DEWETRON POWER ANALYZERS FOR ELECTRIC MOTORS & DRIVE SYSTEMS

DEWETRON

- **> New approaches in hardware and software technology**
- **> Modularity and adaptability**
- **> High-performance Power Analyzer meets dynamic demands**
- **> Simple selection of the right measuring range vs. greatest possible dynamics**
- **> Dynamic and precise high voltage inputs**
- **> Avoiding wiring errors and time-saving configuration**

FURTHER INFORMATION?

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MARKET DEMANDS

Today‘s requirements regarding the efficiency and dynamics of electric motors and electric drivetrains are demanding: Highly dynamic measurement of currents and voltages, online efficiency determination as well as the calculation of power parameters are essential. Especially during the development of electrical components, motors, drivetrains or complete vehicles, raw data must be stored for further analyses of the power parameters. Cost constraints, limited resources and innovative companies emerging as new competitors in the OEM market increase the pressure on decision-makers and users.

Figure 1: DEWE2-PA7 in use

In response to this pressure, innovative, time-saving and easily adjustable measuring technology is needed. Conventional power meters and traditional user interfaces have become limited in their ability to meet the demand of the ever-changing technology.

This whitepaper describes typical problems of electrical power analysis as well as solutions and advantages resulting from new approaches in hardware and software technology. The use of this new technology contributes to resolving today‘s challenges in terms of efficiency, precision, cost and time requirements.

1. MODULARITY AND ADAPTABILITY

Electric motors with 6 or 9 phases have become a standard in highly efficient electric drivetrains. As a result, a holistic analysis of the drivetrain is no longer possible with a previously conventional Power Analyzer. Expensive synchronization, costly extensions, additional costs for software licenses, and calibration are the consequences of continuing to use traditional methods of power analysis. With the DEWE2-PA7 and the DEWE3-PA8, DEWETRON offers two high-performance Power Analyzers that meet the dynamic demands of development engineers and measurement technicians. Up to 16 power channels with precision accuracy, power calculation of up to 9-phase systems, online power calculation of several power groups (DC and AC) as well as the synchronous and complete detection of mechanical and environmental parameters (e.g. speed, torque, temperature) enable the analysis of electric motors, batteries, inverters, entire drivetrains or complete vehicles with a single Power Analyzer. Power Analyzers by DEWETRON can replace several systems by performing their tasks with unparalleled modularity and flexibility. Using only one system reduces the time for training and commissioning, reduces costs for the regular calibration of the measurement technology and software licenses, saves valuable development time and ensures reliable data in one single file format („Single Point of Truth“).

Figure 2: DEWE2-PA7 & DEWE3-PA8 Power Analyzers

2. SIMPLE SELECTION OF THE RIGHT MEASURING RANGE VS. GREATEST POSSIBLE DYNAMICS

During the development and testing of electric machines, various tests are undertaken to determine robustness, performance and efficiency. In this testing process, drivetrains are powered up under various scenarios and evaluated with the help of performance indicators. With conventional power measurement systems, a sufficiently broad measurement range must be chosen. At a lower load, this leads to a lower accuracy while for individual load points, the configuration must be adjusted. This however increases the time required for the configuration causing the test rig to be blocked for an unnecessarily long period.

With the dynamic, precise and high voltage inputs of DEWETRON, only one measuring range, from several volts up to +/- 2000 V_{Peak} is necessary. This eliminates the need to adjust the measuring range. In addition to that, it also avoids errors and reduces the time required to configure the „right“ measuring range. Furthermore, the disadvantages of a measuring range changeover (transition range, no continuous measurement data) are eliminated.

3. TIME-SAVING CONFIGURATION & AVOIDANCE OF WIRING ERRORS

As the complexity of the test or test structure increases, the possibility of potential wiring failures and „misconfigurations“ increases as well. In the worst-case scenario, this might even lead to unusable data, a needed repetition of the measurement and consequently to uncalculated costs.
DEWETRON’s measurement software OXYGEN with its power analysis option enables an intuitive, logical grouping of the individual electrical systems in so-called power groups, flexible assignment of physical inputs and assignment to various predefined circuit variants. For fast plausibility, performance parameters are already visualized in the configuration to detect wiring faults before the actual measurement. Thus, faults can be identified early and quickly and resolved in the software configuration without changing the physical voltage and current inputs.

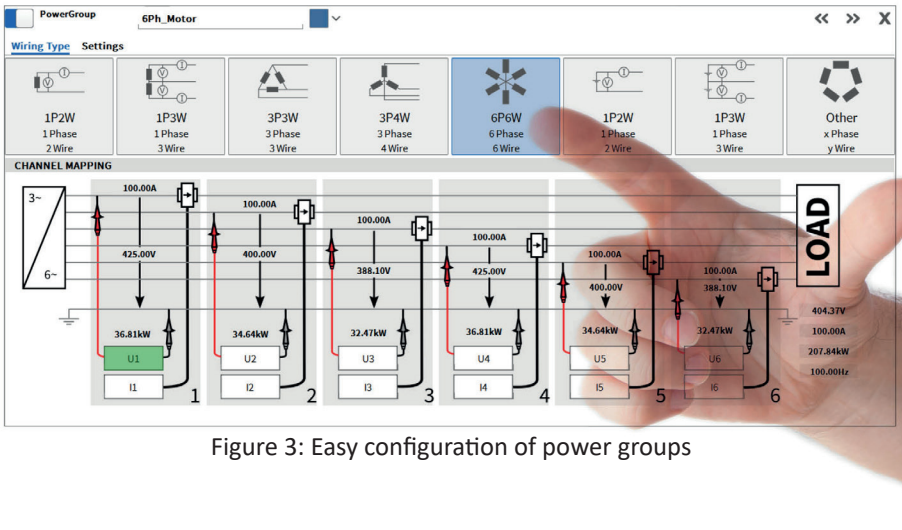

Figure 3: Easy configuration of power groups

THE DEWETRON SOLUTION

With the DEWE2-PA7 and the DEWE3-PA8 Power Analyzers as well as the entire DEWE2- and DEWE3-series, DEWETRON offers professionals high-performance, high-precision accuracy and user-friendly „tools“ with an intuitive operating concept and simple configuration. No matter whether it is used in the laboratory or fully integrated into test benches or automation systems, DEWETRON data acquisition systems convince test engineers with their flexibility, simple configuration as well as setup and with smart interfaces and protocols (e.g. XCP oE, SCPI oE, EtherCAT) that ensure the intuitive operation, remote control, or even the automation of test procedures. Whether testing one or several electric motors, batteries, or inverters, DEWETRON‘s Power Analyzers are the right systems for electrical/mechanical efficiency determination of today‘s and tomorrow’s electric drivetrains.

BENEFITS

> Poly-phase power analysis up to 9 phases in a single Power Analyzer (usually only 3-phase power calculation or over laborious postprocessing)
> Online DC and AC power calculation (up to 200 kHz fundamental frequency) for several power groups simultaneously (typically max. 900 Hz for fundamental)
> Online efficiency and performance determination of up to 16 power channels in a power measurement system (4-6 for conventional systems)
> Variable synchronization sources (usually fixed assignment of a synchronization source)
> Gapless recording of the raw data (usually only the possibility to create snapshots)
> Stand-alone and fully integrated Power Analyzer (various chassis for mobile applications as well)
> State of the art interfaces and protocols (e.g. XCP oE, ASAM MDF4, SCPI oE) for easy integration and remote control

SAVINGS

> Replacement of 2-3 stock systems (data logger, power scope, transient recorders, wattmeter) by only one data source with one data format („Single Point of Truth“)
> Significant reduction of costs for training, calibration, maintenance, software licenses (only one system, one software for the analysis of a drivetrain)
> Considerable time savings due to simple configuration and operation which releases resources for other important tasks
> Increasing efficiency, reducing losses through accurate, reliable and traceable performance analysis
> Simple and time-saving integration into automation systems with modern interfaces and protocols

THE EXPERT

RAFAEL LUDWIG

Rafael Ludwig studied electrical engineering and audio engineering at the Graz University of Technology and the University of Music and Performing Arts Graz. During his master studies, he specialized in acoustics and audio recording. After graduating, he worked as an acoustics engineer in the R&D department of a mechanical engineering company before he joined DEWETRON in 2017. Now at DEWETRON, he is an application engineer for automotive, e-mobility and power applications as well as for general test and measurement solutions.

FURTHER QUESTIONS? **CONTACT THE AUTHOR:**
rafael.ludwig@DEWETRON.com