DYNAMIC POWER ANALYSIS

WITH DEWETRON POWER ANALYZER

DEWETRON

- > Learn the DEWETRON way of power analysis
- > Forget conventional power analyzers
- > Cycle-by-Cylce Analysis
- > High-Dynamic Range Inputs for continuous analysis
- > Deeper view on the dynamic system performance
- > Record every single sample for documentation

FURTHER INFORMATION?

Visit us on www.dewetron.com

STATE-OF-THE ART POWER ANALYSIS SOLUTION

For many years the power measurement and analysis of AC voltage and current was considered a stationary discipline. This has fundamentally changed in recent years with the application of frequency-variable drives as well as the recognition of electric drive technology for automobiles. Now it is also important to collect and verify dynamic characteristics of the drives, since many systems rarely have in stationary operating points for long during their operating period, but rather identify them continuously.

Since „Classic“ Power Analyzers available on the market are designed primarily for stationary applications, DEWETRON has accepted the challenge of improving the classic power analyzer so that it is responsive to today’s mobile requirements and ready for the future demands of the power analysis market . With the high proportion of converter-fed drives in use today, it is possible to decrease the number of measuring ranges, since large peak measuring ranges are required most often, even at low power levels.

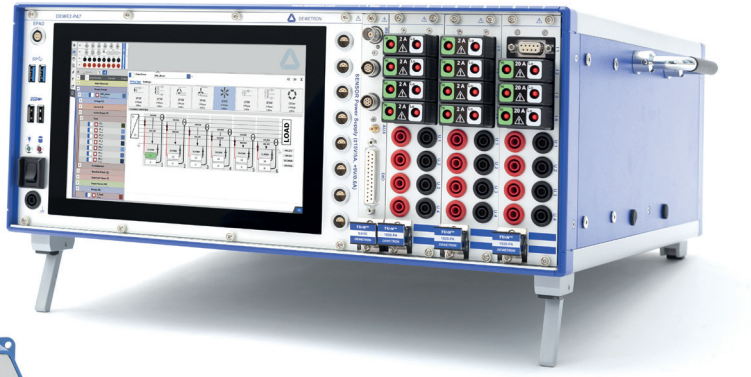
OBJECTIVE AND CONVENTIONAL SOLUTION

In today‘s world, electrical powertrains should be tested and evaluated in most realistical environments and with high dynamic load profiles to assure that customer‘s measurement and analysis requirements are satisfied. Traditionally, power testing, measurement and analysis have been expensive and time consuming. With improved power analysis technology, complete solutions to testing requirements become efficient and economical. Also, the very expensive testing time should be reduced to a minimum, to develop a solution under economical requirements.

WHY THIS OUTDATED ANALYZER CAN'T PROVIDE RELIABLE DATA FOR THE DECISION CRITERIA?

> No independent usage of voltage and current inputs, alternative and low common mode wiring schematics can't be used
> Complex Analog Circuits (big and heavy) are not very flexible for the future requirements
> Extra Analog Signal Path for Frequency detection is required
> User must set the filter cutoff frequency before the measurement, analysis at low and high speed in one run can be very challenging
> No Capability of Capturing the whole Waveform data, the engineers must use other recording equipment (Scope Recorder) to analyze the waveforms after the run
> Fixed Calculation Window size during measurement is always a compromise of Resolution and Dynamic
> Blind Spots due to gaps in border area of the calculation window

OUR SOLUTION



> DEWE2-PA7 with DEWETRON OXYGEN Software

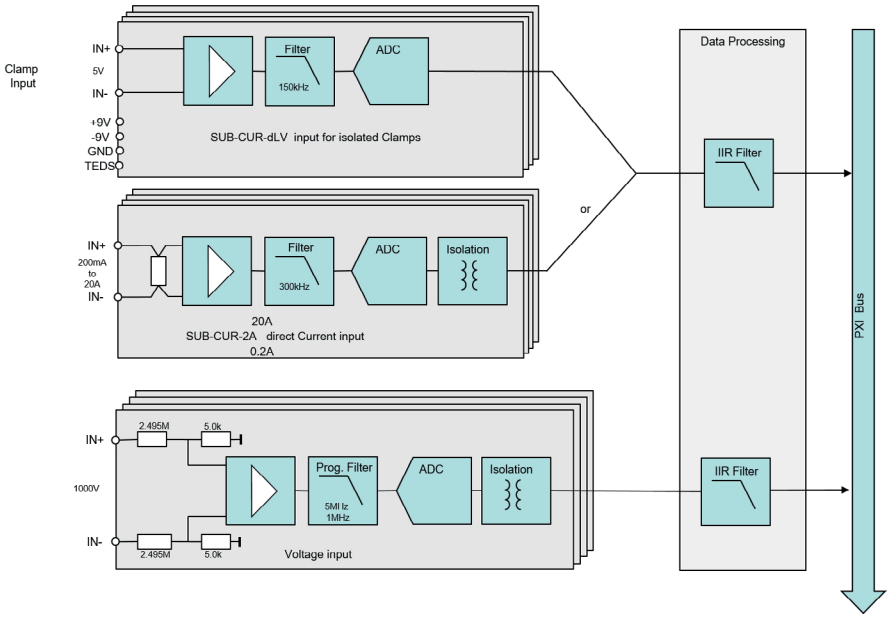
> TRION-1820-Power-4

> TRION-Base

> PA-IT Current Transducer Series

HDR-Inputs (High-Dynamic-Range) for precise Measurements from a few volts up to 2000V as well as amps up to 2000A in combination with our PA-IT Current Transducer Series enables the user to analyze the dynamic drivetrain behavior. Beginning with load jumps and moving start-up and braking, the whole spectrum of power analysis is possible.

Our dynamic Power Analyzers combined with our AWARD-Winning Measurement Software Oxygen, makes power analysis easy and intuitive. The Power Analysis functionality of the Oxygen Software integrates the most advanced frequency detection algorithm available to respond all the requirements of modern power analysis. This feature is the key to achieving precise, reliable and stable readings, even under adverse circumstances. Since DEWETRON continuously analyzes every single zero-crossing, and furthermore every single fundamental period because it is our mission, to analyze the signals gaplessly for the whole truth.



> High Density Input Module with multiple channels
> One straight forward signal path directly connected to the 18-Bit ADC
> Independent Voltage and Current Inputs for full-flexible use
> Signal Filter in FPGA, Continuous data stream to internal RAM and CPU
> All further Operations are done in the Oxygen Software
> Each Power Group has its own free selectable synchronization source for fundamental frequency detection (Further Details, see below)
> Calculation of every Power Value (Power, Voltage/Current RMS and Fundamental) is done every single Period (down to 1ms).

THE FREQUENCY DETECTION INNOVATION

DEWETRON's intention was to develop a solution with auto tuning capability which was easy to use for the operator and that addresses all the weak points of former solutions. The frequency detection solution is the result of collecting and analyzing information from customers and integrating those requirements into the development of the solution.

> Minimum detectable frequency is 0.2 Hz (<= 1MS/s sampleate)
> Adaptive filter with delay compensation for noise suppression
> Adaptive zero-cross detector threshold avoiding multiple bounces
> Sub-sample accuracy due to interpolation
> Continuous operation, with no gaps

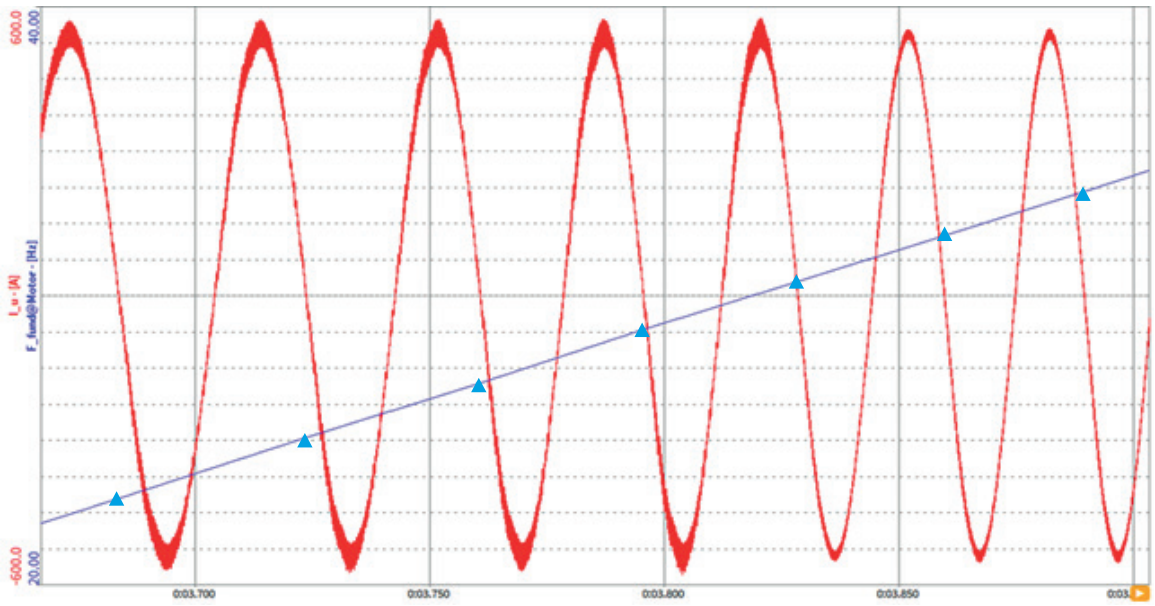


Figure 1: Detect and visualize every single zero-crossing (period) of the fundamental

Example 1: Analyze vibrations of speed control with high resolution

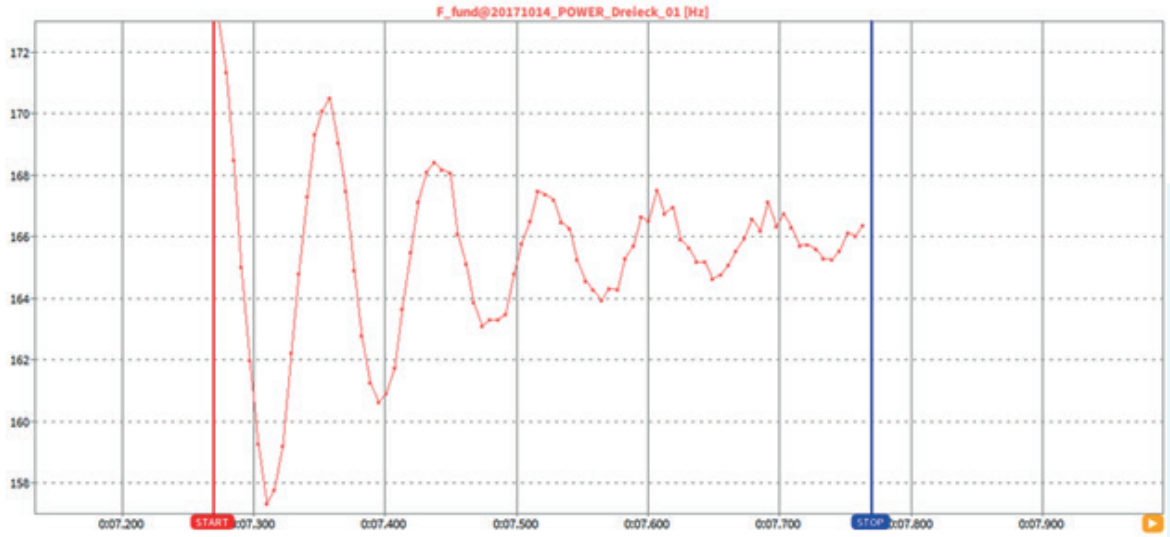


Figure 2: Fundamental Frequency Trace of a Load Step, vibrations of 10 Hz can be clearly detected

Example 2: Reliable frequency detection even with high noise proportion

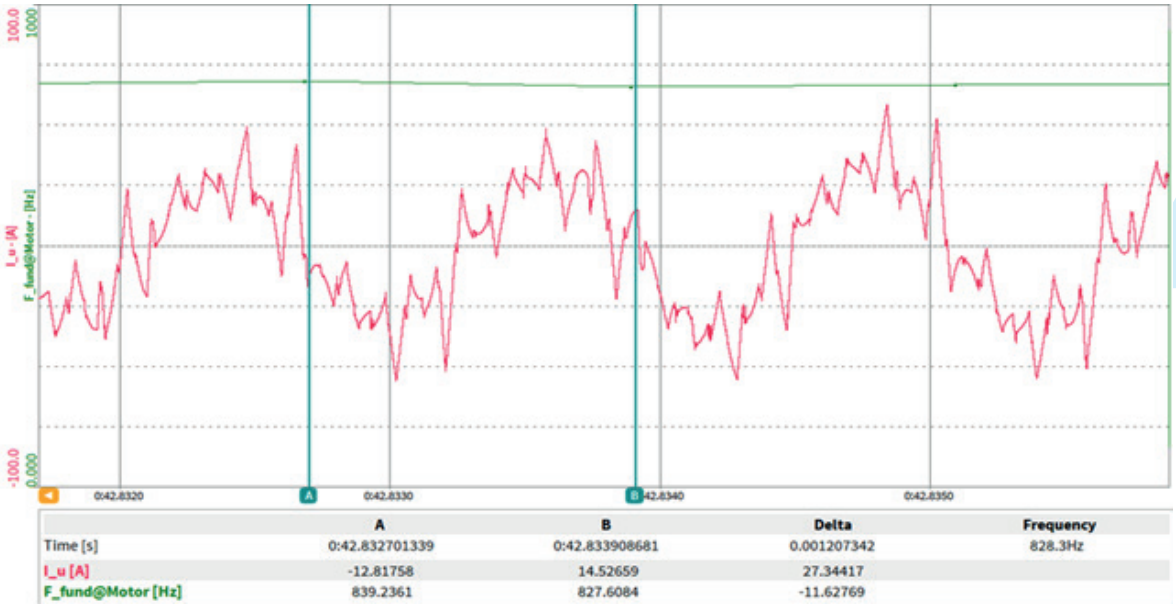


Figure 3: Fundamental frequency/period detection with highly distorted waveform

Example 3: Analyze the full Range of your DUT with a single shot

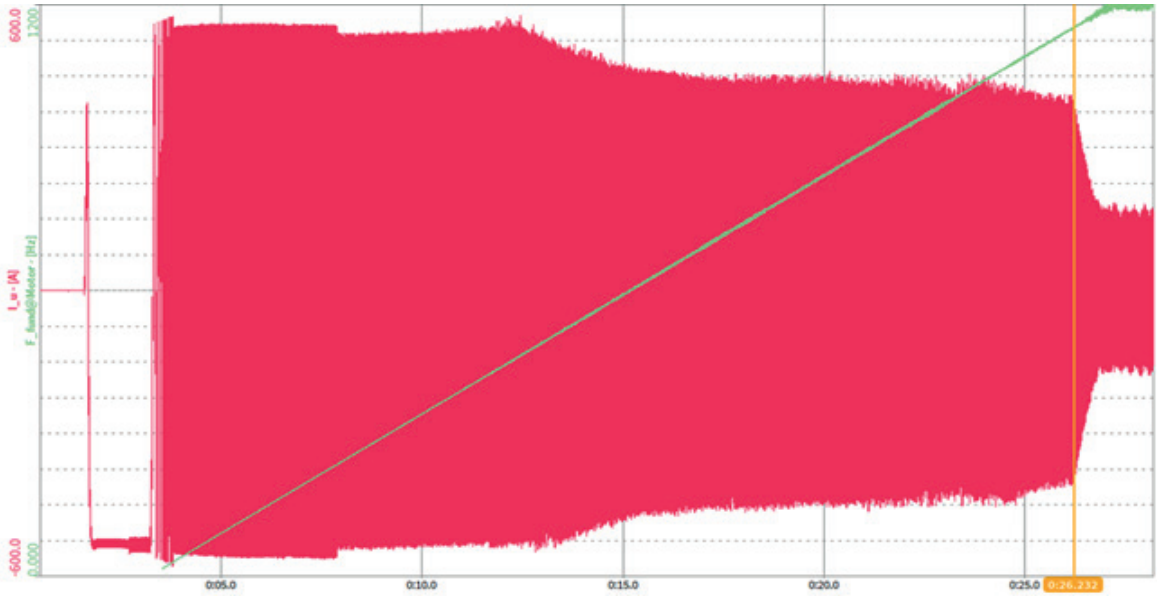


Figure 4: The high range of fundamental frequency detection allows analysis of the DUT in a single shot

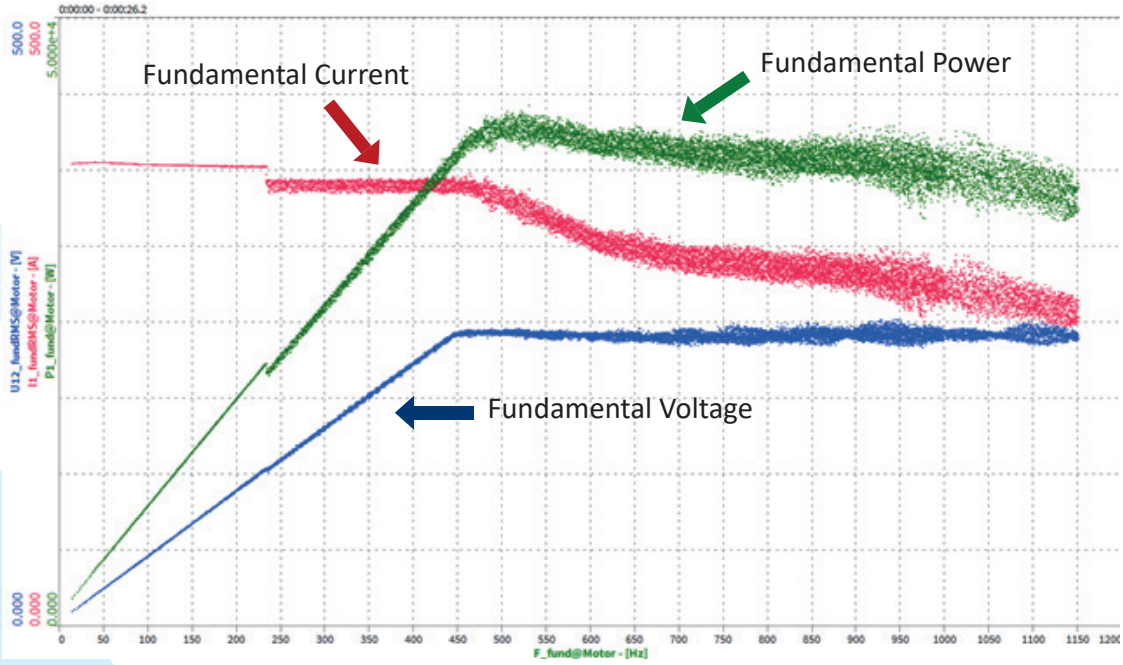


Figure 5: Visualize the control characteristic of a motor run-up, recognize changes in control strategies

Example 4: Reliable frequency detection even with high noise proportion

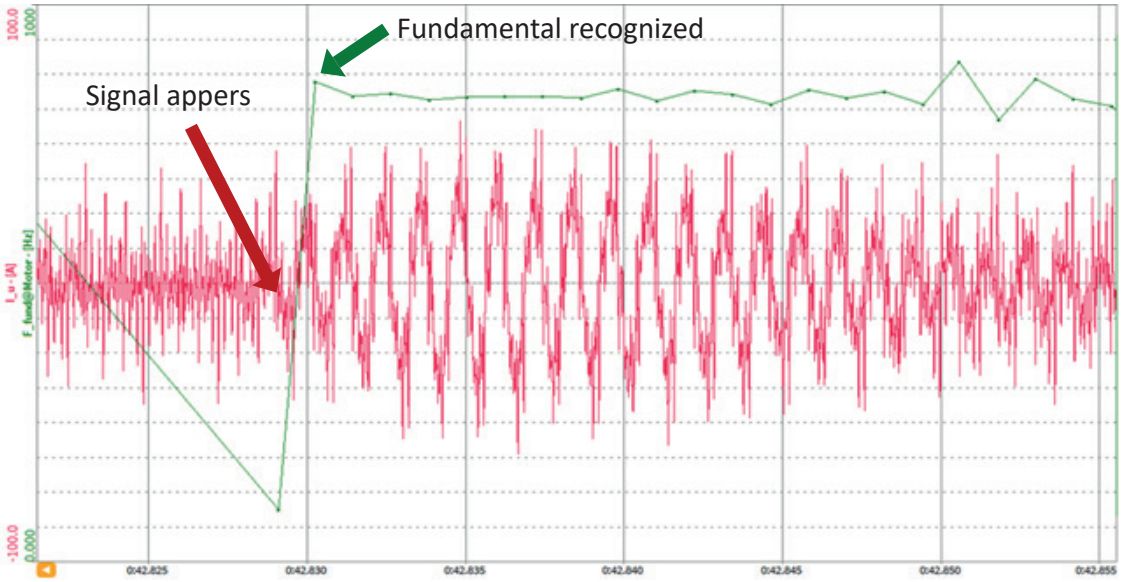


Figure 6: The fast reaction time guarantees reliable results from the first detected fundamental period

THE EXPERT

MICHAEL OBERHOFER

Michael Oberhofer is the product owner and technical expert for power analysis at DEWETRON. He received his master's degree in electrical engineering, with a concentration on energy technology, from the Graz University of Technology with a focus on energy technology. Michael started his career at DEWETRON as an application engineer and sales consultent for electrical power analysis. Since 2015, he has been responsible for the technical product development and definition of power analyzers, as well as managing the software production backlog.

FURTHER QUESTIONS? **CONTACT THE AUTHOR:**
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