with markers indicating significant frequencies. Users can add markers to aid analysis.

There are two types of data acquisition:

- Power quality: This is the default mode for each motor. The NetEP automatically polls each motor to acquire data on power quality, distortion peak levels, unbalances, crest factor and other parameters.
- Time waveform acquisition: The NetEP gathers spectral data for current, torque and voltage, in addition to motor speed, rotor bar, eccentricity, power out, percent load, percent efficiency, effective service factor, input power, power factor, torque time waveform and KVAr data.

Monitoring capabilities

Power quality monitoring identifies:

- Improper tap settings on supply transformers
- Poorly distributed single-phase loads
- Overloaded (saturating) supply transformers
- Missing or open power factor correction capacitors
- Voltage surges/sags

Motor performance monitoring identifies:

- Thermal overloading of the motor and machine
- Deterioration from heat-related issues
- Motor efficiency
- Motor speed
- Percent load

Current monitoring identifies:

- Overloading
- High resistance connections
- Misconnections
- Iron saturation
- Improperly wound motors

Current/voltage spectrum monitoring identifies:

- Saturation problems
- Broken rotor bars
- Eccentricity

Torque monitoring identifies:

- Mechanical issues
- Transient overloading
- Mechanical imbalances
- Bearing problems
- Cavitation
- Worn impellers

Inspecting a torque plot which shows transient anomalies

Technical capabilities and specifications

- Continuously monitor more than 100 parameters on up to 32 motors
- Connect to motors using up to seven voltage buses
- Measurements include: Peak, RMS, THD, TD, CF, unbalance, power factor, input power and symmetrical components for each V, I phase (and in total)
- Spectrum acquisition (three phases, voltage and current)
- Time waveform acquisition
- Torque time waveform, torque spectrum
- Speed
- Eccentricity
- Power out
- Percent load
- Percent efficiency
- Effective service factor

Identify predictive maintenance opportunities

- Set alarm limits for parameters
- Display trends for parameters

Surveyor NetEP software capabilities

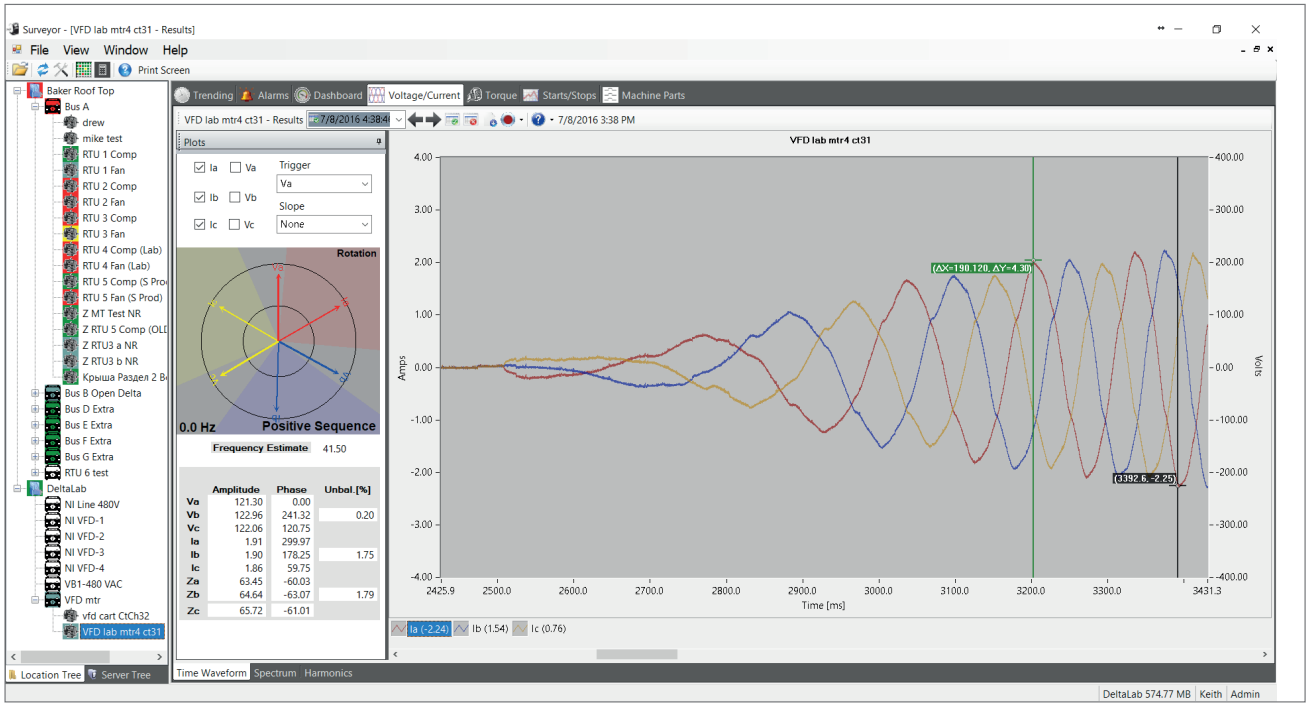
- At-a-glance condition status for all machines
- View multiple NetEPs on a single display
- Dashboard view of more than 100 measurements
- Time waveform displays
- Spectrum plots with markers
- Trend information
- Machine, alarm, voltage bus editing
- Torque time waveform and spectrum
- Alarm acknowledgement
- Data retention/storage

Additional specifications

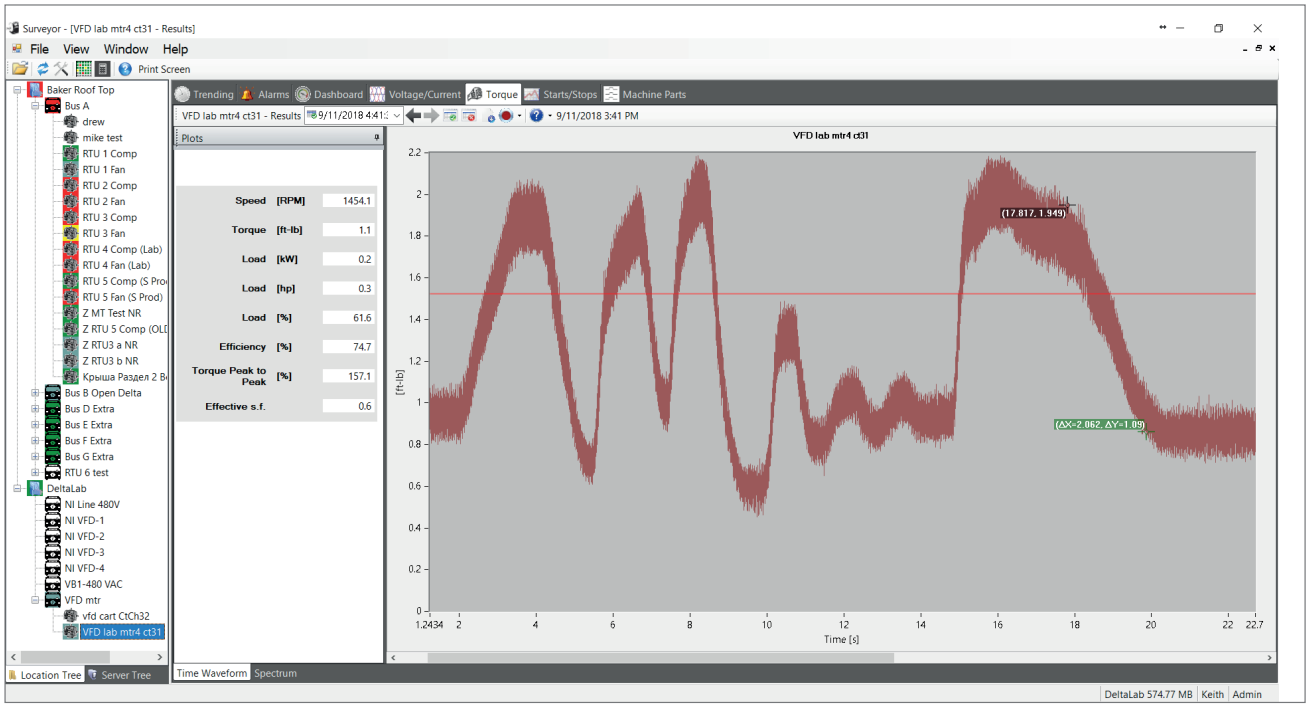
- Local-area network: Ethernet 802.4 standard 10/100/1000 Base T
- AC input power: 110V–240V
- Current transformers (CTs): 5A–2000A, up to 150 ft CT signal runs on CAT V cable, 25 kHz signal acquisition
- Computers, data storage and computer network connectivity is provided by customer

Server requirements

- Server processing capability: 2 GHz or faster CPU with 64-bit support and at least 2 cores
- Memory: at least 2 GB; 4GB or more recommended
- Disk space: at least 10 GB of free disk space per NetEP
- Operating system: Microsoft Windows 2012 or later; Windows 8 or later
- Local-area network connection: 10/100/1000 Base T
- Database: Microsoft SQL or SQL Express
- IP address: static
- Power source: UPS (uninterruptible power supply)



A time waveform plot showing the startup phase of a VFD-driven motor.



Torque history showing a fluctuating load on the motor.

Megger

Power on

Learn more about the Baker product line

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