Automotive Brochure

ON-ROAD TESTING

DURABILITY TESTING

POWERTRAIN & E-MOBILITY

EXTREME ENVIRON-MENT TESTING

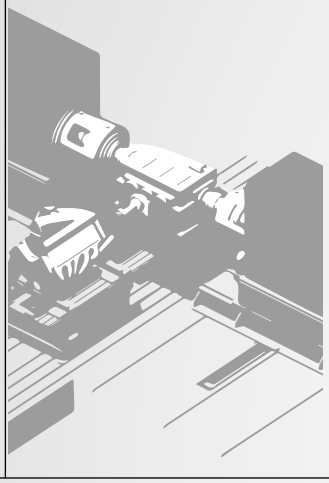
DEWESoft®
measurement innovation

For every application

Since more than 15 years DEWESoft® provides solutions for a wide range of applications. The package covers Instruments and Software from single devices up to networked high channel count systems. The DEWESoft® solution fits perfectly to your need in field, laboratory or test bed.

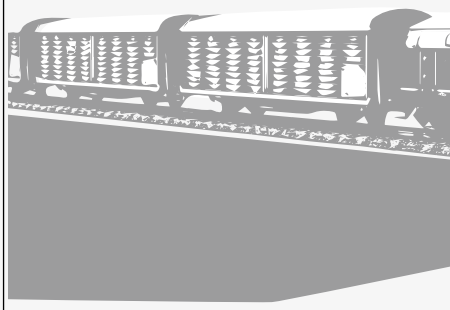
SERVICE & DIAGNOSIS

TEST BED



CONTROL ROOM

DISTRIBUTED SYSTEMS

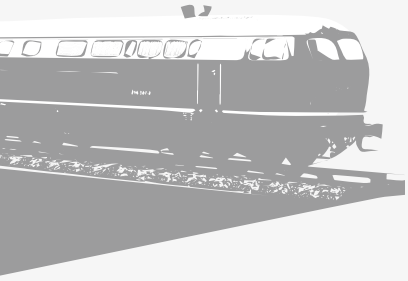


SERVICE & SUPPORT

Call our team of experienced engineers to help you with your questions related to specific measurement applications.

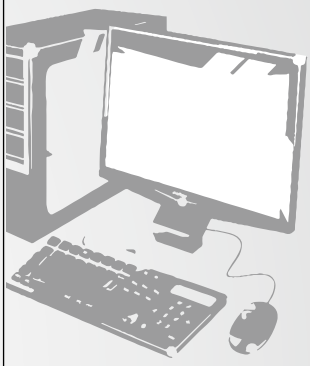
TOTAL CARE

Maintenance package, Service Centers worldwide for annual ISO calibration

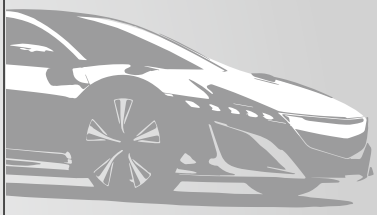


HIGH CHANNEL COUNT

OFFICE: PREPARATION, ANALYSIS & REPORT



IN VEHICLE USE



CUSTOMISATION

From customising the front connector to fit to your sensors, up to implementing software / application features.

TRAINING

In-house, in your company or via new website with PRO training, on every topic, according to your needs.

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Instruments

SIRIUS*m*

Mobile 4 channel analyser

- *4 channel IEPE/Voltage*
- *1 Encoder/Tacho input*
- *USB interface*
- *USB powered*

SIRIUS*i*

Isolated mobile 8 channel analyser

- *8 channel IEPE/Voltage*
- *2 Encoder/Tacho inputs*
- *USB interface*
- *1 CAN port*

SIRIUS*i* + SBOX

SIRIUSi + SBOX can also be separate slices for more flexibility

Standalone instrument with integrated SBOX computer

SIRIUSi:

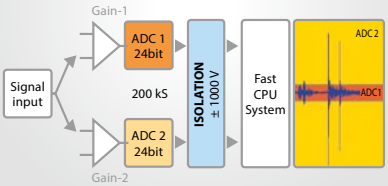
- *Isolated mobile 8 channel IEPE/Voltage analyser with 2 Encoder/Tacho inputs*
- *1 CAN port*

SBOX:

- *High performance industrial PC*
- *Core i7 CPU 2GHz*
- *4 GB RAM*
- *240/960 GB removable SSD*
- *4 x USB 3.0 ports, 2 x USB 2.0, HDMI, VGA, GigE, WLAN*
- *Built-in GPS (option)*

HIGH DYNAMIC

This new technology solves the often faced problem that the signal is higher than expected and therefore clipped. DEWESoft® DUALCOREADC® technology always gives you the full possible measuring range, because the signal is measured with a high and a low gain at the same time!



CUSTOMISABLE FRONT-END

Select your amplifier configuration! Example:

- 3 x High-Voltage input 1200 V
- 1 x IEPE/Voltage + Encoder/Tacho
- 2 x IEPE/Voltage
- 2 x MULTI (Strain gage/Voltage, sensor excitation, Tacho, analogue out)

IEPE SENSOR CHECK

The LED ring around the connector will light green/red depending if sensor impedance is ok.

R2DB

Mobile all-in-one instrument with integrated SBOX computer, display and hot-swappable batteries

- *Mobile isolated 16 channel analyser with customized module configuration*
- *Direct connection for KRYPTON product line*
- *4x USB, 2x Ethernet, GPS, WIFI interface*
- *2 CAN ports*
- *192 Wh battery capacity*

R8

Compact portable all-in-one instrument with integrated SBOX computer

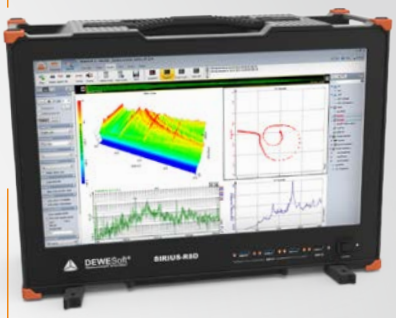
Configurable standalone rack with

- *1 to 8 plug-in modules, up to 64 isolated high dynamic modules or 128 high density modules*
- *8 CAN ports*

Highest data throughput:

- *64 channels @ 200 kS/s, 24 bit (up to 64 ch @ 1 MS/s, 16 bit)*
- *Rack-mount option available*

R8DB

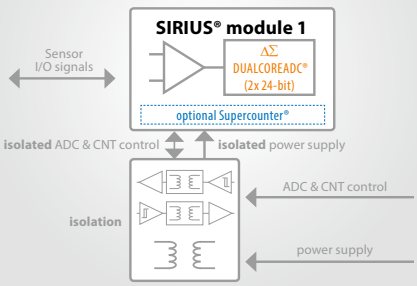


Compact portable all-in-one instrument (same as R8) with built-in display and hot-swappable batteries

- *Multi-touch high-brightness 17" display*
- *Other specs same as R8*
- *192 Wh battery capacity*

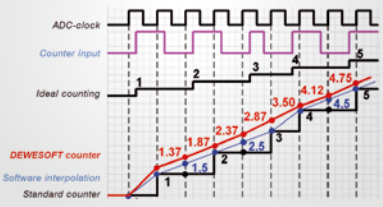
FULLY ISOLATED

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!



Supercounter®

To achieve highest accuracy, DEWESoft® uses a special technique to determine the count and exact time of the input edge on a 102 MHz timebase. This allows the usage even for most demanding applications such as torsional vibration.



EVERYTHING FROM A SINGLE SOURCE

All instruments are completely manufactured in-house, starting from the CNC-milled rugged aluminium housings over dedicated front-end electronics hardware, up to the intuitive, but powerful software combining all the features to the solution for your application.

Rugged Instruments

KRYPTON THx

KRYPTON LVx

KRYPTON STGx

KRYPTON CPU

Any thermocouple measurement

- *8 or 16 isolated thermo-couple inputs*
- *TC types: K, J, T, R, S, N, E, C, U, B*
- *Up to 100 Hz sampling rate*
- *< 0.001 °C resolution*

Low voltage measurement

- *4 or 8 isolated analogue inputs*
- *±100 V input range*
- *Up to 20 kHz sampling rate*
- *1000 V isolation channel/ground & channel/channel*

Distributed strain measurement

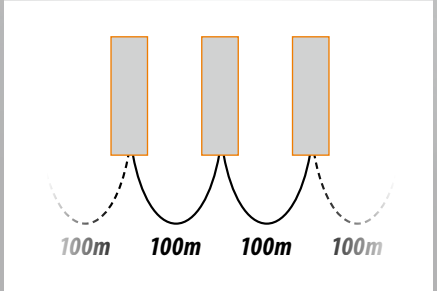
- *3 or 6 differential voltage or strain inputs*
- *24-bit sigma delta*
- *1-15V programmable excitation*
- *Up to 20 kHz sampling rate*

Extemely rugged computer

- *Low power consumption < 12W*
- *2 GB of RAM*
- *128 GB of SSD*
- *1x KRYPTON input, 1x Ethernet, 3x USB, WLAN*

DISTRIBUTED SYSTEMS

Highly distributed systems, with up to 100 m between separate unit.

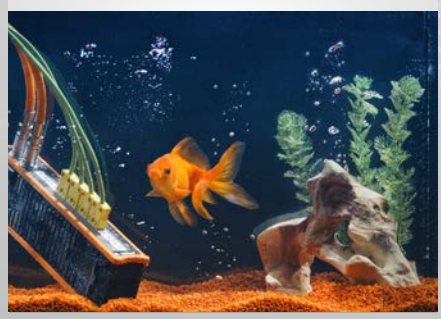


HIGH RUGGEDNESS

High shock & vibration rating of more then 100 g.

IP 67 & HIGH TEMPERATURE

Totally sealed product line, which can be submerged in water, with high temperature range of -40 °C to 85 °C



Navigation Instruments

DS-CLOCK

Synchronization box

- *10 Hz GNSS receiver for basic positioning*
- *Ability to synchronize multiple DEWESoft® devices on different locations with GPS time*

DS-VGPS-HS/C

Multiple purposes GNSS sensor

- *100 Hz update rate*
- *Less then 2 cm positional accuracy with RTK*
- *DS-VGPS-HSC with analogue/digital and CAN output*
- *Small LED display for reading velocity*

DS-IMU1

Basic vehicle dynamics sensor

- *Ruggedized and miniature fusion of gyroscope, accelerometer, GNSS receiver and magnetometer*
- *100 Hz update rate*
- *< 2000 g shock rating*

DS-IMU2

Advanced vehicle dynamics sensor

- *Extreme ruggedness and small form factor*
- *Dual antenna GNSS receiver for static heading*
- *Less then 1 cm positional accuracy with RTK*
- *500 Hz update rate*
- *< 3°/h gyro drift*

GNSS SATELLITES

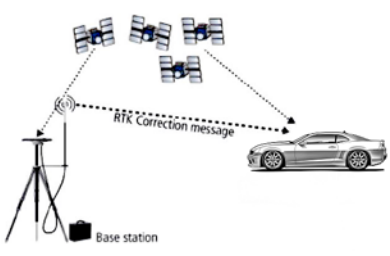
Tracking of GPS L1/L2/L5, GLONASS L1/L1, BeiDou, WAAS, EGNOS, MSAS, GAGAN, QZSS and optionally RTK positioning

SYNCHRONISATION

Possibility to syhcnronize with all DEWESoft® products (SIRIUS®, 43, KRYPTON, ...)

HIGH ACCURACY

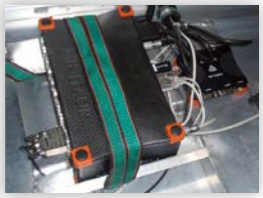
Positional accuracy down to 1 cm with usage of Real-time Kinematic GNSS technology

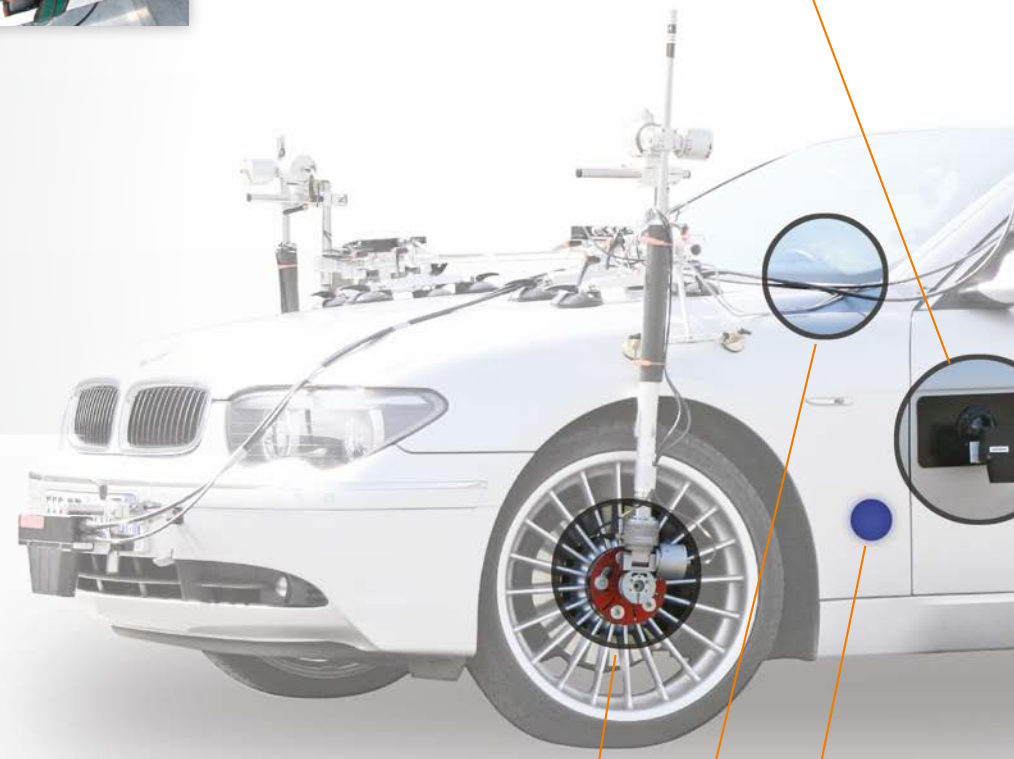


Sensor Connection Options

ANALOGUE INPUTS

The analogue inputs are able to acquire data from sensors like pedal force sensors, brake cylinder pressure, temperature of brake discs and others.





COUNTER INPUTS

Counter inputs can be used for measurement of brake pedal switch, speed and distance from external velocity sensor, speed of four wheels, steering wheel position and others.

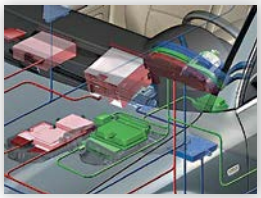
High quality counter inputs are able to perform basic counting, encoder measurement and frequency measurement in the famous Supercounter® mode, which dramatically increases the accuracy of counting.

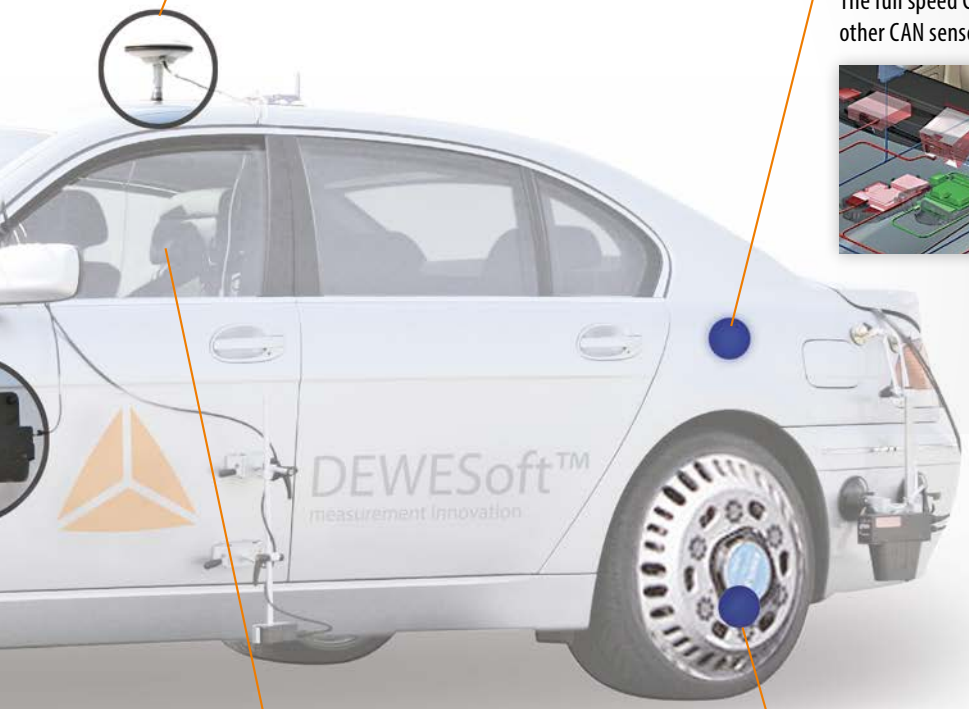
GPS DATA, DS-IMU2, ADMA, Oxford, Racelogic

GPS built in S-BOX, provides velocity, position, orientation information which is used for brake test calculations.

CAN, OBD II, J1939, CCP, XCP, FlexRay, GMLAN

The full speed CAN interface connects to vehicle CAN or other CAN sensors; CAN output feature included.





VIDEO

Different video devices can be added and acquired synchronously with other sources.

RoaDyn measuring wheels

Ethernet based acquisition of Kistler RoadDyn 2000 with hardware synchronisation for getting the wheel force and torque in all 3 dimensions.

Software: DEWESoft® X2

INPUTS

Analogue

GPS

Counter/Digital

Video

Vehicle Bus

Aerospace interfaces

STORING

DEWESoft® X2 offers extensive trigger features for the start/stop of the measurement, in addition with pre- and post-time. You can also use math formulas to generate more complex conditions. Triggers possible on any channel (analogue, digital, math…)!

Trigger Types

Simple edge
(either rising or falling slope)

Window trigger
(two levels; entering or leaving logic)

Pulsewidth trigger
(longer or shorter than duration logic)

Window and Pulsewidth
(completely selectable as above)

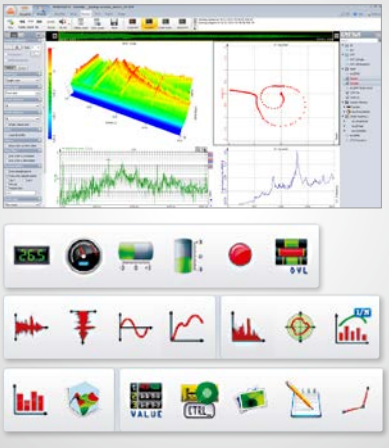
Slope Trigger
(rising or falling slope with steepness selection)

DEWESoft® X2 data acquisition software is the solution to acquire signals simultaneously from different sources (even with different sampling rates). It can display, store and process the data via very powerful mathematic and analysis functions either online or offline on already stored data file.
With the focus on our own powerful hardware, the release of the innovative DEWESoft® X software leads to improved, intuitive operability, shortened setup time and reduced setup mistakes. This avoids repeating measurements, which saves time and money.

- *Intuitive User Interface*
- *Quick reload of data files*
- *Analysis & Export without license*
- *Easy export to a lot of formats*
- *Free updates (no annual license costs)*
- *Free Audio replay*
- *Powerful Signal Processing (Math) -> correlation, cepstrum, array math, less need for additional post-processing software*
- *Filtering (FIR, IIR, FFT filter, integration, derivation, . . .)*
- *Calculations also possible on stored data „offline-math“*
- *TEDS support (intelligent sensors, read and write)*
- *Custom user input (data header)*

USER INTERFACE

Design your own measurement instrument. Freely arrange your displays by the use of a wide range of various instruments (Recorder, Scope, FFT, XY recorder, . . .).



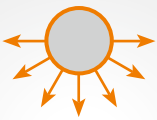
OUTPUTS

Analogue out (FGEN):

- *Alarm output: use triggers on any input channel. Conditions can be: simple edge, filtered edge, window, pulsewidth, window and pulsewidth, slope, delta or any math condition*
- *Control channel: change the analogue output voltage manually during the measurement*
- *Sound output: replay any channel via the soundcard*
- *File replay: replay the stored channels on the analogue out*
- *CAN output: send init commands to sensors, or output calculation results of DEWESoft®*

PUBLISHING AND EXPORT

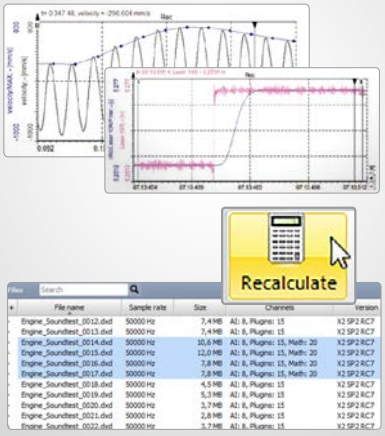
If the powerful integrated post processing features of DEWESoft® are not enough, you can even export the data to several different file formats.



Microsoft Excel®, Flexpro*, Text, ASCII, MATLAB®, Diadem®, UNV, FAMOS, NSOFT, Sony®, RPC III, Comtrade®, WAV, Google Earth® KML, BWF, ATI, SDF, WFT, CSV, TDM, TDF, and more ... implementation of custom file formats on request.*

DATA-PROCESSING

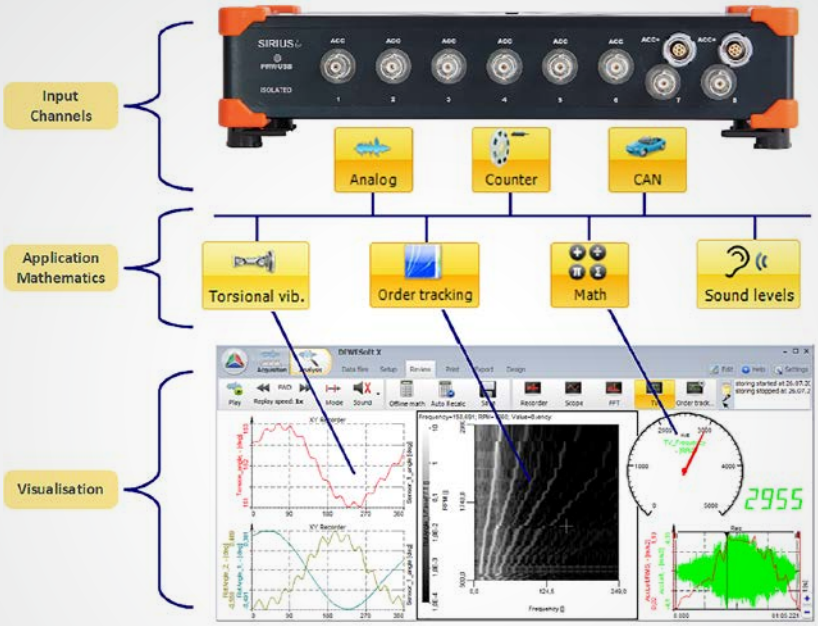
Realtime data processing - See everything in real time! Over the past years we have covered lots of application areas with expert modules, so that the user is only a click away from the total solution. But many more applications can be covered using the powerful mathematic features. **Post-Processing – change/add everything later in the office!** Only store the raw data, and back in the office add all the calculations (like filters, statistics, FFT's, logical conditions,…)



Apply offline changes on multiple data files at once.

THE DEWESoft® CONCEPT

THE MULTIFUNCTIONAL INSTRUMENT FOR EVERY APPLICATION.



The DEWESoft® amplifiers on the **analogue frontend** build the solid base to convert any physical input (strain, acceleration, force, temperature, current, …) into accurate digital signals for the software.

All other signals such as digital, counter, CAN bus, video data, serial interface… are acquired fully synchronized. **DEWESoft® always stores the raw signals!**

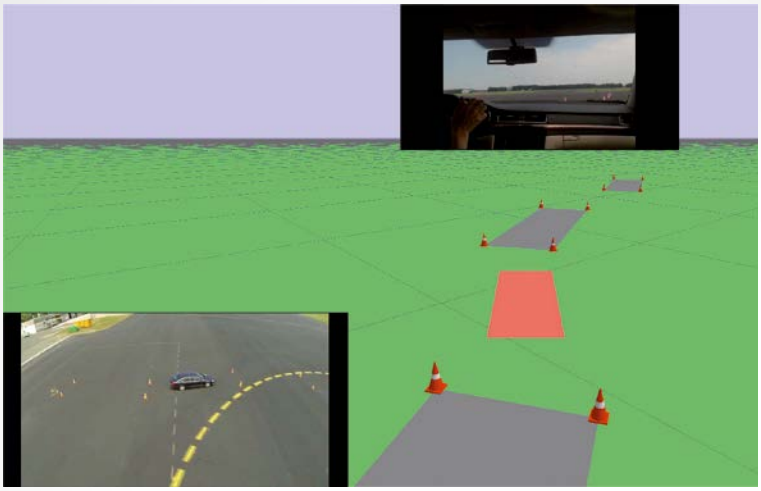
The channels arrive on the digital **„backbone“,** where they can be used for further mathematical calculations (filtering, statistics) and in modules such as Torsional Vibration, Order tracking, Sound Level… The math results can be used as input for other modules and vice versa! Calculations in realtime, as well as on stored data.

The results can then be linked to powerful, configurable instruments (like Digital meter, Analogue meter, Recorder, Scope, FFT, XY graph, Orbit plot, 3D graph…) with lots of properties.

Very often the math modules provide specialized instruments, which results in a turn-key solution for a range of applications.

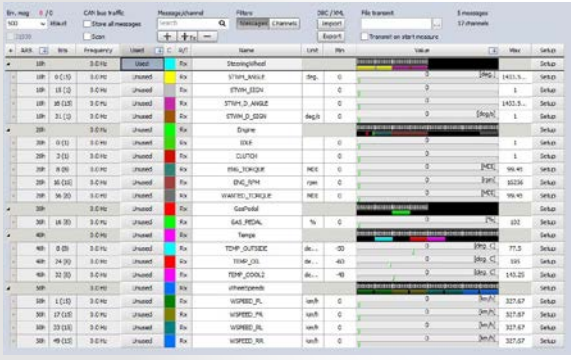
Software related to Automotive

POLYGON



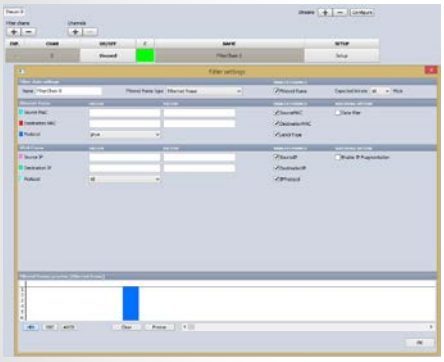
- *Easy definition of test polygons for all kinds of vehicle dynamic and other moving vehicle involved tests*
- *Supports multiple vehicles and other moving or fixed objects*
- *Easy test polygon definition*
- *3D visualisation with easily adaptable viewing angle*
- *Free definable outputs like distances, angles, gate crosses*

CAN



- *Easy recording and analysis of CAN traffic*
- *CAN standard/extended messages*
- *DBC import/export functionality*
- *J1939 support*
- *Possibility of online/offline decoding (storing just CAN bus traffic)*
- *Option of file replay (.csv transmit) through CAN output*

ETHERNET RECEIVER



- *Easy recording and analysis of Ethernet traffic*
- *Multiple Ethernet receivers in single instance of DEWESoft®*
- *Different filter chains for additional messages*
- *Bitrate up to 100 Mb/s*
- *ARP and IPv4 support*

DS-IMU PLUGIN

- *Fast and easy configuration of DS-IMU2, DS-IMU1 and DS-GYRO1 products*
- *Correction of alignment offset and GNSS antenna offset*
- *Additional calculation of position, velocity, acceleration, slip angle for 5 additional reference points*
- *Multiple instances of DS-IMU and DS-GYRO products are supported*

GPS

- *Easy recording and analysis of GNSS devices*
- *Recognition of DEWESoft® GNSS products*
- *Support of GNSS via NMEA 0183 standard*
- *Direct calculation of distance, acceleration*
- *Possibility to synchronize DEWESoft® instruments with GPS PPS technology*

XCP/CCP INTERFACE

- *Access ECU memory using A2L definition file*
- *Support of Ethernet (XCP – TCP/IP or UDP/IP) and CAN interface (XCP/CCP) with no extra hardware needed*
- *Plug and play configuration*

ADDITIONAL SW OPTIONS

- *OBDII plugin*
- *ADMA plugin*
- ***FlexRay recorder***
- *Serial COM plugin*
- *Microstrain MIP plugin*
- *RoaDyn2000 Kistler torque wheel driver*
- *Weather station driver*
- *J1587 driver*
- *And many more*

On-road testing

Due to its high flexibility in hard- and software, DEWESoft® supports a wide range of on-road testing manoeuvres. From basic brake test, pass by noise, to highly sophisticated handling analysis and development of advanced driver assistance systems,which are simply a must in nowadays cars. Such a flexible system brings us in another dimension of testing, where one system with incredible software is capable of performing multiple different tests.

The software supports many standard ISO or regulation manoeuvres that include online checks for validation, visualised online results, post-processing and reporting tools. Such a complete package makes DEWESoft® on-road testing system a complete all-in-one solution.

In addition many external interfaces can be monitored by DEWESoft®, for instance: CAN, Flexray, Video, OBDII, Ethernet. Complemented by additional support for special sensors etc. eye-tracking glasses, brain head measurements, third party IMU, ADMA, OxTS, Racelogic, ...

MAIN FEATURES

- *Quick and easy installation*
- *Online data transfer between multiple systems*
- *Measurement results available online*
- *Scalable systems for multipurpose usage*
- *Multiple data sources (analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, RoadDyn 2000, video & many more)*
- *Realtime Math channels*
- *Synchronisation between all data sources*
- *Possibility to capture different software modules (vehicle dynamics, combustion analysis, vibrations, ...) in one synchronized data file*
- *Export to many different file formats*

BRAKE TEST

With DEWESoft® data acquisition systems it is possible to perform Standard brake test (ECE13H, FMVSS 135, ...) or advanced R&D brake test with additional measurement of brake balance, brake noise and many more parameters.

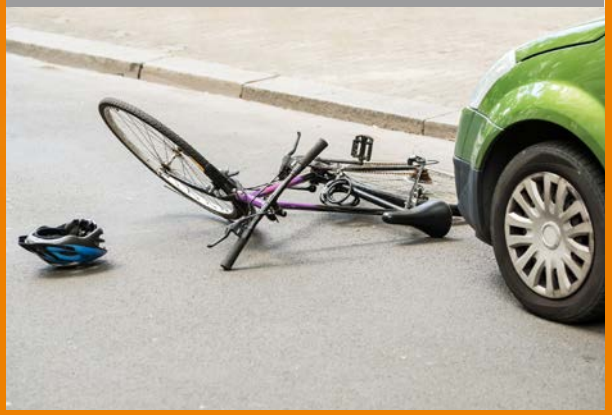
PASS BY NOISE

Pass by noise system can be used on any kind of vehicles (cars, trucks, military vehicles, ships, airplanes, ...). For automotive industry several standards are supported ISO 362, UNECE R51.02 and SAE J1470.

VEHICLE DYNAMICS – HANDLING TESTING

All kinds of vehicle dynamics manoeuvres are supported, including several ISO test analysis (ISO3888-2 »Elk test«, ISO7401 Step steer, ISO7401 Frequency sweep sine, ECE 13H Slow increasing steer, ...), which includes driver guiding, validation of data and report generation.

ADVANCED DRIVER ASSISTANCE SYSTEMS AND DRIVER MACHINE MONITORING



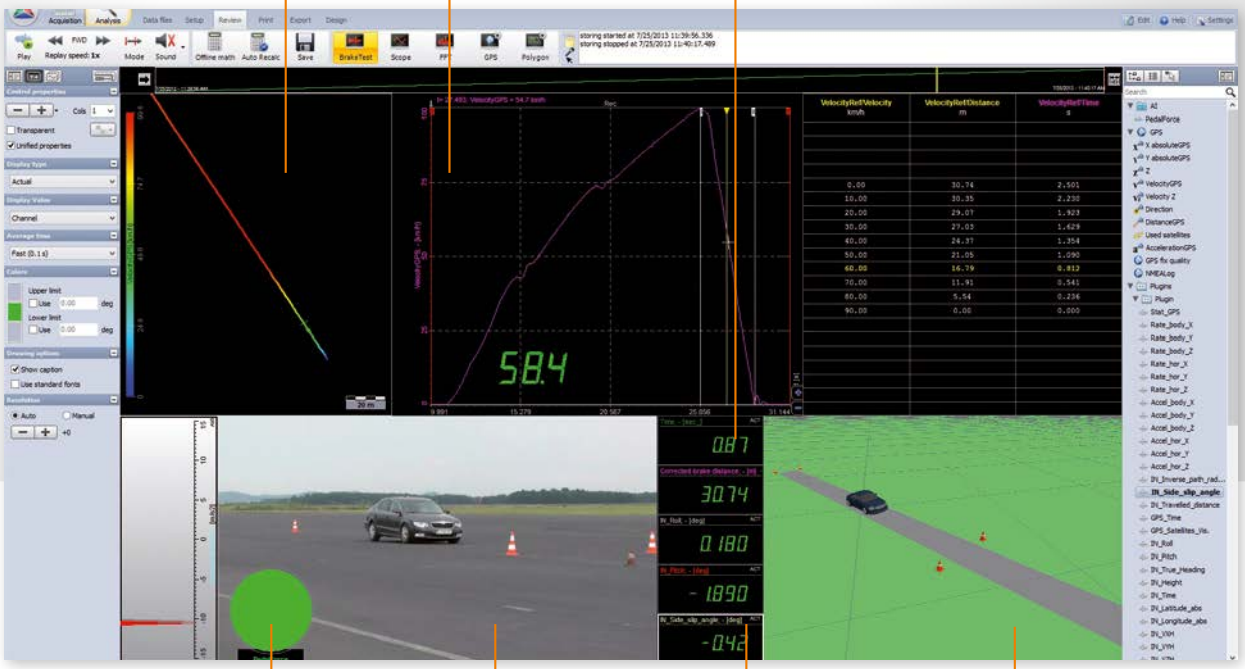
Due to higher safety requirements, ADAS testing has become extremely important for vehicle manufacturers. DEWESoft® offers the Polygon plugin, which covers almost every active safety test, like: collision avoidance, blind spot detection, lane change warning and many more. DEWESoft® systems can also be used to monitor the driver: e.g. reaction time, focus, comfort, ...

Brake test

GPS information
Position information versus velocity.

Recorder
Speed graph over time

CAN-Bus Data/OBD II
Synchronous data from CAN-bus line:
- Wheel speed,
- ABS status,
- Steering wheel angle,
- …



Analogue input
Pedal force

Video Information
Synchronized video information

IMU Information
Synchronous inertial data:
- Pitch,
- Roll,
- Slip angle

Polygon/Math
Virtual track for calculation of distance & additional mathematical channels

- *Dedicated brake test plugin*
- *Easy to configure and fast installation process*
- *Automated workflow with DEWESoft® sequencer*
- *Automated report generation*
- *Direct pedal force, travel sensor, pressure inputs via analogue or CAN*
- *Multiple brake temperature logging*
- *Direct High and Low speed CAN input*
- *Live results*
- *Build in analysis and math for:*
  - *Standard tests (ECE13H, FMVSS 135, ...)*
  - *ABS testing*
  - *R&D tests*
  - *Braking comfort testing*
  - *Possibility to add additional standards or manoeuvres*

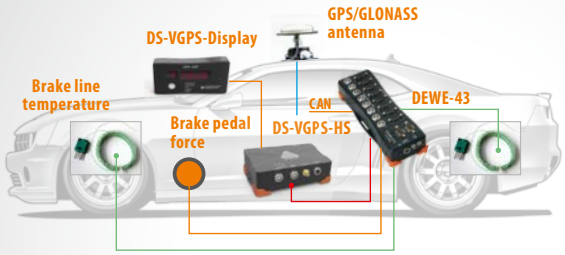
The DEWESoft® Brake test system covers all kind of braking tests and ABS tests – due to its high flexibility it also covers tests of braking comfort and vehicles with regenerative braking. It's essential that the measurement of braking distances has very high accuracy, because this key-parameter can make the difference between having an accident or not. Thus, DEWESoft® uses a 100 Hz based GPS system, with correction of IMU, to achieve the highest possible accuracy. Including online checks for validation, visualised online results with additional integrated post-processing math and reporting make DEWESoft® Brake test system a complete all-in-one solution.

ADDITIONAL APPLICATIONS

Each test with big capital:

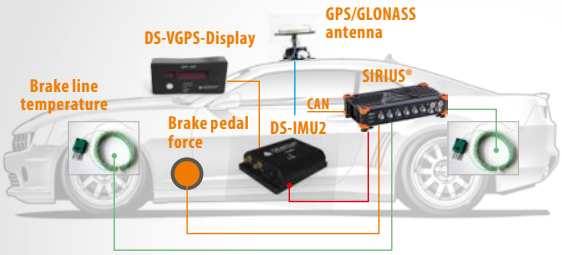
- *Tire tests*
- *Acceleration tests*
- *Handling tests*
- *Fuel consumption, etc.*

BASIC BRAKE TEST FOR HOMOLOGATION AND ACCORDING TO ECE13H SYSTEM



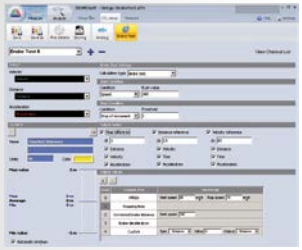
- *100 Hz GPS based measurement of speed and distance*
- *Possibility to correct data with IMU*
- *Including brake test plugin and sequence according to standard*

R&D BRAKE TEST SYSTEM



- *500 Hz update rate of speed and distance with IMU*
- *Scalable from 8 to 1000 channels*
- *Possibility to measure braking balance*
- *Brake noise/frequency (Judder, Groan, Hum, Moan, ...) with online FFT analyser*
- *Modal analysis of brake disc*

BRAKE TEST CALCULATION

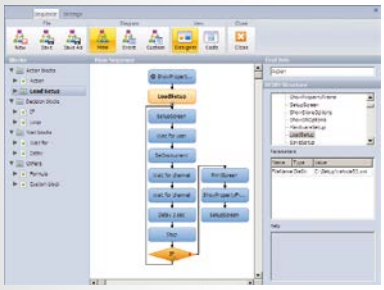


You can use the standard brake test calculation or define your own custom solution (see screenshot).

Calculated parameters are:

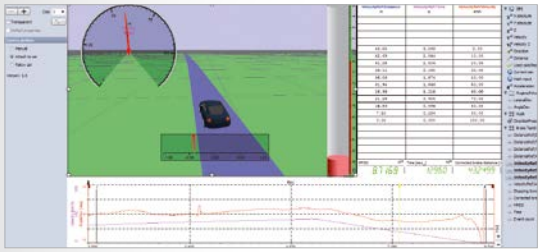
- *Start speed of braking, stopping time, brake deceleration over complete measurement*
- *Corrected brake distance and MFDD factor according to standard*
- *Derivation of acceleration, used to check the passanger comfort*

BRAKE TEST SEQUENCE



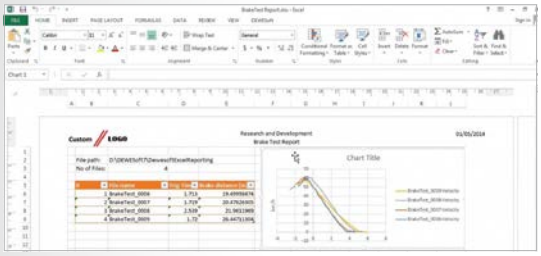
The sequencer is a tool to predefine process steps in a sequential format. To perform a maneuver it's possible to use a sequence according to ECE13H regulation or a custom sequence, which fits more to the driver/test engineers needs.

ONLINE VALIDATION



Calculations are performed immedietly after performing brake test, so the driver has feedback of Brake distance, MFDD, ...

EXCEL/MATLAB/FLEXPRO REPORT SCRIPT



Testing report and comparison between files can be completed with the usage of Excel/Matlab/Flexpro macro, which can be prepared by DEWESoft® engineers or build by company test engineer.

Pass by noise

- *Automated workflow with DEWESoft® sequencer*
- *Easy to configure and fast installation process*
- *Fully battery powered*
- *Direct IEPE microphone, analogue IR temperature input*
- *Additional direct weather station logging and CAN/OBDII interface for speed, gear position and RPM measurement*
- *100 Hz GPS based measurement with 2 cm RTK position accuracy*
- *Velocity accuracy of 0.1 km/h*
- *Calculation of CPB and sound level according to IEC61672*
- *Build in analysis for standards tests (ISO 362, UNECE R51.02, SAE J1470, ...)*
- *The standard pass by noise test can be complemented with additional custom inputs for experimental R&D tests*
- *Live results and automated report generation*

DEWESoft® Pass by noise is a flexible research & development measurement package. In addition to hardware it contains powerful software for online check and validation of results.

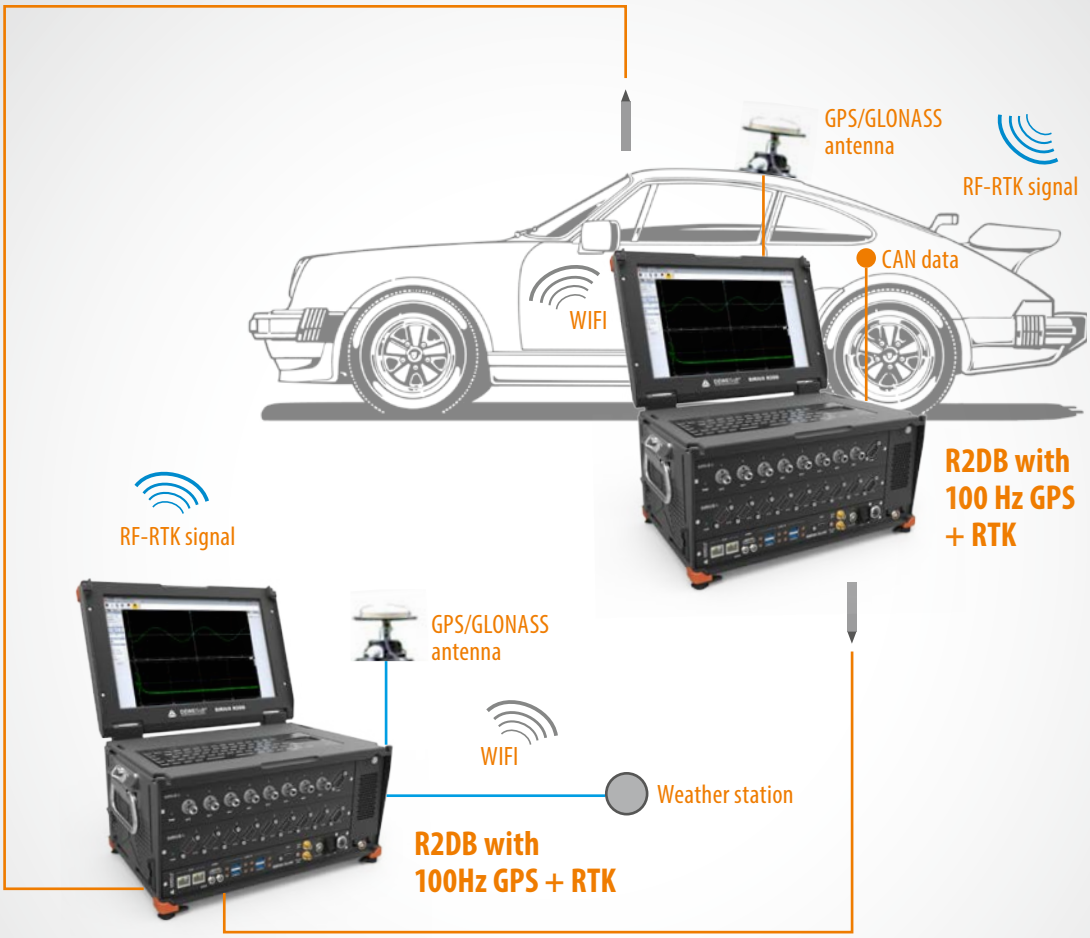
The DEWESoft® sequencer can be used to define a completely custom test-sequence that will guide the driver through the complete test process and provide results immediately.

PPS-Sync technology and DEWESoft® NET software option allows the communication between different computers in Master/Slave mode, which allows user to transfer data from outside (microphones, weather station, asphalt temperature,...) to vehicle directly. After this online process, visualisation and also validation of the data can be done on the Master vehicle.

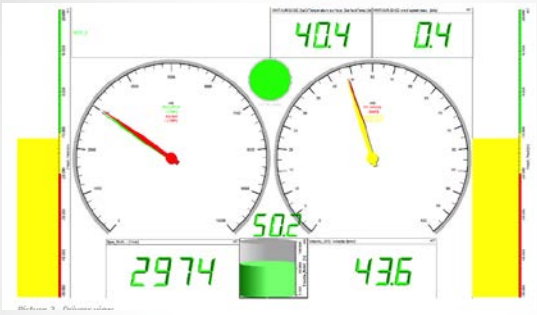
ADDITIONAL APPLICATIONS

- *Tire acoustics*
- *Engine and gearbox acoustics*
- *Tyre to road sound emission*
- *Intake and exhaust noise*
- *Sound pressure level emitted by stationary roadvehicles, ...*

PASS BY NOISE SYSTEM CONFIGURATION

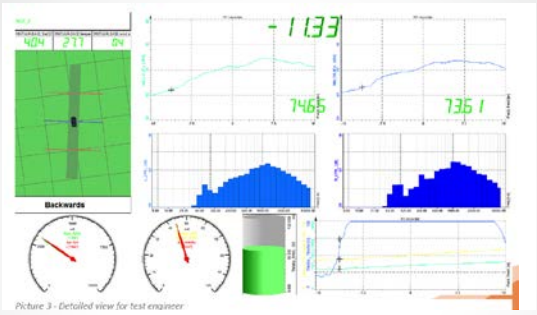


DRIVERS VIEW WITH ONLINE VALIDATION



The most important parameters are calculated online, so that the driver can see immediately if the test has passed or failed. This greatly reduces the time of testing and analysing.

DETAILED CALCULATION



Even detailed calculations can be performed online during the test: e.g. CPB, Sound level FFT analysis, and Polygon calculation. These results are vital for the analysis engineer to compare different test-runs and to immediately see the highest frequency.

Vehicle dynamics – handling testing

- *Quick and easy installation*
- *Automated workflow with DEWESoft® sequencer*
- *Measurement results avaliable online*
- *Scalable systems for multipurpose usage*
- *Direct support of several standard manoeuvres (ISO3888-2 »Elk test«, ISO7401 Step steer, ...) which includes tools to analyse the behaviour of the car*
- *Multiple data sources (analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, RoadDyn 2000, video & many more)*
- *Realtime Math channels*
- *Synchronisation between all data sources*
- *Possibility to capture different software modules (vehicle dynamics, combustion analyser, vibrations, ...) in one synchronized data file*
- *Export to many different file formats*
- *Possibility of automated report generation*

An objective vehicle dynamics test system plays a key role in development and assessment of a new vehicle. The DEWESoft® system can cover all kinds of testing activities over the whole product life-cycle: starting from benchmarking and target setting testing during development all the way to verification and validation of existing car designs. Such a flexible system brings us in another dimension of testing, where one system with several software options is capable of performing many different tests.

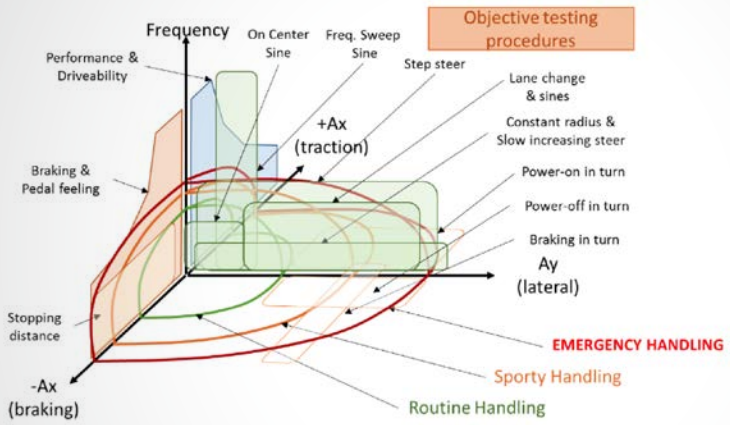
The vehicle dynamics system is based on a combination of GPS with IMU sensor, which is very simple and easy to set up. This combination can guarantee valid signals, where GPS alone is not enough (e.g. when you drive through a tunnel).

Online checks for validation, visualised online results including post-processing math and reporting make the DEWESoft® vehicle dynamics system all-in-one solution.

ADDITIONAL STANDARD APPLICATIONS

- *ISO3888-2 "Elk test"*
- *ISO7401 Step steer*
- *ISO7401 Frequency sweep sine*
- *ECE 13H Slow increasing steer*
- *and many more handling analysis*

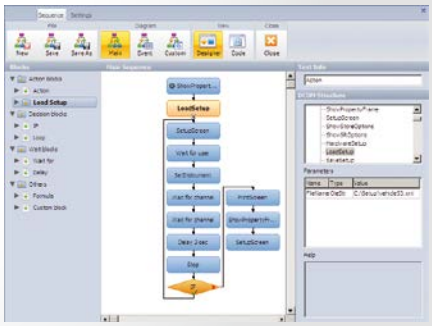
OBJECTIVE TESTING PROCEDURES



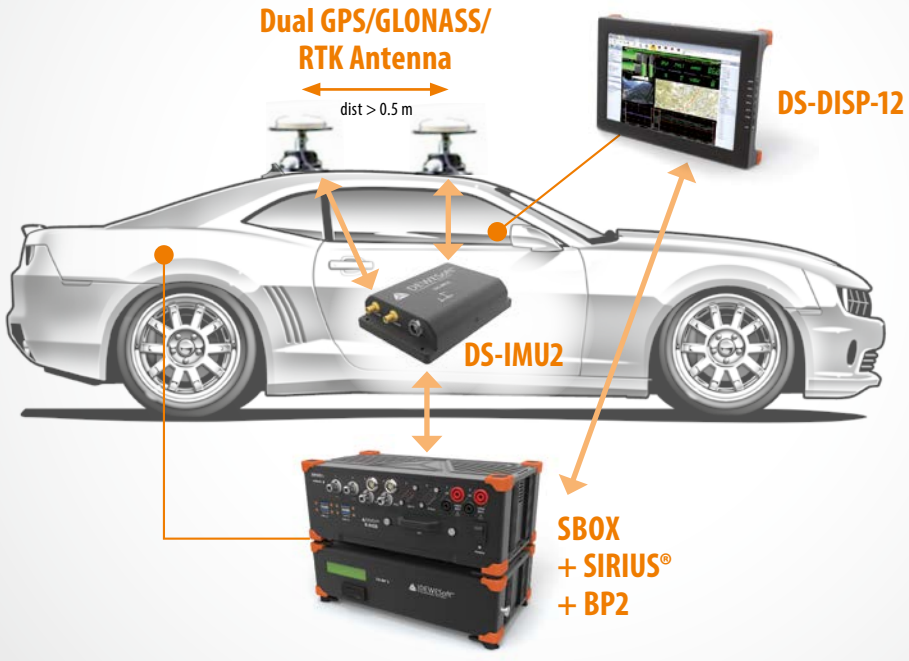
Objective testing is used more and more to correlate the simulation model to the physical objects, which is a key factor to improve the accuracy of virtual prototyping. For all these tasks it is very important to have reliable and accurate test results, in order to avoid mistakes in the design, development or (even worse) the target setting process. The application of ISO standards and robust legacy test procedures are good practices for the implementation of a reliable testing process. The »minimal« set of test, which are defined by ISO standards, are covering the main aspects of vehicles behaviour on lateral, longitudinal and cross-coupled dynamics as shown in the picture on the left.

ANALYSIS SEQUENCE FOR OBJECTIVE TESTING

Another key factor for test efficiency and reliability is the implementation of a test automation and validation system. DEWESoft® can provide all required hard- and software! DEWESoft® (including the sequencer) can calculate all necessary parameters (translated velocity, acceleration and slip angle values) for analysing the vehicle dynamics of the manoeuvres mentioned before. A system which is able to provide such measurements can be seen on the picture below.



VEHICLE DYNAMICS SYSTEM CONFIGURATION



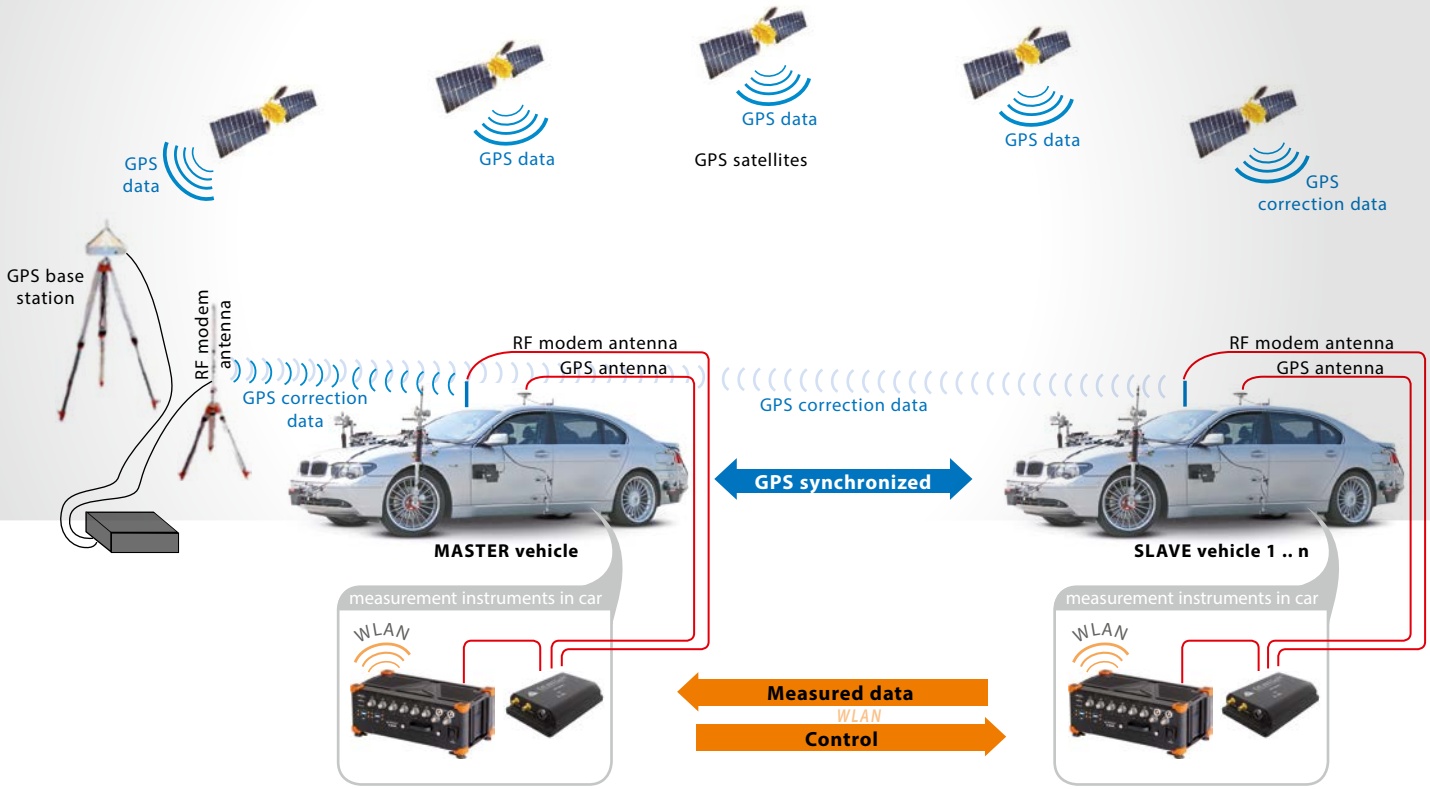
Additional R&D applications

- *Advanced driver assistance systems (ADAS) tests*
- *Pass by noise*
- *FUSI*

Key features of the system

- *500 Hz update rate*
- *High absolute position accuracy using RTK ±2 cm*
- *Dual antenna for 0.1° heading accuracy*

Autonomous driving test and validation system



SYSTEM OVERVIEW

Advanced driver assistance systems are automated systems, which increase safety and improve the driving experience. Safety features for avoiding collisions and accidents have to be tested during development. For such purposes DEWESoft® has a perfect solution. The latest GPS based position measurement technology is used to ensure a highly accurate and easy-to-use ADAS test system. This is possible due to the RTK (Real Time Kinematic with 2 cm accuracy) option for GPS sensors. This requires an immoveable GPS base station that sends correction data to all DS-IMU2 devices. A standard RF modem is used to send this data, so that a wide area can be covered.

Data from two or more vehicles provides very accurate position and distance information relative to each other and/or a fixed object, which is the basis for an ADAS test system. In addition DS-IMU2 provides accurate measurement of all vehicle dynamics, including side-slip angle.

Via the DEWESoft® NET option the measurement results (including the data from the Polygon plugin) can be transferred to the master system online during the measurement.

The robust WLAN solution allows communication over a distance of up to 1km. There is theoretically no limit in the number of vehicles within this measurement– only the WLAN bandwidth limitation.

The accurate GPS-PPS technology allows perfect synchronisation of data from various sources in different locations: e.g. analogue, counter, video, CAN, CCP/XCP, FlexRay, ...

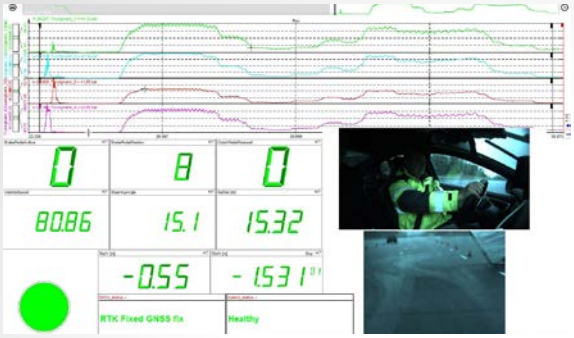
In addition to the features of the ADAS-Basic test system with IMU and GPS-RTK, the ADAS-Professional system includes the GeneSys IMU fibre optic gyro for applications where a GPS signal is not available for a longer period, such as in tunnels. This combination provides accurate measurement of all vehicle dynamics, including side-slip angle.

KEY FEATURES

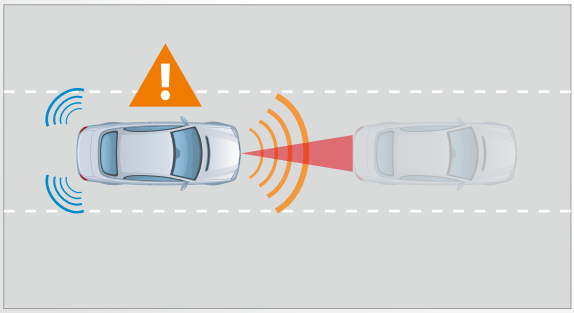
- *Ruggedised and reliable GPS IMU with high dynamics of 500Hz*
- *< 2 cm position accuracy*
- *Easy to use software (Fully integrated in DEWESoft X®) with additional Polygon option for real-time car to car distance and time to collision calculations in 2D*
- *Any SIRIUS® module configuration and possibilities for extensions with additional SIRIUS®, DEWE-43 or DS-CAN2*
- *Many additional synchronized data sources like Video, CAN, FlexRay, XCP, OBDII, ...*

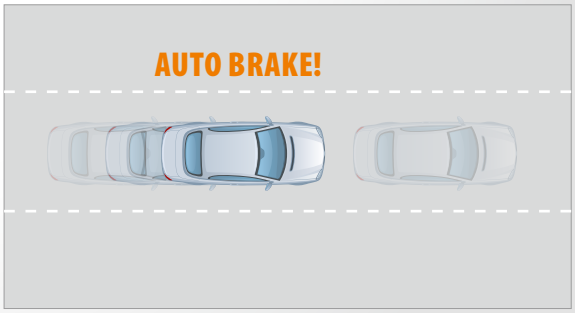
THE FOLLOWING ADAS ARE JUST A FEW TESTING POSSIBILITIES THAT CAN BE DONE WITH THE LATEST TECHNOLOGY OF DEWESoft®:

COLLISION AVOIDANCE AND AUTONOMOUS BRAKING TESTING



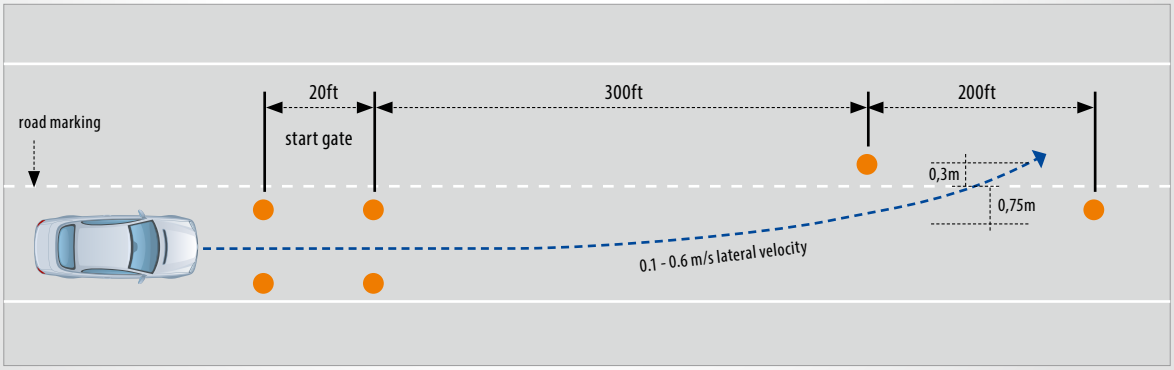
Since **Autonomous emergency braking** and **Forward collision warning** features will be mandatory by 2018 for all new commercial vehicles, DEWESoft® has developed a tool specially for testing such vehicle safety features. It provides less then 2 cm positional accuracy with real-time updates about relative distances, velocity, acceleration, heading, time to collision, detection of unavoidable obstructions around a moving vehicle and the ability to store all other information of target and master vehicles, which are needed for collision avoidance testing. Connectivity and communication between multiple vehicles work in a range up to 1km. With many additional external connectivity options (Video, CAN, FlexRay, additional collision warning signals, ...). In addition the system can also be used on open roads, with relative RTK measurements (relative position accuracy between the cars is in range of ±2 cm and and the possibility of tests according to ISO15623 – Forward vehicle collision warning systems and Euro NCAP - AEB procedure.





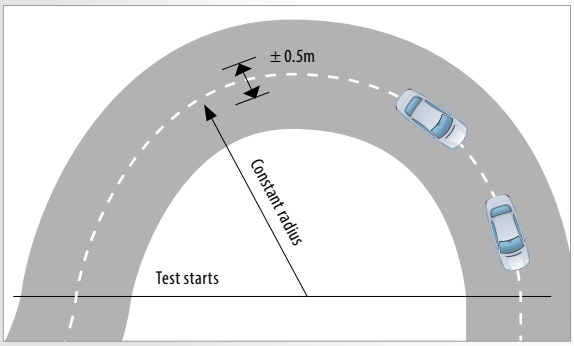
LANE DEPARTURE WARNING AND LANE ASSIST SYSTEMS TESTING

Another safety feature is a **lane departure warning system**, which is designed to warn a driver when the vehicle moves out of its lane. Some vehicles also have a **lane maintaining system**, which assists the driver by reducing the steering input burden in corners: DEWESoft® also has a solution for that! The vehicle manufacturer can use the DEWESoft® system to verify the performance of the to lane departure warning systems that are installed inside the vehicle. Relevant technology: medium/high-speed cameras developed by DEWESoft®, GPS for precise positioning data and additional CAN and microphone inputs.DEWESoft® offers R&D testing and also according to ISO 17351 and NHTSA NCAP test procedure.



ADAPTIVE CRUISE CONTROL TESTING

ACC is a system that is capable of automatically adjusting the speed of a vehicle to match the speed of the car or truck in front of it. If the lead vehicle slows down, adaptive cruise control can automatically match it. When traffic picks back up, these automatic systems are also capable of acceleration. It is critical to test such systems with different drive manoeuvres. DEWESoft® system are reliable, easy to use and time saving, because of quickly prepared setups.

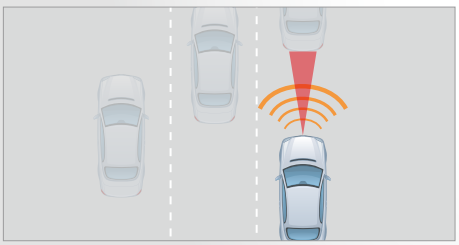


One of the main features of such system is multiple target connectivity, where more then 10 cars can be calculated at the same time on a single computer in real-time.
In addition system allows direct input of Lidar laser scanner (as for instance IBEO lidar laser scanner) or even development interfaces (Ethernet, FlexRay, CAN, ...), so even values directly from either radar or laser system can be measured. It's also possible to measure ACC warning signals from the vehicle with either CAN or Analogue/ Digital input and synchronize additional external distance sensors and video from different cameras.

SUPPORTED ACC TESTS:

- *Steady state distance and overtaking from steady state*
- *Approaching and acceleration / deceleration in convoy*
- *ISO 15622 with Target acquisition range, Target discrimination test and Curve capability test procedures*

BLIND SPOT DETECTION TESTING

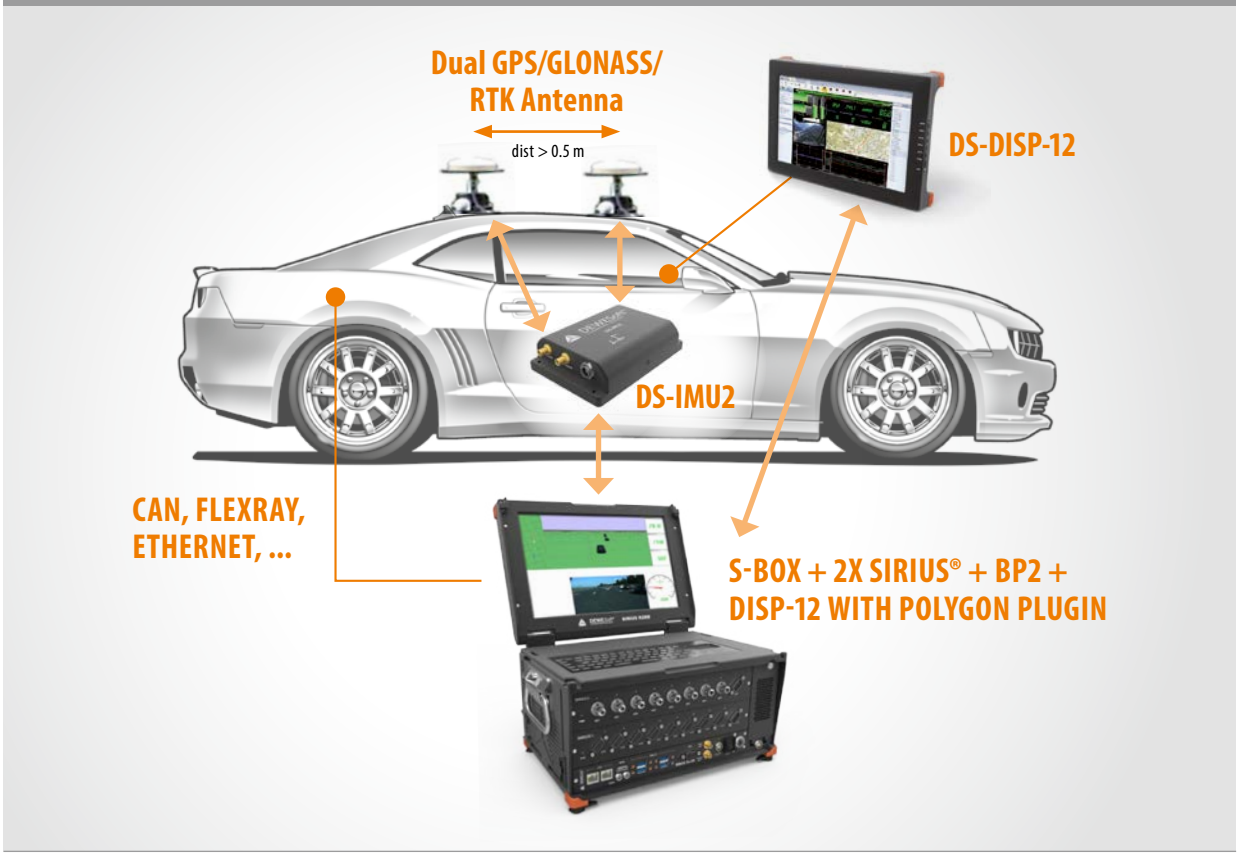


In the automotive context, "blind spots" are areas outside of a vehicle that the driver is unable to see. To test and validate such system it's possible to use DEWESoft® ADAS solution, which provides real-time measurement of more then 10 different objects (vehicles, pedestrians, balloon cars, ...). To have maximal precision, RTK GPS technology is used for <2 cm positional accuracy. To get additional information about the effectiveness of the blind spot detection, cameras, Lidar sensors and other analogue sensors can be installed inside the vehicle.

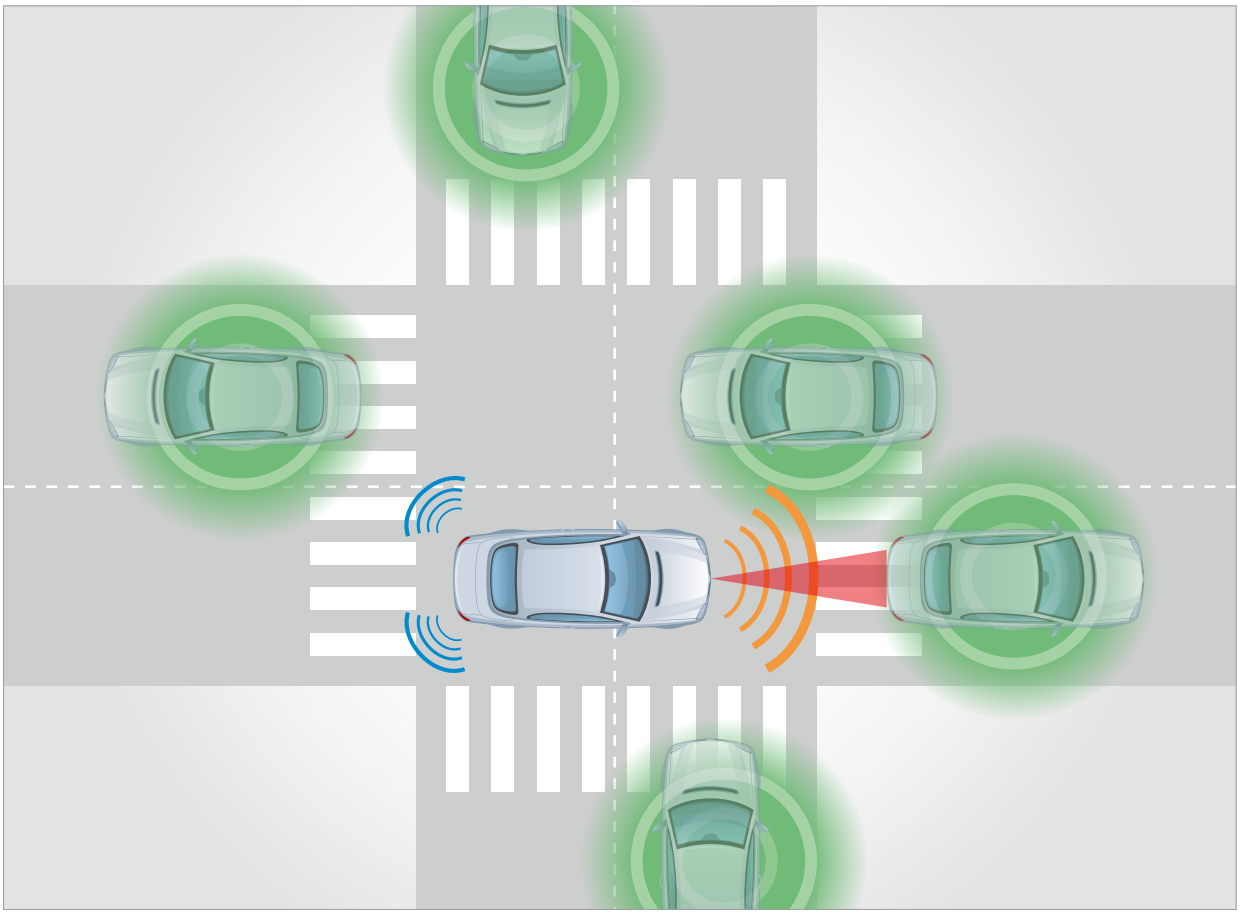
ADDITIONAL APPLICATIONS

- *All vehicle dynamics tests*
- *Lane departure warning*
- *Forward collision warning*
- *Lane change warning*
- *Pre-crash*
- *Intersection assistance*
- *Rear collision warning*
- *Driver drowsiness detection testing . . .*

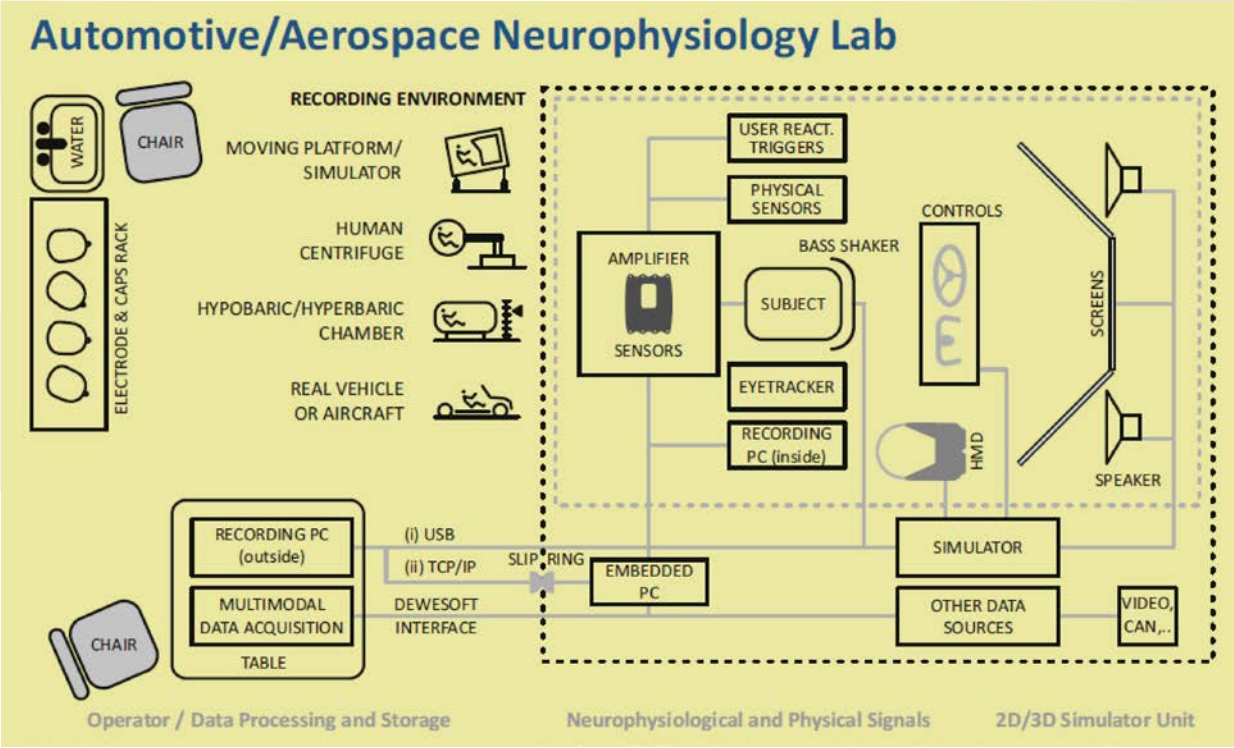
LIDAR/RADAR/ULTRASONIC SENSOR DEVELOPMENT



Communication between multiple vehicles for development of safety related sensors and advanced driver assistance systems. Synchronized connection of more then 10 cars in a network with online calculation and visualisation.



Driver monitoring and reaction measurement system



DEWESoft® and its partners SMI (SensoMotoric Instruments) and g.tec (g.tec medical engineering) have developed a system for measuring drivers reaction, attention and behaviour inside the vehicle either in simulator or in real car. To measure where driver is looking at and which part of drivers brain is active at the moment together with biomedical data, which tell if drivers feels comfortable in a certain car or not, is crucial for development, validation and effectiveness of advanced driver assistance systems. Therefore such systems are important in all phases of the car (development, testing/validation and production), to see how normal population reacts in such cars.

The indispensable turnkey platform provided by DEWESoft® and partners uses a single software interface, which allows human factors researchers and automotive interface developers to analyse the correlation of human attention data and vehicle performance data – **synchronized in real-time**.

The same system (hard- and software), can be also used in other industries e.g. in aerospace, transportation,...

SMI EYE TRACKING GLASSES

The glasses-type eye tracker, SMI Eye Tracking Glasses 2 Wireless, is proven with more than 100,000 participants recorded worldwide. With its Natural Gaze™ design, The ETG captures natural human interaction with maximal peripheral vision in real-world driving, as well as other man-machine interaction tasks.

Supplied Corrective Lenses module allows for maximum coverage of user populations. The ETG logs eye and gaze raw data, such as gaze direction and pupil dilation. It also records gaze videos, which map a persons gaze traces in a high definition scene video.

With SMI BeGaze, multiple participants' gaze data can be aggregated on target areas to measure attention or off-road glances. The specific "Off-Road Glance Duration Analysis Module" is compliant with "NHTSA Driver Distraction Guidelines for in-Vehicle Electronic Devices" testing.

With the ICA module, cognitive workload calculations based on eye-and-gaze raw data are added to driver-state assessments.

For more details contact either DEWESoft® sales office or SMI directly at:
SensoMotoric Instruments GmbH
www.smivision.com | info@smi.de

G-TEC G.HIAMP BIOSIGNAL ACQUISITION SYSTEM

The g.Hlamp is a medical grade biosignal amplifier that allows to measure EEG, ECoG, ECG, EMG, Respiration, GSR, Pulse, Blood Pressure, etc. It is available with 80, 144 or 256 input channels (+/- 250mV). The amplifier has 256 ADC converters with 24 Bit inside for perfect signal resolution and it supports active and passive electrodes and ECoG grids.

To connect and configure the unit, a special plugin was designed to use a g.Hlamp multi-channel amplifier inside a DEWESoft® data acquisition system as an additional device. The data acquired with g.Hlamp are stored together with all other signals acquired by the DEWESoft® system in a DEWESoft® data file. The plugin allows to configure the g.Hlamp and to use its impedance measurement tool. It allows to perfectly synchronize the biosignal data with any other sensors connected to the DEWESoft® system.

The software is intended for visualisation and storage of data recorded with g.Hlamp integrated in a DEWESoft® data acquisition system for research and investigational purposes.

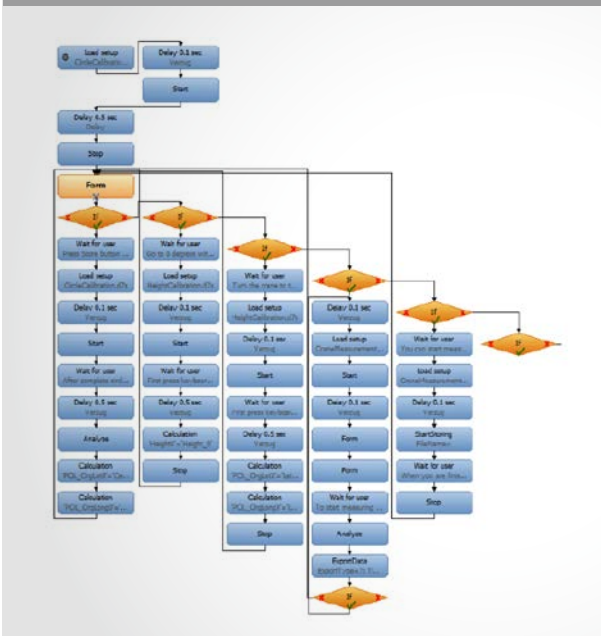
For more details contact either DEWESoft® sales office or
G-TEC directly at:
g.tec medical engineering GmbH
www.gtec.at | office@gtec.at

Related applications in heavy machinery

MEASUREMENT OF CRANE

DEWESoft® DS-VGPS-RTK solutions are widely used also in heavy industry. One example application is measuring movement of crane's boom to recalculate bending and specify the crane.

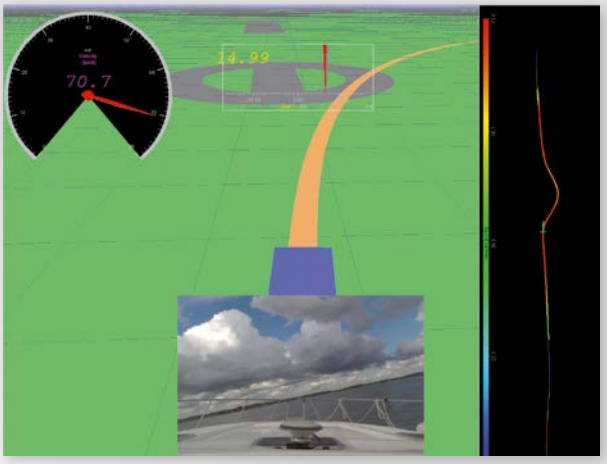
AUTOMATED TESTING PROCEDURES IN SEQUENCER



MEASUREMENT SETUP

Bluetooth connection of DS-VGPS-HS-RTK with 100 Hz output rate and 2 cm positional accuracy to the operator station in the cabin. Additional RS232 connection of vehicle's internal bus.

Related applications on the sea



The combination of quick and easy installation with the high flexibility of the DEWESoft® Vehicle Dynamics system is also a perfect fit for sea-side testing.

The scalability and multipurpose design of the system makes it possible to measure different components of the ship even when thy are locally distributed. All data-sources are perfectly synchronised: e.g. the Combustion analyser data from the engine, the Power module data from electrical engines and batteries and the vibration data from analogue input.

APPLICATIONS ON THE SEA

- *Handling testing (different slaloms)*
- *Pass by Noise*
- *Avoiding obstacles*
- *Component testing*
- *Performance testing ...*

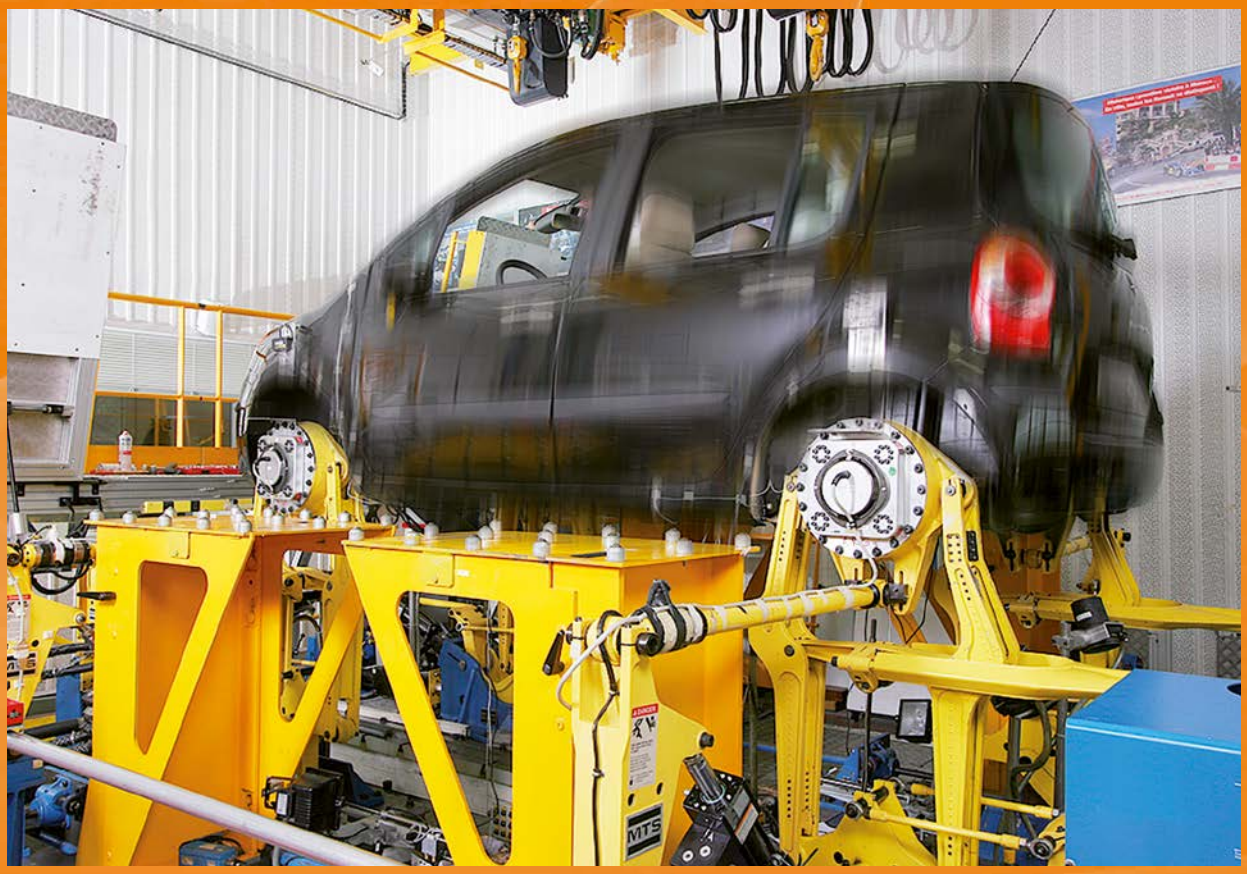
Related applications in the air

Due to the ruggedness, high environmental protection and flexibility of the Advanced Vehicle Dynamics System it's possible to test an airplane, where all the components are under difficult conditions: e.g. high G forces and huge temperature differences. It's crucial to get precise and accurate data while performing such manoeuvres, especially orientation parameters such as Roll, Pitch, Heading and Angular Velocity, which are the key values for designers of the plane.

APPLICATIONS IN THE AIR

- *High G maneuver testing*
- *Component testing*
- *Performance testing ...*

Durability testing



Data acquisition systems provided by DEWESoft® are heavily used in performance, durability and reliability testing. This covers a broad range of testing applications from product, part or material testing. It is possible to even test if a complete system meets its design goals, engineering or functional specifications. Furthermore it can measure any required environmental conditions in which products may be used, to lifetime span and tensile, load testing and many more.

The DEWESoft® software includes highly sophisticated algorithms for online FFT analysis, order tracking, torsional and rotational vibrations, structural analysis, which makes analysis of the data much much easier.

KEY FEATURES

- *Quick and easy installation*
- *Connection of any sensor*
- *Scalable from 8 to 1000 channels for multipurpose usage*
- *Input protection and optical ±1000 V isolation*
- *Simultaneous sampling*
- *Anti aliasing filters*
- *Programmable analogue outputs*
- *TEDS functionality*
- *Highest precision and easy to use (fully integrated in DEWESoft®X)*
- *Measurement results available online including additional math channels*
- *Many additional synchronised data sources like analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, RoadDyn 2000, video & many more*
- *Automated workflow with DEWESoft® sequencer*
- *Possibility to capture different software modules (vehicle dynamics, combustion analysis, vibrations, ...) in one synchronized data file*
- *Export to many different file formats*

VEHICLE ROAD LOAD DATA

Portable and rugged DEWESoft® road load data systems are used in vehicle testing, material research and parts approval. The data, which is collected on the test track or on a test rig, can be used for simulation models or even as a direct replay of »real« environmental conditions on a testbed. DEWESoft® supports data export to the RPCIII file format for such simulations.

STRESS-STRAIN ANALYSIS

The DEWESoft® SIRIUS® STG module allows to cover stress and strain measurement of materials and structures. This data acquisition system can be used to measure stress on bridges, cars, aircrafts, ... and many more objects.

FATIGUE ANALYSIS

Fatigue analysis is a special software module inside DEWESoft®, which is used in material science. It's used to measure fatigue life, which is the number of stress cycles of a specified character that an object under test can sustain before failure. These cycles can easily be measured by the highly accurate SIRIUS® devices.

ADDITIONAL DSA POSSIBILITIES

A unique feature of DEWESoft® is to capture many different sensors (Accelerometers, microphones, straingauges, ...) synchronously inside one measurement even with different sampling rates. This allows to perform almost every Dynamic Signal Analysis measurement.

Vehicle Road Load Data

The Road load data system provided by DEWESoft® is capable of recording the data during real test drives under extreme conditions and avoid reruns, which shortens the time of testing dramatically. The system is easy to install, configure and is ready in a matter of seconds after mounting. The same units can also be used at test rigs either for a whole vehicle or certain component. Afterwards this data can be replayed with the same system on a test bed to simulate all the forces and vibrations in the laboratory boundaries.

Such systems are also used in material research, process and parts approval, where it's important to optimize mechanical components to a real-life environment.

Data can be later on exported to many different file formats (as Matlab, Diadem, ...) for further detailed analysis.

KEY FEATURES

- *Connection of any sensors*
- *Scalable from 8 to 1000 channels*
- *Input protection and optical ±1000 V isolation*
- *Simultaneous sampling*
- *Anti aliasing filters*
- *Programmable analogue outputs*
- *TEDS functionality*
- *Quick and easy installation*
- *Highest precision and easy to use (fully integrated in DEWESoft® X)*
- *Measurement results available online*
- *Many additional synchronised data sources like analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, RoadDyn 2000, video & many more*
- *Possibility to capture different software modules (vehicle dynamics, combustion analysis, vibrations, ...) in one synchronized data file*
- *Export to many different file formats*

INSTRUMENTS

DS-R8 WITH ANALOGUE OUT

- *Any combination of up to 128 inputs (all the SIRIUS® modules)*
- *Up to 64 analogue outputs*
- *Up to 1 MS/s sampling rate*
- *Up to 8 CAN inputs*
- *High-end computer with the latest i7 generation processor*
- *SSD with up to 960 GB of storage*

front view

rear view

	DEWESoft® R8	DEWESoft® SIRIUS®
Max. number of isolated channels	64	8 / slice
Sample Rate/Res. – opt 1	1MS / 16 Bit	1MS / 16 Bit
Bandwidth – opt 1	2MHz	2MHz
Sample Rate/Res. – opt 2	200 kS/s / 2x 24 Bit	200 kS/s / 2x 24 Bit
Bandwidth – opt 2	75 kHz	75 kHz
Base accuracy	0.05%	0.05%
Customised calculation	✓	✓
Analogue output	Up to 64 ch	Up to 8 ch
CAN/Flexray/XCP	✓	✓
Camera	✓	– (on computer)
Integrated GPS	✓	–
Option Combustion analyser	✓	✓
Option DSA package	✓	✓
Option Power	✓	✓
Storing raw data	✓	✓

Stress and strain analysis

Stress and strain analysis make it possible to determine the stresses and strains in materials and structures, which are subjected to forces or loads. Such tests are measured with many different sensors like for instance load cells, extensometers, strain gauges, ... Therefore DEWESoft® has developed universal and extremely advanced hardware modules for performing such a measurement. The combination of highly sophisticated analysis algorithms and ease of use in one software packet, makes DEWESoft® the perfect tool for such demanding performance tests.

KEY FEATURES

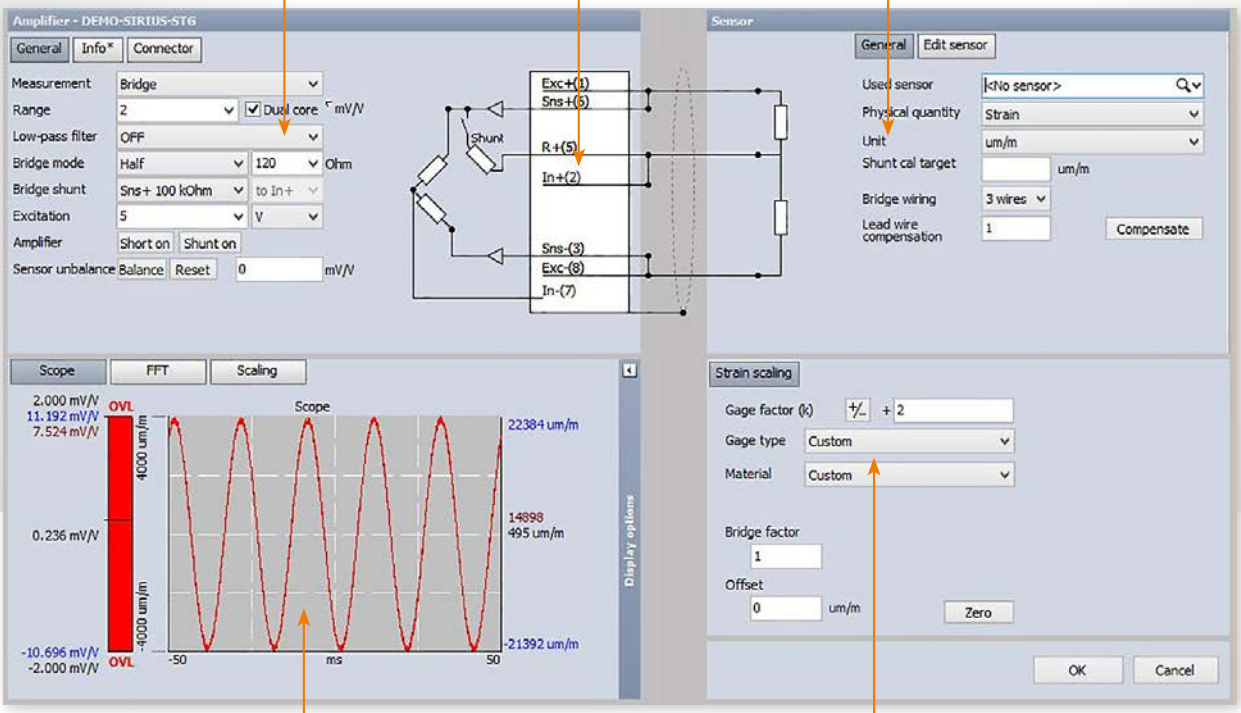
- *Quick and easy installation*
- *Direct support of **quarter, half and full bridge strain gage** measurements with 120 and 350 Ω*
- ***Lead wire compensation** in case of long wires*
- *Bridge balance support*
- ***Programmable excitation** voltage from 0 .. 20 V or 0 .. 60 mA*
- *High dynamic with **160 dB range** and 75 kHz bandwidth*
- *Input **AC and DC coupling** for higher resolution*
- *Programmable shunt and **shunt calibration***
- *Scalable from 8 to 1000 channels for multipurpose usage*
- *Input protection and optical ±1000 V **isolation***
- *Anti aliasing filters*
- *TEDS functionality*
- *Measurement results available online including additional math channels*
- *Many additional sychronised data sources like analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, RoadDyn 2000, video & many more*
- *Automated workflow with DEWESoft® sequencer*
- *Export to many different file formats*

ADVANCED UNIVERSAL STG MODULE

Amplifier configuration
Range, Bridge mode, Shunt, Excitation

Connection schema
Bridge, Voltage, Current, ...

Sensor configuration
TEDS recognition, Lead wire compensation, Shunt target, ...



Scope/FFT/Scaling
Raw signal vs scaled signal overview in Scope or FFT

Scaling
Strain (Gauge factor, Gauge type, Material, ...) by two points or by function

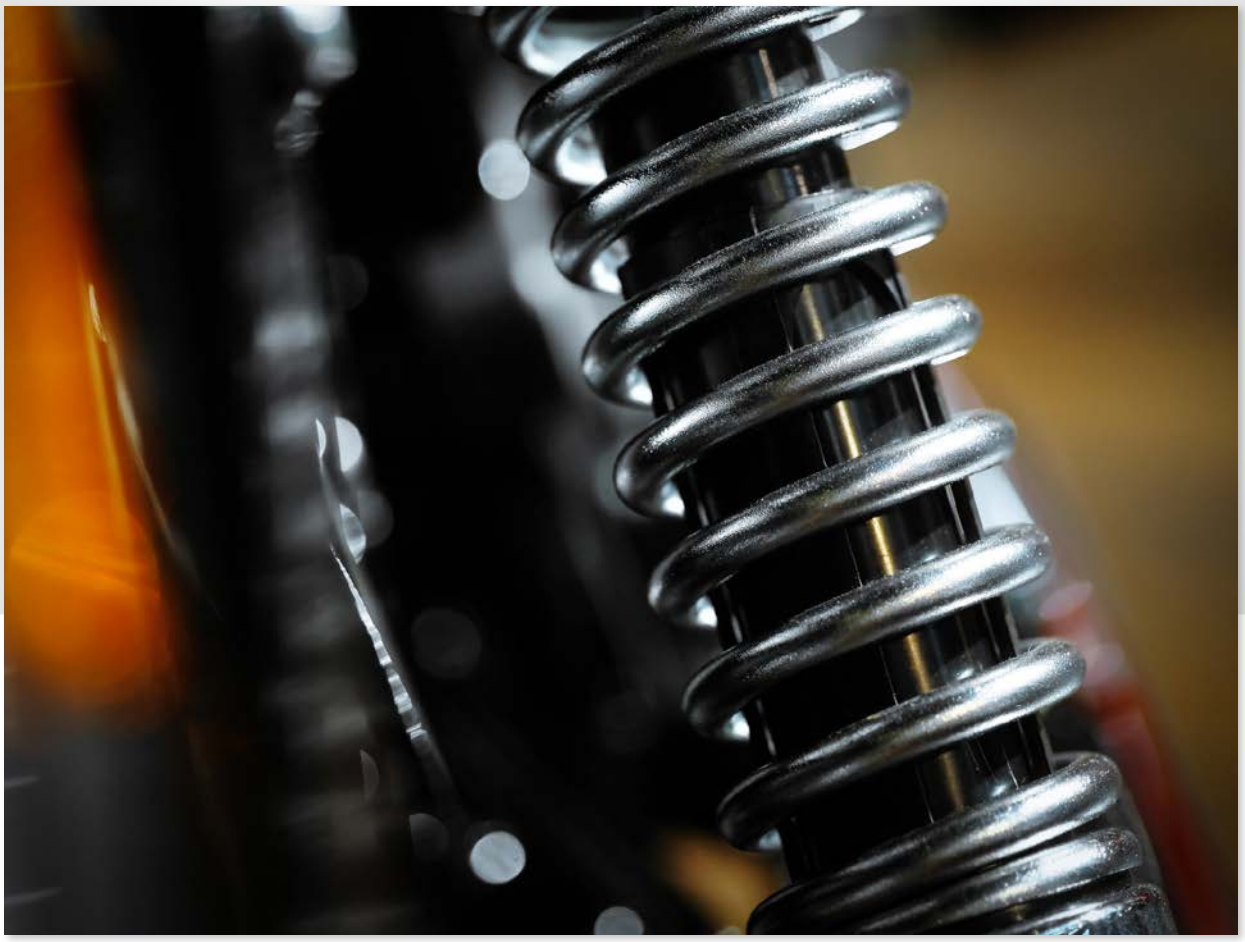
STANDARD HARDWARE DESIGN

SIRIUSi 8xSTG

MSI

Analogue Inputs	8 ch voltage, full/half/quarter bridge strain, current (with ext. Shunt), resistance, temperature, potentiometer
ADC type	24 bit delta-sigma DUALCOREADC® with anti-aliasing filter
Sampling rate	Simultaneous 200kS/sec
DUALCOREADC® Ranges (Low Range)	±50 V (2.5 V), ±10 V (500 mV), ±1V (50 mV), ±100 mV (5 mV)
Br ranges @ 10 Vexc (Low Range)	1000(50) mV/V, 100(5) mV/V, 10(0.5) mV/V
Dynamic Range@10kS (DUALCOREADC®)	137 dB (152 dB)
Input coupling	DC, AC 1 Hz (3 Hz, 10 Hz per SW)
Input impedance	1 MΩ between IN+ and In- for 50 V Range ; all other Ranges > 1 GΩ
Bridge modes	Full/Half/Quarter Br 120/350Ω 3-wire or 4-wire; internal bridge completion
Internal shunt resistor	59.88 kΩ and 175 kΩ, bipolar to Exc+ or Exc- (others on request)
TEDS	supported on all except SIRIUSi 8xSTG-L2B7f DSI® adapters only fit on 9pin DSUB
Excitation Voltage	0 to 20 VDC software programmable (16 Bit DAC), max 0.1 A / 0.8 W
Excitation Current	0 to 60 mA software programmable (16 Bit DAC)
Overvoltage protection	In+ to In-: 50 V Range: 300 V; all other Ranges: 50 V (200 V peak for 10msec)
Digital inputs	SIRIUSi 8xSTG: none SIRIUSi 8xSTG-L2B10f: on 10pin LEMO connector one pin is used for digital I/O -> total 8 digital I/O (open collector)
Typical power consumption (max.)	15 W (25 W)

Fatigue analysis



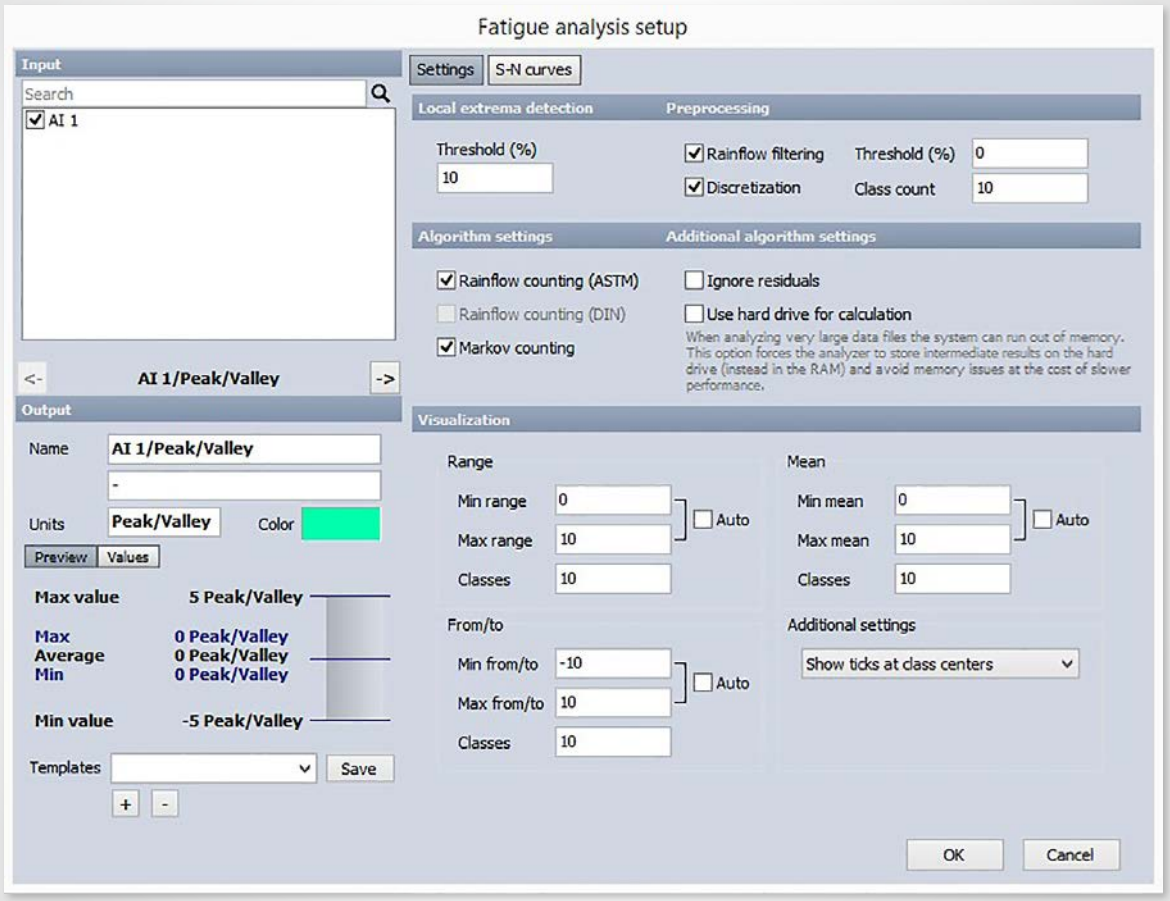
Fatigue testing is crucial in material science, with which the weakening limit (fatigue life) of a material or object caused by repeatedly applied loads is recognised.

The output of such tests is S-N curve or Wöhler curve, which is a graph of a cyclic stress against the logarithmic scale of cycles to failure. The new DEWESoft® Fatigue analysis mathematical module can perform such a test and help engineers to do fatigue prediction and durability testing.

KEY FEATURES

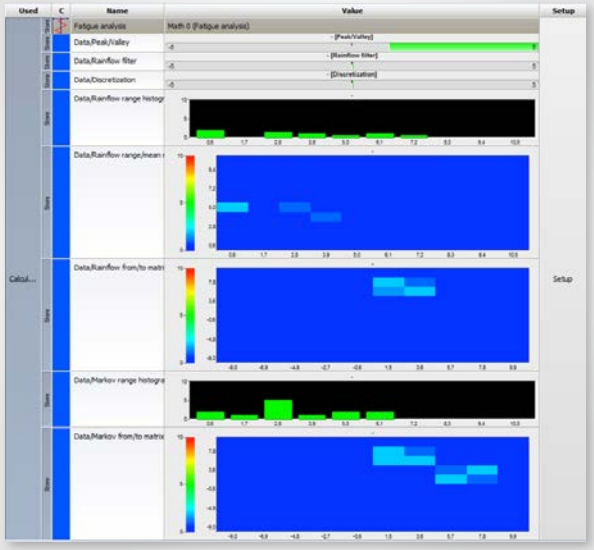
- *Quick and easy installation*
- *Direct preprocessing or local extreme detection, counting methods with algorithm settings, visualisation and analysis software support*
- *Standard counting algorithms as ASTM, DIN and Markov counting are implemented*
- *High dynamic of hardware modules with 160 dB range and 75 kHz bandwidth*
- *Input AC and DC coupling for higher resolution*
- *Scalable from 8 to 1000 channels for multipurpose use*
- *Anti aliasing filters*
- *TEDS functionality*
- *Temporary fatigue results available online including additional math channels*
- *Many additional synchronised data sources like analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, video & many more*
- *Automated workflow with DEWESoft® sequencer*
- *Export to many different file formats*
- *Analysis of huge data files*

FATIGUE ANALYSIS CONFIGURATION



Configuration of preprocessing with turning points (peak/valley) detection, rainflow filter and discretisation. Algorithm settings and visualisation with several standards ASTM, DIN and Markov counting for calculations and analysis.

VISUALISATION CALCULATION

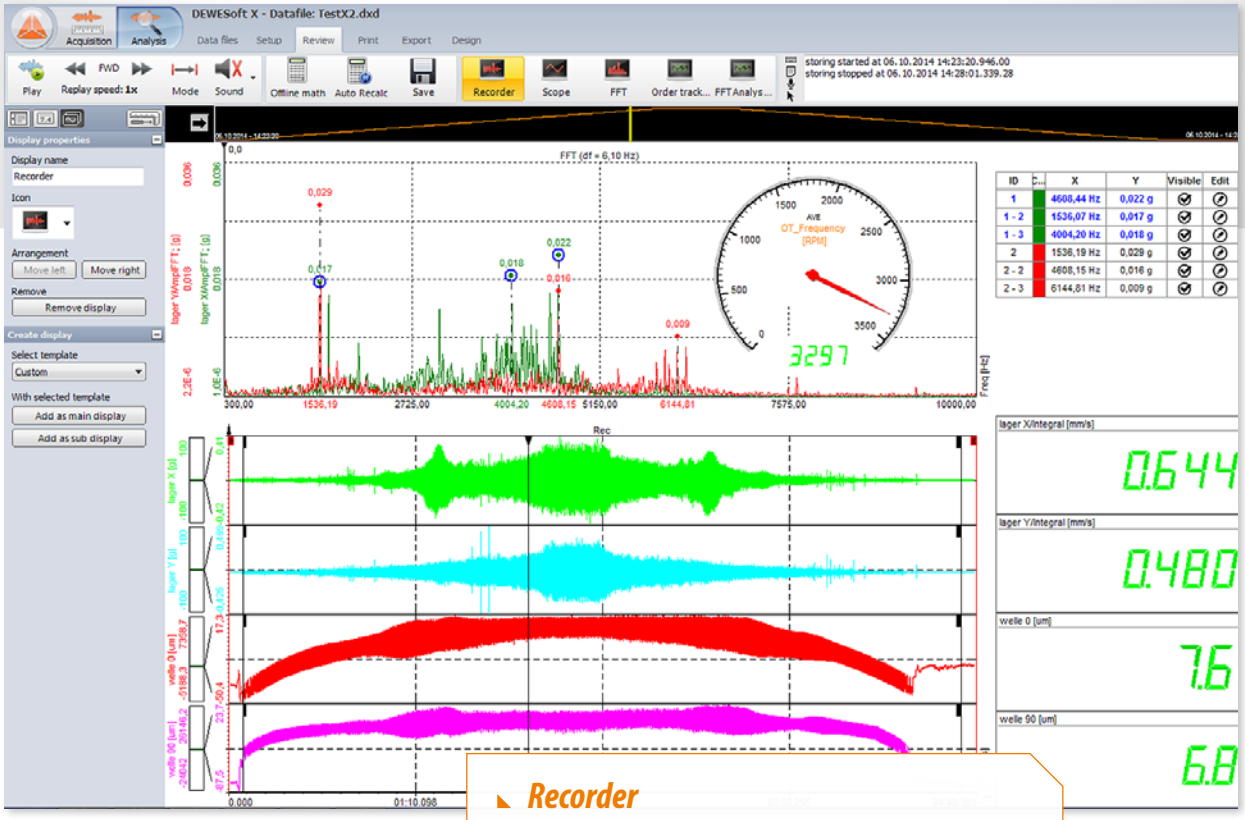


Rainflow filter, Discretisation, Rainflow range and cycles histogram, Rainflow range/mean and from/to matrix calculations.

Additional Dynamic Signal Analysis Possibilities

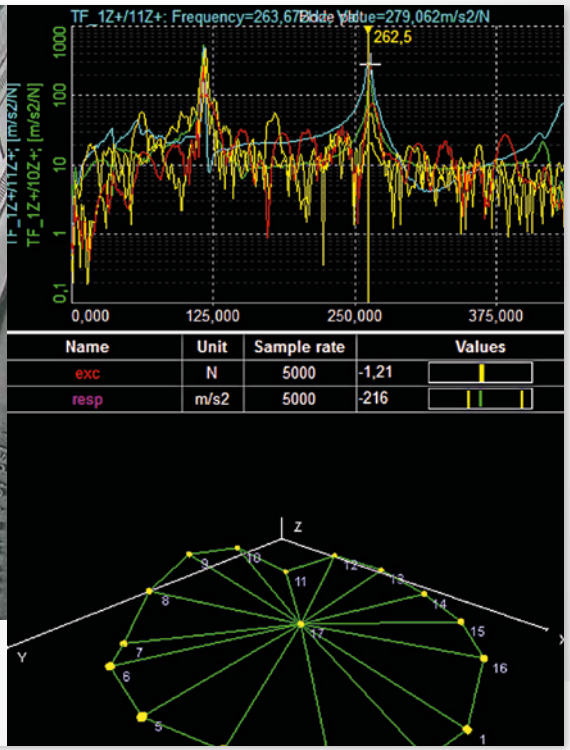
DEWESoft® offers extension for DSA measurements. The same hard- and software can cover nearly all DSA applications. More details can be found in Dynamic Signal Analysis brochure.

NOISE & VIBRATION



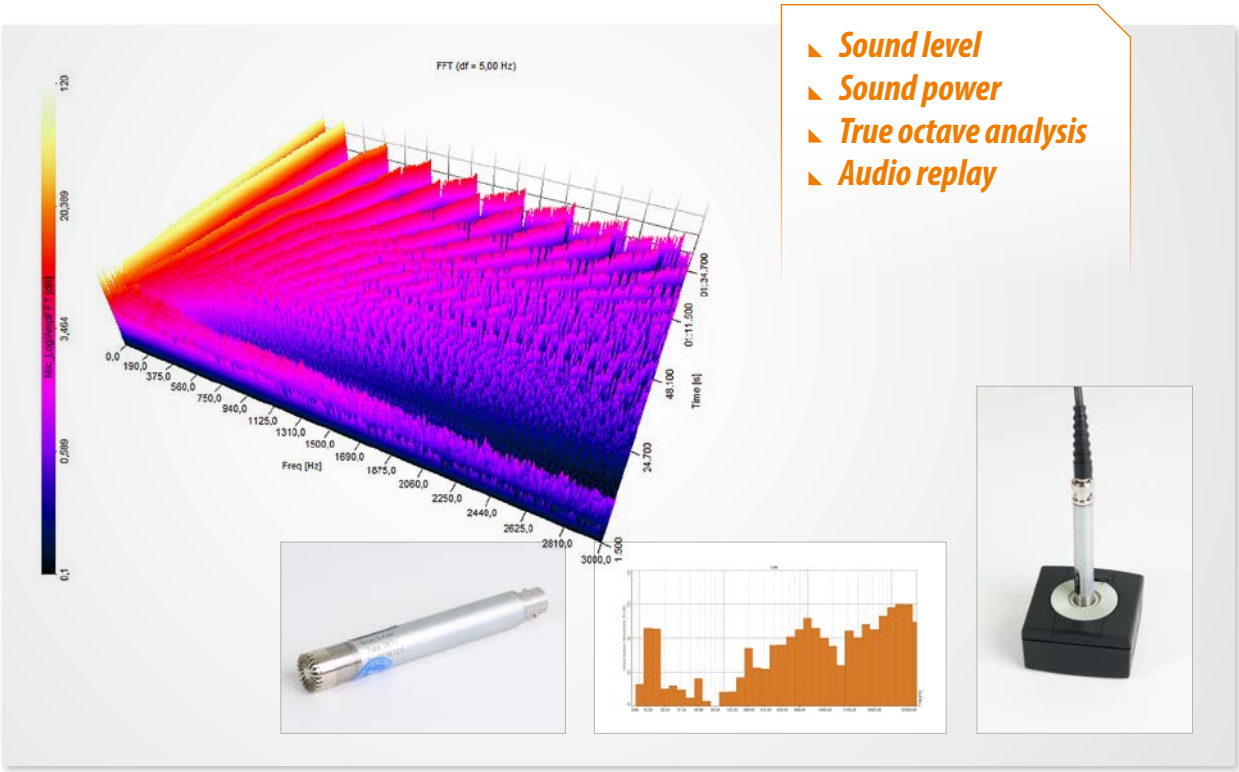
- *Recorder*
- *FFT analyser with multipurpose cursor functionalities*
- *Global level*
- *Octave band analysis*
- *Time domain analysis*
- *Multi domain analysis*
- *Filters*

STRUCTURAL ANALYSIS



- *Modal analysis (impact test, sweep sine)*
- *Operating deflection shapes (ODS)*
- *Shock and drop tests (SRS)*
- *Bump test*
- *Short time FFT*
- *Human body vibration*

ACOUSTIC ANALYSIS



- *Sound level*
- *Sound power*
- *True octave analysis*
- *Audio replay*

Powertrain and e-mobility testing

Powertrain development is the most important requirement in successfully competing in today's transportation market of cars, trucks, motorcycles, vessels, ... In the past powertrain development has been about increasing the power-to-weight ratio of the combustion engine, but nowadays companies focus more on balancing the need for power and torque of the vehicle with legislative emission requirements, which are getting very difficult. Also due to new technologies on the market, companies are trying to build hybrid or electric vehicles to decrease emissions.

DEWESoft® fully supports this standard and thus increases the capability of our products. This has been successfully done with introducing SIRIUS® and DEWESoft® X2 software.

KEY FEATURES

- *Quick and easy installation*
- *Connection of any sensors*
- *Scalable from 8 to 1000 channels for multipurpose usage*
- *Input protection and optical ±1000 V isolation*
- *Simultaneous sampling*
- *Anti aliasing filters*
- *Programmable analogue outputs*
- *TEDS functionality*
- *Highest precision and easy to use (fully integrated in DEWESoft® X)*
- *Measurement results available online including additional math channels*
- *Many additional synchronised data sources like analogue, digital, CAN, GPS, IMU, FlexRay, XCP, CCP, RoadDyn 2000, video & many more*
- *Automated workflow with DEWESoft® sequencer*
- *Possibility to capture different software modules (vehicle dynamics, combustion analysis, vibrations, power calculations, ...) in one synchronized data file*
- *Export to many different file formats*

COMBUSTION ANALYSIS

DEWESoft® has developed a perfect product SIRIUSi with direct charge input for mobile and test-bed combustion analysis. Including award winning easy to use software it's possible to set it up and start measuring in less then 5 minutes.

ROTATION AND VIBRATION MEASUREMENT

For even further analysis of the engine or rotation parts of the vehicle, additional vibration calculations have been added to the standard math functionality of DEWESoft® software package.

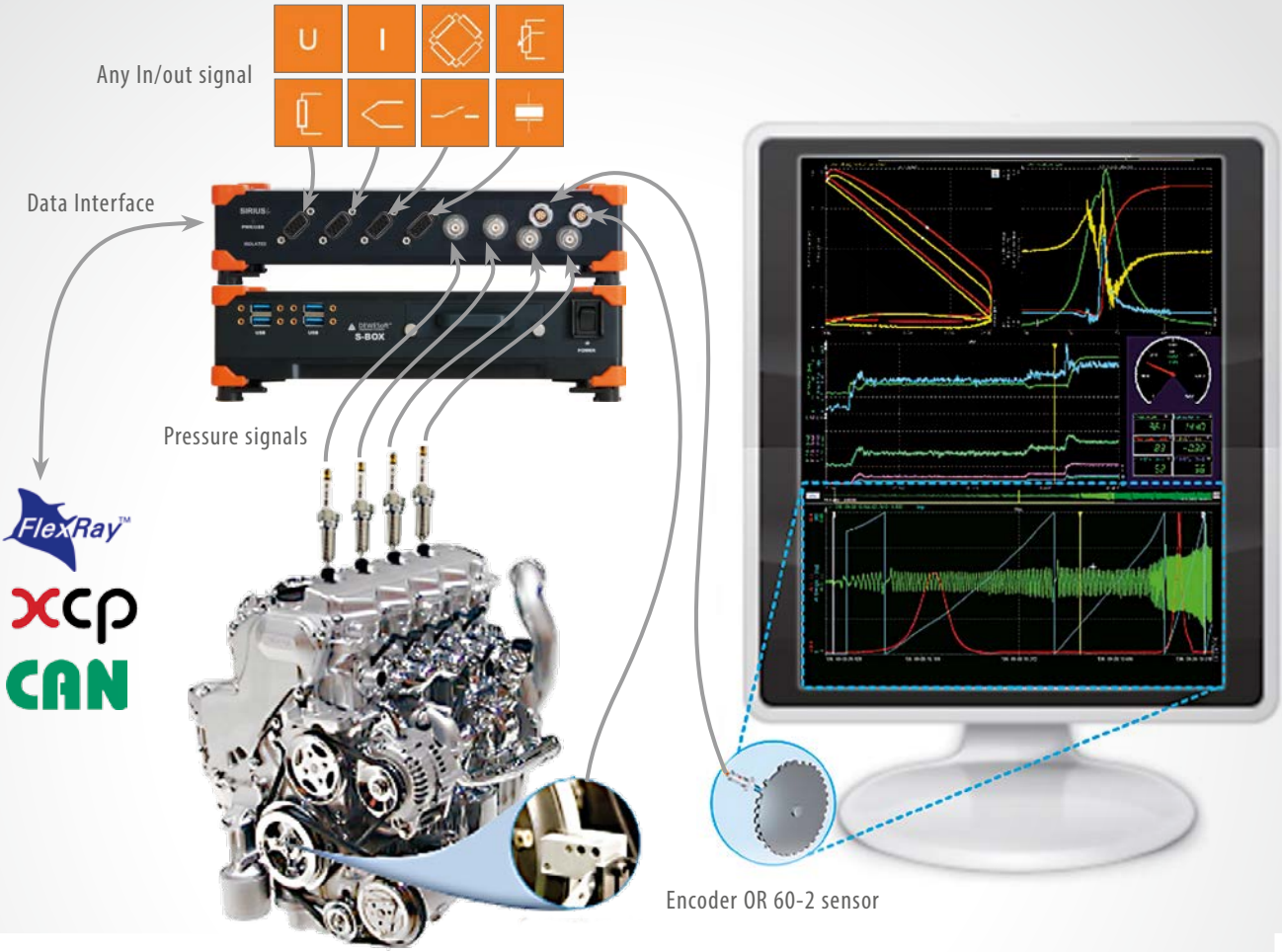
E-MOBILITY

Due to shift from combustion vehicles to hybrid or even purely electric vehicles DEWESoft® has developed a special POWER module, which allows the user to combine all the mechanical data and CAN data with power measurements and calculations.

RELATED POWER MEASUREMENT POSSIBILITIES

DEWESoft® can cover complete power market from power grid, transformers, wind and solar, nuclear power plant, turbine and generator to aircraft and marine power measurements.

Combustion Analyser



SIRIUSi Combustion Analyser systems from DEWESoft® are used for engine research, development and optimisation. Also for component development and testing – such as ignition systems, exhaust systems and valve control gear.
The system consists of our top of the notch isolated SIRIUSi hardware and the well-known DEWESoft® software package for measurement and analysis. It supports angle and time-based measurement and uses highly sophisticated algorithms for online or offline mathematics and statistics – calculating heat release and other thermodynamic parameters.
The combustion analyser can either be used in-car (via the INCA™ interface) or it can be fully integrated into a test-bed environment. It can also acquire data from other sources like: Video, CAN, FlexRay, XCP/CCP Ethernet, …

If the powerful integrated post processing features of DEWESoft® are not enough, you can even export the data to several different file formats.
In addition to combustion analysis, the system can be expanded to handle other measurement applications such as hybrid testing on the power train, noise and vibration measurement all with perfectly synchronised video or GPS data.

MAIN FEATURES

- *8 analogue inputs with sensor supply for any sensor and signal type*
  - *Charge, IEPE, Voltage, Strain, Torque, Temperature, …*
- *Two versions in speed and resolution:*
  - *SIRIUSi-HS: 16 bit, 1 MS/s for high speed engines*
  - *SIRIUSi: 24 bit, 200 kS/s for low RPM diesel engines*
- *Direct connection of any RPM sensor: InCar (e.g. 60-2), Encoder, CDM+Trg*
- *1 isolated high speed CAN bus interface*
- *Expandable to higher channel count*
- *Interface to Test-bed and INCA™*
- *Multiple data interfaces CAN, FlexRay, Counter, GPS, Video, ...*
- *Simultaneous online analysis of*
  - *Torsional and rotational vibration*
  - *Order tracking*
  - *Electrical power*
  - *Combustion noise*
  - *Sound power*

APPLICATION OVERVIEW

Combustion analyser is a standard application for all research, development and calibration tasks of a combustion engine and development of exhaust gas after treatment. Combustion analyser is already required from the beginning of a prototype: e.g. for friction testing or in research for basic particle or emission analysis.

Exact identification of the top dead centre and a calibrated and compensated measurement chain are key to accurate measurement results. Combustion analyser is often used on a chassis dyno or even for the prototype within the drivability calibration procedure to optimize engine and vehicle behaviour.

On the engine test bed combustion analyser is a standard tool to calculate and visualise relevant physical parameters from the combustion engine and to monitor and protect the unit under test. Different communication protocols to the control room via Ethernet or RS-232 are supported: e.g. Tornado, AVL PUMA Open. Analogue output channels are of course also supported.

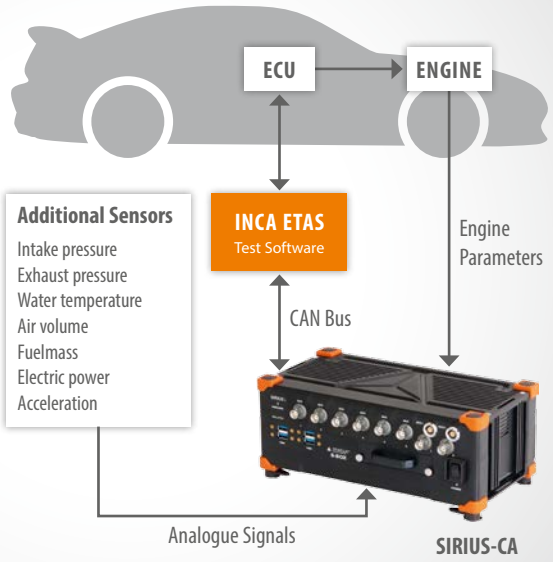
For testing under real conditions, the DEWESoft® Combustion analyser is perfectly suited for In-Car use. The combination with the CAN or XCP/CCP interface and any other sensor allows acquisition of all relevant data together with the combustion cycle. The combination with INCA™ via CAN interface offers a complete solution for the ECU calibration.

The DEWESoft® Combustion Analyser can be used on all types of combustion engines, such as car, truck, ship, motorcycle, power-saw, …

Engine Research and Development tasks:

- *Misfire and knock detection*
- *Friction analysis*
- *Injection and ignition analysis*
- *Valve control system timing*
- *Combustion noise and vibrations*
- *Mechanical stress diagnosis*
- *Energy balance*
- *Gas exchange analysis*
- *Residual gas verification*
- *Exhaust gas after treatment*
- *Engine mapping*

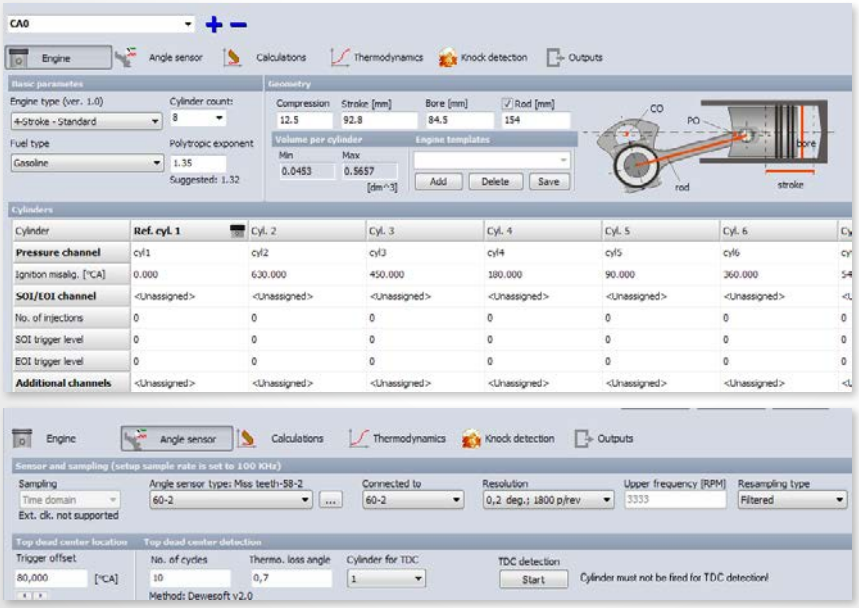
IN CAR USE



TEST BED APPLICATIONS

EASY AND INTUITIVE CONFIGURATION

Simply define the engine type with the number of cylinders and its geometrical parameters. In the cylinder menu the analogue channel of each cylinder and the alignment of the cylinder angles can be defined. Additionally the injection channels and additionally channels for transforming any input channel to angle based can be selected in the Engine setup.
The next step is to select the angle sensor type and define the desired output resolution (down to 0.1°). The TDC (Top Dead Centre) can be detected automatically - without firing - using the maximum pressure level or optionally with a dedicated TDC sensor.

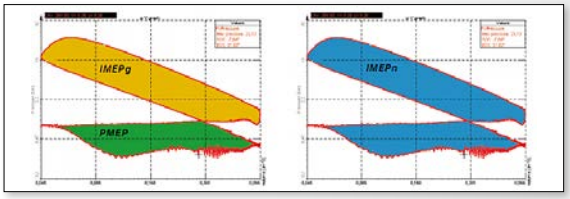


SELECTING THE DESIRED RESULTS

After these few steps of configuration, we only need to enable the desired output channels. Overall- or running-average, derivation, temperature, heat release, work, power are just some examples of the possibilities.

HEAT RELEASE

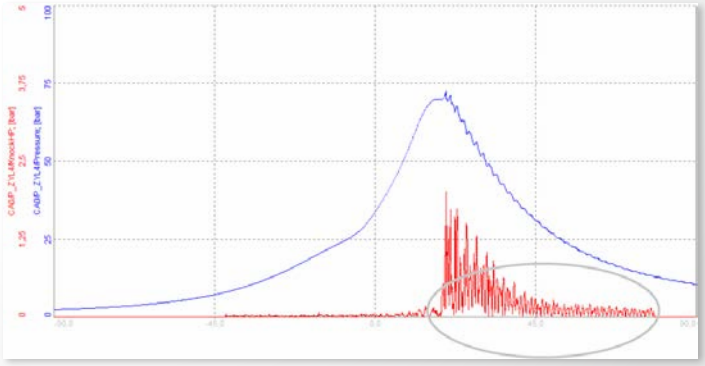
The online heat release calculation results in the energy for each cycle and various parameters. Another result is the exact angular progression (5, 10, 50 or 90%) of the energy. Also the SOC (start of combustion) and EOC (end of combustion) are calculated. All these values are based on the heat release algorithm. The combustion analyser shows all these values as well as relevant mean values



IMEPg, PMEP and IMEPn – all these values can be visualised online in a graphical or in numerical view.

KNOCKING DETECTION

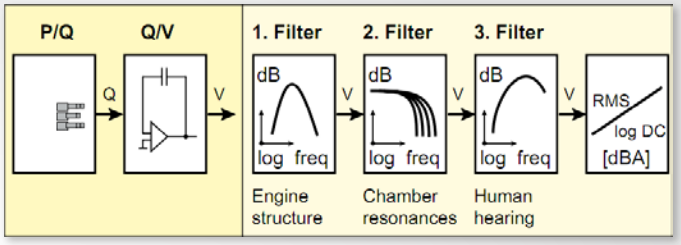
Knocking in spark-ignition internal combustion engines occurs when combustion of the air/fuel mixture in the cylinder does not start off correctly. The robust knocking detection algorithm is based on comparing the signal before and after the TDC.



SELECTING THE DESIRED RESULTS

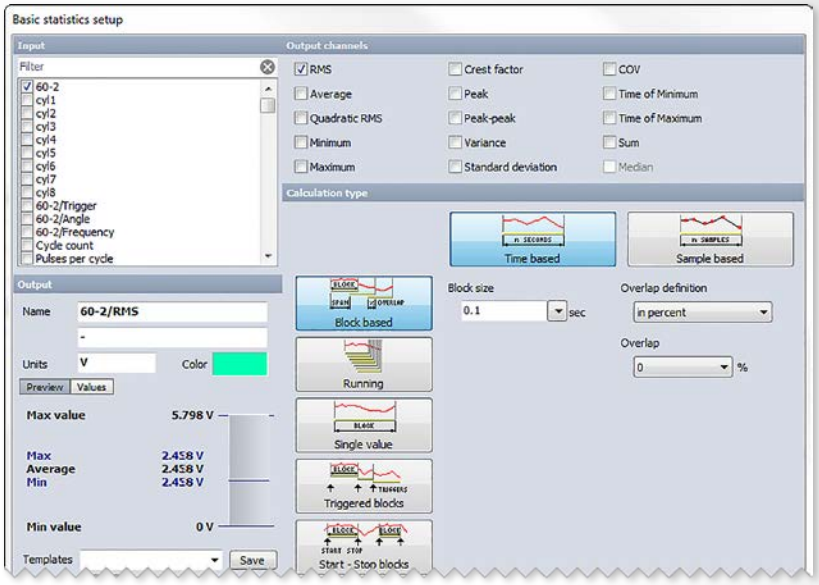
KNOCKING DETECTION

The combustion noise option allows the measurement of noise level caused by an internal combustion engine during operation. The CA-noise must be calculated in the time domain. First the value is scaled from bar to Pascal. This is followed by the U-filter, which simulates the transfer function of the engine (1. and 2. filter in the overview).



MATHEMATICS AND STATISTICS

The physical channels can be supplemented with the online mathematics like statistics, filters, FFT, alarm conditions and many others.
Online calculated values may be used for optimisation or other automated procedures. With the new post-processing feature of DEWESoft® X, all the powerful mathematical and analysis functions can now also be used for the already stored data (offline mode).



SUMMARY OF CALCULATED RESULTS

The overview below shows the power of the DEWESoft® CA module. Most of them are available as cylinder and engine averaged results as well.

GROUP	NAME	DESCRIPTION
Pressures	MAX P	Peak pressure value
	MAP P Pos	Peak pressure position [degrees]
	Pressure	Current pressure cycle
Derivates	MAX D	Peak pressure derivate value
	MAX D POS	Peak pressure derivate position
	Derivate	Current pressure derivative
Volume	Volume	Cylinder volume curve
Zero correction	P CORR	Zero correction factor for pressures
MEP	PI	Work delivered to the piston over engine cycle
	PIH	Work performed by cylinder gasses on the piston during compression and expansion
	PIL	Work performed by the piston during exhaust and induction

GROUP	NAME	DESCRIPTION
Work, Power, Torque	Work	Work [Joule]
	Power	Power [kWh]
	Torque	Torque [Nm]
Heat release	I5	Position of the heat release at 5% [deg]
	I10	Position of the heat release at 10% [deg]
	I50	Position of the heat release at 50% [deg]
	I90	Position of the heat release at 90% [deg]
	IXX	Position of the heat release at user defined % [deg]
	SOC	Start of combustion [deg]
	EOC	End of combustion [deg]
	TQ	Heat release during combustion
	TI	Integrated heat release
Knocking	KF	Knocking factor
Injection	SOI	Start of injection
	EOI	End of injection

DEWESoft® POSTPROCESSING

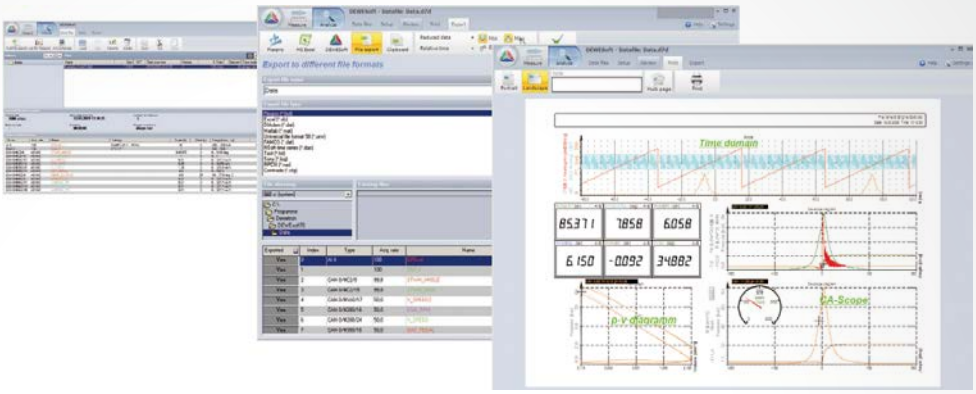
In DEWESoft® X calculations (i.e. mathematical channels) can be added to datafiles after the measurement has been finished. It can even resample the settings of the encoder or of the engine. Those parameters are then recalculated and saved in the datafile.

This powerful feature allows to delay CPU intense calculations until after the measurement has finished. i.e. during the measurement you only store the relevant raw measurement data. And after the measurement is done, you can run all the mathematical calculations on a powerful PC in your office.

APPLICATION OVERVIEW

You can replay any captured data file, zoom-in with the recorder graph cursors, make measurements, print in full colour to any printer. You can export the data to a wide variety of formats compatible with today's most popular analysis software package, like: FlexPro®, MATLAB®, Excel®, AVL CONCERTO™ and many more. You can even export the whole measurement view to an AVI video file to create dynamic documentation.

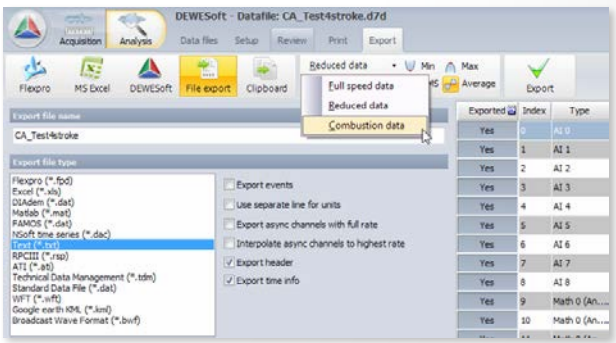
No license is needed to use DEWESoft® in the **Analyse mode.** So you can install the software on all your computers, or even distribute it to your customers, and they can view the results. In this way, all of your colleagues and customers can replay your data files – just by sharing the data file!



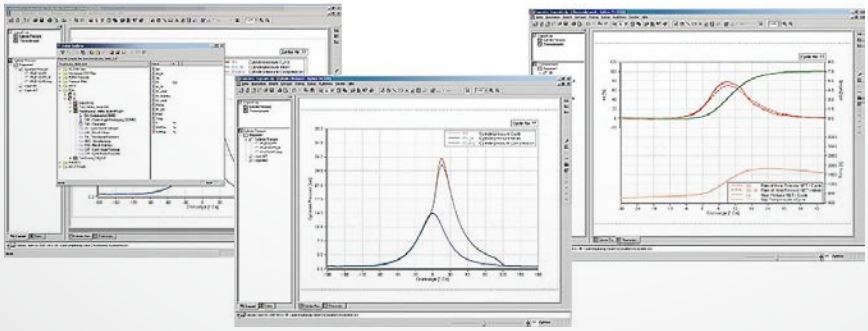
The export dialogue allows selecting different export file formats in time and angle based format. For angle based data export you select the **Combustion data** option. Choose the format and start the export.

Supported export formats:

- FlexPro®
- Excel®
- CONCERTO™
- DIAdem™
- MATLAB®
- UNV
- FAMOS
- nSoft
- Text
- ...



Typical analysis-example using AVL CONCERTO™:



COMBUSTION ANALYSIS SYSTEM

The DEWESoft® Combustion Analyser system combines the software processing capabilities of DEWESoft® with the best hardware available on the market: SIRIUSi. The isolated measurement system has a sample rate of 1MS/s per channel with a vertical resolution up to 2x24Bit, CAN Input/Output and synchronous real-time Supercounters®.

HARDWARE

SIRIUS® S-BOX

- *BASE STATION (embedded PC) with 6xUSB, HDMI, VGA, GLAN, WLAN, 1Hz GPS*
- *PC: i7 2.0 GHz, Intel QM57, 4 GB RAM*
- *Storage : 128 GB removable SSD*
- *Including DEWESoft® X Professional Edition and*
- *Windows® 7 Ultimate version (multilang. support)*
- *9-36VDC supply*

SIRIUSi-HS or SIRIUSi

SIRIUSi-HS - High Speed

- *A/D converter: 16 Bit; 1 MS/sec*
- *SNR: 89 dB @100 kHz BW*
- *0.1° resolution @6000 RPM and 8 channels*

SIRIUSi - High Dynamic

- *A/D converter: 2 x 24 Bit DUALCOREADC®; 200 kS/sec*
- *SNR: 150 dB @100 kS/sec*
- *0.1° resolution @1650 RPM*
- *0.2° resolution @3300 RPM*

SIRIUSi - common features

- *4 CHG modules supporting:*
  - *Charge signals of up to 100 000 pC*
  - *Voltage (up to 10V), DC and AC coupling (0.1 Hz)*
  - *IEPE with 4, 8 or 12 mA and full TEDS support*
- *4 LV modules supporting:*
  - *Voltage (up to 100V), DC and AC coupling (1 Hz)*
  - *Programmable sensor supply up to 30V/100mA*
  - *Full DSI® support for any sensor signal*
- *2 synchronized real time counters (LEMO 7)*
- *1x CAN bus 2.0b isolated*
- *DS-TACHO with adjustable triggerlevel (max. 100V)*
- *All I/O fully galvanically isolated 1kV*
- *USB2 interface, 6-36V_{DC} supply, 2x sync. connector*
- *Optional channel expansion, battery packs, ...*

SOFTWARE

CA-BASE

- *Online mathematics, statistics, standard derivation*
- *Fast online displays: pressure/ pv-diagram, . . .*
- *Time domain sampling, especially for cold start tests*
- *Includes on-line fast combustion "scope", configurable as pressure-volume diagram (pressure vs. crank angle)*
- *Includes basic statistics, off-line display, data storing, data export to ASCII (also Excel®) and export to FlexPro® and Concerto (AVL)*

CA-OPT 1

Extended mathematics, including online calculation of

- *Heat release*
- *Standard deviation*
- *IMEP, PMEP, NMEP*
- *Thermodynamics*
- *Knock detection*

CA-OPT 2

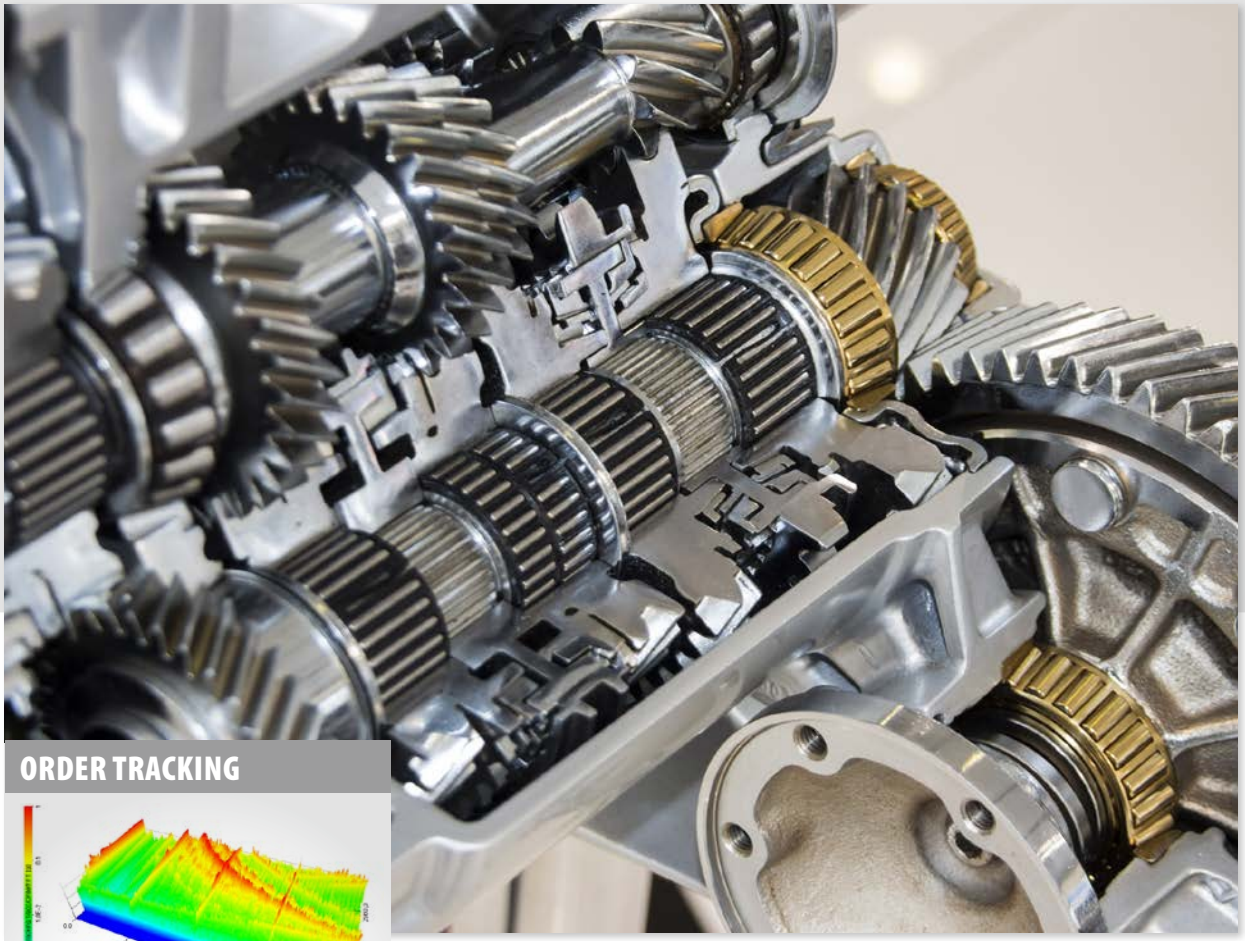
Torsional vibration and rotational vibration analysis software (software only !)

- *Torsional vibration and static torsion measurement*
- *Differential revolution and slippage measurement*
- *Angle resolution up to 0.00075° at 10000 RPM*
- *Supports all incremental position encoders*
- *Rotational vibration analysis: requires only 1 encoder*
- *Torsional vibration analysis: requires two encoders!*

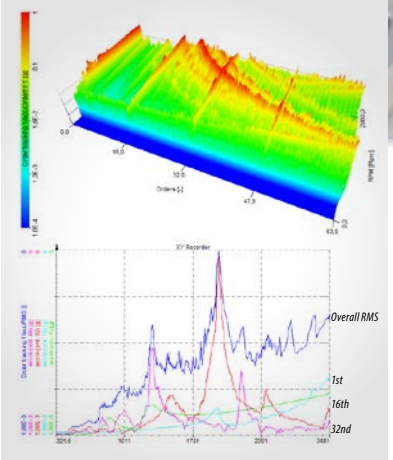
CA-OPT 3

Combustion noise analysis (software only !)
Online dB noise calculation based on the CA noise special filtering

Rotation and Vibration

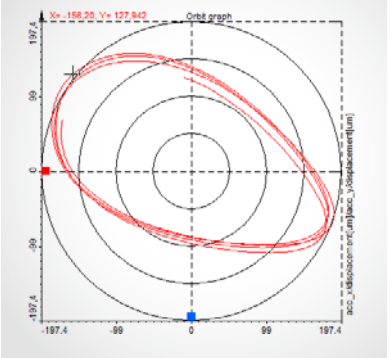


ORDER TRACKING



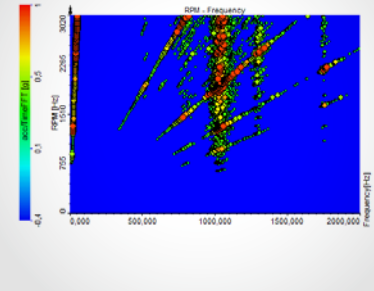
The Order tracking module is the main function for measurements with varying speeds. Any input can be used: microphone, accelerometer, even the output of the torsional vibration module.
Clearly separate engine related harmonics from other frequencies like structural resonances. The high precision digital counters of the DEWESoft® instrument provide accurate and repeatable measurements. Result are represented in 3D, color spectrogram but also in 2D view for selected order and phase extraction over RPM.

ORBIT GRAPH



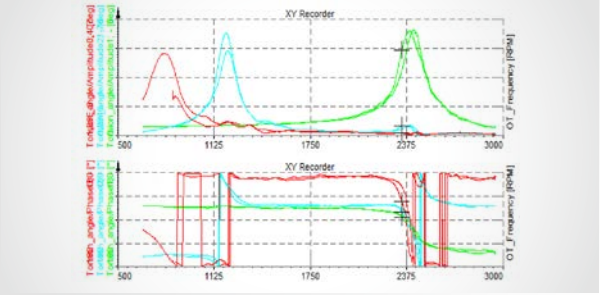
For displaying the axis movement DEWESoft® offers the orbit plot.
Integration/double integration can easily be done directly in the channel configuration setup, for calculation of displacement based on accelerometer input. The output of the Order tracking module can be used for displaying single orders as well as cyclic averages.

CAMPBELL PLOT



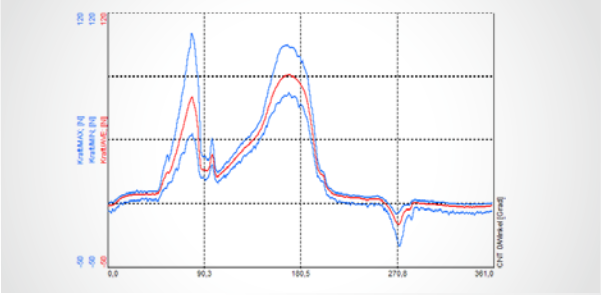
This instrument works based on classification of the measured values, with several options like rainbow, greyscale and adjustable classes. It can be applied on TimeFFT as well as OrderFFT.

TORSIONAL VIBRATION



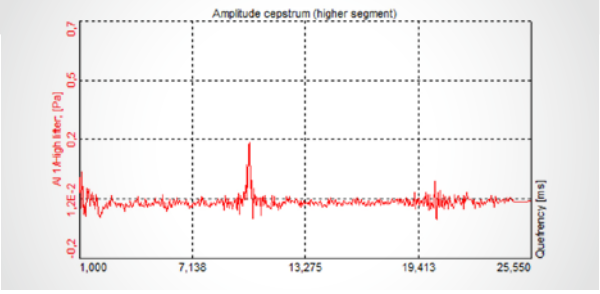
With the high-precision digital counters of the DEWESoft® instruments, based on an 102 MHz time base, rotational and torsional vibration angles and velocities (with two encoders) can also be exactly determined at high RPM speeds. Constant angle offset, uncentered mounting and sensor errors can be compensated, gearbox ratios are supported and additional filters can be applied.

MULTI-DOMAIN



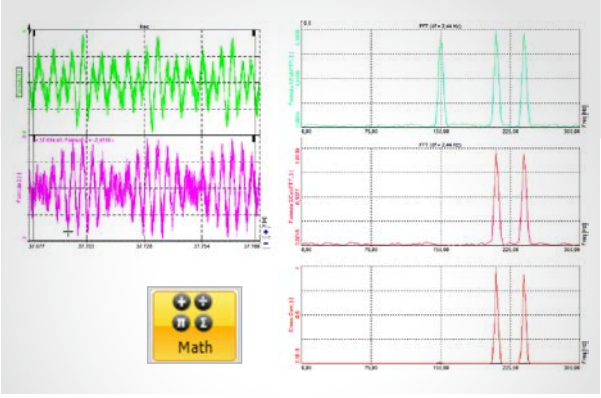
Analyse machines with repetitive processes and resample the data to any other channel base (e.g. angle-domain) to calculate e.g. concentricity errors of shafts (min, max, avg…) per cycle or over all cycles.

CEPSTRUM



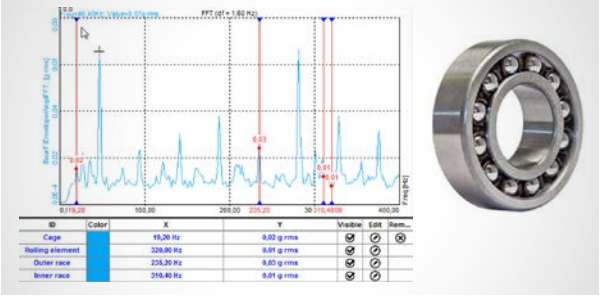
The cepstrum calculation (also used to determine characteristics in speech analysis) helps to identify vibration signatures, such as frequencies in gearbox and bearing analysis.
DEWESoft® provides mirror spectrum, low and high frequency output.

AUTO & CROSS CORRELATION



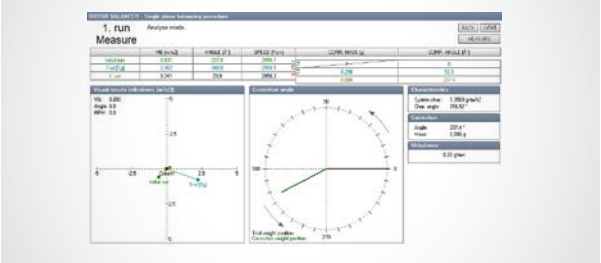
For quantification of signals related to each other or to get the relevant information out of noisy data, the powerful DEWESoft® mathematics provides all the necessary tools.
Similar to Matlab you can work and calculate with the array data to display the result already during measurement.

BEARING FAULT (ENVELOPE)



Easily identify the bearing fault frequencies with the help of automatic markers in the spectrum.
Defects on the cage, rolling element, outer or inner race (FT, BSF, BPFO, BPFI) and also their harmonics can be seen. Just select manufacturer and bearing type via the bearing database. The bearing data base can also be edited by user.

BALANCING

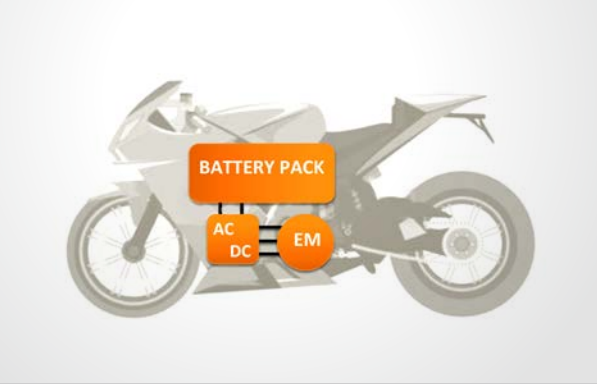


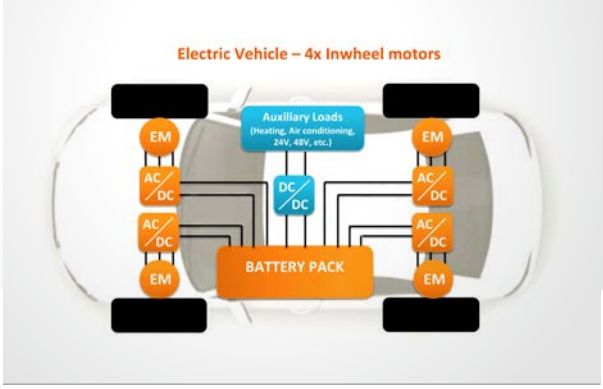
To cancel out the vibration caused by the first order (unbalance), DEWESoft® offers the balancing module. It is very easy to setup, just specify tacho sensor an accelerometer(s). It acts as a sequence: First record the actual status, then add a trial mass, last step is to add the calculated correction mass at the appropriate angle. Steps can be repeated if required. Depending on the rotating part, both single-plane and dual-plane balancing is supported. All results and the raw data are stored in the datafile.

E-mobility

ELECTRIC VEHICLE TESTING

The Power Analysis module allows measuring every kind of motor (1-12 phase) and inverter (DC-AC, AC-AC, switching frequencies up to some 100 kHz). The modular hardware system allows measuring the power (AC or DC) at multiple points perfectly synchronized. This unique feature allows comprehensive analysis for all types of electric drivetrains (single motor, motor and generator, 2-4x in-wheel-motors) considering also other loads (heating, air-conditioning, 24V, 12V, etc.). The high sampling rate and bandwidth of the DEWESoft® Power Analyser enable the measurement of wireless in-wheel motors. And thanks to the small physical size of the hardware, you can even use it to measure the efficiency of electric motorcycles and electric two-wheelers under real driving conditions.

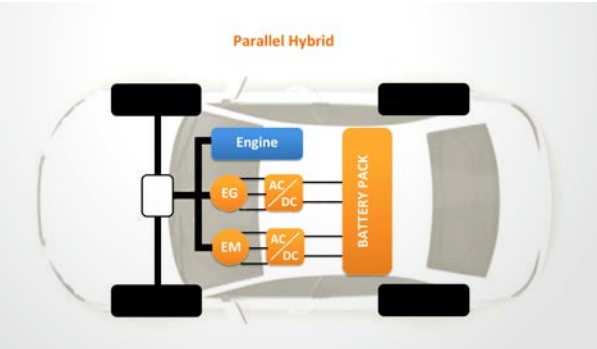


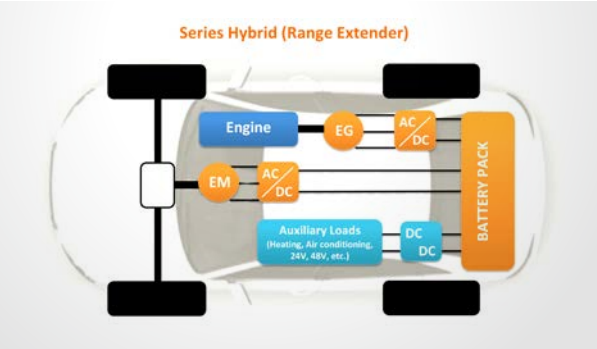


HYBRID TESTING: COMBINED POWER AND COMBUSTION ANALYSIS

The Combustion Analysis (CA) module allows detailed analysis of the combustion process. The analysis is perfectly synchronised to the power analysis. The DEWESoft® Combustion Analyser enables the user to display and compare measurement data using several different diagrams like, the pV-diagram (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. Additionally DEWESoft® provides a dedicated knocking detection and combustion noise algorithm. The basis for all of these calculations are precise angle position

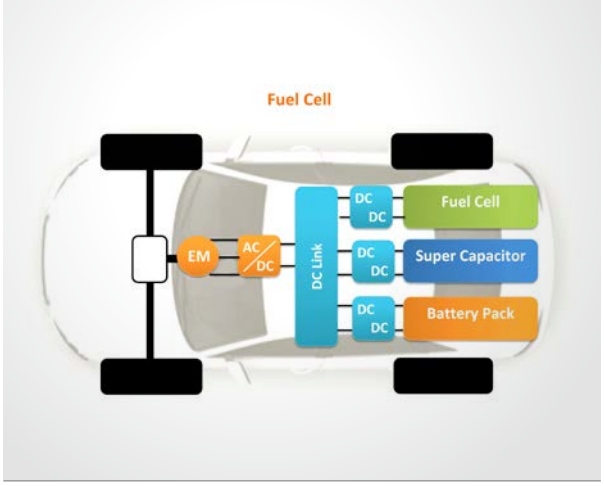
data and cylinder pressure measurement. DEWESoft® provides the perfect hardware for this: the galvanically isolated SIRIUSi charge inputs (with up to 24-bit resolution) are in perfect sync to the DEWESoft® Supercounters®. This allows perfect analysis of Hybrid cars already during driving.





HYDROGEN TESTING

The drivetrain of hydrogen cars differs from pure electric vehicles due to the energy storage. While pure electric vehicle use a battery as energy storage, hydrogen powered vehicle use hydrogen as energy storage which is converted to electric power via a fuel cell. The drivetrain also includes a so called super capacitor which stores power for short-time peak loads (up to 2000A) and a battery pack. Testing of hydrogen cars affords a couple of AC and DC power measurements (see picture). To determine the efficiency of hydrogen cars, we need additional measurements, like voltage, current and hydrogen flow.



BATTERY TESTING

The battery as central element in the electrical powertrain strongly affects performance and range of electric vehicles. Extensive tests are necessary: starting from the cell-characteristics up to the complete powertrain. Detailed analysis requires temperature and voltage measurement at multiple points (e.g. 50x cell voltage and 50x cell temperature). The flexible and scalable solution from DEWESoft® allows to measure more than 1000 channels from different sensors, perfectly synchronised.
The DEWESoft® Power Analyser system can be used for the development of batterys (efficiency analysis, cell characterisation, endurance tests, crash tests, short-circuit analysis, overheating / overloading tests, ageing tests, etc.) as well as for monitoring applications (data logging, transient recording, charge-discharge analysis, etc.).

CHARGING ANALYSIS

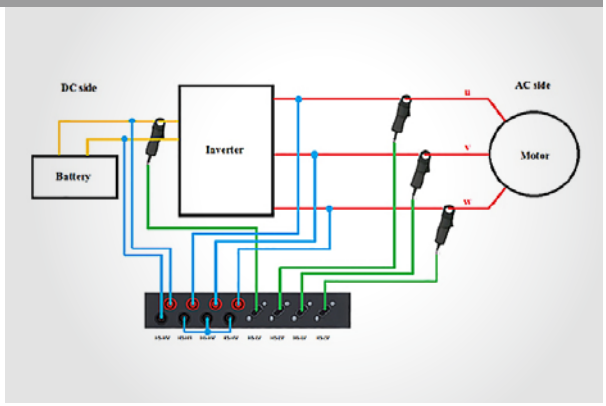
CONDUCTIVE AND INDUCTIVE CHARGING (WIRELESS POWER TRANSFER)

Charging analysis can be done for conductive charging (AC or DC) and as well for the increasingly popular inductive charging. The inductive charging process (also called wireless power transfer) affords high switching frequencies of the inverter (up to 150 kHz) to reach maximal efficiency of the power transfer. The high bandwidth (2 MHz), the high Sampling Rate (1 MS/s) and the possibility to measure AC and DC currents of the DEWESoft® Power Analyser fulfills all requirements for testing both, conductive and inductive charging.

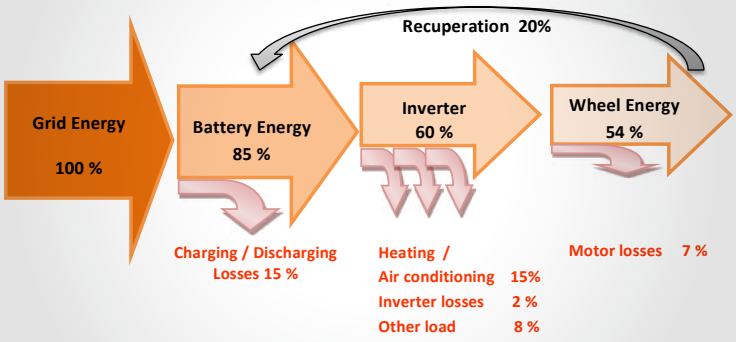
EXEMPLARY E-MOBILITY MEASUREMENT RESULTS

ONLINE ANALYSIS OF EFFICIENCY – RECUPERATION – ENERGY BALANCE

Standardised driving cycles (NEFZ, WMTC, etc.) are not suitable to measure the energy consumption of electric vehicles. They don't consider all aspects which influence the energy consumption of vehicles and are always done on roller test benches. The future of electric vehicle testing is analysing them under real-life conditions. The innovative solution of DEWESoft® allows doing all analysis already during measurement. The sophisticated math functions can calculate different parameters like efficiency, recuperation, etc. and the user-friendly and customisable software interface allows visualisation of all these parameters. The chart shows the exemplary energy flow of an electric vehicle.



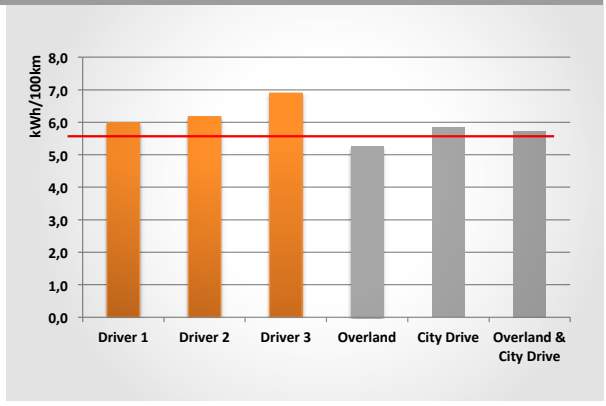
Some inverters of electric vehicles (e.g. bus) are working at different switching frequencies to increase the efficiency in different driving situations (city / overland drive). With the DEWESoft® Math library it is possible to filter out the currently used switching frequency and automatically do the analysis for different switching frequencies (using logical conditions).



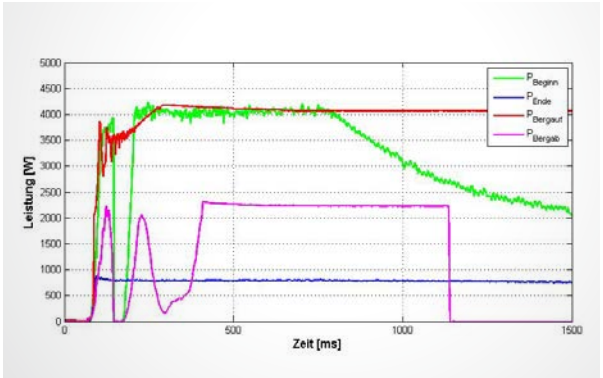
ANALYSING DIFFERENT DRIVING SITUATIONS

There are a lot of parameters which can influence the energy consumption of electric vehicles. These parameters can be ambient parameters like temperature, weather, quality of the road or different driving situations (uphill, downhill, city-, overland- or combined drives) or also different drivers. The DEWESoft® Power Analyser makes it possible to do energy analysis considering all of these parameters already during the test drives.

The first chart shows an example of the acceleration behavior of different test drivers on the same test-track (left) and the analysis at different driving situations (right). The acceleration behavior can influence the energy consumption of up to 10 %.



The second chart shows the acceleration of the scooter at different driving situations. The green chart is the acceleration with full-charged battery, the blue one when the battery was nearly empty, the red one for uphill and the magenta one for downhill driving.



CHARGING PROFILE, CHARGING TIME AND EFFICIENCY

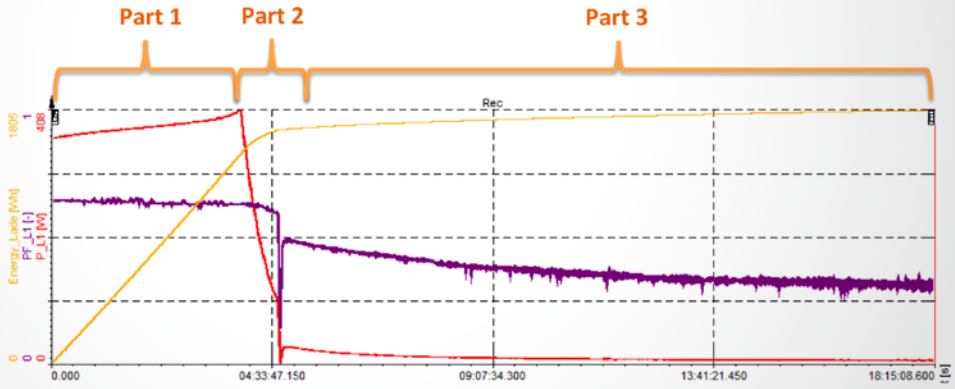
The data logging capability of the DEWESoft® Power Analyser allows recording the complete charging process.

Example Analysing Charging Profile (red = charging power, orange = energy, violet = power factor):

Charging Part 1: Continuous charging with high power. Within 4 hours 80% of the battery is charged.

Charging Part 2: Reaching of the charging end voltage and short interruption, 86% charged

Charging Part 3: Last charging part with low power. Within 14 hours battery is fully charged.

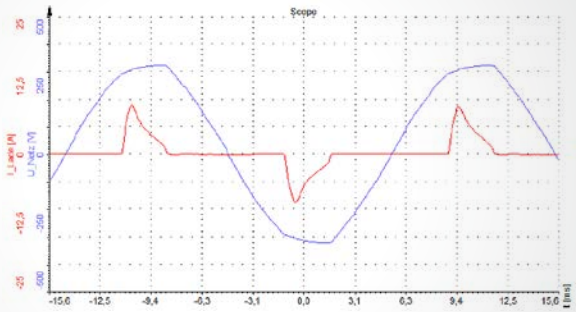


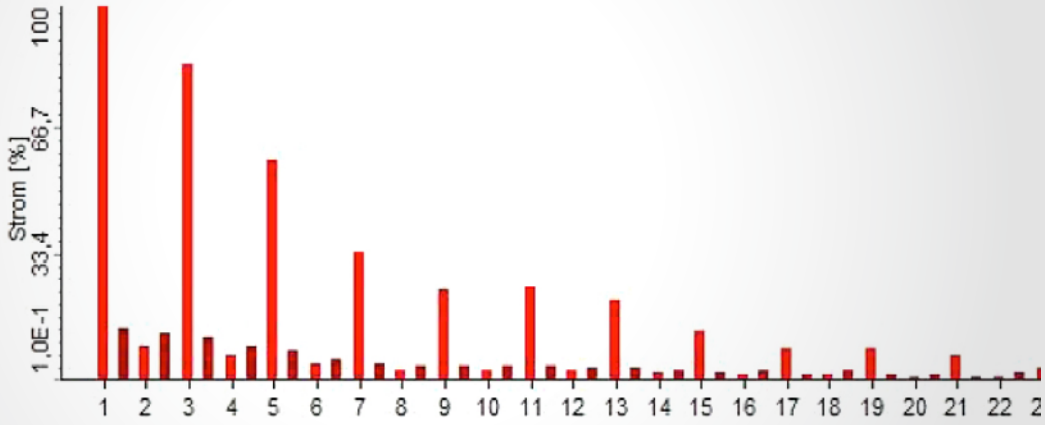
EMC TESTS OF CHARGING DEVICES ACCORDING TO IEC61000-3-2 AND IEC 61851

DEWESoft® supports EMC conformity tests of charging devices according to IEC 61000-3-2. The Power Quality Library automatically calculates all necessary parameters.

Instruments like the Harmonic FFT, the Harmonic table, Harmonic reference curve and the scope function ensure fast and reliable analysis.

Harmonic order	Frequency [Hz]	Current [A]	Current Limit [A]
1	50	1,82	-
3	150	1,42	2,3
5	250	0,95	1,14
7	350	0,58	0,77
9	450	0,45	0,4
11	550	0,44	0,33
13	650	0,36	0,21
15	750	0,22	0,15

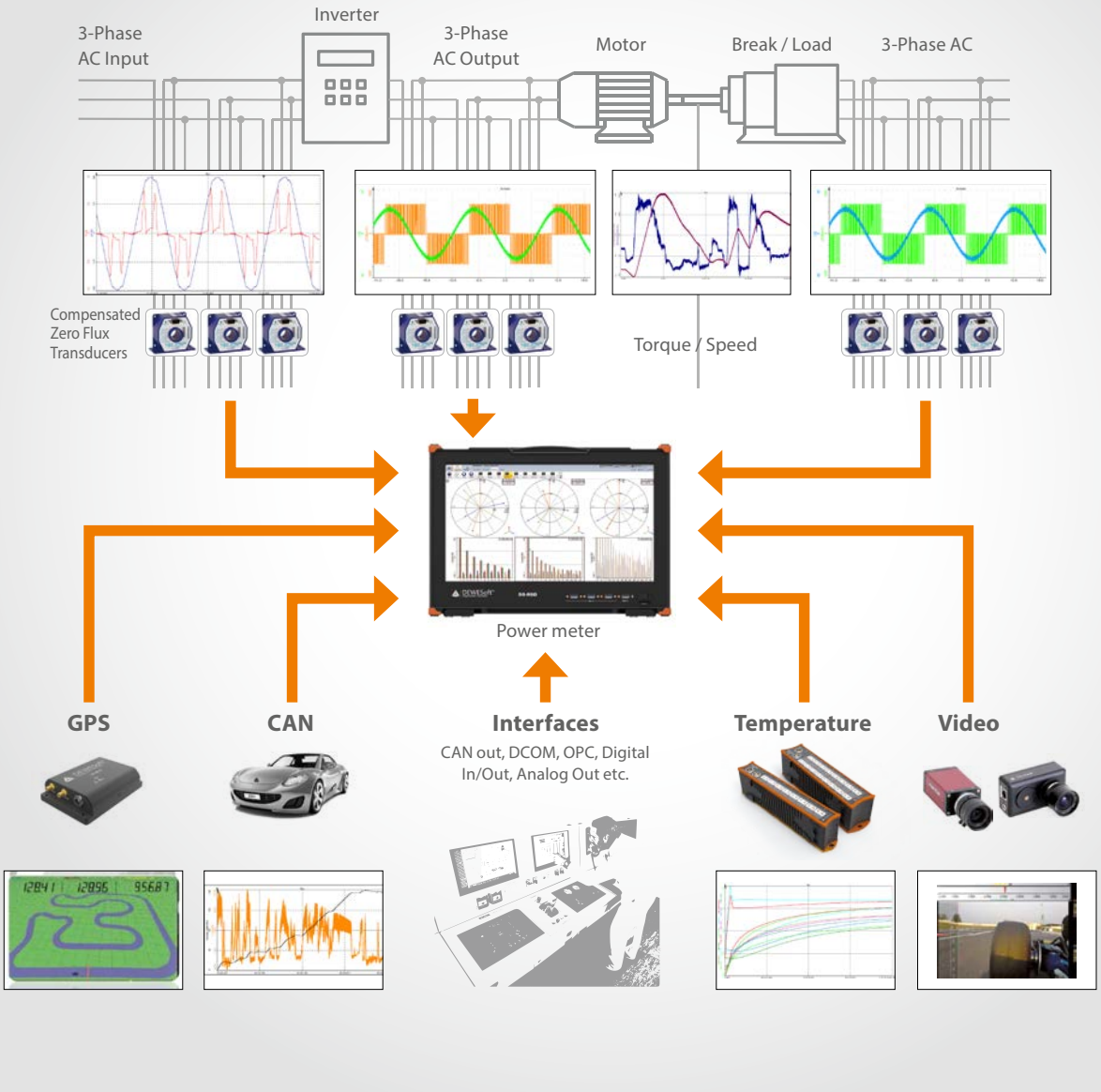




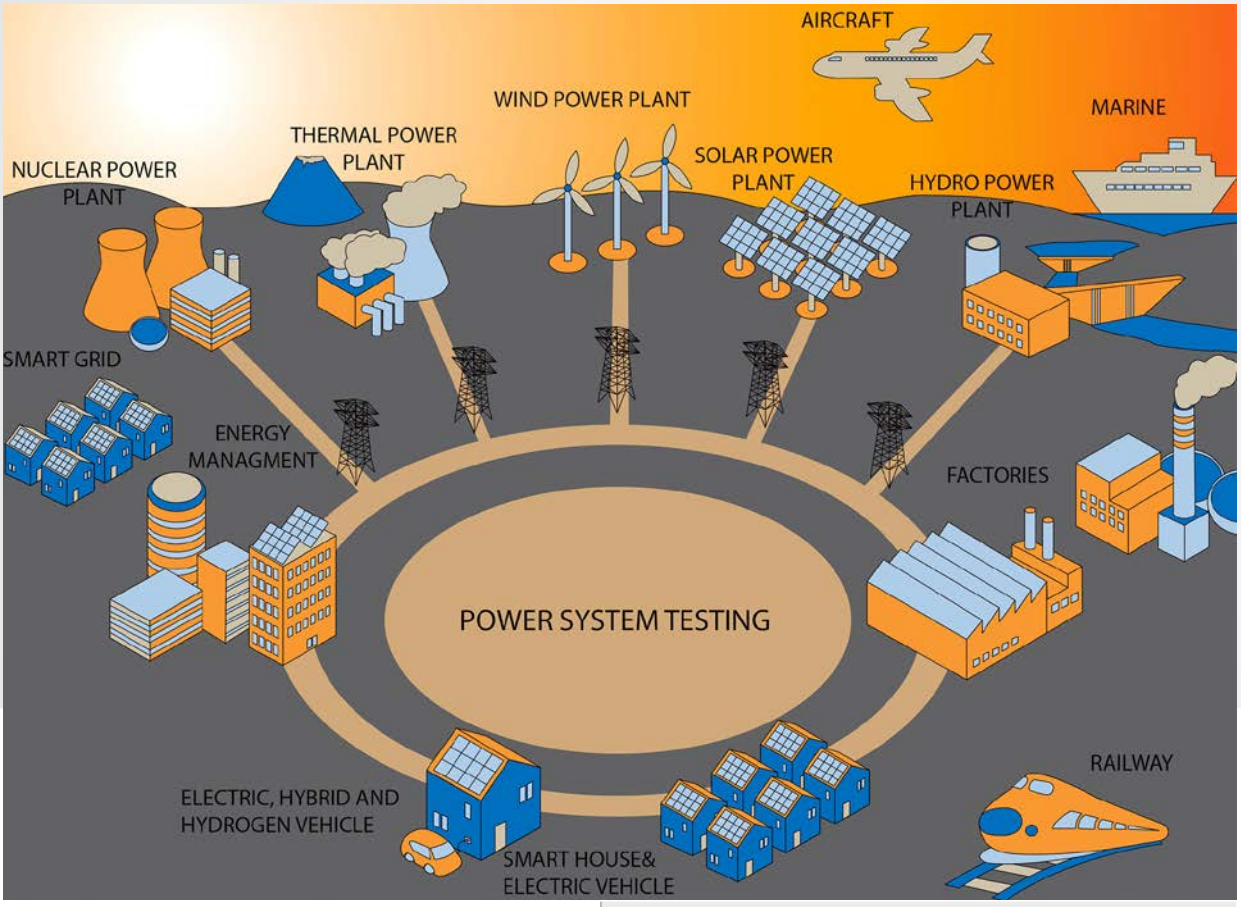
Additional Power Measurements Possibilities

Furthermore DEWESoft® system can be extended in the field of Power measurements with the same hardware and software it will be possible to cover nearly all applications. More details can be found in Power brochure.

Applications cover high-speed analysis of motors, inverters, transformers up to enhanced power quality analysis on renewable power plants or at the grid. Due to the flexible hardware design it´s even possible to simultaneous analyse the whole power system of aircrafts, railway or ships. ***More details can be found in the Power brochure:***



POWER QUALITY ANALYSIS & POWER SYSTEM TESTING



POWER GRID	*Fault & Transient Recording* *Power Quality Analysis (IEEE 1159, EN50160)*
TRANSFORMER	*Efficiency Analysis (IEC 60076-1)* *No-load and short circuit testing* *Vibration, Noise (see Dynamic Signal Analysis brochure)*
WIND, SOLAR AND CHP	*Power Performance (IEC 61400-12)* *Power Quality (IEC 61400-21 / FGW-TR3)* *Active & Reactive Power (FGW-TR3)* *Behavior at faults (FGW-TR3)*
NUCLEAR POWER PLANT	*Turbine & Generator* *Testing Rod Drop Testing* *Castor Testing*
TURBINE & GENERATOR	*Modal Analysis (see Dynamic Signal Analysis brochure)* *Order Tracking (see Dynamic Signal Analysis brochure)* *Balancing (see Dynamic Signal Analysis brochure)* *Rotational Vibration (see Dynamic Signal Analysis brochure)* *Efficiency Measurement*
SMART GRID & ENERGY MANAGEMENT	*Power System testing* *Load profile* *Demand Side Management*
AIRCRAFT	*Power System Testing* *Fault & Transient Recording* *Hybrid Testing (Combustion & Power)* *Harmonic Analysis*
MARINE	*Power System Testing* *Fault & Transient Recording* *Hybrid Testing (Combustion & Power)*
RAILWAY	*Power System Testing (AC & DC rails)* *Power Quality Analysis* *Fault & Transient Recording* *Short-Circuit Analysis* *Pantograph & Current Shoe Testing*
E-MOBILITY	*Electric Two Wheeler* *Electric Vehicle* *Hybrid Vehicle (series and parallel)* *Hydrogen Vehicle*
EQUIPMENT TESTING	*Fans and pumps testing* *Circuit Breaker testing* *Filter analysis* *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) and a lot more*

Extreme environment testing

FEATURES

- *DEWESoft® products can withstand extreme and harsh environments*
- *Temperature range -40°C to 85°C*
- *IP 67 rated devices to work even underwater*
- *Up to 200 kHz update rate*
- *Vibration strength > 100 g*
- *Shock-proof > 2000 g*
- *Certain products with extremely low power consumption ideal for air-conditioning testing*
- *Possibility of distributed measurement*
- *Easy to configure and fast installation process*
- *Universal type of thermocouples can be connected*
- *Additional GPS module*

KRYPTON and SIRIUS® waterproof instruments were specially developed for use in extreme and harsh environments. This product line can withstand wide temperature range down to -40°C and up to 85°C and are totally sealed, with IP 67 environmental rating. This means they are resistant to humidity, water, dust and also due to rubber inside the unit those products are high shock and vibration rated. The unique features of those units is also distributed measurement, so the device can be placed next to the sensors and is daisy chained only with a single cable, to the next device.

APPLICATIONS

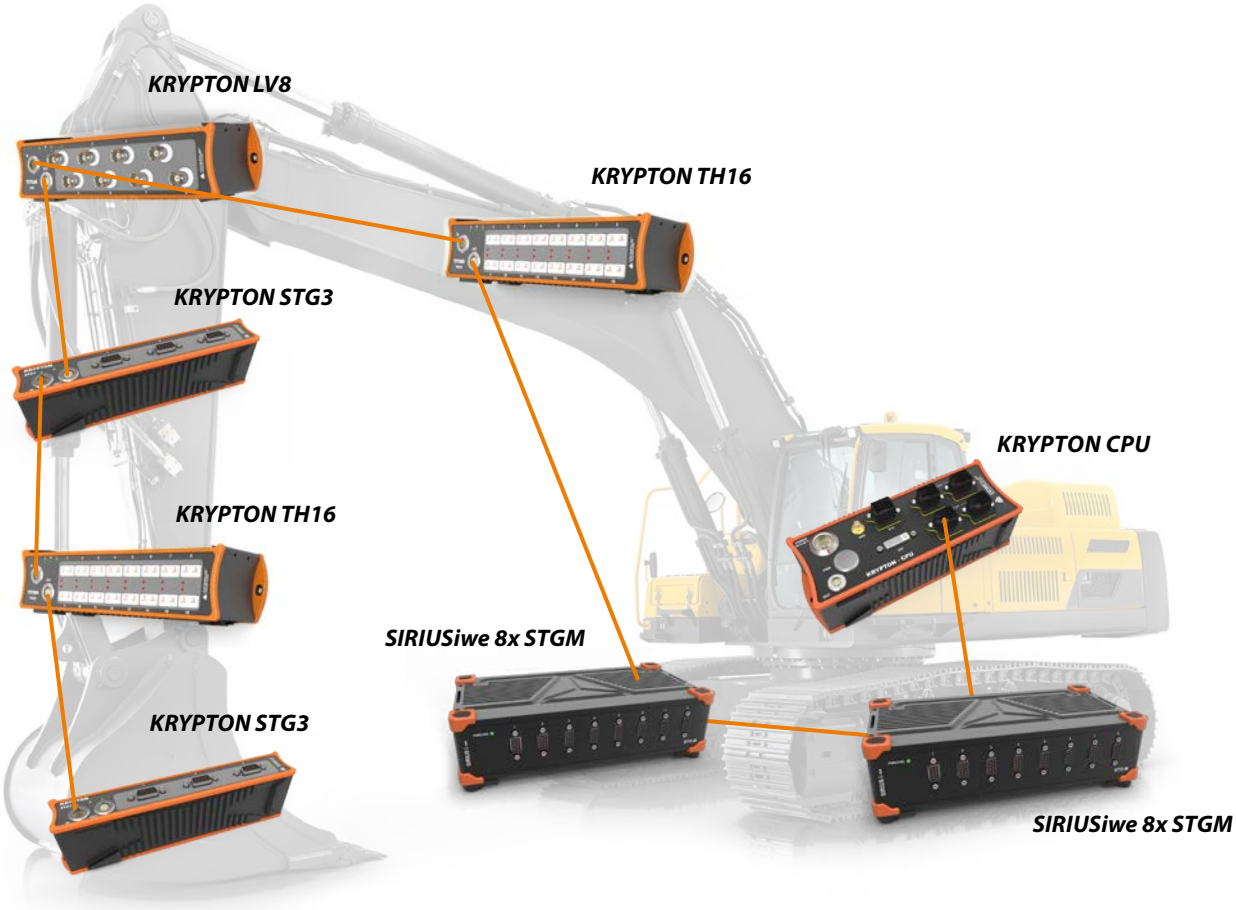
- *Air-conditioning testing*
- *Off-road vehicles, construction, agriculture machines testing*
- *Climate chambers and outdoor climate tests*
- *Structural monitoring*

ENVIRONMENTAL TESTS

New DEWESoft® products (KRYPTON and SIRIUSiwe) were designed for harsh and difficult environment. Those instruments can be either used inside in environmental chambers for climate testing and also outside at real climate testing.

COMPONENT AND MATERIAL PERFORMANCE ASSESMENT

DEWESoft® instruments have high performance and reliability due to high vibration resistance, extreme shock-proof and IP67 rating (dust, water and humidity resistance). With EtherCAT communication topology it's possible to distribute them over large areas, to shorten sensor cable length.



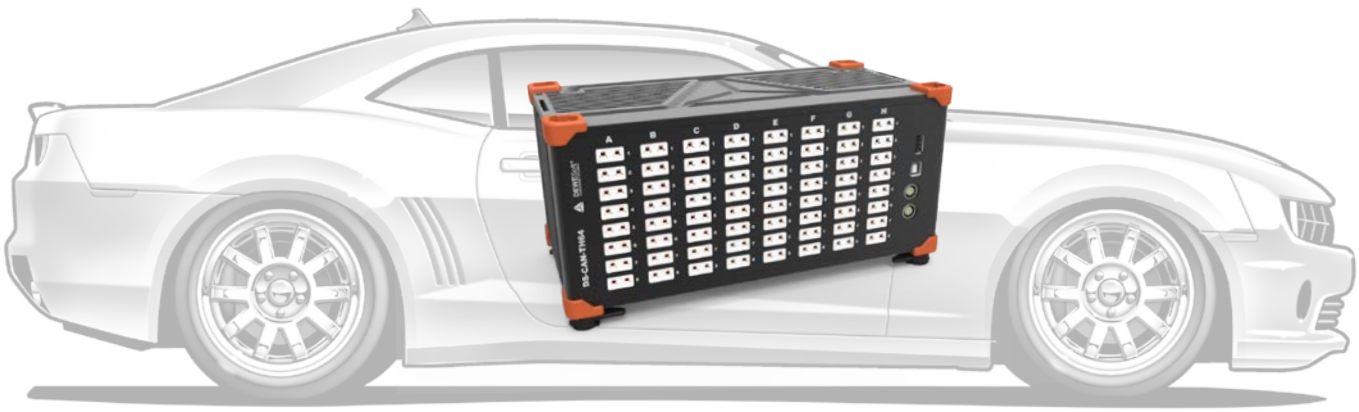
HEATING AND AIR-CONDITIONING TESTING

KRYPTON and DS-CAN-LOG have a small compact shape and can be stacked up to hundreds of channels. Therefore those instruments are suitable for heating and air-conditioning testing. Specially DS-CAN-LOG, which has extremely low power consumption and can run Standalone for several hours. It also has CAN interface for other HW and SW connectivity.

WINDSCREEN/WINDOW DEFROST/DEMIST TESTING

Both KRYPTON and DS-CAN-LOG can withstand wide temperatures, ranging from -40°C up to 85°C. Therefore those instruments can also be used in windscreen, window defrost and demist testing. Both instruments can have different amplifiers / inputs: strain gauge, low voltage and thermocouples.

DS-CAN-LOG TH64

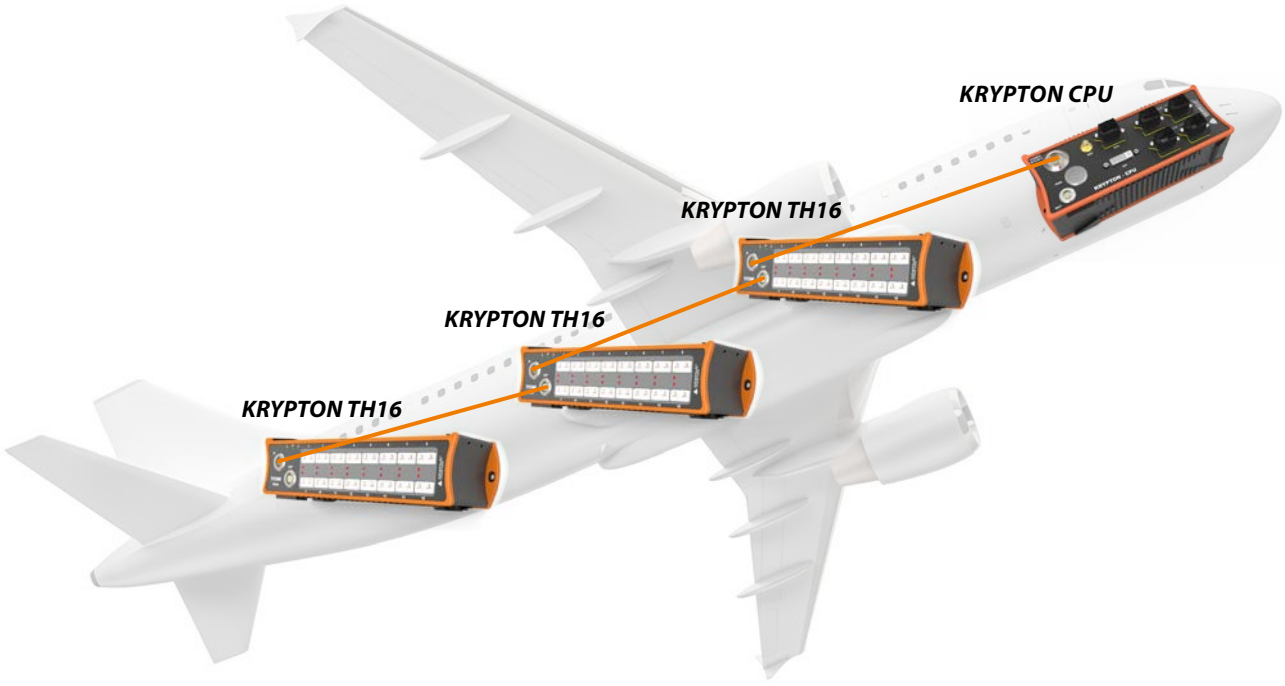


WINTER VEHICLE TESTING

Due to ruggedness and wide operating temperature range DEWESoft® systems are perfect for all kinds of winter tests. Tire and powertrain performance, snow-ingestion, fuel system, power steering system, antilock brake, cold-start testing and many more tests can be performed with a single flexible DEWESoft® system. With new DS-IMU products it's also possible to perform tests in the area of dynamic driving and lateral traction, dynamic peak and slide braking, ABS braking, handling and stability, acceleration and traction control system tests, ...

CLIMATE COMFORT TESTING IN OTHER VEHICLES

All DEWESoft® systems can be used also in other kinds of "vehicles": e.g. in aerospace, railway applications, heavy industry, ... The distributed nature of EtherCAT makes KRYPTON the perfect devices for distributed measurement: e.g. for climate comfort testing in airplane, where sensors are distributed over the cabin and many other applications.



Specifications

SIRIUS®

- *Fast data recorder*
- *High dynamic range up to 160 dB*
  20 times better than 24 bit systems
- *Isolated input amplifiers for any sensor/signal*
- *Analogue output, function generator or file replay*
- *Including DEWESoft® X next generation DAQ software*

STANDARD SLICE – SELECTION GUIDE

		DUALCOREADC® (high dynamic 2*24 bit 160 dB)				High Speed (1 MS/s 16 bit)	
				Fanless			
Isolation	Connectors	Isolated	Differential	Isolated	Differential	Isolated	Differential
Modular version		SIRIUS*i*	SIRIUS	SIRIUS*if*	SIRIUS*f*	SIRIUS*i*-HS	SIRIUS-HS
Rack version		SIRIUS*ir*	SIRIUS*r*	-	-	SIRIUS*ir*-HS	SIRIUS*r*-HS
EtherCAT® vers.		SIRIUS*ie*	SIRIUS*e*	-	-	-	-
IEPE							
4xACC	BNC				USB		
3xACC, 1xACC+	BNC + Lemo				USB		
8xACC	BNC	EtherCAT + USB	EtherCAT + USB	EtherCAT + USB	EtherCAT + USB	USB	USB
6xACC, 2xACC+	BNC + Lemo	EtherCAT + USB	EtherCAT + USB	EtherCAT + USB	EtherCAT + USB	USB	USB
HD 16xACC	BNC	EtherCAT + USB	EtherCAT + USB		EtherCAT + USB		
CHARGE							
8xCHG	BNC	EtherCAT + USB	EtherCAT + USB			USB	USB
6xCHG, 2xCHG+	BNC + Lemo	EtherCAT + USB	EtherCAT + USB [2]			USB	USB [2]
VOLTAGE							
8xHV	Banana	EtherCAT + USB		EtherCAT + USB		USB	
4xHV, 4xLV	Banana+DSUB/Banana	EtherCAT + USB				USB	
6xHV, 2xLV+	Banana+DSUB/Banana	EtherCAT + USB				USB	
8xLV	DSUB/BNC/Banana	EtherCAT + USB	EtherCAT + USB	USB [4]	USB [4]	USB	USB
8xLV+	DSUB/BNC/Banana+Lemo	EtherCAT + USB	EtherCAT + USB	USB [4]	USB [4]	USB	USB [2]
HD 16xLV	DSUB/BNC	EtherCAT + USB	EtherCAT + USB	USB (BNC only)	USB (BNC only)		
MULTI							
8xMULTI	DSUB	EtherCAT + USB	EtherCAT + USB				
4xACC+-4xSTGM	DSUB+BNC+Lemo			USB			
STRAIN GAGE							
8xSTG	DSUB/Lemo	EtherCAT + USB	EtherCAT + USB			USB	USB
6xSTG, 2xSTG+	DSUB+Lemo	USB					
8xSTG+	DSUB/Lemo+Lemo	EtherCAT + USB	EtherCAT + USB			USB [2]	USB [2]
8xSTGM	DSUB	EtherCAT + USB	EtherCAT + USB	USB	USB		
8xSTGM+	DSUB+Lemo	EtherCAT + USB [2]	EtherCAT + USB [2]	USB	USB		
8xSTGM-DB	DSUB	EtherCAT + USB [2]	EtherCAT + USB [2]				
HD 16xSTGS	DSUB/Lemo	EtherCAT + USB	EtherCAT + USB				
CAN-BUS							
4xCAN	DSUB	USB [1]		USB			
8xCAN	DSUB	EtherCAT + USB [1]		USB			
CUSTOMIZED							
Custom	DSUB/BNC/Banana/Lemo	EtherCAT + USB	EtherCAT + USB			USB	USB
ANALOG OUT							
AO8 option	BNC	USB [3]	USB [3]			USB [3]	USB [3]

1) for Rack: SIRIUSir-9xCAN instead of 8xCAN
2) not available for Rack version
also not available for Racks: 8xSTG-L2B10f, 8xSTG-L2B7f and 8xSTG+-L2B10f
3) for all 8xCAN versions and SIRIUSir-9xCAN and EtherCAT versions there is no AO8 option available
4) Fanless operation only for BNC or Banana version (without excitation)
5) Analog output option will only work with DEWESoft® X function generator option, file replay and control channel. Signal conditioning mode is not supported with SIRIUS High Densitiy.

HIGH DYNAMIC: DUALCOREADC® with 2x24 Bit

SIRIUS® analog input modules types	SIRIUS-ACC	SIRIUS-CHG	SIRIUS-HV	SIRIUS-LV	SIRIUS-MULTI	SIRIUS-STG	SIRIUS-STGM
version with additional counter / DIO	SIRIUS-ACC+	SIRIUS-CHG+	–	SIRIUS-LV+	SIRIUS-MULTI	SIRIUS-STG+	SIRIUS-STGM+ SIRIUS-STGM-DB
Isolated version i	✓	✓	✓	✓	✓	✓	✓
Differential version	✓	✓	–	✓	✓	✓	✓
Rack version r [1]	✓	✓	✓	✓	✓	✓	✓
Fanless version f	✓	–	✓	✓ [5]	–	–	✓
Analog inputs1)							
Analog inputs per module	1	1	1	1	1	1	1
Data Rate / Channel [Hz]	200 k	200 k	200 k	200 k	200 k	200 k	200 k
Vertical Resolution	2 * 24 Bit	2 * 24 Bit	2 * 24 Bit	2 * 24 Bit	2 * 24 Bit	2 * 24 Bit	2 * 24 Bit
Bandwidth	75 kHz	75 kHz	75 kHz	75 kHz	75 kHz	75 kHz	75 kHz
Voltage	±10 V, ±500 mV	±10 V, ±500 mV	±1200 V, ±50 V	±200 V to ±100 mV	±10 V to ±50 mV	±50 V to ±100 mV	±10 V to ±10 mV
Input coupling	DC, AC 1 Hz (3,10 Hz SW)	DC, AC 0.1 Hz, 1 Hz, 10 Hz or 100 Hz	DC	DC, AC 1 Hz (3,10 Hz SW)	DC	DC, AC 1 Hz (3,10 Hz SW)	DC
Sensor Excitation	-	-	-	2..30 V bipolar 0..24 V unipol. max. 0.2 A/2 W	0 .. 12 V, max. 44 mA 12 V, 5 V	0 .. 20 V max. 0.1A/0.8W, 0 .. 60 mA	0 .. 12 V, max. 44mA
Bridge connection (internal completion)	-	-	-	Full	Full, Half, ¼ 120/350 Ω 3-wire	Full, Half, ¼ 120/350 Ω 3 or 4-wire	Full, Half, ¼ 120/350 Ω 3-wire
Programmable Shunt (default Values)	-	-	-	-	59.88 kΩ	59.88 kΩ, 175 kΩ bipolar	100 kΩ, bipolar
IEPE/ICP Sensors	4 or 8 mA	4, 8 or 12mA	-	DSI®	DSI®	DSI®	DSI®
Resistance	-	-	-	DSI®	DSI®	✓	DSI®
Temp. (PT100 to PT2000)	-	-	-	DSI®	DSI®	✓	DSI®
Temp. (Thermocouple)	-	-	-	DSI®	DSI®	DSI®	DSI®
Potentiometer	-	-	-	-	✓	✓	✓
LVDT	-	-	-	DSI®	DSI®	DSI®	DSI®
Charge	-	100.000 pC, 10.000 pC	-	DSI®	DSI®	DSI®	DSI®
Current	ext. Shunt	ext. Shunt	-	ext. Shunt	ext. Shunt	ext. Shunt	ext. Shunt
TEDS interface	✓	✓	-	✓	✓	✓	✓
Advanced functions	Sens. error detection, high dynamic range	Sensor error detection in IEPE and charge mode (injection)	High Voltage High Isolation	High sensor power and multi range	Analog and digital inputs, analog out	Supports all strain types and high input range	Low power, Sensor and Amplifier balance, Bipolar shunt
Analog input connectors							
Connector type (Default)	BNC	BNC	Banana	DB9, BNC, Banana	DB15, L2B16f	DB9, L2B7f, L2B10f	DB9, L2B8f, L2B16f
Digital types (version with addtional counter/digital input)							
Counter (connector)	1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	1 ch(DB15)	1 ch(L1B7f) 1ch(L2B10f)[6]	1 ch(L1B7f)
Digital Input (connector)	3 ch(L1B7f)	3 ch(L1B7f)	-			3 ch(L1B7f) 1ch(L2B10f)[6]	3 ch(L1B7f)
Digital Output (connector)	1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	-	1 ch(L1B7f) 1ch(L2B10f)[6]	1 ch(L1B7f)
Additional information							
Isolation voltage [2]	1000 V	1000 V	CAT II 1000V	1000V	1000 V	1000 V	1000 V
Power consumption (max.) [4]	8 W (15 W)	10 W (18 W)	8 W	10 W (25 W)	15 W (25 W)	15 W (25 W)	11 W (20 W)

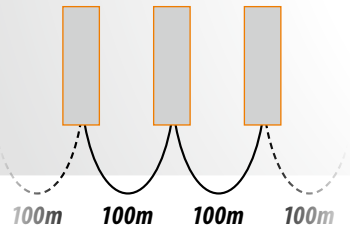
HIGH DENSITY: 24 Bit, 16 channels per slice			HIGH SPEED: 16 Bit with high bandwidth				
SIRIUS-HD-ACC	SIRIUS-HD-LV	SIRIUS-HD-STGS	SIRIUS-HS-ACC	SIRIUS-HS-CHG	SIRIUS-HS-HV	SIRIUS-HS-LV	SIRIUS-HS-STG
–	–	–	SIRIUS-HS-ACC+	SIRIUS-HS-CHG+	–	SIRIUS-HS-LV+	SIRIUS-HS-STG+
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	-	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
-	-	-	-	-	✓	✓ 5)	-
2	2	2	1	1	1	1	1
200 k	200 k	200 k	1 M	1 M	1 M	1 M	1 M
24 Bit	24 Bit	24 Bit	16 Bit	16 Bit	16 Bit	16 Bit	16 Bit
75 kHz	75 kHz	75 kHz	500 kHz	500 kHz	2 MHz	1 MHz	1 MHz
±10 V to ±200 mV	±100 V to ±100 mV	±10 V to ±10 mV	±10 V to ±200 mV	±10 V to ±200 mV	±1600 V to ±20 V	±100 V to ±50 mV	±50 V to ±20 mV
DC, AC 0.1 Hz, 1 Hz, (3, 10 Hz SW)	DC	DC	DC, AC 1 Hz (3,10 Hz SW)	DC, AC 0.1 Hz, 1 Hz, 10 Hz or 100 Hz	DC	DC, AC 1 Hz (3,10 Hz SW)	DC, AC 1 Hz (3,10 Hz SW)
-	2..30 V bipolar 0..24 V unipol. max.0.2 A/2 W	0 .. 12 V, max. 44 mA	-	-	-	2..30V bipolar 0..24V unipol. max. 0.2 A/2 W	0 .. 20 V max. 0.1 A/0.8 W, 0 .. 60 mA
-	Full	Full, Half, ¼ 120/350 Ω 3 wire	-	-	-	Full	Full, Half, ¼ 120/350 Ω 3 or 4-wire
-	-	100 kΩ	-	-	-	-	59.88kΩ, 175kΩ, bipol.
4, 8 or 12 mA	DSI®	DSI®	4 or 8 mA	4, 8 or 12 mA	-	DSI®	DSI®
-	DSI®	DSI®	-	-	-	DSI®	✓
-	DSI®	DSI®	-	-	-	DSI®	✓
-	DSI®	DSI®	-	-	-	DSI®	DSI®
-	-	✓	-	-	-	-	✓
-	DSI®	DSI®	-	-	-	DSI®	DSI®
-	DSI®	DSI®	-	100.000 pC to 1000 pC	-	DSI®	DSI®
ext. Shunt	ext. Shunt	ext. Shunt	ext. Shunt	ext. Shunt	-	ext. Shunt	ext. Shunt
✓	✓	✓	✓	✓	-	✓	✓
Sensor error detection	Low power, high input range, high sensor supply	Low power, Sensor and Amplifier balance	High speed, Sens. error detection,	Sensor error detection in IEPE and charge mode (injection)	High Voltage High Bandwidth	High sensor power and multi range	High speed, Support all strain types and high input range
BNC	DB9, BNC	DB9, L1B10f	BNC	BNC	Banana	DB9, BNC, Banana	DB9
-	-	-	1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	1 ch(L1B7f)
-	-	-	3 ch(L1B7f)	3 ch(L1B7f)	-	3 ch(L1B7f)	3 ch(L1B7f)
-	-	-	1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	1 ch(L1B7f)
1000 V	500 V	500 V	1000 V	1000 V	CAT II 1000V	1000 V	1000 V
11 W (22 W)	11 W (22 W)	11 W (22 W)	15W (22 W)	10 W (18 W)	8 W	10 W (25 W)	15 W (25 W)

1) Rack version modules not available with extended height (eg. STG+).
2) Analog input types: Pinout of input connector may limit functionality. Please refer to detailed specification below.
DSI®-Option requires DB9 connector on the module or adapter connector or cable.
3) applies only for isolated SIRIUS® version
4) One complete slice with same modules
5) Fanless operation only for BNC or Banana version (without excitation)
6) One digital I/O per amplifier with Lemo 2B10f connector

KRYPTON™ the Ethercat modules

THE INDUSTRIAL DISTRIBUTED INSTRUMENTS:

- *Ethercat technology*
- *Up to 100 m module to module*
- *IP67 dust and water proof*
- *Operating temperature -40 . . . 85 °C*
- *Fast and slow sampling rates*
- *Perfect synchronisation when combined with other DEWESoft® hardware*
- *Based on DEWESoft® amplifier technology*



ETHERCAT ADVANTAGES

- *Fully compatible with ETHERNET hardware*
- *Power supply, data lines and hardware synchronisation in ONE cable*

DEWESoft® USER ADVANTAGE

- *Easy plug and play hardware recognition*
- ***NO IP address search***
- *ONE USER INTERFACE for all DEWESoft® hardware*

	KRYPTON 8x TH, 16x TH	KRYPTON 4x LV, 8x LV	KRYPTON 3xSTG, 6xSTG
Input channels	8 (16) isolated universal thermocouple and voltage	4 or 8 isolated voltage	3 (6) differential voltage or strain
Input signals	TC types: K, J, T, R, S, N, E, C, U, B / Voltage: 1V and 100mV	+/- 100V	Voltage: 10V; 1V, 100mV or 10 mV; Strain: 2 .. 1000mV/V programmable; 1/1; 1/2 and 1/4 Bridge; Excitation: 1 .. 15Volt programmable, max. 0.4 Watt/channel
Input connector	mini Thermocouple connector (cooper)	BNC	DSUB 9pin
Sampling rate	Maximum 100 Hz per channel (software selectable)	10 kHz per channel (software selectable)	Maximum 20 kHz per channel (software selectable)
ADC type	24 bit sigma delta	24 bit sigma delta	24 bit sigma delta
Input impedance	>100 MΩ	1 MΩ	10 MΩ
Isolation voltage peak	1000 V channel/ground & channel/channel	1000 V channel/ground & channel/channel	-
Resolution	<0.001 deg. C	0.01 mV	-
Accuracy	TC: ±0.02% of reading ±0.5 °C ±10µV Voltage: ±0.02% of reading ±10µV	±0.03% ±5mV	±0.03% of reading ±0.02% of range ±0.1mV
Gain drift over temperature	typ. 3ppm/K (max. 10 ppm/K)	typ. 10ppm/K (max. 20 ppm)	typ. 10ppm/K (max. 40 ppm/K)
Offset drift over temperature	0.03µV/K	10µV/K	typical 0.3 µV/K + 5 ppm of range/K
Noise	0.25µVrms (=0.007°Crms@Type K)@10 S/s 0.7µVrms (=0.02°Crms@Type K)@100 S/s	0.7 mVrms	up to 100 dB
Interface	LEMO 1B Ethercat cable (single cable connection power + sync + data)	LEMO 1B Ethercat cable (single cable connection power + sync + data)	LEMO 1B Ethercat cable (single cable connection power + sync + data)
Data rate	100 Mbit bus speed	100 Mbit bus speed	100 Mbit bus speed
Power supply voltage	6 to 50 V DC	6 to 50 V DC	6 to 50 V DC
Power consumption	3 Watt (8xTH), 4 Watt (16xTH)	2.5 Watt (4xLV), 3 Watt (8xLV)	3.5 Watt (3xSTG), 5 Watt (6xSTG)
Dimensions	200x50x30 mm (8xTH) / 200x50x45 mm (16xTH)	200x50x30 mm (4xLV) / 200x50x45 mm (8xLV)	200x50x30 mm (3xSTG) 200x50x45 mm (6xSTG)
Weight	Typically 650 g (8xTH) / Typically 900 g (16xTH)	Typically 650 g (4xLV) / Typically 900 g (8xLV)	Typically 650 g (8xTH) Typically 900 g (16xTH)
Environmental rating	IP67	IP67	IP67
Shock & Vibration Rating	> 100 g	> 100 g	> 100 g
Temperature range	-40 … 85 deg. C	-40 … 85 deg. C	-40 … 85 deg. C
Supported Software & Hardware Platforms	Software: DEWESoft® X2 / Hardware: KRYPTON modules perfect sync to all DEWESoft® Hardware	Software: DEWESoft® X2 / Hardware: KRYPTON modules perfect sync to all DEWESoft® Hardware	Software: DEWESoft® X2 Hardware: KRYPTON modules synchro-nize with all DEWESoft® Hardware

DEWE-43A

MUST HAVE FOR EVERY ENGINEER

8 ANALOGUE INPUTS

- *Multi-sensor input for Voltage, Bridge, IEPE, Temperature, Charge*
- *Simultaneous sampling*
- *200 kHz/channel*
- *24 bit, alias-free*
- *10 V, 1 V, 100 mV, 10 mV ranges (200 V with DSI® adapter)*
- *± 5 V, 12 V sensor supply*
- *Isolated power supply as standard*

8 COUNTER INPUTS 24 DIGITAL INPUTS

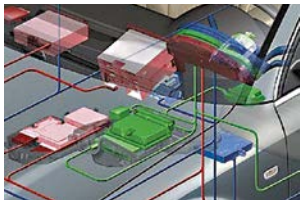
- *Counting, Waveform timing, Encoder, Tacho and Geartooth sensors*
- *Digital inputs*
- *Fully synchronized with analogue data*

2 CAN BUS PORTS

- *optical isolation*
- *Vehicle CAN, OBDII, J1939*
- *CAN sensors support*
- *CAN 2.0b up to 1 MBit/sec*

DEWESoft®

- *DEWESoft® X included*
- *Synchronous data acquisition of different sources*



DS-IMU & DS-GYRO1

THE NEXT GENERATION OF HIGH PERFORMANCE AHRS UNITS

	DS-IMU1	DS-IMU2	DS-GYRO1
NAVIGATION			
Horizontal position accuracy GPS / DGNSS/ OMNISTAR/ RTK	2.0 / 0.6 / - / - m	1.2 / 0.6 / 0.1 / 0.01m	-
Vertical position accuracy GPS / DGNSS/ OMNISTAR/ RTK	3.0 / 1.0 / - / - m	2.0 / 1.0 / 0.2 / 0.02 m	-
Velocity accuracy	0.05 m/s	0.007 m/s	-
Roll & Pitch accuracy (dynamic)	0.2 °	0.15 °	0.6 °
Heading accuracy (dynamic with GNSS)	0.2 °	0.1 °	w/o GNSS -1 °
Slip angle accuracy	0.3 °	0.2 °	-
Range	Unlimited	Unlimited	Unlimited
Hot start time	500 ms	500 ms	500 ms
Output data rate	100 Hz	500 Hz	up to 500 Hz
GNSS			
Supported navigation systems	GPS L1, GLONASS L1, GALILEO E1, COMPASS L1	GPS L1, L2, L5 , GLONASS L1, L2, GALILEO E1, E5, BeiDou B1. B2	-
Supported SBAS systems	WASS, EGNOS, MSAS, GAGAN, QZSS	WASS, EGNOS, MSAS, GAGAN, QZSS, OMNISTAR HP/XP/G2	-
ADDITIONAL FEATURES			
PPS output	✓	✓	✓
RTK	–	✓	-
Static heding (dual antenna)	–	✓	-
HARDWARE			
Interface	USB	USB	USB
Operating voltage	5 to 36 V	5 to 36 V	4 to 36 V
Power consumption	100 mA @ 5 V	220 mA @ 12 V	65 mA @ 5 V (typical)
Operating temperatures	-40 °C to 85 °C	-40 °C to 85 °C	-40 °C to 85 °C
Environmental protection	IP 67, MIL-STD-810G	IP 67, MIL-STD-810G	IP 68, MIL-STD-810G
Input protection	–	–	± 40 V
Shock limit	–	–	2000 g
Dimensions	30x40.6x24 mm	90x127x31 mm	30x40.6x24 mm
Weight	25 g	304 g	25 g
APPLICATIONS			
General Vehicle Dynamics	✓	✓	–
Brake Test	✓	✓	–
Acceleration Test	✓	✓	–
Lane change	✓	✓	–
Circle drive	✓	✓	–
Chassis development	✓	✓	–
Assistent systems	✓	✓	–
Comfort testing	✓	✓	–
Validation	✓	✓	–
ADAS	–	✓	–
Pass by Noise	–	✓	–
FUSI	–	✓	–
RTK positioning	–	✓	–
Orientation of different vehicles	✓	✓	✓
Acceleration of different vehicles	✓	✓	✓

INERTIAL SENSORS	Accelero-meter	Gyroscope	Magneto-meter	Pressure	Accelero-meter	Gyroscope	Magneto-meter
Range (dynamic)	2g, 4g, 16g	250 °/s, 500 °/s, 2000 °/s	2g, 4g, 8g	10 to 120 kPa	2g, 4g, 16g	250 °/s, 500 °/s, 2000 °/s	2g, 4g, 16g
Noise density	400 µg/√Hz	0.009 °/s/√Hz	210 µg/√Hz	0.56 Pa/√Hz	400 µg/√Hz	0.005 °/s/√Hz	210 µg/√Hz
Non-linearity	< 0.05 %	< 0.05 %	< 0.05 %	-	< 0.05 %	< 0.05 %	< 0.05 %
Bias stability	20 µg	4 °/hr	-	100 Pa/yr	60 µg	3 °/hr	-
Scale factor stability	< 0.05 %	< 0.05 %	< 0.05 %	-	< 0.05 %	< 0.05 %	< 0.05 %
Cross-axis alignment error	< 0.05 °	< 0.05 °	< 0.05 °	-	< 0.05 °	< 0.05 °	< 0.05 °
Bandwitdh	400 Hz	400 Hz	110 Hz	50 Hz	256 Hz	256 Hz	110 Hz

IS-GYRO1 has no pressure sensor

Accessories

SIRIUS-SBOX-2

GENERAL SPECS	
Number of measurement channels per system	8 to 64
Up to four chassis for	SIRIUS® 8x ACC, 8x MULTI, 8x STG, 8x HV or customised
Interfaces	4x USB3.0, 2x USB2.0, HDMI, VGA, GigE, WLAN, 2x Sync
Operating temperature	0 to 50° C

SBOX SPECS	
GPS	Optional: 10Hz/20Hz/100Hz
Power supply	9 - 36 VDC
CPU	i7 2.0 GHz
Chipset	Intel QM57
RAM	4 GB
HDD	240 GB removable SSD option: 960 GB removable SSD option: 128 GB int. FLASH (for OS)

CAN INSTRUMENTS

2 CHANNEL CAN: DS-CAN2

- *2 high speed CAN interfaces (isolated)*
- *Synchronization with all DEWESoft® products*
- *Up to 8 CAN interfaces per system*
- *Incl. DEWESoft® X-Prof.*
- *-20° .. +60° C operating temperature (fanless)*
- *No external power supply needed if CAN listen only*

4 CHANNEL CAN: SIRIUS*im* 4xCAN

- *4 high speed CAN interfaces (isolated)*
- *Sync with all DEWESoft® instruments*
- *5V / 500mA sensor supply on each connector*
- *USB powered only (2x USB cable)*

8 CHANNEL CAN: SIRIUS*i* 8xCAN

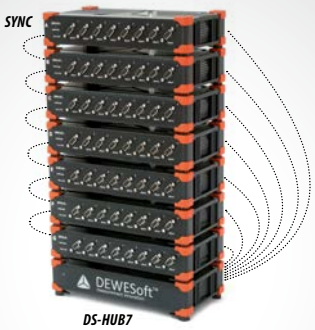
- *8 high speed CAN interfaces on front side (isolated)*
- *+1 high speed CAN interface on rear side (isolated)*
- *Sync with all DEWESoft® instruments*
- *5V / 500mA sensor supply on every front connector*
- *12V / 200mA sensor supply on the rear connector*

OPTION ANALOGUE OUT

8 BNC connectors on rear side for analogue output (on request also available on front side)

- *Standalone Digital Signal Amplifier*
- *Control Channel*
- *Replay*
- *Function Generator*

SYNCHRONISATION



All SIRIUS® systems can be combined to a multichannel system. Each can be used independently or as a single fully synchronized system

USB-EXTENDER1

16 remote AI channels over 50 m Ethernet cable (and 50 m sync cable) @ 185 kS/s

- *Well-tested solution for USB extension*
- *Extends USB up to 100 m (328 ft.) over UTP cable*
- *Hub 4 x USB (supports USB 2.0 and USB 1.1)*
- *Transmits signals up to 480 Mbps*
- *Uses inexpensive CATx cable you may already have installed in your building*
- *True plug and play – no drivers needed*

BATTERY PACKS FOR MOBILE SOLUTIONS

BP2*i*

- *For SBOX and up to 4 SIRIUS® slices*
- *Supports 2 Li-Ion batteries each 96 Wh (total capacity: 192 Wh)*
- *Hot-swap functionality*
- *Status display*
- *Maximum output power: 160W*
- *Input voltage range: 10-36VDC*
- *Output voltage: 21V (powered), 11-16V (battery)*
- *Wrong polarity protection*

BP4*i*

- *For SBOX and up to 8 SIRIUS® slices*
- *Supports 4 Li-Ion batteries each 96 Wh (total capacity: 384Wh)*
- *Hot-swap functionality*
- *Status display*
- *Maximum output power: 250W*
- *Input voltage range: 12-36 VDC*
- *Output voltage: 24V (powered), 11-16V (battery)*
- *Wrong polarity protection*

DS-DISP-12

- *12 " industrial grade display*
- *1280x800 resolution*
- *Rugged housing*
- *Multi-touch*
- *700 cd/m² high brightness*
- *-20 .. 60° C operating range*

DS-REM-CTRL

Control box:

- Start
- Stop
- Pause
- Shut down

DS-MOUNT

Various mounting plates for DEWESoft® instruments. We also develop special mounting plates for larger projects, so please talk to your local sales agent for further information.

TRANSPORT CASE

- *Water-, break- and dustproof (IP 67)*
- *Pullout handle*
- *Robust polyurethane rollers*
- *Foamed plastic adapted for corresponding measurement device*

DS-IRIG-ACDC

- *Converts IRIG AC signal to IRIG DC*
- *Useful for clocking SIRIUS®, DEWE-43 and DS-NET*
- *Can act as a converter from 4 pin Lemo to 2 pin Lemo (HW sync between SIRIUS® and DS NET)*
- *Can act like a converter from BNC IRIG DC to 4 and 2 pin Lemo for sync*

DS-VGPS-HSC

- GPS based position, speed and displacement sensor with 100 Hz
- Free programmable analogue and digital output for speed and distance
- High accurate, free programmable GPS synchronised clock source to GPS
- Including, GPS antenna, power supply cable to cigarette lighter

DS-GPS-CLOCK

IRIG or GPS synchronized clock source

- Input: GPS antenna or IRIG signal code A or B, AM or DC
- Output: TTL clock from 10 Hz to 10 MHz, PPS, DS-SYNC and IRIG-B DC
- USB interface to host system, power supply over USB
- GPS antenna

TACHO SENSORS

DS-TACHO2

- *Optical tacho probe with LED*
- *Stainless steel with 2.5m cable*
- *Up to 4kHz frequency*
- *Distance to object up to 1m,*
- *Power supply 3-15VDC, 45mA*
- *Visible red pointer, Control LED*
- *Operating temperature -10°C to +70°C*
- *Dimensions 73mm length, 16mm diameter*
- *L1B7m connector for SIRIUS® and DEWE-43 counter input*
- *Incl. 30 cm reflector band*

DS-TACHO3

- *Optical tacho probe with LASER (red class2)*
- *Stainless steel with 2.5m cable*
- *Up to 4kHz frequency*
- *Distance to object up to 7.5m*
- *Power supply 3-15VDC, 0.13 W*
- *Visible red pointer, Control LED*
- *Operating temperature -10°C to +70°C*
- *Dimensions 73mm length, 16mm diameter*
- *L1B7m connector for SIRIUS® and DEWE-43 counter input*
- *Incl. 30 cm reflector band*

TACHO LEVEL CONVERTER

DS-TACHO1

- *Converts analogue tacho signal to TTL*
- *Fits to COUNTER input (Lemo 7pin) on DEWE-43 and SIRIUS®*
- *±100V input isolated, trigger threshold adjustable ±10mV … ±2V*

DS-TACHO4

- *Laser optical tacho probe (red class2) with 5m optical fiber and trigger box*
- *Up to 100kHz frequency*
- *Distance to object 2-5mm*
- *Power supply 3-30VDC, 120mA*
- *Operating temperature -10°C to +70°C*
- *Dimensions M6 x 20mm2.5m cable with L1B7m connector for SIRIUS® and DEWE-43 counter input*
- *Incl. 1 m reflector band with 2mm black/white grid*

DEWESoft® CAMERAS

	DS-CAM-88	DS-CAM-120	DS-CAM-600	Webcam
GENERAL				
Color option	DS-CAM-88c	DS-CAM-120c	DS-CAM-600c	Yes
Monochrome option	-	-	DS-CAM-600m	Yes
OPTICAL SPECIFICATION				
Image sensor	Sony ICX414	Sony ICX618	CMOSIS CMV2000 2E5M1PP	various
Sensor type	CCD		CMOS	CCD/CMOS
Resolution	VGA resolution 640x480		Full HD resolution 1920x1080	1280x720
FPS	88 FPS @ 640x480 167 FPS @ 320x240 289 FPS @ 160x120	120 FPS @ 640x480	600 FPS @ 640x480 300 FPS @ 1920x1080 1460 FPS @ 320x240	30 FPS
Optical size	1/2"	1/4"	Diagonal 12.7 mm (2/3")	various
Pixel size (in µm)	9.9 x 9.9	5.6 x 5.6	5.5 x 5.5	various
Dynamic range	35 dB autogain function	32 dB autogain function	60 dB	various
Shutter	Full frame		Electronic Global Shutter	–
Shutter time	26 ns - 60 s (autoshutter function)	58 µs - 60 s (autoshutter function)	210 ns - 90 s	–
Color correction	auto white-balance		DS-CAM-600c: yes DS-CAM-600bw: no	Yes
MECHANICAL SPECIFICATIONS				
Operating temperature	+5..+45°C		0..+50°C	0..+45°C
Operating humidity	25% - 80% (no condensation)		25% - 80% (no condensation) IP67 protected version available: DS-CAM-600-CW	25% - 80% (no condensation)
Dimensions	86.4 x 44 x 29 mm (3.40 x 1.73 x 1.14 in)		54 x 40 x 92 mm (2.13 x 1.57 x 3.63 in)	various
Lens mount	C-mount		C-mount (1" 32G thread)	–
Connectors	Screw mount GigE RJ45; EIAJ (Hirose) 12 pin		Gigabit Ethernet: RJ45	USB
Conformity	CE, FCC, RoHS, GigE Vision, GenICam (PoE IEEE 802.3at)		CE, EN55022, class A; EN61000-4-2; EN61000-4-3; EN61000-4-4; EN61000-4-6; FCC Part 15, class A RoHS, GigE Vision 1.2	Direct X
ELECTRICAL SPECIFICATIONS				
Supply voltage	+8 to +30 VDC		Power-over-Ethernet (42-57 V)	USB (5 V)
Power-over-Ethernet	optional		yes	–
Power consumption	3.6 W		6 W	2 W

CAM-BOX1

Adapter box for connecting up to 4 DS-CAM-88/120 to the DEWESoft® instrument. Combines Sync and Power to the camera connector. External GigE switch required.

CAM-BOX2

Distribution box for connecting up to 4 x DS-CAM-88/120 to the DEWESoft® instrument. Wide range supply input (9-36V DC), integrated GigE switch

CAM-BOX3

Distribution box for connecting up to 4 x DS-CAM-300/600 to the DEWESoft® instrument. Wide range supply input (9-36V DC), integrated GigE switch with 4 x PoE; SIRIUS® chassis with 1.5 U height

CURRENT TRANSDUCERS

TRANSDUCER SPECIFICATIONS

	IT 60-S	IT 200-S	IT 400-S	IT 700-S	IT 1000-S
Primary Current Range DC, RMS Sinus	60 A	200 A	400 A	700 A	1000 A
Overload Ability Short Time (100 ms)	300 Apk	1000 Apk	2000 Apk	3500 Apk	4000 Apk
Max. burden resistor (100 % of Ip)	10 ohm	10 ohm	2.5 ohm	2.5 ohm	2.5 ohm
di/dt (accurately followed)	> 25 A/µs	> 100 A/µs	> 100 A/µs	> 100 A/µs	> 100 A/µs
Temperature influence	< 2.5 ppm/K	< 2 ppm/K	< 1 ppm/K	< 1 ppm/K	< 1 ppm/K
Output Ratio	100 mA at 60 A	200 mA at 200 A	200 mA at 400 A	400 mA at 200 A	1 A at 1000 A
Bandwidth (0.5 % of Ip)	DC .. 800 kHz	DC .. 500 kHz	DC .. 500 kHz	DC .. 250 kHz	DC .. 500 kHz
Linearity	< 0.002 %	< 0.001 %	< 0.001 %	< 0.001 %	< 0.001 %
Offset	< 0.025 %	< 0.008 %	< 0.004 %	< 0.005 %	< 0.005 %
Frequency Influence	0.04 %/kHz	0.06 %/kHz	0.06 %/kHz	0.12 %/kHz	0.06 %/kHz
Angular Accuracy	< 0.025° + 0.06°/kHz	< 0.025° + 0.05°/kHz	< 0.025° + 0.09°/kHz	< 0.025° + 0.18°/kHz	< 0.025° + 0.09°/kHz
Rated isolation voltage rms, single isolation CAT III, polution deg. 2 IEC 61010-1 standards EN 50178 standards	2000 V 1000 V	2000 V 1000 V	2000 V 1000 V	1600 V 1000 V	300 V 300 V
Test voltage 50/60 Hz, 1 min	5.4 kV	5.4 kV	5.4 kV	4.6 kV	3.1 kV
Inner diameter	26 mm	26 mm	26 mm	30 mm	30 mm
DEWESoft® Shunt	5 ohm	5 ohm	2 ohm	2 ohm	1 ohm

CURRENT CLAMPS AC/DC

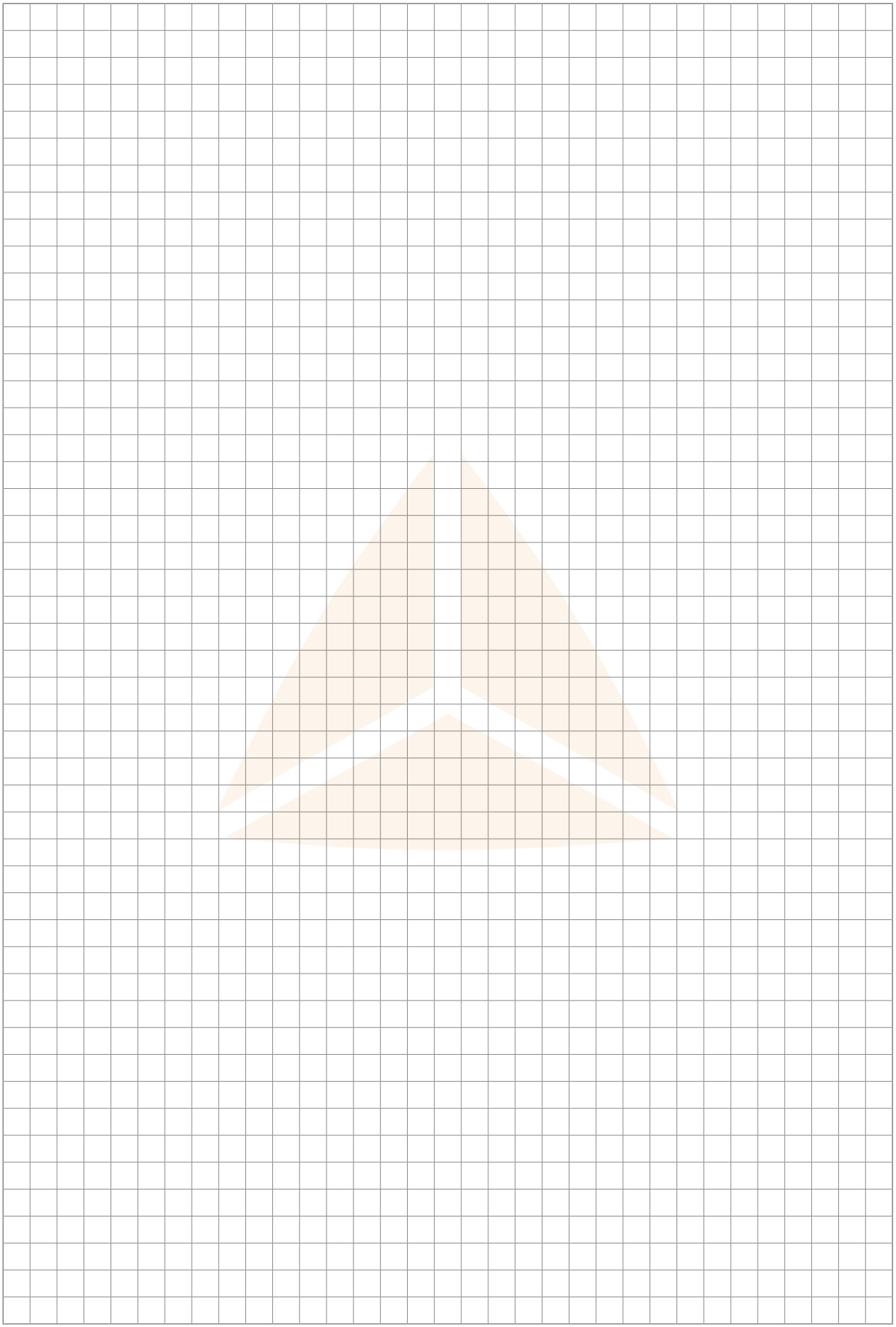
DS-CLAMP-150DC

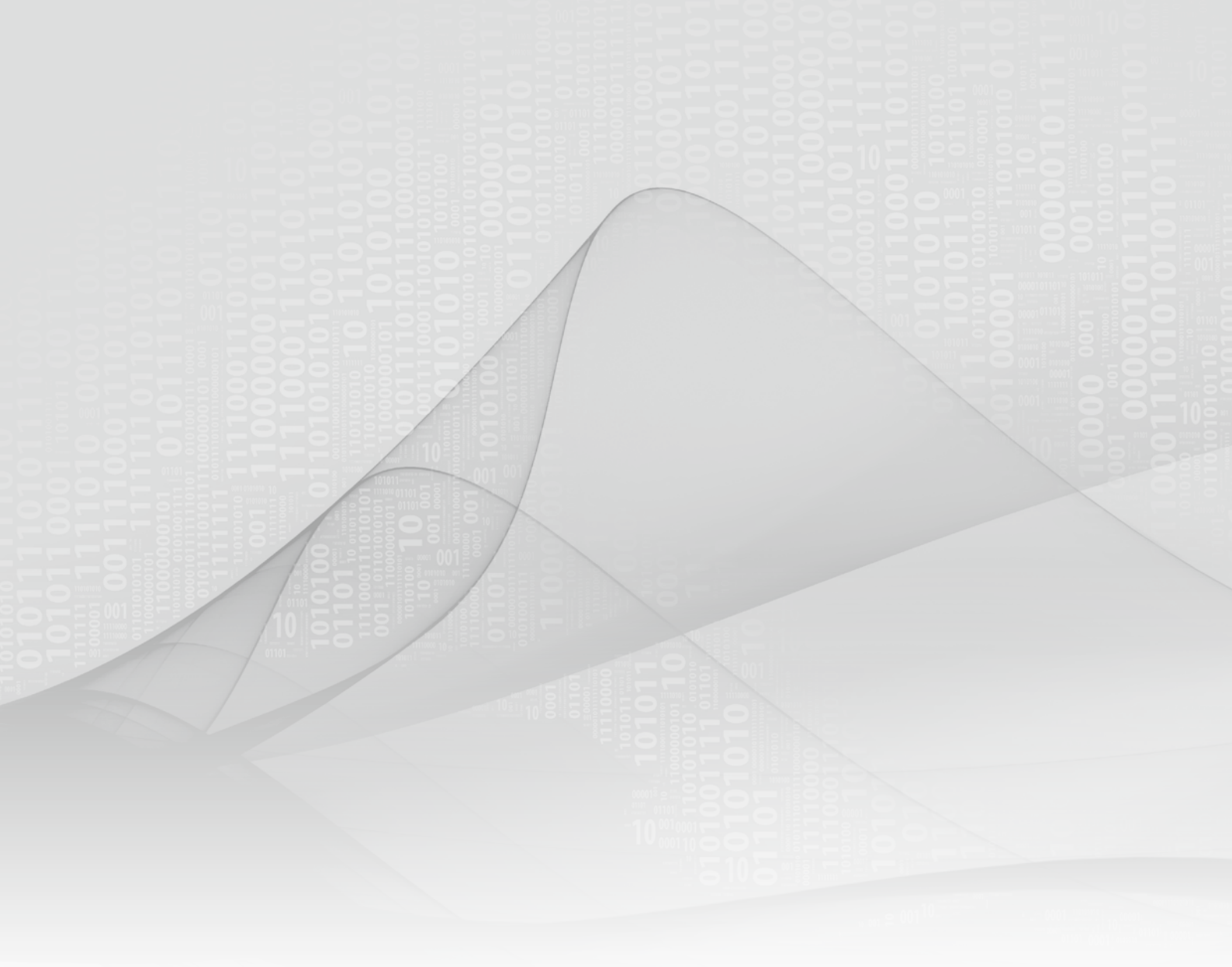
Type	Hall sensor
Range	150 A rms / 300 A peak
Bandwidth	DC to 100 kHz
Accuracy	1 % + 2 mA 0.5 % with Software Sensor Calibration
TEDS	Fully supported
Sensivity	20 mV/A
Resolution	±1mA
Overload Capability	500A DC (1min)
Dimensions	205 mm x 60 mm x 15 mm (Clamp opening d = 32 mm)

DS-CLAMP-1800DC

Type	Hall sensor
Range	1800 Apk
Bandwidth	DC to 20 kHz
Accuracy	2.5 % +/- 0.5A
TEDS	Fully supported
Sensivity	1 mV/A
Resolution	±1mA
Overload Capability	2000A DC (1min)
Dimensions	205 mm x 60 mm x 15 mm (Clamp opening d = 32 mm)

NOTE





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