DEWESoft®

POWER ANALYZER

WELCOME TO THE DEWESOFT EXPERIENCE. ONE SOFTWARE, ONE HARDWARE, ONE SOLUTION.

7 YEAR WARRANTY

DEWESoft®

V23-2

HARDWARE HIGHLIGHTS

DEWESOFT 7-YEAR WARRANTY

Our warranty covers that the instruments function as promised for a period of 7 years from the day of the delivery.

HIGHEST ACCURACY

Even though extremely small, Dewesoft power analyzer is highly accurate with 0.03 % accuracy.

HIGH SAMPLE RATE

The high sampling rate (up to 15 MS/s) and high bandwidth (up to 5 MHz) ensures that the data has the highest quality for the analysis.

FULLY ISOLATED

The worry free solution provides isolation on the sensor side (channel to GND, as well as, channel-to-channel) and even isolated sensor excitation! Less noise, no ground loops, best signal quality.

SMALLEST POWER ANALYZER
SIRIUS technology allows us to build the world's smallest power analyzer.

FULLY SYNCHRONIZED
Data from various sources are perfectly aligned: Analog, Digital, Counter, Vehicle buses, Video, ...

VOLTAGE INPUTS
Measurement ranges up to 2000 V DC (CAT II 1000V).

PLUG AND PLAY
Any device, sensor or signal. Smart sensors with TEDS are recognized automatically.

TOTAL SOLUTION
Combine your power measurements with NVH, combustion analysis, Vehicle Dynamics and other powerful Dewesoft tools.

INTERFACES
Intelligent Interfaces for simple and reliable integration to other systems. DCOM, CAN, EtherCAT®, Ethernet, XCP.

FLEXIBLE AND SCALABLE
Dewesoft allows the user to customize the instrument exactly to their needs. Select the instrument and amplifiers and build your perfect measurement instrument. Use the All-In-One Instruments with up to 64 input channels for high channel counts or synchronise any number of modular SIRIUS units for distributed measurement applications.

TEMPERATURE RANGE
Our instruments are the perfect solution for summer and winter testing. The wide operating temperature range allows using them down to -30 °C.

XHS High Voltage	
ADC type	Hybrid ADC - alias free up to 2 MS/s, 16-bit up to 15 MS/s
Sampling rate	Simultaneous up to 15 MS/s
Ranges	±2000 V, ±1000 V, ±400 V, ±200 V
Input impedance	10 MΩ in parallel 1 pF
Overvoltage category	10 MΩ in parallel 1 pF
Accuracy (DC – 1kHz)	0.03% of reading & 0.02% of range

XHS Low Voltage	
ADC type	Hybrid ADC - alias free up to 2 MS/s, 16-bit up to 15 MS/s
Sampling rate	Simultaneous up to 15 MS/s
Ranges	±100 V, ±50 V, ±20 V, ±10 V, ±5 V, ±2.5 V, ±1 V, ± 500 mV, ±250 mV, ±100 mV and 50 mV
Input impedance	Range < 10 V: 10 MΩ; Range ≥ 10 V: 1 MΩ || 110 pF between INx to GND
Sensor Excitation	2.5 to 30 VDC bipolar / 2 to 24 VDC unipolar, SW selectable (16-bit DAC), max 0.2 A / 2 W
Overvoltage protection	Range ≥ 10 V: 300 V continuous, Range < 10 V: 100 V (200 V peak for 10 ms)
Connector	DSUB 9, BNC, Banana
Accuracy (DC – 1kHz)	0.03% of reading & 0.02% of range

HARDWARE OVERVIEW

SIRIUS® MODULAR

Most flexible and distributable single slices with USB and EtherCAT® interface.

SIRIUS® SBOX

Synchronized, highly reliable data logger and powerful data processing computer.

SIRIUS® R4/R4rt/R4-HUB

Integrated solution with 4 SIRIUS slices and powerful SBOX computer or USB hub in one unit with real-time EtherCAT® slave interface.

SIRIUS® XHS

High-speed data acquisition system (15 MS/s) with the new Hybrid ADC technology capable of high-bandwidth transient recording and very high-dynamic, alias-free data acquisition.

KRYPTON® 1 SERIES

Distribute your measurements down to a single channel

ANALOG OUTPUTS

SIRIUS slices can be configured with 8 analog outputs and function as a multi-channel function generator, can also do real-time signal conditioning, analog replay of data in analysis, and perform manual or automated control output with output voltage levels of up to +/- 10 V.

Our systems are completely customizable to the customers' needs. Amplifiers and connectors can be chosen as well as number of signal inputs and the number of measurement inputs.

HIGH ISOLATION

High channel-channel and channel-ground isolation prevents ground loops and damage to the system from excessive voltage.

SIRIUS® R8DB/R8rt

Integrated instrument with 8 SIRIUS slices, powerful SBOX computer, optional 19″ display (R8D) and batteries (R8DB) and real-time EtherCAT® slave interface (R8rt).

SIRIUS® R1DB/R2DB

Small-size instrument with embedded computer, 12″ display and batteries.

SIRIUS® R3

Up to 3 SIRIUS slices in a rack mounted lab unit with standard easy-to-upgrade computer.

DIGITAL/COUNTER/ENCODER INPUTS

Each counter channel is capable of 3x digital inputs, 1x event counter, encoder, period, pulse-width, duty-cycle, and precise frequency and angle measurement using patented SuperCounter® technology.

HYBRID ADC TECHNOLOGY

Offers everything you ever wanted out of a high-end data acquisition system. High bandwidth and high dynamic mode available software selectable per channel.

SENSOR POWER SUPPLY

Amplifiers provide channel-independent, programmable power supply for sensor excitation.

ISOLATED CAN BUS INTERFACE

High-speed CAN 2.0b channels with 1 Mbit/s data throughput with additional support for CCP, OBDII, J1939, and CAN output.

Our data acquisition systems are versatile, modular, easy to use and can work with any sensor with the highest precision imaginable. Input channel configurations are flexible and the input channel count can vary from 1 to 1000's of channels. Our measurement systems are flexible and can grow with you at any time in your measurement process.

UNIVERSAL ANALOG INPUTS

A wide variety of universal and analog amplifiers that accept voltage and full/half/quarter bridge signals natively as well charge and IEPE accelerometers, thermocouple and RTD temperature sensors, current, resistance, and even LVDT sensors, with the use of DSI adapters.

SIRIUS® XHS

HYBRID ADC TECHNOLOGY

Offers everything you ever wanted out of a high-end data acquisition system. High bandwidth and high dynamic mode available and software selectable per channel.

VARIETY OF AMPLIFIERS

High voltage amplifiers that can measure 2000 V peak directly. Low voltage amplifiers for connecting almost any current sensor. ACC amplifiers for connecting high-speed accelerometers and pressure sensors. The XHS range of amplifiers available will grow in the future and will also include charge and strain gauge amplifiers.

SMALLEST FORM FACTOR

With the standard SIRIUS sized chassis you can easily carry the SIRIUS XHS in your backpack along with your laptop for field measurements.

HIGH GALVANIC ISOLATION

High channel-to-channel and channel-to-ground isolation prevents damage to the systems from excessive voltage and avoids ground loops.

The future is here - and it is in the form of a single device. 15 MS/s sampling rate. 5 MHz Bandwidth. Up to 150 dB Dynamic Range. Meet our new Hybrid ADC data acquisition technology.

ALIAS FREE MODE

Up to 2 MS/s data can be acquired with an extremely high dynamic range, similar to our SIRIUS DualCoreADC devices. The data is totally alias-free, so all higher frequencies are fully rejected. Such an acquisition mode is typically found in Sigma-delta ADCs, and general data recording applications.

By today's standard, you would need two totally separate data acquisition devices for those measurements and applications. But the new SIRIUS XHS data acquisition system allows you to select per channel, depending on the measurement application, the appropriate mode of ADC operation.

XHS-PWR SIRIUS®

The SIRIUS XHS-PWR is a DAQ device designed for direct in-vehicle measurement of current, voltage, and power. It features an integrated patented DC-CT current transducer for very precise current measurements in the most demanding applications such as very high current peaks as well as leakage current measurement.

DC-CT CURRENT TRANSDUCER

DC-CT represents an innovative principle of isolated measurement of DC and AC currents. This compact-sized patented technology allows you to measure peak currents up to 2000 A and leakage currents - with high bandwidth and ultimate performance.

HIGH BANDWIDTH MODE

This mode offers more than **5 MHz** bandwidth and **15 MS/s** sampling rate, SIRIUS XHS can acquire impulse, step, and square signals without any ringing or overshoot. Such an acquisition mode is perfect for transient recording and power analysis, and would usually be found in SAR ADCs.

RUGGED

IP67 rated chassis operating between -20 °C and 70 °C withstanding tough shock and vibration conditions.

PERFECT SYNCHRONIZATION

Even though you can select some channels to be high bandwidth and some to be alias free, filtering is made in the way that all signals are perfectly time aligned with zero phase shift.

CLAMPS & TRANSDUCERS

-40 °C TO +85 °C
Dewesoft offers current transducers with wide temperature range - ideal for both winter (-40 °C) and summer testing (+85 °C).

FLEXIBLE
Dewesoft instruments allow connecting any type of current transducers. There are more than 1000 different current sensors available on the market. If you want to connect your own or other sensors we are happy to help you.

UP TO 30 000 A
Dewesoft offers a very wide range of current measurement ranges up to 30 000 (30 thousand) amperes.

AC/DC CURRENT MEASUREMENT
Dewesoft offers high-accuracy zero-flux current transducers, Rogowski coils, current clamps and shunts for AC and/or DC current measurement.

High-accuracy sensors for AC/DC current measurement and power analysis. From current clamps, high-precision zero flux current transducers, shunts and Rogowski coils.

HIGH ACCURACY
Highly precise zero flux current transducers or fluxgate compensated clamps are a perfect fit for most demanding power measurements for E-mobility and inverter motors applications.

INTEGRATED SENSOR POWER SUPPLY
Current clamps and zero-flux transducer can be powered straight from the DAQ instrument like R2DB, R8 or with external SIRIUS slice compatible chassis.

DC-CT-1000I

ACCURATE MEASUREMENTS - ANYWHERE

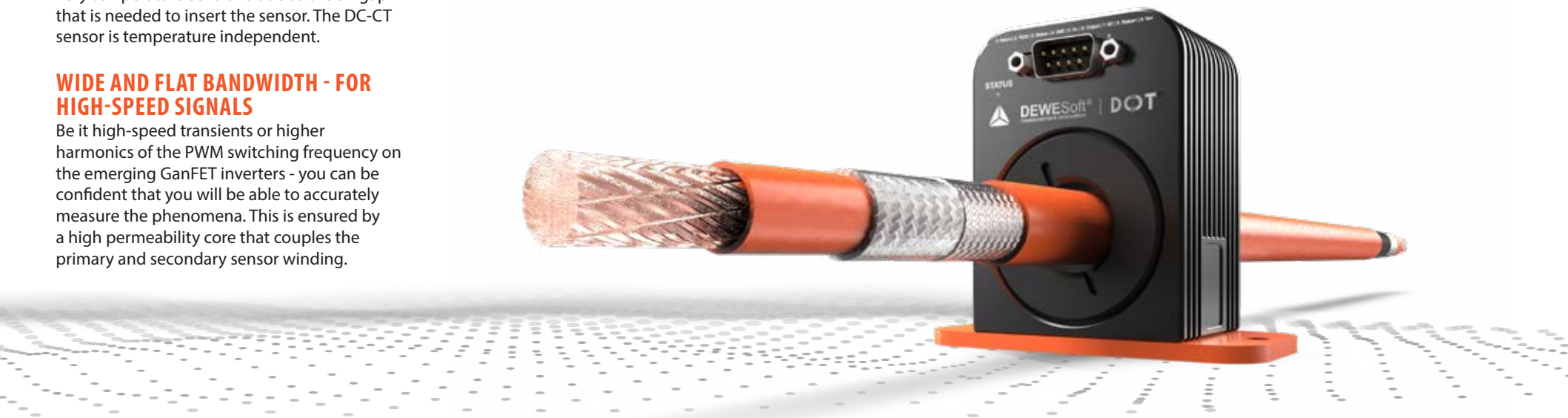
A truly accurate sensor that delivers excellent performance across different ambient conditions. It performs equally well at different temperatures, in magnetically harsh environments, and across whole measurement range.

STABLE MEASUREMENTS - TEMPERATURE INDEPENDENT

As compared to the Hall effect sensors that are very temperature sensitive due to the air gap that is needed to insert the sensor. The DC-CT sensor is temperature independent.

WIDE AND FLAT BANDWIDTH - FOR HIGH-SPEED SIGNALS

Be it high-speed transients or higher harmonics of the PWM switching frequency on the emerging GanFET inverters - you can be confident that you will be able to accurately measure the phenomena. This is ensured by a high permeability core that couples the primary and secondary sensor winding.



This current transducer is designed for precise current measurement applications. DC-CT technology represents a Platiše Flux Sensor (PFS) which is used in a closed-loop configuration to offer all the benefits of a zero-flux current transducer but with lower power consumption and in a smaller form factor. Making it your device of choice for all types of current measurement.

SMALL SIZE - EASY TO FIT

DC-CT current sensors deliver up to 1000 amperes of continuous measurement range in one of the smallest form-factors on the market.

LOW POWER CONSUMPTION - SIMPLE SETUP

A single Sirius MCTS2 power supply will easily power four DC-CT sensors without any limitations.

ISOLATION

Galvanic isolation between primary and secondary compliant with IEC 61010-1 CAT II 1000 V.

LOW OFFSET

A compact and gapless core design enables very low magnetic remanence and thus overall very low offset current.

HIGH ACCURACY

High accuracy of current measurements in the whole measurement range up to 1000 A.

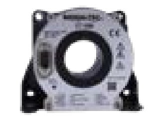
SUPERB IMMUNITY

Single gapless core enables immunity to external magnetic fields with highest possible sensitivity.

TEDS SUPPORT

Both the sensor itself and the burden resistor have built-in TEDS compatibility, which makes it plug and play. Connecting the current transducer to the DAQ device will initiate automatic sensor recognition and settings will be configured automatically.

CURRENT TRANSDUCERS

	CT 100		CT 200		CT 400		C 500		CT 1000		CT 2000	
Type	Zero-Flux		Zero-Flux		Zero-Flux		Zero-Flux		Zero-Flux		Zero-Flux	
Primary Current Range DC RMS Sinus	100 A		200 A		400 A		500 A		1000 A		2000 A	
Conversion ratio	1:500		1:1000		1:1500		1:750		1:1500		1:2000	
Overload Ability Short Time (100 ms)	20 kApk		20 kApk		20 kApk		5000 Apk		5000 Apk		10000 Apk	
Max. measurement resistor (100 % of Ip)	25 Ω		20 Ω		10 Ω		5 Ω		4 Ω		3.5 Ω	
Step response (0 ... 90%)	0.2 µs		0.2 µs		1 µs		1 µs		1 µs		1 µs	
Temperature influence	0.2 ppm/K		0.2 ppm/K		0.1 ppm/K		1 ppm/K		0.3 ppm/K		< 0.1 ppm/k	
Nominal secondary current	200 mA at 100 A		200 mA at 200 A		266 mA at 400 A		666 mA at 500 A		666 mA at 1000 A		1 A at 2000 A	
Bandwidth (-3 dB)	DC ... 2 MHz		DC ... 1.1 MHz		DC ... 800 kHz		DC ... 520 kHz		DC ... 440 kHz		DC ... 140 kHz	
Linearity	1.5 ppm		1.2 ppm		0.8 ppm		3 ppm		3 ppm		3 ppm	
Offset	< 0.0015 %		< 0.0010 %		< 0.0008 %		< 0.00115 %		< 0.0012 %		< 0.0012 %	
Accuracy	Amplitude	Phase Error	Amplitude	Phase Error	Amplitude	Phase Error	Amplitude	Phase Error	Amplitude	Phase Error	Amplitude	Phase Error
DC	0.002 %	-	0.001 %	-	0.0008 %	-	0.00115 %	-	0.0012 %	-	0.0012 %	-
to 100 Hz	0.015 %	± 0.01 °	0.015 %	± 0.01 °	0.015 %	± 0.01 °	0.015 %	± 0.01 °	0.015 %	± 0.01 °	0.015 %	± 0.01 °
100 - 1 kHz	0.025 %	± 0.05 °	0.02 %	± 0.02 °	0.02 %	± 0.01 °	0.02 %	± 0.01 °	0.02 %	± 0.01 °	0.05 %	± 0.05 °
1 kHz - 10 kHz	0.2 %	± 0.1 °	0.15 %	± 0.05 °	0.15 %	± 0.1 °	0.1 %	± 0.05 °	0.15 %	± 0.1 °	0.25 %	± 0.1 °
10 kHz - 20 kHz	0.5 %	± 0.25 °	0.5 %	± 0.25 °	0.5 %	± 0.5 °	0.2 %	± 0.5 °	1.5 %	± 1 °	1 %	± 1 °
20 kHz - 50 kHz	0.5 %	± 0.25 °	0.5 %	± 0.25 °	0.5 %	± 0.5 °	0.2 %	± 0.5 °	1.5 %	± 1 °	-	-
50 kHz - 100 kHz	1 %	± 0.5 °	1 %	± 0.5 °	1 %	± 1 °	0.5 %	± 1 °	4 %	± 2 °	-	-
Rated isolation voltage RMS, single isolation CAT III, pollution deg. 2, IEC 61010-1 standards, EN 50178 standards	1000 V		1000 V		1000 V		1000 V		1000 V		1000 V	
Test voltage 50 / 60 Hz, 1 min	4.95 kV		4.95 kV		4.95 kV		4.2 kV		4.2 kV		6 kV	
Inner diameter	28 mm		28 mm		28 mm		38 mm		38 mm		70 mm	
Dimensions	93 x 78.8 x 49.5		94 x 78.8 x 49.5		95 x 78.8 x 49.5		128 x 106 x 54		128 x 106 x 54		231 x 220 x 76	
Supply voltage (±5 %)	±15 V		±15 V		±15 V		±15 V		±15 V		±15 V	
Operating humidity	20 % to 80 % (not condensing)		20 % to 80 % (not condensing)		20 % to 80 % (not condensing)		20 % to 80 % (not condensing)		20 % to 80 % (not condensing)		20 % to 80 % (not condensing)	
Operating temperature	- 40 °C to + 85 °C		- 40 °C to + 85 °C		- 40 °C to + 85 °C		- 40 °C to + 85 °C		- 40 °C to + 85 °C		- 40 °C to + 85 °C	
DEWESoft® Shunt	5 Ω		5 Ω		5 Ω		1 Ω		1 Ω		1 Ω	
PWR-MCTS2 needed	Yes		Yes		Yes		Yes		Yes		Yes	
Compatible amplifiers	SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43	
Cable length	5 m - MCTS to Transducer 0.3 m - Amplifier to MCTS		5 m - MCTS to Transducer 0.3 m - Amplifier to MCTS		5 m - MCTS to Transducer 0.3 m - Amplifier to MCTS		5 m - MCTS to Transducer 0.3 m - Amplifier to MCTS		5 m - MCTS to Transducer 0.3 m - Amplifier to MCTS		5 m - MCTS to Transducer 0.3 m - Amplifier to MCTS	

CURRENT CLAMPS AC/DC

	DS-CLAMP-200DC		DS-CLAMP-500DCS		DS-CLAMP-500DC		DS-CLAMP-1000DC	
Type	Flux gate		Flux gate		Flux gate		Flux gate	
Current Range	200 A DC or AC RMS		500 A DC or AC RMS		500 A DC or AC RMS		1000 A DC or AC RMS	
Sensitivity	10 mV/A		4 mV/A		4 mV/A		2 mV/A	
Bandwidth	DC to 500 kHz		DC to 200 kHz		DC to 100 kHz		DC to 20 kHz	
Bandwidth (upgraded after 2022)	DC to 700 kHz		DC to 500 kHz		DC to 200 kHz		not yet available	
TEDS	Fully supported		Fully supported		Fully supported		Fully supported	
Conductor Position Sensitivity	max. ± 0.1 % of reading		max. ± 0.1 % of reading		max. ± 0.2 % of reading		max. ± 0.2 % of reading	
Zero Offset (+25°C)	max. ± 10 mA		max. ± 250 mA		max. ± 250 mA		max. ± 50 mA	
Error due Earth Magnetic Field	max. ± 50 mA		max. ± 100 mA		max. ± 150 mA		max. ± 150 mA	
Temp. Coefficient	± 0.01 %/°C		± 0.01 %/°C		± 0.01 %/°C		± 0.01 %/°C	
Accuracy	Amplitude	Phase Error	Amplitude	Phase Error	Amplitude	Phase Error	Amplitude	Phase Error
DC	± 0.2 % rdg., ± 40 mA	-	± 0.3 % rdg., ± 100 mA	-	± 0.2 % rdg., ± 100 mA	-	± 0.2 % rdg., ± 200 mA	-
to 100 Hz	± 0.2 % rdg., ± 20 mA	± 0.1 °	± 0.3 % rdg., ± 50 mA	± 0.1 °	± 0.2 % rdg., ± 50 mA	± 0.1 °	± 0.2 % rdg., ± 100 mA	± 0.1 °
100 - 500 Hz	± 0.3 % rdg., ± 40 mA	± 0.2 °	± 0.3 % rdg., ± 100 mA	± 0.2 °	± 0.3 % rdg., ± 100 mA	± 0.2 °	± 0.5 % rdg., ± 200 mA	± 0.2 °
500 Hz - 1 kHz	± 0.5 % rdg., ± 40 mA	± 0.5 °	± 0.5 % rdg., ± 100 mA	± 0.5 °	± 0.5 % rdg., ± 100 mA	± 0.5 °	± 1.0 % rdg., ± 200 mA	± 0.5 °
1 kHz - 5 kHz	± 1.0 % rdg., ± 40 mA	± 1.0 °	± 1.0 % rdg., ± 100 mA	± 1.0 °	± 1.0 % rdg., ± 100 mA	± (0.5 f [kHz]) °	± 2.0 % rdg., ± 200 mA	± (0.7 f [kHz]) °
5 kHz - 10 kHz	± 1.5 % rdg., ± 40 mA	± 1.5 °	± 1.5 % rdg., ± 100 mA	± 1.5 °	± 1.5 % rdg., ± 100 mA	± (0.5 f [kHz]) °	± 5.0 % rdg., ± 200 mA	± (0.7 f [kHz]) °
10 kHz - 20 kHz	± 5 % rdg., ± 40 mA	± (0.5 + 0.1 f [kHz]) °	± 5 % rdg., ± 100 mA	± (0.5 + 0.1 f [kHz]) °	± 5 % rdg., ± 100 mA	± (0.5 f [kHz]) °	± 30 % rdg., ± 200 mA	± (0.7 f [kHz]) °
20 kHz - 50 kHz	± 5 % rdg., ± 40 mA	± (0.5 + 0.1 f [kHz]) °	± 5 % rdg., ± 100 mA	± (0.5 + 0.1 f [kHz]) °	± 10 % rdg., ± 250 mA	± (0.5 f [kHz]) °	± 30 % rdg., ± 200 mA	± (0.7 f [kHz]) °
50 kHz - 100 kHz	± 10 % rdg. ± 100 mA	± (0.5 + 0.1 f [kHz]) °	± 15 % rdg., ± 250 mA	± (0.5 + 0.1 f [kHz]) °	± 30 % rdg., ± 250 mA	± (0.5 f [kHz]) °	/	/
100 kHz - 200 kHz	± 15 % rdg., ± 40 mA	± (0.5 + 0.1 f [kHz]) °	± 30 % rdg., ± 250 mA	± (0.5 + 0.1 f [kHz]) °	/	/	/	/
200 kHz - 300 kHz	± 15 % rdg., ± 40 mA	± (0.5 + 0.1 f [kHz]) °	/	/	/	/	/	/
300 kHz - 500 kHz	± 30 % rdg., ± 100 mA	± (0.5 + 0.1 f [kHz]) °	/	/	/	/	/	/
Dimensions [mm]	153 x 67 x 25		153 x 67 x 25		238 x 114 x 35		238 x 114 x 35	
Max. Conductor Size	20 mm		20 mm		50 mm		50 mm	
Power Supply	± 11 V to ± 15 V		± 11 V to ± 15 V		± 11 V to ± 15 V		± 11 V to ± 15 V	
Current Consumption	max. 6 VA		max. 7 VA		max. 7 VA		max. 7 VA	
Operating Environment	Indoors, Pollution Degree II, altitude up to 2000m		Indoors, Pollution Degree II, altitude up to 2000m		Indoors, Pollution Degree II, altitude up to 2000m		Indoors, Pollution Degree II, altitude up to 2000m	
Operating Temp.	- 40 °C to + 85 °C		- 40 °C to + 85 °C		- 40 °C to + 85 °C		- 40 °C to + 85 °C	
Operating Humidity	up to 80 % (not condensing)		up to 80 % (not condensing)		up to 80 % (not condensing)		up to 80 % (not condensing)	
Safety Standards	EN61010-2-032:2012		EN61010-2-032:2012		EN61010-2-032:2012		EN61010-2-032:2012	
EMC Standards	EN61326-1:2013		EN61326-1:2013		EN61326-1:2013		EN61326-1:2013	
Rohs	EN50581:2012		EN50581:2012		EN50581:2012		/	
PWR-MCTS2 needed	Yes		Yes		Yes		Yes	
Compatible amplifiers	SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43		SIRIUS LV / HS-LV / XHS-LV, SIRIUS STG / HS-STG, SIRIUS STGM, DEWE 43	
Cable length	3 m - MCTS to Clamp 0.3 m - Amplifier to MCTS		3 m - MCTS to Clamp 0.3 m - Amplifier to MCTS		3 m - MCTS to Clamp 0.3 m - Amplifier to MCTS		3 m - MCTS to Clamp 0.3 m - Amplifier to MCTS	

CURRENT CLAMPS AC / ROGOWSKY COILS AC

	DS-CLAMP-5AC	DS-CLAMP-15AC	DS-CLAMP-200AC	DS-CLAMP-1000AC
Type	Iron-Core	Iron-Core	Iron-Core	Iron-Core
Range	5 A AC RMS	15 A AC RMS	200 A AC RMS	1000 A AC RMS
Sensitivity	100 mV/A	100 mV/A	10 mV/A	1 mV/A
Accuracy (+25 °C)	5 mA - 0.5 A ± 2 % of reading 0.5 A - 1 A ± 1 % of reading 1 A - 12 A ±0 .5 % of reading	< 1 A ± 2.5 % of reading 1 A - 15 A ± 1 % of reading	0.5 A - 10 A ± 3.5 % of reading 10 A - 100 A ± 2.5 % of reading 100 A - 240 A ± 1 % of reading	< 1 A ± 2 % of reading 10 A - 100 A ± 0.5 % of reading 100 A - 1200 A ± 0.3 % of reading
Phase Error	5 mA - 0.5 A ± 2 ° 0.5 A - 1 A ± 1° 1 A - 12 A ± 1 °	< 1 A ± 5 ° 1 A - 15 A ± 3 °	0.5 A - 10 A not specified 10 A - 100 A ≤ 5 ° 100 A - 240 A ≤ 2.5 °	< 1 A not specified 10 A - 100 A ≤ 1 ° 100 A - 1200 A ≤ 0.7 °
Bandwidth	2 Hz to 5 kHz	2 Hz to 10 kHz	2 Hz to 10 kHz	2 Hz to 10 kHz
Resolution	0.01 A	0.01 A	0.5 A	0.001 A
TEDS	Fully supported	Fully supported	Fully supported	Fully supported
Overload Capability	1.5 x I nominal	1.3 x I nominal	1.3 x I nominal	1.3 x I nominal
Conductor Position Sensitivity	≤ 0.5 % of reading	≤ 0.5 % of reading	≤ 0.5 % of reading	≤ 0.1 % of reading
Influence of Crest Factor	≤ 1 %	≤ 3 %	≤ 3 %	≤ 1 %
Error due Earth Magnetic Field	/	≤ 15 mV/A @ 50 Hz	≤ 15 mV/A @ 50 Hz	≤ 15 µV/A @ 50 Hz
Temperature Coefficient	±0.015 % / °C	≤ 0.2 % / 10 °C	≤ 0.2 % / 10 °C	≤ 0.1 % / 10 °C
Influence of Frequency	/	< 5 % of output signal from 20 Hz ... 1 kHz < 10 % of output signal from 1 kHz ... 10 kHz	< 3 % of output signal from 20 Hz ... 1 kHz < 12 % of output signal from 1 kHz ... 10 kHz	< 1 % of output signal from 30 Hz ... 48 Hz < 0.5 % of output signal from 35 Hz ... 1 kHz < 1 % of output signal from 1 kHz ... 5 kHz

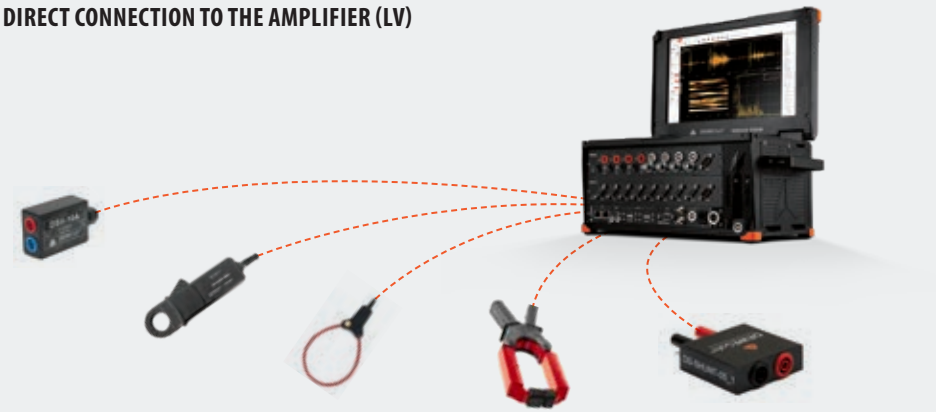
	DS-FLEX-3000-17	DS-FLEX-3000-35	DS-FLEX-3000-35-HS	DS-FLEX-3000-80	DS-FLEX-30000-120
Type	Rogowski coil	Rogowski coil	Rogowski coil	Rogowski coil	Rogowski coil
Current Range	3 A, 30 A, 300 A, 3000 A AC RMS	3 A, 30 A, 300 A, 3000 A AC RMS	3000 A AC RMS	3 A, 30 A, 300 A, 3000 A AC RMS	30 A, 300 A, 3000 A, 30000 A AC RMS
Bandwidth	3 A: 10 Hz to 10 kHz	3 A: 10 Hz to 10 kHz Others: 10 Hz to 20 kHz	5 Hz - 1MHz	3 A: 10 Hz to 10 kHz Others: 10 Hz to 20 kHz	3 A: 10 Hz to 5 kHz Others: 10 Hz to 20 kHz
Others: 10 Hz to 20 kHz	3 A: 10 Hz to 10 kHz	≤1,5 %	≤1,5 %	≤1,5 %	≤1,5 %
Others: 10 Hz to 20 kHz	5 Hz - 1MHz	3 A: 10 Hz to 10 kHz	350 mm (Ø 100 mm)	800 mm (Ø 250 mm)	1200 mm (Ø 380 mm)
Others: 10 Hz to 20 kHz	30 A: 10 Hz to 5 kHz Others: 10 Hz to 20 kHz	Not Supported	Fully Supported	not supported	Not Supported
Accuracy (+25 °C)	≤ 1.5 %	≤ 1.5 %	≤ 1.0 %	≤ 1.5 %	≤ 1.5 %
Coil Length	170 mm	350 mm	350 mm	800 mm	1200 mm
TEDS	Not supported	Not supported	Fully supported	Not supported	Not supported

	DSIi-10A	DSIi-20A	DS-SHUNT-05
Type	Current Transducer	Current Transducer	Shunt
Current Range	10A AC/DC	20A AC/DC	5A
Bandwidth	100 kHz	100 kHz	-
Accuracy (+25 °C)	0.3 %	0.3 %	0.1 %
Resistance	-	-	50 mOhm

Other Current Transducers for AC and DC measurement from 300 mA up to 4000 A on request.

SENSOR POWER SUPPLY

DIRECT CONNECTION TO THE AMPLIFIER (LV)



CONNECTION VIA SIRIUSi-PWR-MCTS2

CONNECTION VIA SIRIUSi-PWR-MCTS2

SIRIUSi-PWR-MCTS2 / SIRIUSir-PWR-MCTS	
Power supply	9 - 36 V DC
Max power consumption	85 W
Physical dimensions	265 x 140 x 65 mm
Operating temperature	-20 °C to 50 °C
Storage temperature	-40 °C to 85 °C
Humidity (@60°C)	95 % RH non-condensing
Output	4 x Isolated Power supply (1500 V DC, 60 sec)
Output voltage	±15 V DC
Maximum output per channel	20 W
Short circuit protection	indefinite (automatic recovery)
Over load protection	150 % of Iout max. typ

Most of the current sensors can get power supply directly out of the amplifier (HS-LV or LV) like Rogowski Coils, AC/DC Clamps, DSI-adapters. For current sensors with high-power consumption like AC/DC fluxgate clamps or the zero-flux transducers there is an additional Power supply unit available, which can be fully integrated into All-In-One Instrument (R8D, R2D) or as external SIRIUS box. the most compact power supply solution on the market.

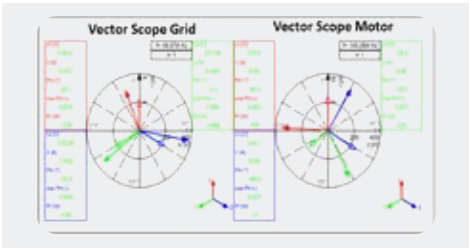
DEWESoft® X HIGHLIGHTS

THE DEWESOFT POWER ANALYZER COMBINES THE FUNCTIONALITY OF MULTIPLE INSTRUMENTS IN JUST ONE COMPACT INSTRUMENT.

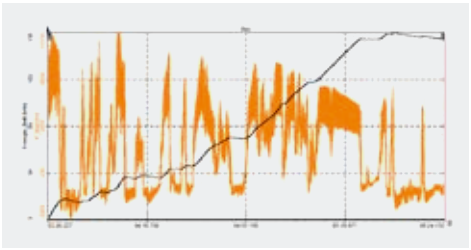
Our Power Analyzer isn't just the smallest one in the world - it's also the most capable. Our flexible hardware combined with Dewesoft X software creates a whole new world of testing possibilities for electrical measurement applications.

HIGHLIGHTS DEWESoft® X

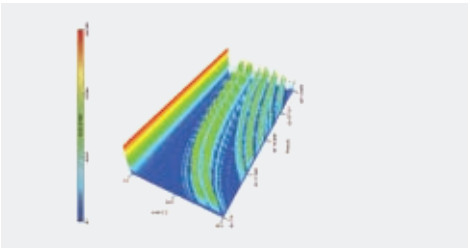
POWER ANALYZER
P, Q, S, PF, cos phi,… Possibility of more than 100 calculable values.



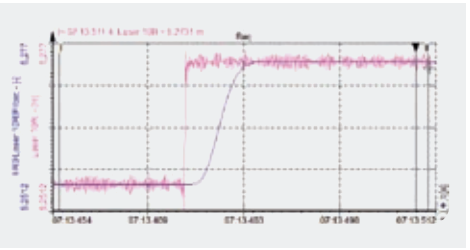
RECORDER / DATA LOGGER
Raw data storing at full sampling rate.

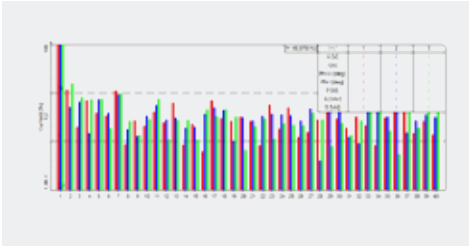


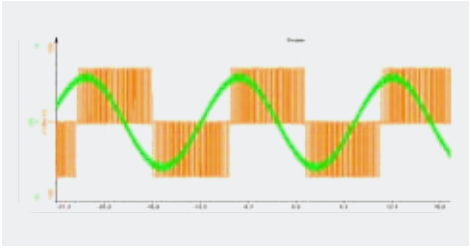
FFT ANALYSIS
2D FFT, 3D FFT, Sideband Marker etc.

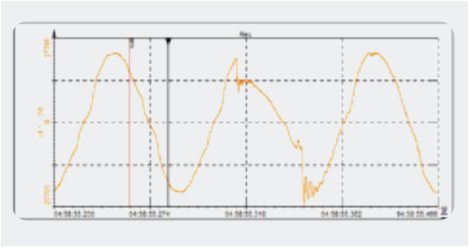


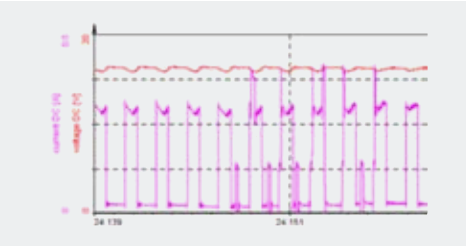
POST PROCESSING
Powerful analysis after measurement.











POWER QUALITY
FFT, Harmonic FFT, Harmonics, Interharmonics, Higher Frequencies, Flicker, Flicker emission etc.

STANDARDS
The instruments comply to a list of international standards such as the **IEC61000-4-30** among others.

RAW DATA
Raw Data is essential for a detailed analysis of any electric machine. Transients and oscillations can be captured continuously or with a trigger condition. Power values together with raw data allows the detection of anomalies.

TRANSIENT RECORDING
Triggering on analogue, math or power channels.

STATIC AND DYNAMIC TESTING
Our sophisticated Power calculation algorithms ensure amazing results during both static and dynamic recording conditions. Analysis of both low-speed wind turbine power (<10 Hz), up to high speed electric vehicle motors (<3000 Hz) is possible. Detailed analysis of period-based values is also included.

POWER ANALYZER

FULLY ISOLATED

Our worry-free solution provides sensor isolation (channel-to-ground), as well as channel-to-channel isolation, and even excitation isolation! Less noise, no ground loops, and the best possible signal quality.

2000 V DC / CAT II 1000 V

Direct input and acquisition of high voltage signals.

0.03 % ACCURACY

We offer high-accuracy amplifiers and sensors for voltage and current measurement with accuracy as high as 0.03 %.

15 MS/s SAMPLING RATE

Dewesoft data acquisition hardware features high sampling rate amplifiers with 15 MS per second sampling rate. Making it ideal for fast transient behavior.

High-sampling rate, high-bandwidth, and high-accuracy hardware for power analysis on electric motors, inverters, transformers, switches and any other electronic equipment. In conjunction sensors can be connected for temperature, vibration, RPM and torque measurement, and more.

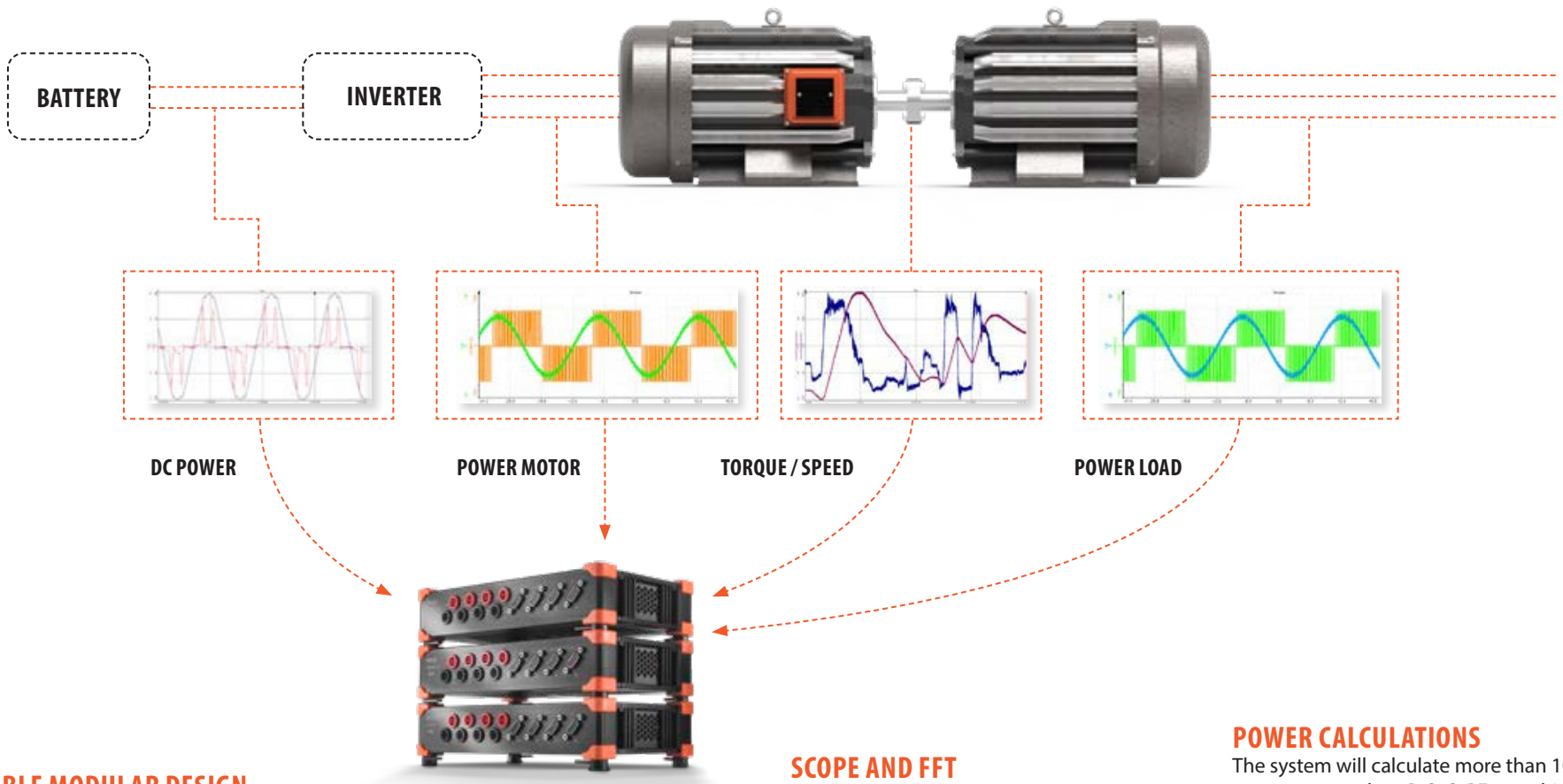
CURRENT SENSORS

We offer high-accuracy current sensors such as zero-flux current transducers, flux-gate current transducers, AC/DC current clamps, Rogowsky coils and shunts with the power supply directly from the system.

ADVANCED ONLINE AND OFFLINE MATH PROCESSING

DewesoftX includes an easy-to-use mathematics engine. You can apply math functions during the measurement, as well as during post-processing.

EXTENDABLE MODULAR DESIGN



EXTENDIBLE MODULAR DESIGN
Multiple power modules can be stacked to extend channel count - all perfectly synchronized to each other.

DISTRIBUTABLE
Several devices can be over long distances and still be perfectly synchronized for fault location analysis.

HIGH PRECISION POWER ANALYSIS
High-accuracy Dewesoft hardware combined with DewesoftX Power software guarantees reliable measurement results.

Our Power Analyzer isn't just the smallest one in the market - it's also the most capable. Flexible hardware combined with DewesoftX creates a whole new world of testing possibilities for applications accross a plethora of industries.

SCOPE AND FFT
In addition to the power analysis other useful tools and visualisations are available such as a Scope, Vector Scope, Harmonic FFT, 2D FFT, and 3D FFT. For example the 3D FFT of a motor run-up will yield valuable information about the behavior of the machine in a single plot.

RAW DATA
Raw data storage is essential for detailed analysis of all measured signals. Transients and Oscillations can be captured continuously or by means of a trigger. Power values in conjunction with raw data allow for immediate anomaly detection.

POWER CALCULATIONS
The system will calculate more than 100 power parameters such as P, Q, S, PF, cos phi and many others. All these calculations can be done during the measurement or in post-processing.

STATIC AND DYNAMIC TESTING
Our sophisticated power calculation algorithms ensure amazing results during both static and dynamic recording conditions. Analysis of both low-speed wind turbine power (<10 Hz), and high-speed electric vehicle motors (>5 kHz) is possible. Detailed analysis with period-based values is also included.

E-MOBILITY

ELECTRIC VEHICLE TESTING

ONLINE ANALYSIS OF EFFICIENCY – RECUPERATION – ENERGY BALANCE

The Dewesoft Power Analyzer combining the comprehensive DewesoftX software and the SIRIUS measurement device is the perfect solution for an all-in-one measurement experience for electric vehicles. Measuring any type of motor, be it single phase or multiphase (up to 12 phases), inverter (DC/DC, AC/AC, DC/AC) testing capabilities into the multiple hundred kHz region, as well as measuring battery parameters. Please see the section: Battery testing.

MODULAR HARDWARE DESIGN

The modular hardware design makes it possible to measure power (AC or DC) at multiple measurement points perfectly synchronised. This unique feature provides the flexibility to do a comprehensive analysis of different types of electric drive trains (Single motor, motor-generator, multiple motor configuration from 2 to 4 motors). All the auxiliary loads can be measured and analyzed simultaneously - including heating, air-conditioning, 24 V loads, and 12 V loads to name just a few.

THE HIGH SAMPLING RATE AND BANDWIDTH

The high sampling rate (up to 15 MS/s) and high bandwidth (up to 5 MHz) ensures that the data has the highest quality for the analysis. The Dewesoft system is also able to measure various other types of signals such as GPS, vibration, CAN, video, torque, acceleration etc.

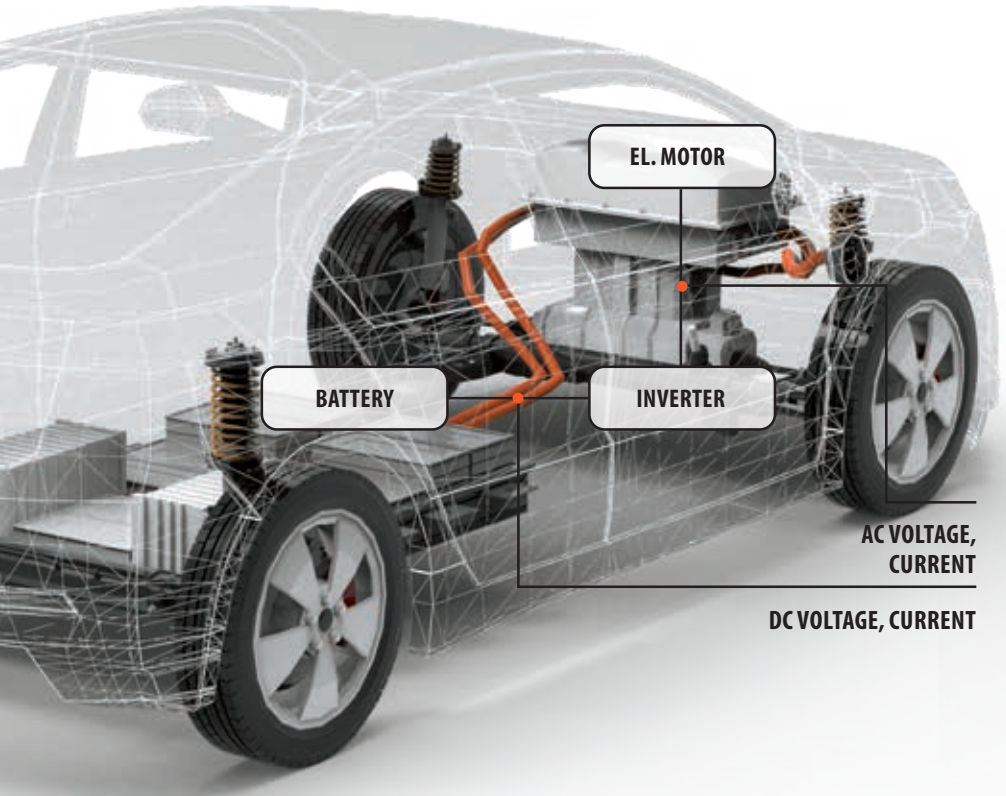
The data that is acquired is very versatile, analysis can be done during the measurement as well as in the powerful post processing tool enabling analysis such as energy flow diagrams, influence factors on efficiency, comparison to other vehicles, charging analysis, comparison of different driver behaviour on different drive cycles. By virtue of the small form factor of the Dewesoft devices they can be used in even the smallest electric vehicles.

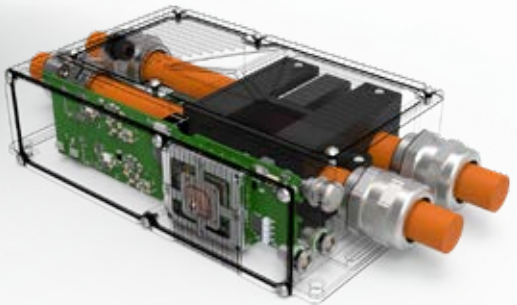
ANALYZING DIFFERENT DRIVING SITUATIONS

There are various parameters that can influence the energy consumption of an electric vehicle. These could be:

- ambient influences, such as temperature or weather,
- the quality of the road surfaces, or different driving situations (uphill, downhill, city, highway. overland or combined drives), and
- the driver profile, as no two drivers have the exact same driving behavior.

The Dewesoft Power Analyzer is able to do an energy analysis considering all of these parameters during the test drives.





ADDITIONAL AUTOMOTIVE TESTING POSSIBILITIES

The Dewesoft measurement devices can also be used for a variety of other automotive testing procedures see the list of applications. More details can be found in the Vehicle Analysis Solutions brochure.

- Autonomous driving
- Vehicle dynamics
- Ride and handling tests
- Brake testing
- Advanced driver assistance systems
- Pass-by noise
- Combustion analysis
- Torsional and rotational vibration
- Order tracking
- Road load data
- Performance testing
- Component testing
- Modal analysis
- Structural testing
- Crash tests
- Structural testing

On-road testing considering different driving conditions and driver profiles.

SIRIUSi XHS-PWR provides 1000 A calibrated range and up to 2000 A peak current and over 500 kHz bandwidth.

HYBRID & HYDROGEN TESTING

COMBINED POWER AND COMBUSTION ANALYSIS

Combining internal combustion engines and electric motors to propel vehicles can prove to be quite the challenge when measurements of the two propulsion methods need to be compared. This is not the case with the Dewesoft Combustion Analyzer and Power Analyzer.

SYNCHRONISED MEASUREMENT

Due to the modular design of the Dewesoft data acquisition devices these two very different types of propulsion systems can be measured and analyzed perfectly synchronised.

COMBUSTION ANALYZER

The Dewesoft Combustion Analyzer enables the user to display and compare measured parameters using several different diagrams such as, pV-diagrams (pressure of angle) or the CA-Scope (pressure over angle).
All CA specific calculations like the mean effective pressure (IMEP, PMEP), heat release, start/ end of combustion (SOC, EOC), start/ end of injection (SOI, EOI), indicated power, maximum pressure (Pmax), derivate pressure (dp/da) are presented either as colour diagrams or as data tables. For more detailed analysis, statistical calculations per cylinder or over the complete engine can be performed.

KNOCKING DETECTION AND COMBUSTION NOISE

Dewesoft provides a dedicated knocking detection and combustion noise algorithm. The basis for all of these calculations are precise angle position data and cylinder pressure measurement. Dewesoft provides the ideal hardware for this: the galvanically isolated SIRIUSi charge inputs (with up to 24-bit resolution) are in perfect sync with the Dewesoft Supercounters. This allows analysis of hybrid cars during real drive tests.

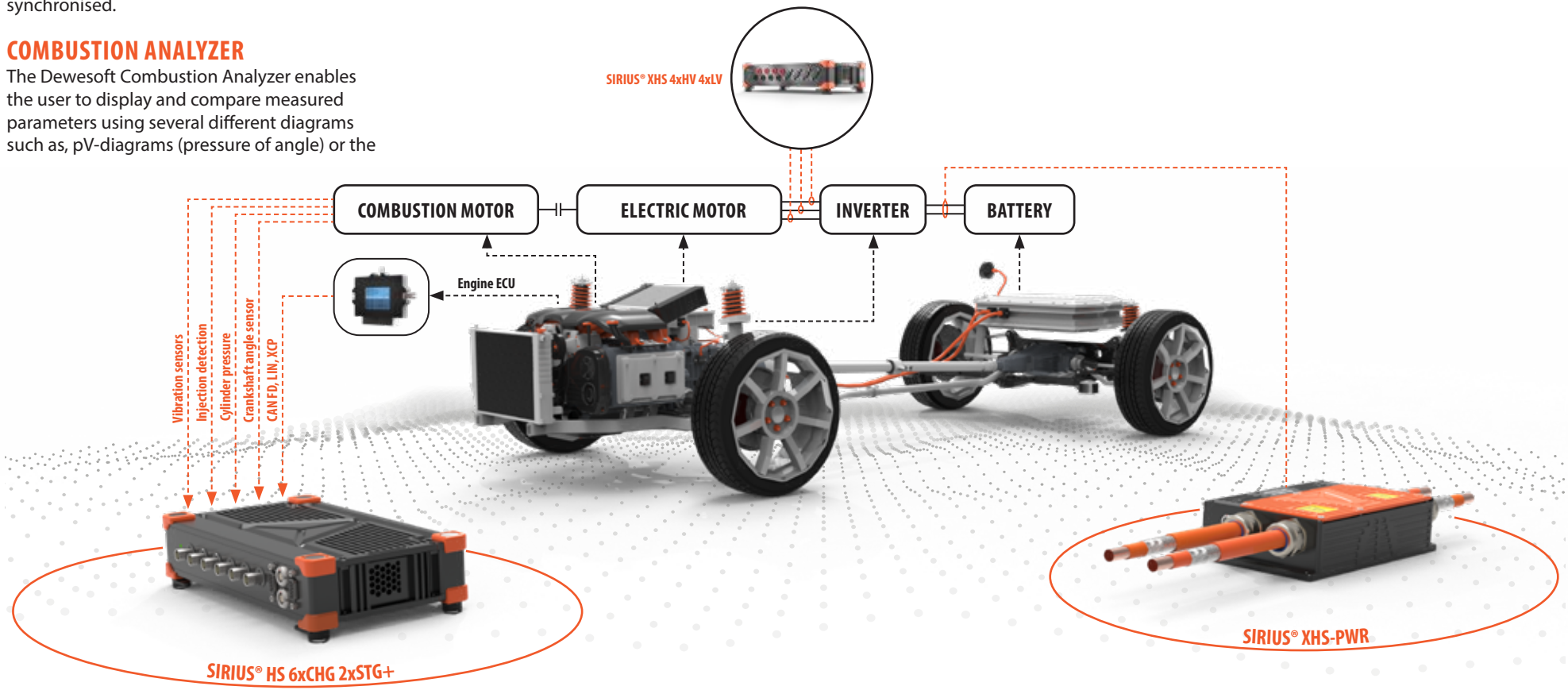
ELECTRIC VEHICLE TESTING

For more information on the measurements of the electrical parameters please refer to the electric vehicle testing section of this catalog.

HYDROGEN TESTING

Fuel cell vehicles (FCV) use a fuel cell to store hydrogen that is then converted to electrical power by a chemical reaction in the fuel cell that is used to drive the electric. As a FCV has a tank that stores the hydrogen there are a few additional parameters that must be measured. The pressure of the tank needs to be monitored through pressurizing and de-pressurizing tests. The flow velocity of the hydrogen to the fuel cell needs to be monitored. Testing of pressure relief devices that are temperature dependant for safety reasons in the event of an emergency. These are just a few of the additional parameters that have to be measured.
The flexibility and modular design of the Dewesoft data acquisition devices makes it possible to measure all the additional parameters and more - GPS, torque, speed, vibration, CAN, video etc.

High-accuracy combustion analyzer system for engine research, development and optimization as well as testing of ignition systems, exhaust systems, and valve control gear.



E-MOBILITY

MOTOR/INVERTER TESTING

Combined motor and inverter testing is the Power Analyzers domain. It offers a high number of input channels for both voltage and current measurements, and provides synchronized data acquisition on all channels.

The Dewesoft R8D Power Analyzer can measure 8 x 3-phase systems simultaneously using a single measurement device. This enables the measurement of an entire power system (e.g. electric vehicle, aircraft, ship etc.) completely synchronous.

The analyzer combines the functionalities of motor and inverter testing and analysis as well as the capability to measure other parameters such as speed, torque, temperature, video, GPS, and CAN.

Earlier typical test bed applications required the use of multiple measurement instruments - Power Analyzer, Scope, Data Logger, CAN reader etc. The Dewesoft Power Analyzer facilitates the measurement and analysis of all the data that would have been measured with such devices in a single measurement device.

- Efficiency
- Power & power quality analysis
- Analyzing 1-12 phase motors
- Raw data analysis
- Transient recording
- Data logging
- Scope
- Vectorscope
- Measurements such as speed, torque, temperature, etc...

All the data can be stored at the full-sampling rate and all analysis can be done during the measurement. Furthermore, the unique post-processing functionality enables data manipulation after the measurement (e.g. mathematics, power analysis settings, etc.). For instance if phase voltages were falsely connected this can be rectified, eliminating the need to repeat the measurement.

TYPICAL CONFIGURATION

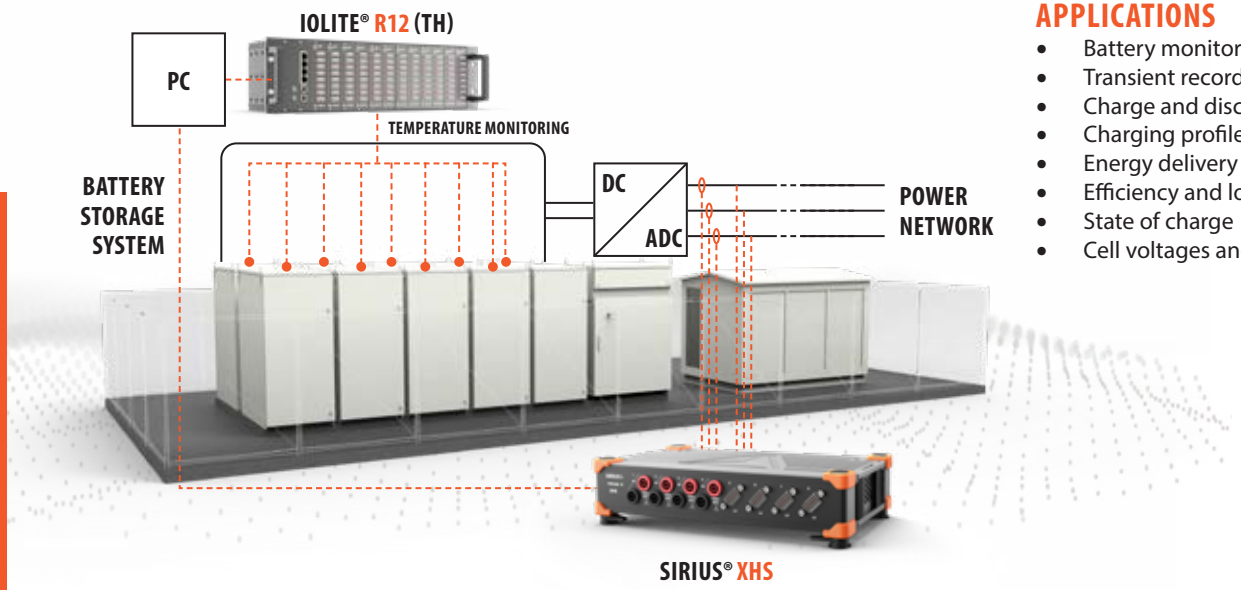
12x Voltage
12x Current
Power Supply for Current transducer
1x Torque
1x Speed

BATTERY TESTING

The batteries in battery electric vehicles (BEVs) are exposed to conditions not optimal for batteries. These include extreme temperatures both hot and cold, humidity, as well as vibrations and shocks. These all have an effect on the stability of power delivery and efficiency of the battery.

EXTENSIVE TESTS

This makes it crucial to do extensive tests on batteries: starting from the cell-characteristics leading up to the complete powertrain of the BEV. Detailed analysis requires temperature and voltage measurement at multiple points e.g. 50x cell voltage and 50x cell temperature measurements.
The flexible and scalable solution from Dewesoft can be configured to encompass over 1000 channels with many different sensors - all synchronised for a detailed analysis.



Battery testing has a broad spectrum of testing requirements, Dewesoft covers them all with ease, whether only one or a combination, the Power Analyzer and Power Quality Analyzer delivers the best results all of the time.

BATTERY DEVELOPMENT

Cell characterisation, endurance and aging tests, shock and vibration, misuse tests such as crash tests, short-circuit tests, overheating-, overloading-, overcharge- tests, forced discharge tests, impact/crush test, thermal misuse,

GENERAL BATTERY TESTING

Voltage and current, power and energy, temperature and humidity, pressure and vibration,

BATTERY CHARGING ANALYSIS

AC/DC charging, charging energy, charge-/discharge efficiency, charging process and time, harmonic analysis as well as inductive and conductive charging.

BATTERY TROUBLE SHOOTING

Such as voltage drops, voltage commutation unbalance and inrush currents.

APPLICATIONS

- Battery monitoring
- Transient recording
- Charge and discharge analysis
- Charging profiles
- Energy delivery
- Efficiency and losses
- State of charge
- Cell voltages and temperatures

EV CHARGING ANALYSIS

CONDUCTIVE AND INDUCTIVE CHARGING

Charging whether conductive (plug-in charging) or inductive (wireless charging) can be analyzed with Dewesoft data acquisition devices, for both alternating current (AC) and direct current (DC).

With higher switching frequencies of the inverter (up to 150 kHz), high sampling rates of up to 15 MS/s ensure that even the fastest transients can be monitored and analyzed.

CHARGING PROFILE AND TIME

This types of tests include analyzing the charging station itself over the different charging levels. Furthermore, they involve analyzing the charging process of the battery starting at the power delivery to the charging station to bulk, as well as the absorption and floating stages of charging.

CHARGE AND DISCHARGE EFFICIENCY

During charging and discharging some energy is lost through heat. The quotient of the amount of energy that is delivered by the battery and the amount of energy that was delivered to the battery, can be measured. Additionally, the efficiency of the drive train from the battery over the inverter to the electrical motor, auxiliary power consumption and finally the actual power that arrives at the wheels, can be measured and analyzed.

TESTBED / ON-ROAD TESTING

Dewesoft data acquisition devices offer the modular design and flexibility that is suited for both testbench testing and in-vehicle testing.

SUPPLY FOR SENSORS

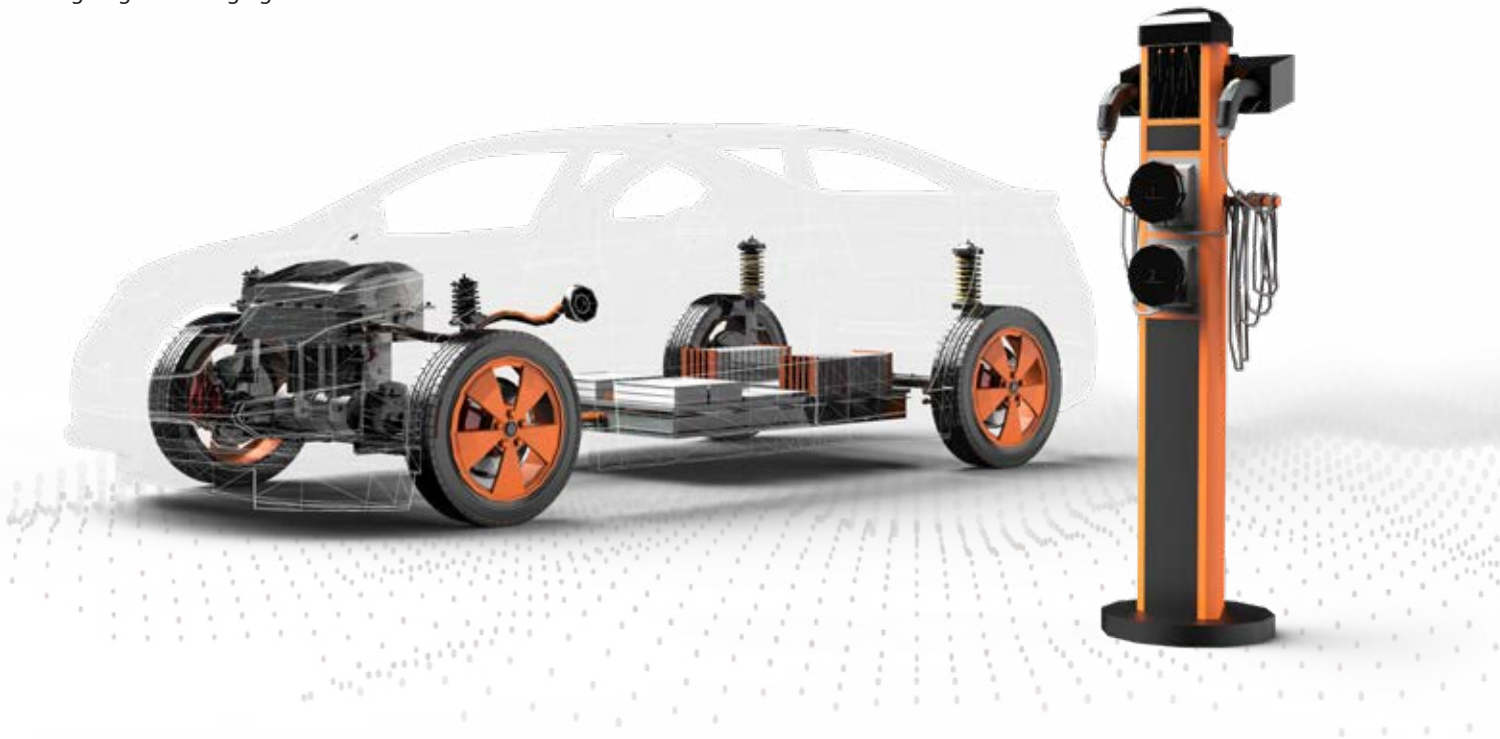
For real-drive tests no auxiliary power is needed from the vehicle. The Dewesoft battery packs - which are hot swappable - can power the Dewesoft system as well as the current transducers and other sensors. With SIRIUSi-PWR-MCTS2 even zero flux transducers that need up to 20 W per unit can be powered. This ensures a true measurement without external influences.

IN-VEHICLE USE

Measurements on BEVs under real-drive conditions require a powerful, mobile, and extra compact measurement system due to the constraints in space. The system also needs to be able to power measurement sensors and other auxiliary systems such as screens directly. Dewesoft Power Analyzers well-suited for this application.

TESTBENCH

Test benches use several important interfaces such as CAN, OPC-UA, DCOM, etc. to receive and relay information. The Dewesoft NET option provides a remote control feature for Dewesoft data acquisition systems, enabling you to control the entire test procedure from a single PC in the control room.



TYPICAL CONFIGURATION

IOLITE® modules
for temperature monitoring
(8x TH, 8x RTD)

SIRIUS® XHS
for inverter monitoring

GRID POWER ANALYZER

GRID ANALYSIS

SMART GRID & ENERGY MANAGEMENT

In conventional power supply systems, the power is produced in big power generation plants (thermal, nuclear, hydro...) and transported via lines to substations, transformers to the customer.

In recent years, the trend toward more renewable energy power plants (wind, solar, etc.) has pushed power supply systems to start moving away from the centralized model. The power grid operators are now facing some inherent challenges.

The systems are designed and built for centralized supply - not for the variable, and intermittent power generation from renewable energy sources, larger loads such as heat pumps and EV charging stations, which are causing transients and voltage quality problems such as dips, swells, or sags.

There is a move toward so-called smart grids, where producers and consumers of energy communicate and interact with each other to avoid problems. They allow for a greater increase in the number of renewable energy systems entering the power grid. However, the design process and the equipment for such smart grids need comprehensive testing.

With synchronized and distributed measurement capability, the Dewesoft Power Analyzer can measure both power generation and power consumption at multiple points in the grid - a solid foundation for the design and planning of smart grids.

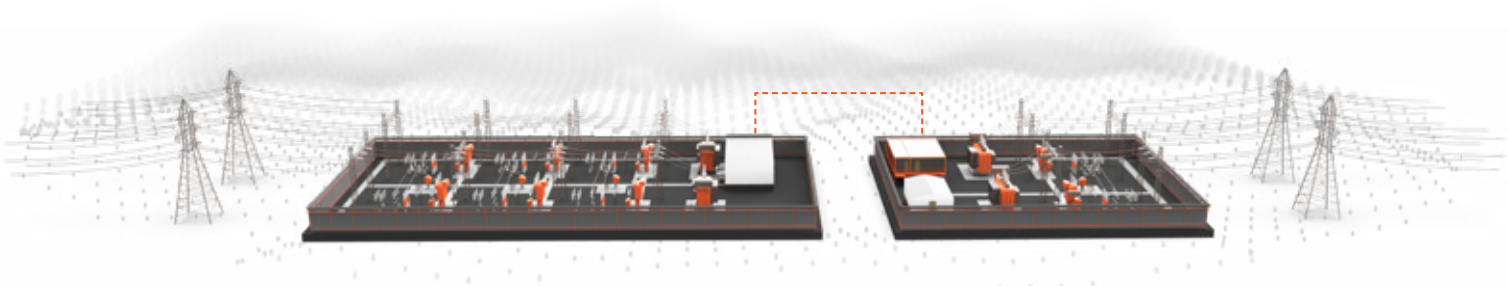
- Power and efficiency analysis
- Multiple power modules analyzed simultaneously
- Synchronous distributed data acquisition
- Interaction between power generation & consumption
- Estimation of line parameters HVDC transmission system analysis

POWER QUALITY ANALYSIS

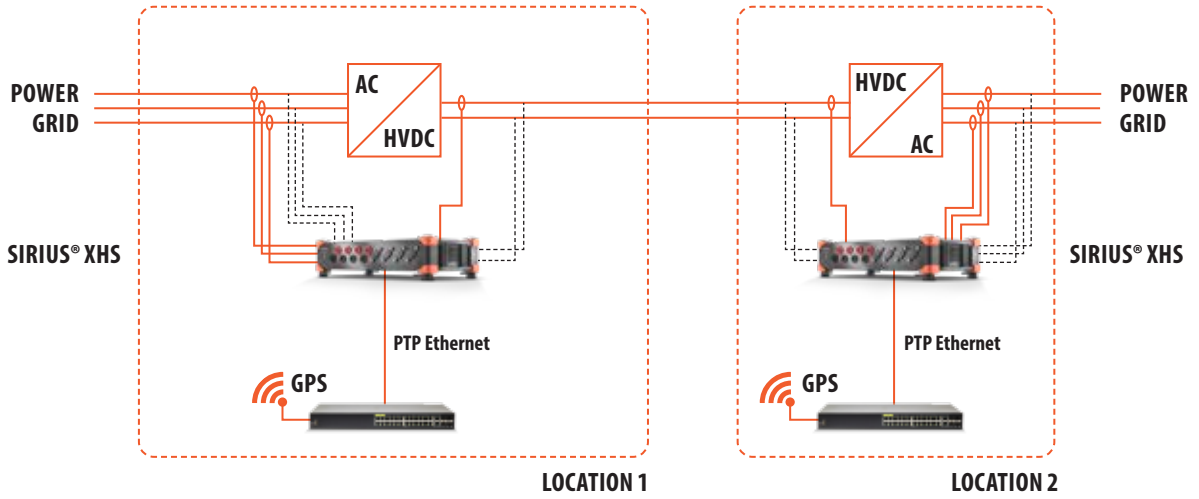
The power quality can be analyzed and a energy management plan for the operation of both energy production plants and energy consumers, can be compiled. Energy management has the objective of optimizing the energy consumption for the industrial as well as the residential sectors. This includes many activities that will lead to a stable decentralized power grid. These activities include reducing the overall energy consumption, move toward more efficient equipment and technologies and thereby also reducing the costs. The Dewesoft Power Analyzer combined with the ability to measure multiple points in the grid simplifies the identification of numerous parameters and faults. These include identifying big loads, inefficient equipment, standby consumption, peak loads, harmonic interference, different types of transients, estimation of line parameters, detection of reverse power flows, voltage and frequency behaviour and many more.

TYPICAL CONFIGURATION

SIRIUS R8
4 x Voltage
16 x Current



High Voltage Direct Current Cable



MOTOR TESTING

Motors have to fulfil higher and higher requirements concerning energy efficiency. Dewesoft power analyzer enables comprehensive motor testing.

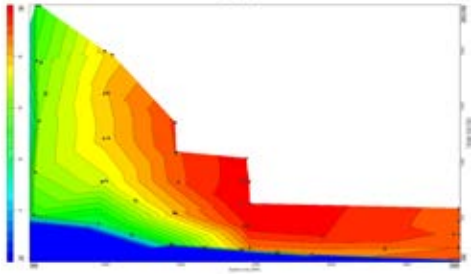
EFFICIENCY DETERMINATION

There are two ways of determining the efficiency of the motor, the direct and indirect method. The direct method requires a measurement of the input power using a Power Analyzer, and a measurement of the output power by measurement of the rotational speed and the torque that is applied to the motor. Direct method approach is supported within the Power Analysis module with outputs for mechanical power, losses, efficiency and efficiency mapping.

The indirect method is based upon loss segregation and then building a sum of all the losses. There are six measurement points defined in the standard, these are summed together and subtracted from the power input, yielding an output power for efficiency determination.

CLARKE & PARK TRANSFORMATIONS

The Clarke transform can be used to simplify the analysis of three-phase circuits. The difference between the abc reference frame

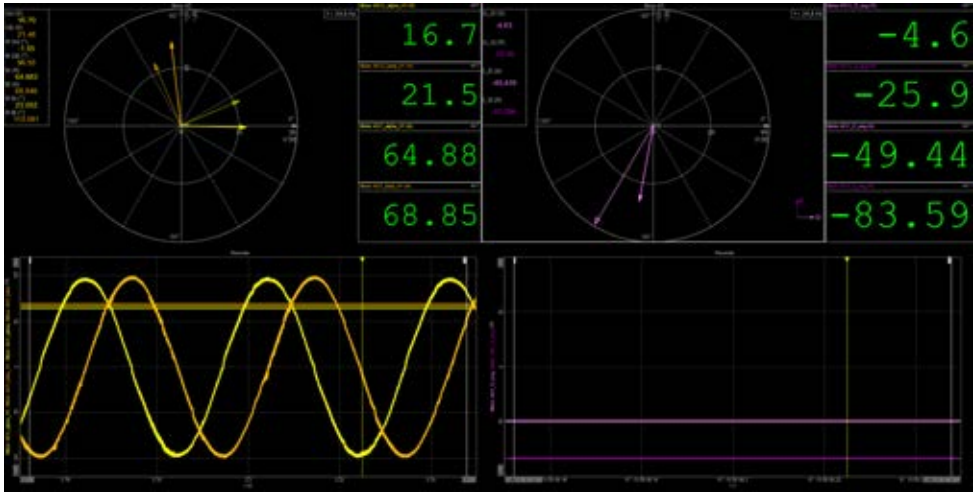


and the αβ reference frame is that the αβ domain has projected three balanced phase quantities onto two stationary axes.

The Park transform is conceptually similar to the Clarke transform: Whereas the αβ (Clarke) transform is the projection of the phase quantities onto a stationary two-axis reference frame, the dq (Park) transform can be thought of as the projection of the phase quantities onto a rotating two-axis reference frame - a rotational transform of the αβ reference frame.

POWER ANALYZER

The Dewesoft Power Analyzer and the capability of additional software sensor calibration guarantees the highest accuracy measurement results. The modular hardware concept is able to measure multiphase (1 to 12-phase) motors as well as the mechanical parameters such as speed and torque. Furthermore, additional parameters such as vibration, sound level, temperature, etc. can also be measured effortlessly.



Type of inverter	Input	Output
Industry inverter	1 to 3~AC	3~AC
Electric vehicle inverter	DC	3 to 12~AC
Photovoltaic inverter	DC	1 to 3~AC
Wind power inverter	3~AC	3~AC
Electric two-wheeler	DC	1 to 12~AC

INVERTER TESTING

The Dewesoft Power Analyzer allows for comprehensive and highly accurate analysis of all kinds of inverters. The combination of modular, highly accurate hardware and powerful software can measure any in- and output configuration up to a 7-phase AC system.

Fundamental frequencies from 0.5 Hz up to 3 kHz can be analyzed as well as switching frequencies into the multiple hundred kHz region. The analysis possibilities reach from efficiency determination to a detailed analysis of each switching pulse.

Raw data storing enables detailed analysis and depiction of each individual switching pulse (e.g. transient behavior in the scope). The power quality library automatically calculates THD, harmonics, etc. with the click of a button. A transient recording captures voltage peaks (e.g. with long cable lengths) or captures current peaks which can be any multiple of the nominal current.

POWER TRANSFORMERS

Power transformer testing as described in the international standard IEC 60076, establishes multiple measurement parameters that must be done on the unit. With tools such as the scope and vector scope, voltage ratios and phase displacements of various primary and secondary configurations (e.g star, delta, and interconnected star) can be analyzed effortlessly.

- Efficiency analysis
- Raw data analysis
- Voltage rise time analysis (dU/dt)
- Transient recording
- Filter analysis

POWER AND POWER QUALITY ANALYSIS

The transient recording functionality with the ability to store all signals at the full sampling rate (up to 15 MS/s) ensures a detailed analysis. Combining this with the trigger functionality both failure and transient events (including long-term transformer testing) can be captured and analyzed with ease. The power quality library enables harmonic measurements of voltage and current into the multiple hundred kHz region. The data can be represented as a percentage of the fundamental frequency as required for the no-load current according to IEC 60076.

SYMMETRICAL COMPONENTS

Additionally, the calculation of the zero-sequence impedance is required, this function is built into the DewesoftX power quality library. Power and efficiency analysis of transformers requires the highest measurement accuracy for the phase angles. This is especially important when analyzing units with a low power factor, which is difficult with conventional measurement equipment

TYPICAL CONFIGURATION

8x Voltage, 8x Current
3x Temperature
Sound
Additional Sensor calibration

- Analysis according to IEC 60076
- Correction of power losses depending on temperature
- Additional sensor calibration
- Harmonics
- Symmetrical components

GRID POWER ANALYZER

FAULT/TRANSIENT RECORDING

Power system conditions such as switching operations (capacitor bank connection or disconnection) or some unforeseen system conditions can cause switching transients, voltage interruptions, over-voltages, harmonics, etc. These can affect the function of power system operation, and lead to outages of delivery lines or even cause a complete black-out of the entire power system.

The effects of these unwanted conditions more than often lead to devices seizing to work or even getting completely destroyed, this is especially true for sensitive electronic equipment. The impact of these faults can be very expensive, and time-consuming in the mitigation of these faults.

- High sampling rate up to 15 MS/s
- Storing raw data
- Triggering on different channels (analog, digital, math, power, power quality, etc.)
- Analysis of all line frequencies (16,7 Hz, 50 Hz, 60 Hz, etc.)

DewesoftX SOFTWARE

Being able to store raw data for analysis and the diverse triggering functions offered in the DewesoftX software makes it easy to identify and analyze any kind of fault that may occur. The triggers in DewesoftX can be triggered on any input channel (analog, digital, etc.), as well as being triggered on mathematical channels and standard power channels.
Analysis can be done on all line frequencies (16,7 Hz, 50 Hz, 60 HZ, 400 Hz, 800 Hz) as well as variable frequencies for variable frequency drives (VDF) and inverters. Power quality parameters such as system unbalance, harmonics, THD, flicker, rapid voltage changes etc. can also be acquired and analyzed by the click of a button, all power quality parameters are measured according to international standards.

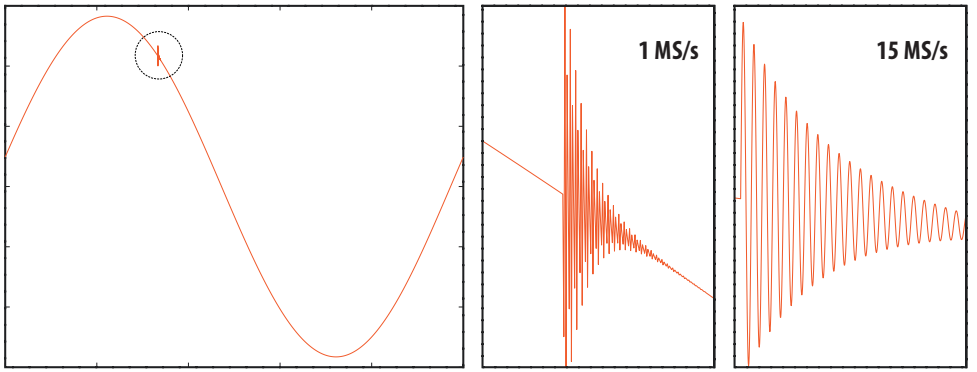
DewesoftX TRIGGERING

The possibility to acquire the data using the fast-on trigger, slow otherwise option data is stored at a reduced rate (min, max, average and RMS), as soon as an event happens the data is stored at full speed enabling all power parameters for analysis. In addition, it is possible to utilize pre and post times which will store the data at full speed before and after the event for as long as the user-determined pre measurement. This reduces the amount of data that is stored which is handy for long time measurements.

The possibility to use math channels to create combined trigger conditions offers the user the freedom to determine the trigger events for individual events or combinations thereof.

TYPICAL CONFIGURATION

SIRIUS R3
12 x Voltage
12 x Current



*Comparison of a transient signal captured at 1 MS/s and 15 MS/s.

STANDBY POWER

The IEC 62301, is the internationally recognised standard for the measurement of the standby power consumed by consumer electronic devices. It is estimated that household appliances consume between 5 and 15 % of the entire power requirement of a standard household, while on standby mode. Lowering the level of power consumed by standby power mode can be beneficial for the environment as well as financially.

MEASUREMENT REQUIREMENTS

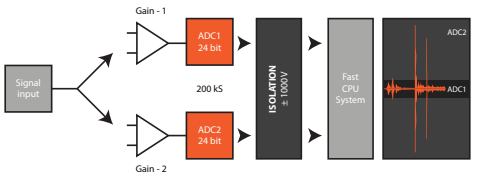
There are several requirements set for the measurement of the standby power. Measurement devices must be able to measure very low currents (< 1mA) and very low power with specified accuracies depending on the wattage (<0.5 W with an accuracy of 0.01 W, >0.5 W with an accuracy of 2 %). Harmonic analysis up to the 49th order (2.5 kHz @ 50 Hz fundamental) is required and a Data logging capability is strongly recommended. The testing process requires the measurement of the power supply voltage, as well as the THD, temperatures etc. all within the specified limits. With the Dewesoft Power Analyzer all of the required parameters can be measured and analyzed.

DEWESOFT DUAL-CORE TECHNOLOGY

The biggest challenge with measuring standby power is measuring currents with a high crest factor. The high crest factor is caused by the pulsed current of the power supply units. Furthermore, input filters often produce reactive currents which can be a multiple of the active current. In older DAQ systems these issues forced measurement ranges to be set much higher than required by the pure sinusoidal signal, which decreased the accuracy: The Dewesoft Dual-core technology (incorporates two 24-bit AD converters in parallel: One measuring the full input range and the other measuring 5 % of the range. This ensures high accuracy for both high and low ranges and makes it possible to have a high range and best accuracy simultaneously. This technology is revolutionary for standby power measurements and reaches never-seen accuracies.

TYPICAL CONFIGURATION

1x Voltage, 1x Current
Additional current transducer calibration for 50 or 60 Hz



- DUAL-CORE-ADC measurement for low currents with high crest factor
- Harmonics and THD
- Data logging

GRID POWER QUALITY ANALYSIS

The different Power Quality parameters describe the deviation of the voltage from its ideal sinusoidal waveform at a certain frequency. The Dewesoft Power Analyzer is rated to the IEC 61000-4-30 Class A acquisition and measurement devices. When compared to other Power Quality Analyzers Dewesoft offers a more detailed power analysis considering its ability to store raw data, powerful post processing capability, analyzing behavior at faults, and the ability to calculate many additional parameters in the extensive math library. An overview of some of the analyses that can be done at the click of a button is presented below.

HARMONIC ANALYSIS

With the DewesoftX software harmonics for voltage and current as well as active and reactive power can be analyzed up to the 3000th order. All flicker calculations are implemented according to the IEC61000-4-7 standard, and the number of sidebands and halfbands are user-definable. For higher frequency analysis harmonics can be grouped into 200 Hz and 2 kHz bands up 150 kHz. The calculation of THD (Total Harmonic Distortion) for voltage and current up to the 3000th order as well as interharmonics rounds up the harmonic analysis with Dewesoft.

FFT WATERFALL ANALYSIS

In addition to the FFT analysis, the harmonic FFT analysis can also be depicted in either a 2D or 3D FFT Waterfall plot. The visualization is user-definable to be either linear or logarithmic, 2D or 3D, and can also be sorted by harmonic order or frequency. This visualisation is especially useful for the analysis of variable-frequency drives (VFD).

FLICKER AND FLICKER EMISSION

The Dewesoft Power Analyzer measures flicker according to the IEC 61000-4-15 standard.

Flicker emission is calculated according to the IEC 61000-21 and is, therefore, able to evaluate the flicker emission into the grid by wind turbines as well as other power generation units.

RAPID VOLTAGE CHANGES

Rapid Voltage Changes (RVC), describes voltage changes that changes more than 3.3% in a predefined time interval. This is added as a supplement to the flicker standard. This is a special calculation in DewesoftX, calculating the maximum voltage drop (Dmax), the stationary deviation after the voltage drop (dc) and the specific time where the voltage dropped under 3.3 % of the nominal voltage as specified in the IEC 61000-4-15.

UNBALANCE - SYMMETRICAL COMPONENTS

Normally an electric power system operates in a balanced, symmetrical three-phase sinusoidal steady-state mode. Unbalance in such a system means that the voltages and/or the currents are unsymmetrical. The Dewesoft Power Analyzer has the ability to measure over 50 different parameters for a comprehensive analysis of an unbalanced system (positive, negative and zero sequences). This enables you to calculate multiple parameters for voltage, current, active, reactive, and apparent power. Unbalanced systems can cause the flow of current in the neutral line, heating of conductors and equipment which decreases efficiency, as well as increasing harmonic currents.

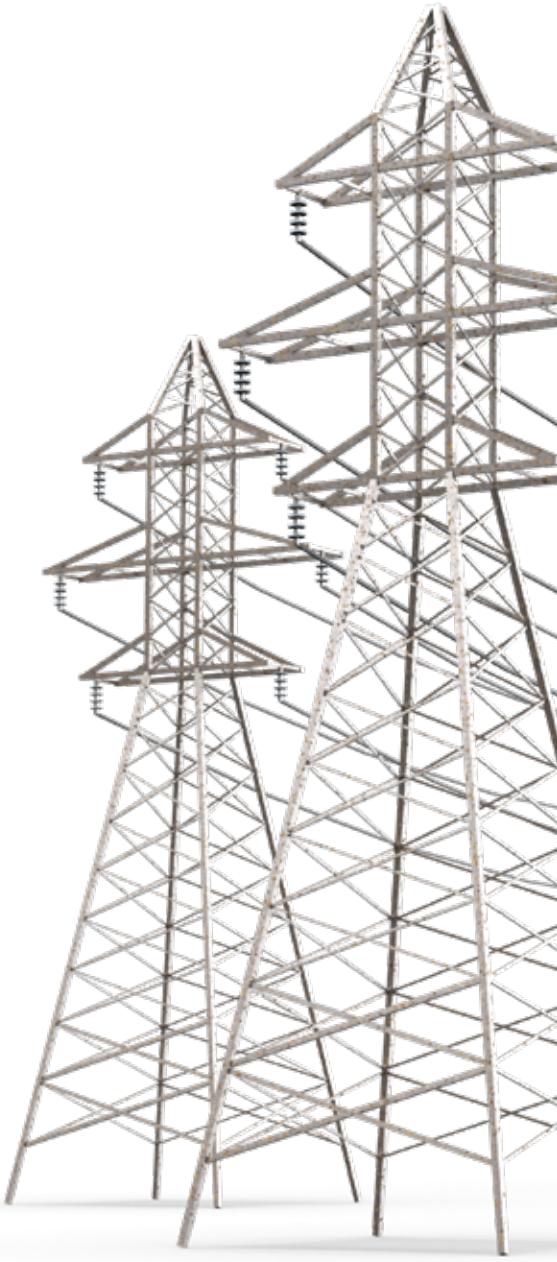
FREQUENCY DEVIATION

Frequency deviation is caused by the connection and disconnection of generation units and loads to the grid. These can have severe consequences to the grid stability and even lead to a blackout. The Dewesoft Power Analyzer can be used to monitor the frequency on the grid, as well as for testing the frequency behavior of power generation units when they are in development.

POWER QUALITY ANALYZER

OVERVIEW OF THE POWER QUALITY STANDARDS SUPPORTED BY DEWESOFT

- IEC 61000-4-30, IEC 61000-4-7,
- IEC 61000-4-15, Requirements for Power Quality Analyzers, Calculation of Harmonics, Flicker etc.
- EN50160, EN 50163, IEE519, IEC 61000-2-4, etc. Power Quality limits of public grid, industries and railway applications
- IEC 61400-21, IEC 61400-12, FGW-TR3, VDE-AR4105 etc. Power Quality Analysis of Renewables
- IEC 61000-3-3, IEC 61000-3-11 EMC of voltage changes and Flicker
- IEC 61000-3-2, IEC 61000-3-12 EMC of harmonic current



- Harmonics and THD up the 3000th order
- Interharmonics & higher frequencies
- Flicker, Flicker emission, RVCs
- FFT, harmonic FFT, waterfall-FFT
- Symmetrical components

POWER QUALITY ANALYZER

ELECTRICAL EQUIPMENT TESTING & MAINTENANCE - BOTH BIG AND SMALL

ELECTRICAL TESTING

The modular hardware design and the powerful DewesoftX software offer a complete solution for the testing of various types of electrical equipment. The testing of modern electrical equipment in this day and age extends well beyond just fundamental testing. It encompasses so much more ranging from safety, energy requirements, electrical performance, and operation to name just a few. Monitoring In-Rush currents, voltage transients, leakage, load tests, polarity testing, currents, harmonics, and power quality analysis are just a few of the possible applications.

- Electrical stability testing
- Fan and pump testing
- Circuit breaker and switch testing
- Filter analysis
- Castor testing
- Rod-drop testing
- Harmonics analysis according to IEC 61000-3-2/-12
- Voltage changes according to IEC 61000-3-3/-11
- CE conformity of electrical devices (Harmonics/Flicker)

FAULT DETECTION

Testing is the only way that faults in the manufacturing can be identified before the equipment is released into the field. Furthermore, it ensures that the electrical equipment has the ability to be used for its intended function. Tests such as electrical stability testing, fan, and pump testing, circuit breaker and switch testing, filter analysis, castor testing, rod-drop testing, harmonics analysis according to IEC 61000-3-2/-12, voltage changes according to IEC 61000-3-3/-11, and CE conformity of electrical devices (Harmonics/Flicker) to name just a few.

MAINTENANCE AND SAFETY

These tests are done for user safety and liability issues. Handling electrical equipment could pose serious hazards such as electric shock, fires, and even explosions. Furthermore, these tests are done to ensure the quality of the equipment and that they adhere to strict safety standards.

RENEWABLE ENERGY SOLUTION

To maintain a stable and secure power grid operation with a large share of renewable generation, certain standards must be adhered to. DewesoftX provides measurements supported with reporting tools according to FGW-TR3 and VDE-AR4105.

ACTIVE & REACTIVE POWER

The power analysis module provides a comprehensive set of power measurements. Combined with the statistics function the user can apply various statistic operations such as, minimum, maximum, averaged values, etc. to any of the output power measurement channels. This, for instance, allows you to capture maximum power, or check output power deviation, for a specific time interval.

Power plants operate at different setpoints for the injection of active and reactive power. Testing that the regulation controller behaves correctly under changing demand conditions (i.e. if power reduction is within tolerance as the frequency increases if reactive power injection increases as the voltage drops, etc.) is essential for ensuring a reliable network operation with integrated renewables. DewesoftX enables you to perform measurement campaigns storing the data for later in-depth analysis.

POWER QUALITY

Implemented parameters enable you to check equipment compliance to power quality standards such as IEC 61400-21.

Special functionalities are implemented to calculate the flicker parameters (such as flicker coefficient, flicker step factor, voltage change factor, etc.). Switching operations are events that can induce transient behavior, such as oscillations that are not correctly dumped. The power quality analyzer implements period value calculations, for much of the calculations (P, Q, S, Urms, Irms, ...). Period values enable you to minimize the averaging effect and are ideal for the observation of transients.

The Dewesoft power quality analyzer also provides the classical power quality parameters such as harmonics (up to 3000), interharmonics, and multiple harmonic distortion measurements such as THD.

BEHAVIOUR AT FAULTS

Since our devices enable distributed and synchronous data acquisition, they are ideal for analyzing behavior at faults, such as tripping of a protection relay, recloser, etc. Raw data from multiple points in the grid enables analysis of fault length, type, and specification of short-circuit current.

Particularly in distribution networks, sudden voltage dips can occur, which can lead to unstable operation or even disconnection of certain generator types, the loss of generation causes the voltage to drop even further and this can, in turn, cause a cascading disconnection of other generators on the grid. The generators thus need to be equipped with the so-called Low-Voltage Ride Through (LVRT) capability, which ensures that a generator can withstand certain supply voltage dips. DewesoftX supports the most common standards (IEC 61400-21, FGW TR3) that describe the testing procedures for LVRT capability.

- Power analysis for AC and DC
- Raw data storing (Switching operations, faults)
- Power quality analysis (Harmonics, Interharmonics, ect.)
- Flicker, -emission, -coefficient, -step factor
- Symmetrical components, period values

POWER QUALITY ANALYZER

WIND POWER TESTING

TEST REQUIREMENTS

These tests include electrical measurements such as power performance, power quality, and behavior at faults to name just a few. Additionally, mechanical measurements need to be performed these include testing structural integrity, power generation sound level, and many more.

Power performance analysis according to the IEC 61400-12, in order to determine the power performance of the power plant requires measurements of the voltage and currents but also includes measurements such as wind speed, wind direction, and temperatures. The averaged values from these measurements are classified in BINS, from these BINS indicators such as the performance factor (CP), and the annual energy production (AEP) can be determined.

DewesoftX

The flexible measurement screen visualization setup in the DewesoftX software enables users to analyze graphs such as power factor over wind speed, or tabling the different BINS, wind speed over time, power performance factor, and any other required power parameters round up the complete measurement package.

COMMISSIONING THE POWER PLANT

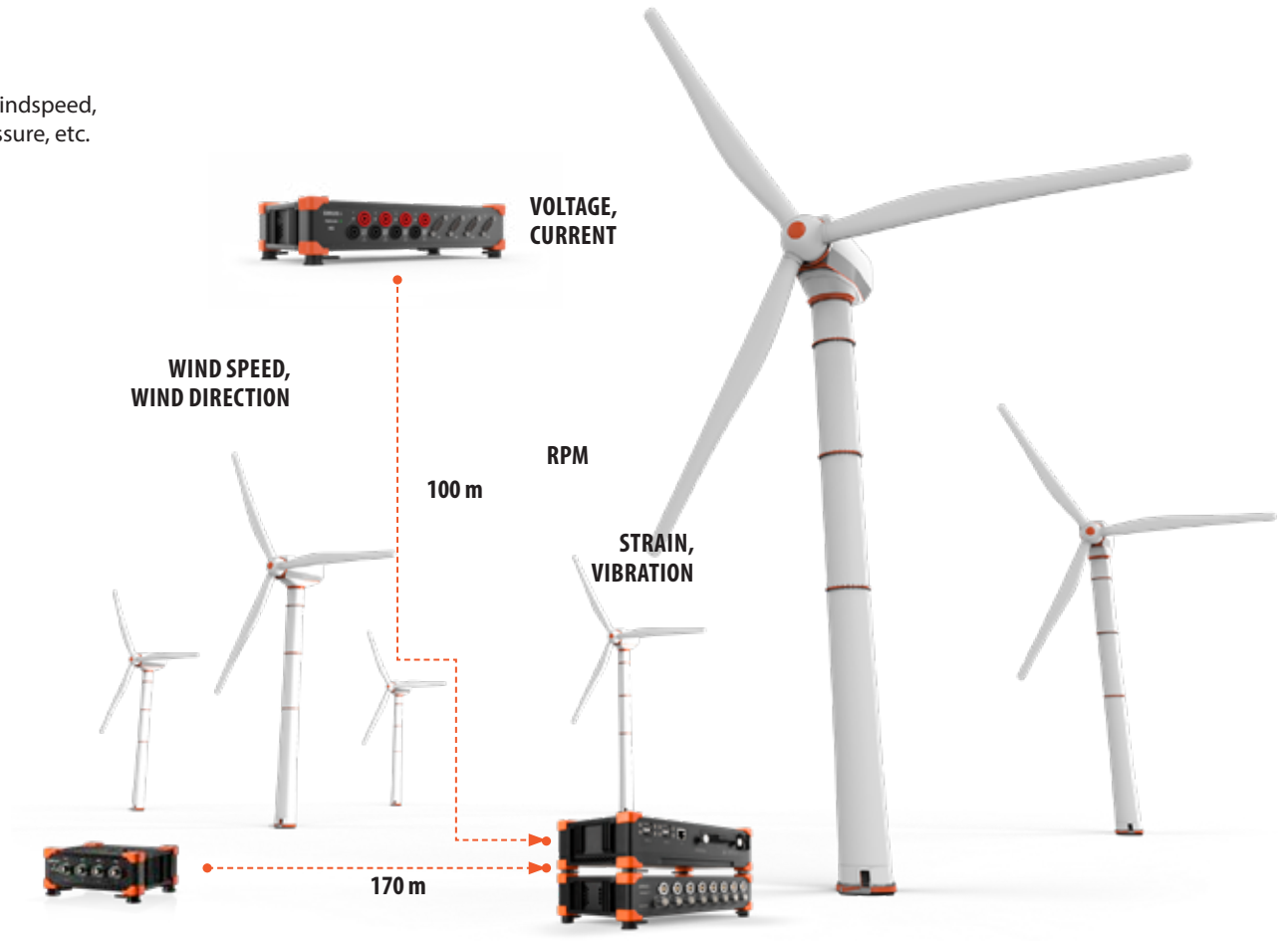
Before commissioning wind power plants must fulfill the local requirements from local regulators and grid operators. The FGW-TR3 and the IEC 61400-12 are the most popular standards worldwide for testing the power quality behavior and behavior at faults of wind power plants. Parameters such as flicker emission, flicker coefficient, harmonics, interharmonics, and higher frequency emissions are just a few of the test results needed.

These results are handed to the grid operators for confirmation that the wind power plant fulfils all the necessary requirements set by local and international standards and that all the power quality emissions are within the set limits. Other tests are also possible with the Dewesoft Power Analyzer these include switching operations and low and high voltage ride troughs.

- Power performance
- Transformer testing
- Structural and sound level testing
- Transformer, generator and inverter analysis

TYPICAL CONFIGURATION

3 x Voltage
3x Current
Additional:
Wind direction, Windspeed, Temperature, pressure, etc.



- High switching frequencies
- High bandwidth Harmonics
- THD
- Flicker
- Energy
- Efficiency

AIRCRAFT POWER ANALYZER

The Aircraft Power module calculates the voltage, current and power characteristics of AC 1-phase and 3-phase 400 Hz systems, and for DC supply systems.

STANDARDIZED AIRCRAFT POWER RESULTS

Related standards for aircraft power measurements are listed below:

- MIL-STD-704F
- GJB181x-xxxx
- GJB 5558-2006
- ISO 12384:2010
- ISO 1540:2006

With the compliance to such standards the full set of aircraft power grid parameters can be determined, such as unbalance, modulation amplitude, phase difference, steady-state frequency, distortion factor, ripple amplitude and many more.

LIGHTING DEVICES

The Dewesoft Power Analyzer is able to measure both Efficiency and Power Quality as well as do a full analysis of Lighting systems using a single instrument. This is a new and innovative lighting test experience. The trend towards energy-saving lighting makes fluorescent and LED lights more and more popular. In comparison to incandescent light bulbs, both fluorescent and LED technologies have higher efficiencies.

DIFFERENT CHARACTERISTICS

These technologies have different characteristics that have to be taken into account when doing measurements on them. For instance, fluorescent lighting makes use of ballast units which make use of high switching frequencies of up to 150 kHz.

LEDs are more energy-efficient than incandescent bulbs, but they also have some disadvantages. Using a light-emitting diode that produces a non-linear load can impact the power quality negatively, by introducing noise into the grid. This puts unwanted strain on the AC circuit.

DewesoftX

The high Sample Rate (15 MS/s) of the Dewesoft Power Analyzer guarantees reliable analysis of any kind of lighting system. The power quality library automatically calculates parameters such as Harmonics, THD, Flicker, etc.

The extensive math library is able to calculate efficiency, energy consumption, and many other parameters. For example, the current through a fluorescent lamp can be determined via the math library out of the secondary current and the cathode current.

TYPICAL CONFIGURATION

SIRIUS XHS
3x Voltage
3x Current
1x Low Voltage input for luminance meter

OVERVIEW

POWER ANALYSIS

Functionality	Dewesoft Power Analyzer
Power Analysis for DC and AC	✓
Power Analysis	P, Q, S, PF, cos phi, D (Distortion), DH (Harmonic distortion), QH (reactive power of harmonics) (for each phase and total)
Fundamental Power	P_H1, Q_H1, S_H1, cos phi_H1, phi_H1 (for each phase and total)
Voltage and Current	RMS, RM, AVE (star and delta)
Energy Calculation	Total, positive and negative (e.g. Recuperation)
Efficiency	✓
Wiring Schematics	DC, 1-phase, 2-phase, 3-phase delta, 3-phase star, 3-phase V, 3-phase Aron, 6-phase (R2, R4, R8), 7-phase (R2, R4, R8, 12-phase (R4, R8))
Star-Delta Calculation	✓ (waveform and RMS values)
Frequencies	16.7 Hz, 25 Hz, 50 Hz, 60 Hz, 400 Hz, 800 Hz, Variable from 0.5 Hz up to 3 kHz
Frequency Source	Voltage, current, external
Period Values	U, I, P, Q, S, symmetrical components for ½, 1, 2 or 4 periods and selectable Overlap up to 99 %
Number of Cycles for Power Calculation	5 - 12
Power Averaging	Selectable - starting from 1 ms , Multiple Averaging (e.g. 20 ms, 60 s, 600 s) possible

POWER QUALITY

Functionality	Dewesoft Power Analyzer
Harmonics (according to IEC61000-4-7)	up to 150 kHz for voltage, current, active-, reactive power, phase angle and impedance
Variable Sidebands and Half Sidebands (according to IEC61000-4-7)	✓
Harmonic Smoothing Filter (according to IEC61000-4-7)	✓
Interharmonics (according to IEC61000-4-7)	✓
Total Harmonic Distortion (THD) (according to IEC61000-4-7)	Voltage and current (Total, odd and even) - selectable up to 150 kHz
Total Interharmonic Distortion (TIHD) and K-factor (according to IEC61000-4-7)	Voltage and current (Total, odd and even) - selectable up to 150 kHz

SOFTWARE FUNCTIONALITY

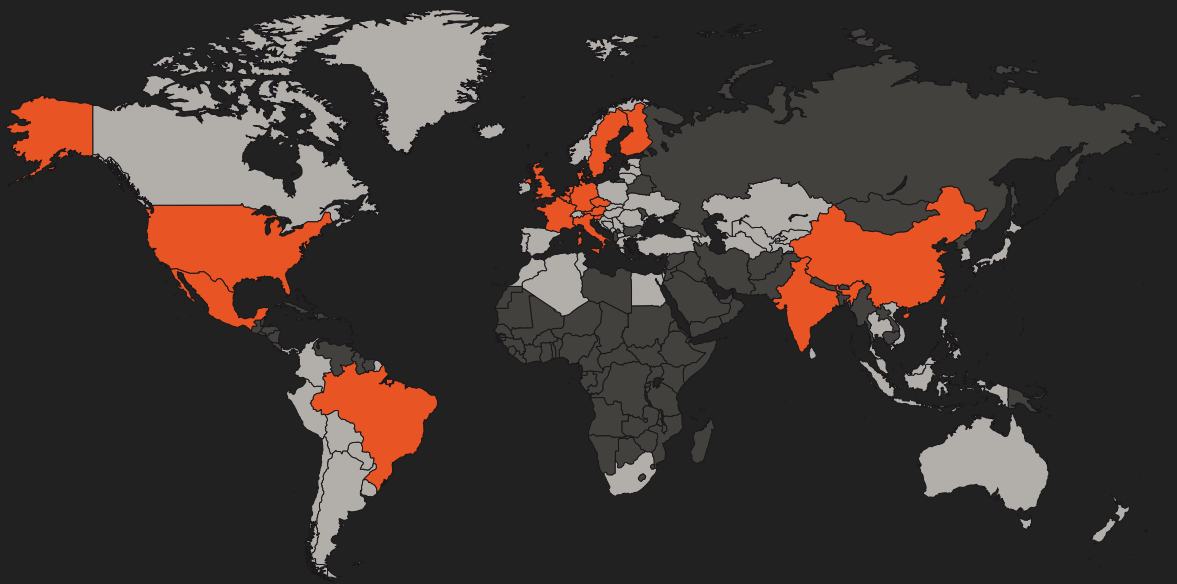
Functionality	Dewesoft Power Analyzer
Power Analysis	✓
Power Quality Analysis	✓
Database Storing	✓
Post Processing	✓
Math Library	✓
Data logging - Raw data storing	✓ (data Storing at Full Sampling rate of 15 MS/s per channel)
Scope	✓ (up to 8 graphs in one diagram, Zoom In- and Out)
Vector Scope	✓ (1-, 2-, 3-phase systems, Clarke transform, Park transform)
FFT	✓ (up to ½ of Sampling Rate)
Harmonic FFT	✓ (up to ¼ of Sampling Rate)
Transient Recording	✓ (up to 15 MS/s)
Triggering Channels	Analog, Digital, Counter, Math, Power, etc.
Triggering options	Simple edge (rising, falling), Window (two-levels: entering, leaving), Pulsewidth (longer or shorter than duration), Window and Pulsewidth, Slope Trigger (rising or falling slope with steepness)
Functionality	Motor Efficiency Analysis
Dewesoft Power Analyzer	✓ (efficiency mapping)

Higher Frequencies (according to IEC61000-4-7)	up to 150 kHz (grouping in 200 Hz bands, 2 kHz bands optional available)
Flicker (according to IEC61000-4-15)	selectable PST and PLT
Flicker Emission (according to IEC61400-21)	✓
Rapid Voltage Changes (according to IEC61000-4-15)	selectable steady state and hysteresis
Symmetrical Components (according to IEC61000-4-30)	Zero-, positive- & negative system for voltage and current (absolute or relative to fundamental)
Additional Symmetrical Components (according to IEC61400-21)	Active and reactive parts for zero-, positive- & negative system

DEWESoft®

7 YEAR WARRANTY

We know that quality is not just what we put into the product, but what you get out of it. We understand that your work depends on the reliability of your tools. That's why we take the extra step to give you a product of high performance and efficiency. Our equipment is built to last. We guarantee you that your hardware will be free from defects and functional. Our warranty covers that the instruments function as promised for 7 years from the day of the delivery. When you buy our data acquisition systems, we make sure they work. Enjoy this unique add-on to Dewesoft's quality products and services!



DEWESOFT® WORLDWIDE: SLOVENIA, Austria, Belgium, Brazil, Czech, China, Denmark, Finland, France, Germany, Hong Kong, India, Italy, Mexico, Singapore, Sweden, UK, USA and PARTNERS IN MORE THAN 50 COUNTRIES

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