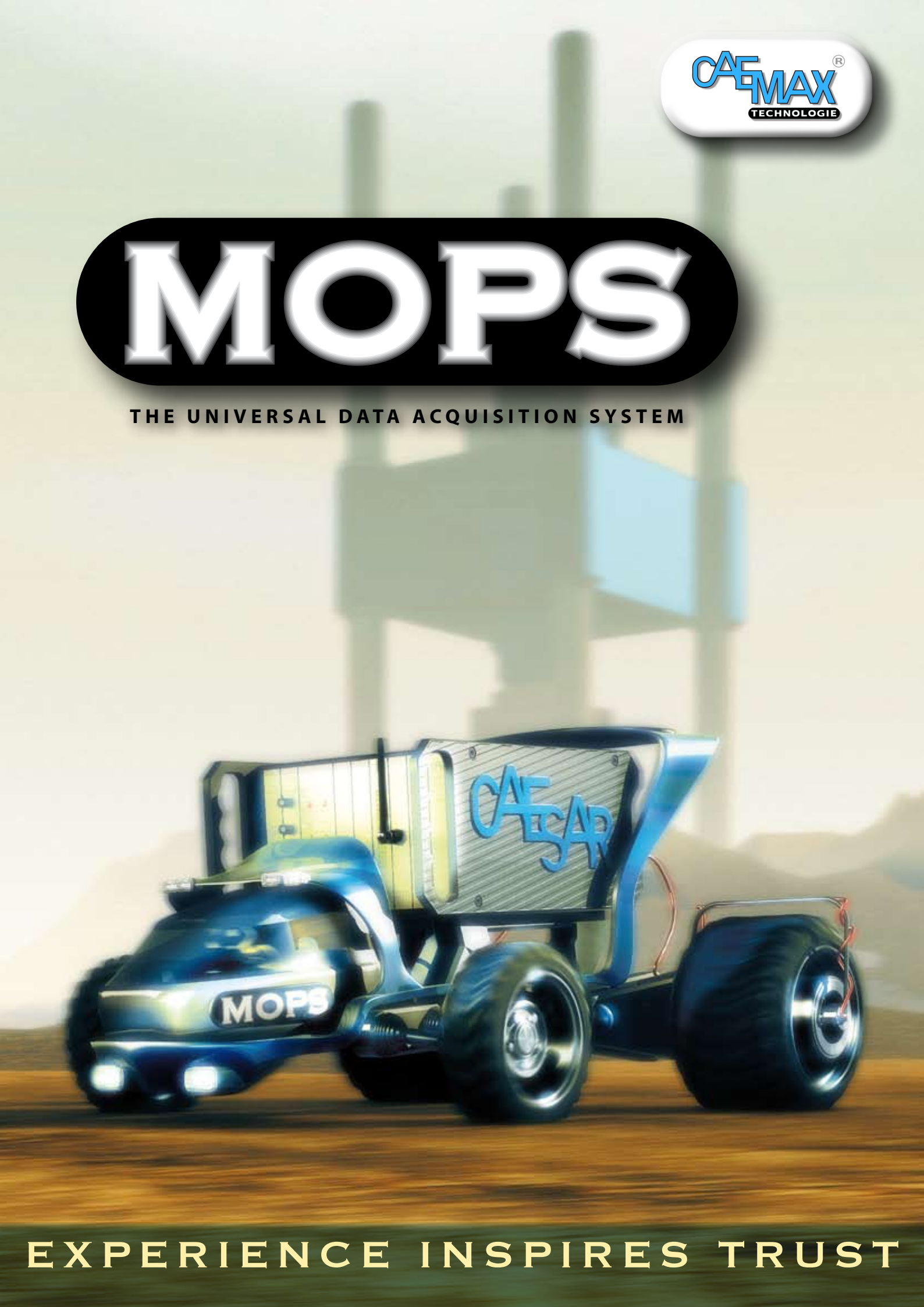
CAEMAX TECHNOLOGIE

MOPS

THE UNIVERSAL DATA ACQUISITION SYSTEM



EXPERIENCE INSPIRES TRUST

MOPS

MOPS – a very unique data acquisition system!

While other data acquisition systems just grow older and become more and more unattractive, the MOPS even gets better and better over the years. Due to its modular concept and the outstanding „Plug and Play" – ability it provides nearly all kinds of signal conditioning. Today the MOPS (MOdular Processor controlled data acquisition System) is one of the most advanced systems in the market. As it was in the beginning:

20 years ago CAESAR was entrusted with the task of delivering a data acquisition system, suitable for the supervision of the complete test operation of a wind power plant, including data storage, on-line monitoring and evaluation. This required that RF telemetry signals from the rotor, all data from the nacelle via light conductors, as well as operating load signals from the tower by wire and meteorological data via RS232 from a remote weather mast 1.5 km away had to be synchronized.

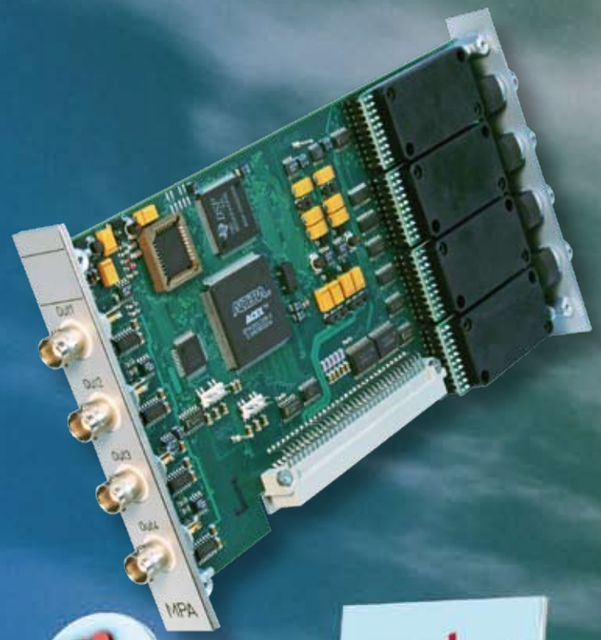
Thus the MOPS was "born". Today the MOPS amplifiers offer programmable gain factors of 1.. 10,000, an automatic Autozero for twice the measuring range and active low-pass filters with Butterworth or Bessel characteristics and a programmable cutoff at approx. 3Hz-20 kHz already integrated. All features are continuously variable by software control. And much more is available: The high-end counter modules MPC and HEI provide an unbelievable resolution of up to 48 bit. Incremental transducers can be directly connected. In addition the MOPS palette includes interfaces for the easy connection of nearly all sensors in the market – even for sensors with digital serial interfaces, CAN bus systems, wheel force transducers (WFT), GPS or inertial platforms.

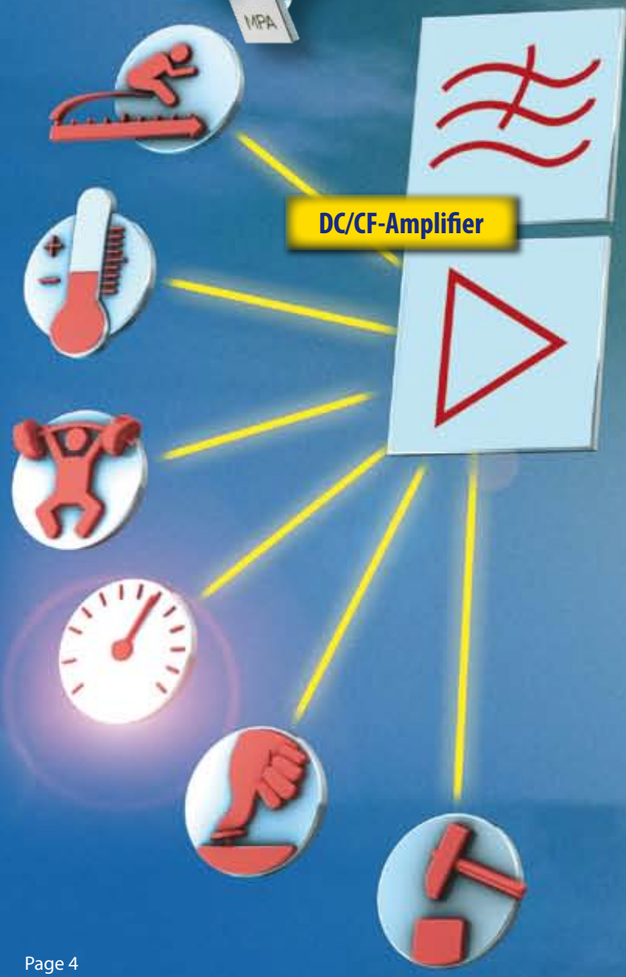
Up to 1024 analog and digital channels can be acquired and/or controlled simultaneously. Only a desktop or laptop PC is needed as a frontend. Beside standard ethernet interface, an optional WLAN telemetry system is provided for the data transmission.

By means of the software modules WinMOPS (for remote control and for data acquisition) all functions and features of the MOPS can easily be handled. All settings will be stored in a setup file and/or in an EEPROM memory (as an option).

THE STRAIN GAGE AMPLIFIER MODULE

The most ingenious amplifier in the world





MPA

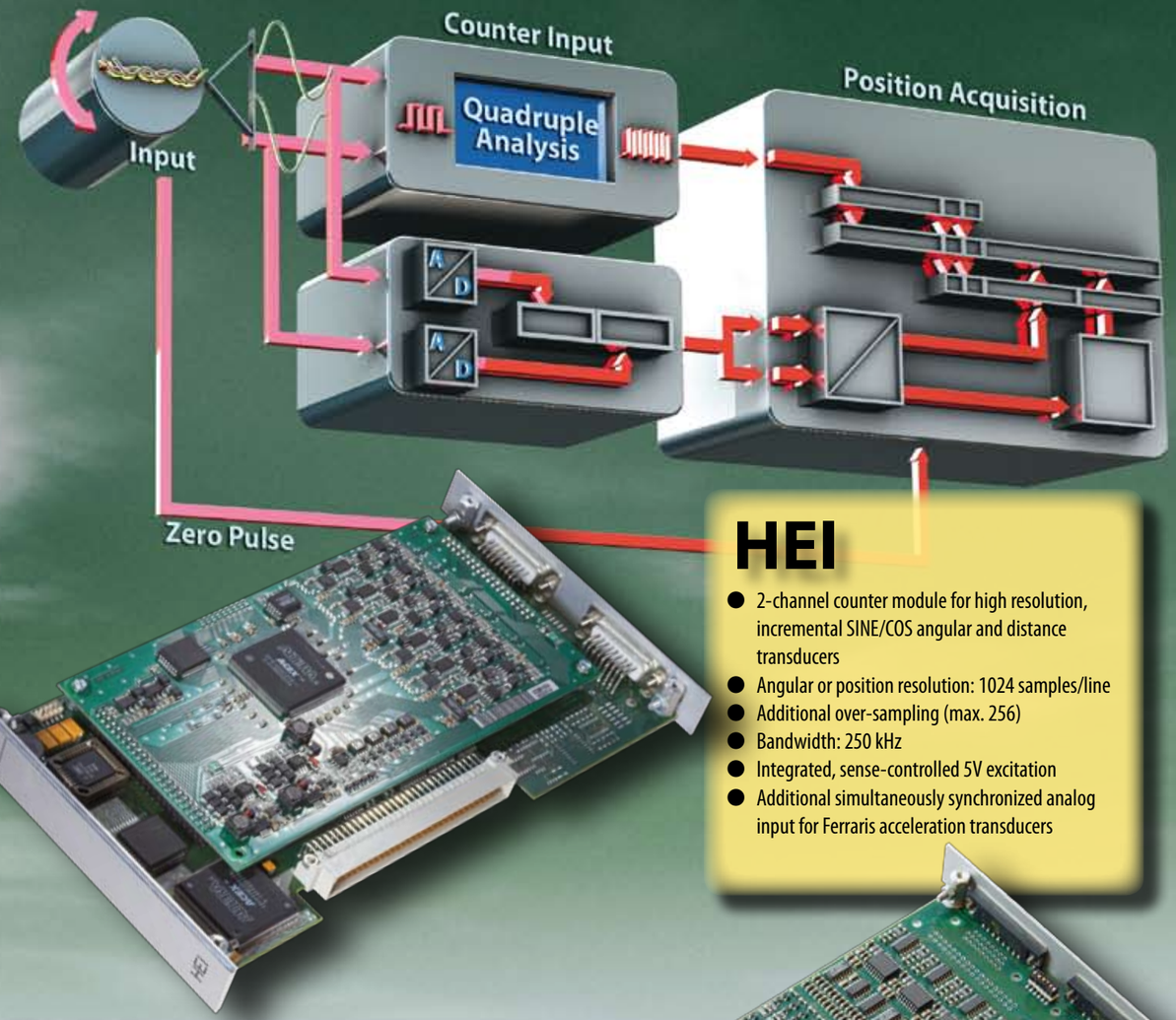
- 4-channel differential amplifier with integrated programmable Anti-Aliasing filter
- Simultaneous A/D-converter and analog test output for each single channel
- Max. input range: ±10V
- Programmable gain: 1 up to 10000 (continuously variable)
- Sensor input: strain gages (full- and half-bridge), Volt, mVolt, potentiometers
- Continuously variable offset
- Stepless variable Offset
- Automatic Autozero for twice the measuring range
- Programmable bridge excitation: ±0V up to ±5V
- DC or carrier frequency mode (4800Hz, 5000Hz, 9600Hz, 10000Hz)
- Bandwidth 10 kHz with gain 1000
- Anti-Aliasing filter (Bessel/Butterworth, 6. pole) with continuously variable cut-off frequency
- Reference calibration with control software
- Software switchable test shunt resistor
- Max. sample rate 128 kHz
- Resolution 14 (16) bit
- 7-Pin-Lemosa socket per channel

On the comfortable amplifier module MPA (multi-purpose-amplifier) a digital signal processor (DSP) replaces much of the conventional analog circuitry needed so far. The 4-channel-amplifier is appropriate for the connection of strain gages (half and full bridges), as well as of inductive and potentiometric transducers and can be operated both in DC voltage and in the carrier frequency mode.

Programmable 6-poles anti-aliasing filters with Bessel or Butterworth characteristics and simultaneous A/D-converters are already integrated in the MPA module. This enables the freely programmable collection of up to 60 strain gage signals with only one MOPS basic unit. The integrated DSP provides digital filtering of the measuring data with arbitrary cutoff frequencies and freely programmable transfer functions as well as the automatic fine alignment and the calibration. And all this with the maximum precision of one single bit, reproducible and free of any temperature drift!

THE COUNTER MODULES

RPM application with highest resolution



HEI

- 2-channel counter module for high resolution, incremental SINE/COS angular and distance transducers
- Angular or position resolution: 1024 samples/line
- Additional over-sampling (max. 256)
- Bandwidth: 250 kHz
- Integrated, sense-controlled 5V excitation
- Additional simultaneously synchronized analog input for Ferraris acceleration transducers

The Universal Counter

MPC

2-channel programmable digital counter for any kind of pulse signals, e.g. distance or position, or the measurement of time intervals and frequencies

- Decoding of incremental encoders
- Programmable event or position counting (16 or 32 bit)
- Programmable start value for event and position counting
- Counter reset to start value by software or reset signal
- Programmable, simultaneous sampling
- Programmable power supply: 0…30 V/DC
- RS 485 input

Counter

2-Channel programmable digital counter MPC

- Incremental encoders
- Cycle time detection
- Frequency measuring
- RS 485 – input
- Event counting
- Revolution voltage converter

Wheel force transducer

incl. Signal contitioning and online calculation for 2 channels

- TTI for telemetry transmission
- TIU for slip-ring transmission

Strain gage amplifier

4-channel universal amplifier MPA

- CF-bridge amplifier
- DC-bridge amplifier
- Potentiometer input for displacement and angle detection
- Voltage measuring µV, mV, V
- Inductive sensor input
- Programmable filters (Bessel, Butterworth)
- Simultaneous ADC
- Gain 1…..10.000 per channel

Revolution

2-channel counter module for high resolution HEI

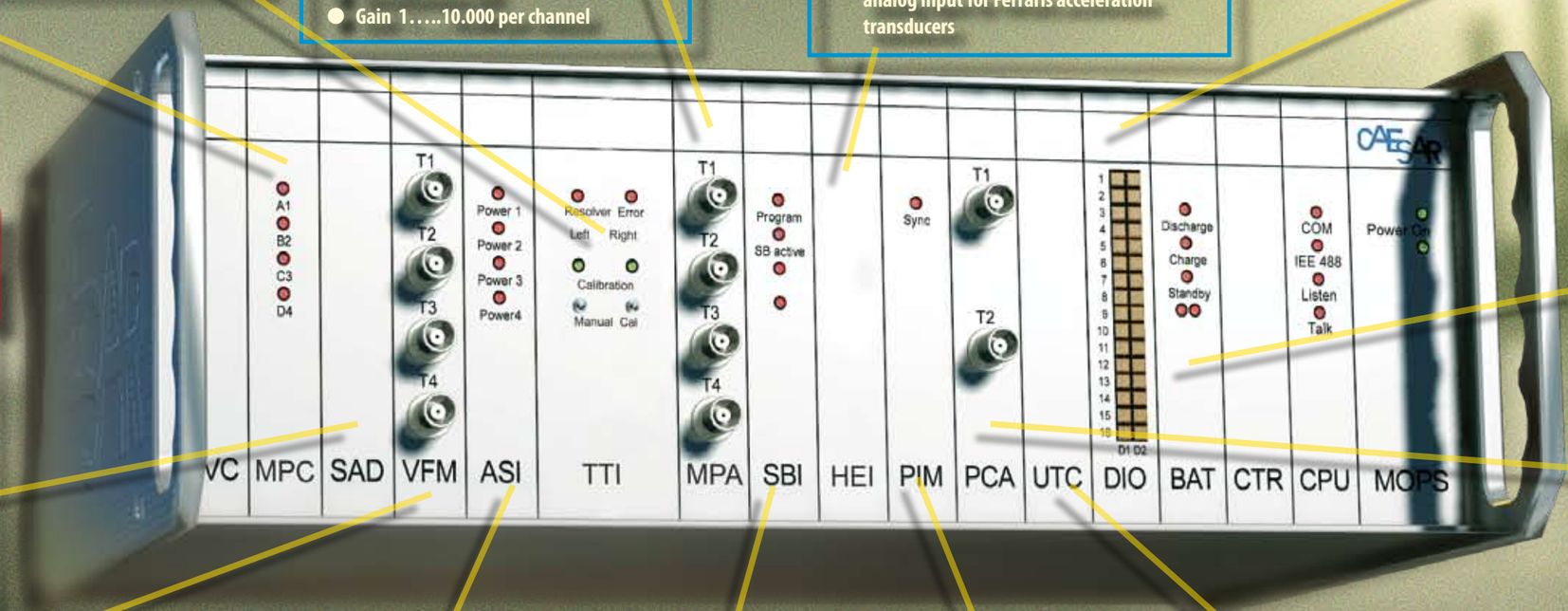
- Incremental SINE/COS angular and distance transducers
- Angular or position resolution: 1024 samples/line
- Additional over-sampling (max. 256)
- Bandwidth: 250 kHz
- Integrated, sense-controlled 5V excitation
- Additional simultaneously synchronized analog input for Ferraris acceleration transducers

Digital I/O

- 2x16 Bit
- Digital in-/output

UPS

Uninterruptible power supply



Analog Input /Output

16-Channel simultaneous SAD
16-Channel multiplex MAD
16-Channel multiplex output DAC
4-Channel simultaneous output SDA

- Switchable input for voltage and current signals
- Unipolar/bipolar

Charge amplifier

2-channel-charge amplifier PCA

- For piezo electric transducers
- Active high and low pass filters
- Programmable input range ± 50 pC up to ± 50000 pC

Antialiasing-Filters

4-Channel filters programmable VFM
16-Channel fixed frequency filters FFM

- Butterworth characteristic 3 Hz up to 20 kHz
- Bessel characteristic 2 Hz up to 10 kHz
- Switchable input voltage up to ± 30 V

Signal amplifier

4-Channel active sensor input ASI to connect

- ICP-transducers
- Active accelerometers
- Current measuring 0 – 20 mA, 4 – 20 mA
- Voltage measuring ± 0,01 up to ± 50 V
- Programmable excitation 0,02 up to 30 V/DC per channel

CAN-Interface

Serial BUS-Interface SBI

- CAN-BUS
- RS 232
- GPS-mouse
- Serial input

Parallel-Digital-Input

Parallel Input Multiplexer PIM

- Test rig controlling
- Interface for PCM-systems with bitparallel, word serial interface

Temperature amplifier

4-channel dynamic universal themperature amplifier UTC to connect

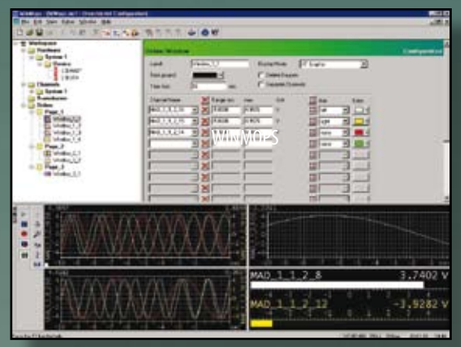
- Active thermo couples
- PT100 elements
- Antialiasing filter

WINMOPS SOFTWARE

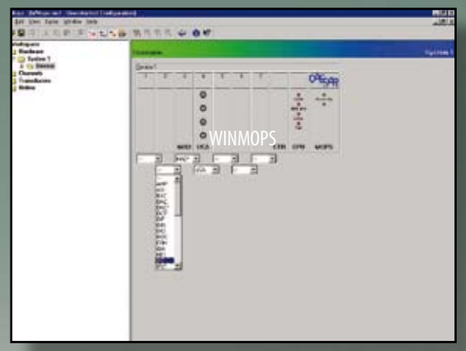
Easy Control

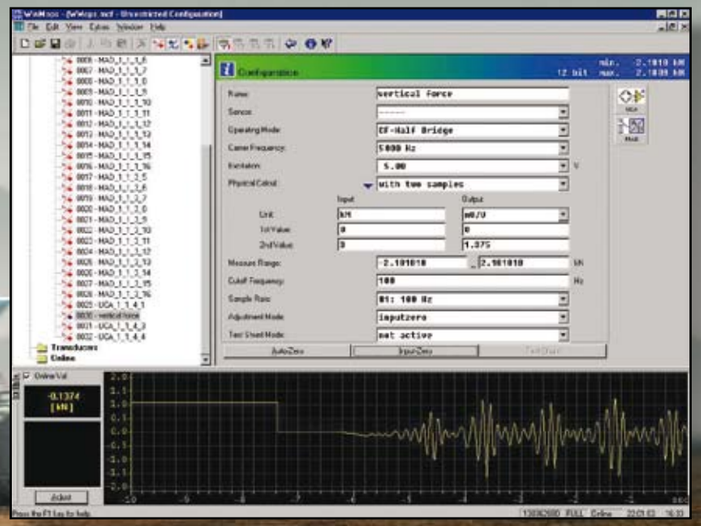
With the setup software WinMOPS the MOPS can easily be controlled by the simple means of a mouse click. The actual hardware configuration is automatically uploaded to the PC. The window-driven software allows arbitrary navigation in order to activate all available parameters of the measuring modules, setup the sensor data-base or even online monitoring.

WinMOPS works "online"! All relevant channel parameters are displayed on one single page. The effect of tuning a certain parameter is immediately seen on the screen. Just another click and the amplifier input is balanced and ready for measuring. Once you have found the perfect setup for any channel, all related parameters can be stored in the sensor data-base for later us. When a new test configuration is to be defined the sensor is simply "connected" to an amplifier by using the drag-and-drop function.

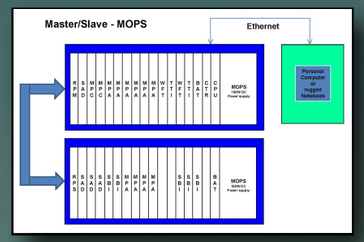


If preferred, all channel and sensor data can also be processed in tabular form. Thus the setting of a parameter can easily be transferred to other channels. The displayed contents of the table can individually be determined by the user. The rows and columns are controlled by appropriate menu filters. The complete table can also be printed for documentation purposes.





SPECIAL MODULES



Master/Slave-Modules to connect up to four MOPS devices

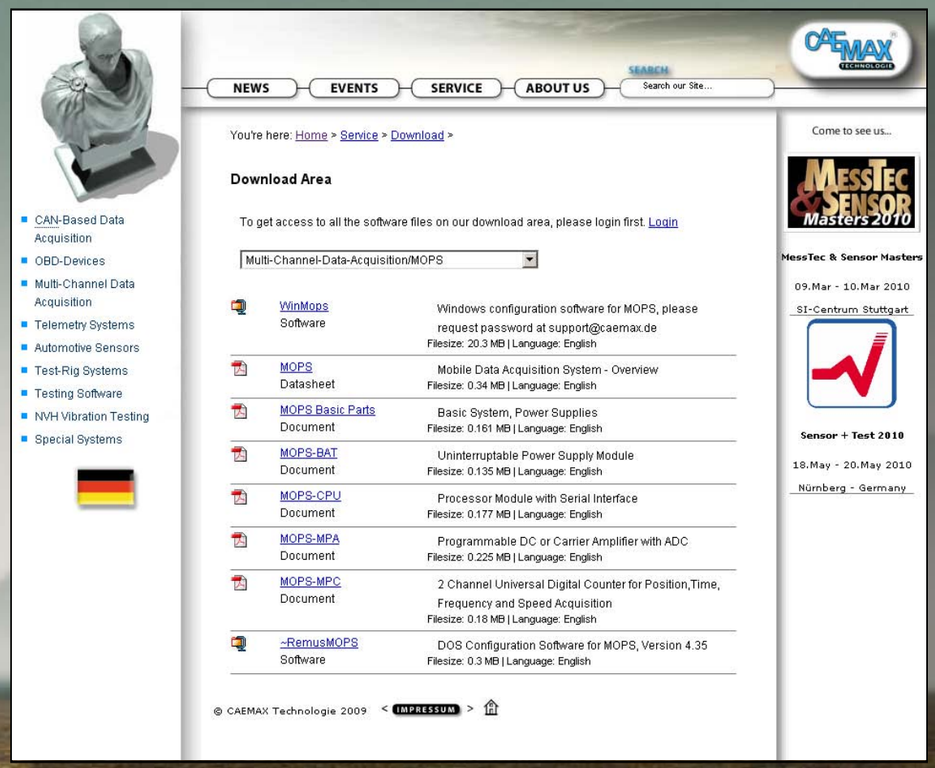
In order to increase the number of slots or channels special modules for a master/slave configuration are available. The MOPS unit which includes the RPM-module (master module) will become the Master-MOPS, who controls all settings and the data transfer of all MOPS units. With a special cable it is possible to connect up to three MOPS-Slave devices (including the RPS-module) to a master device. The adaption to the extended configuration is done automatically, that means the WinMOPS software presents all channel as usual to make further parametrization.

TTI-Module to connect six-components-WFTs

The TTI-module is necessary to acquire data of wheel force transducers with telemetry option together with any other data. The measured WFT-data - three forces, three torques and two angular values per wheel - will be acquired with a sample rate of 20 kHz per channel, digitized with 16 Bit resolution and processed online by a DSP. With the TTI module it is possible to balance the wheel-load during the test drivings.

MOPS-MODULES

Detailed specifications can be found on our website for downloading.



MOPS

MOPS APPLICATION

ON THE ROAD IN CHINA

In order to determine the durability of vehicle parts due to road condition and driving style under realistic conditions, a Mercedes-Benz Viano was sent on a measuring trip through several Chinese provinces.

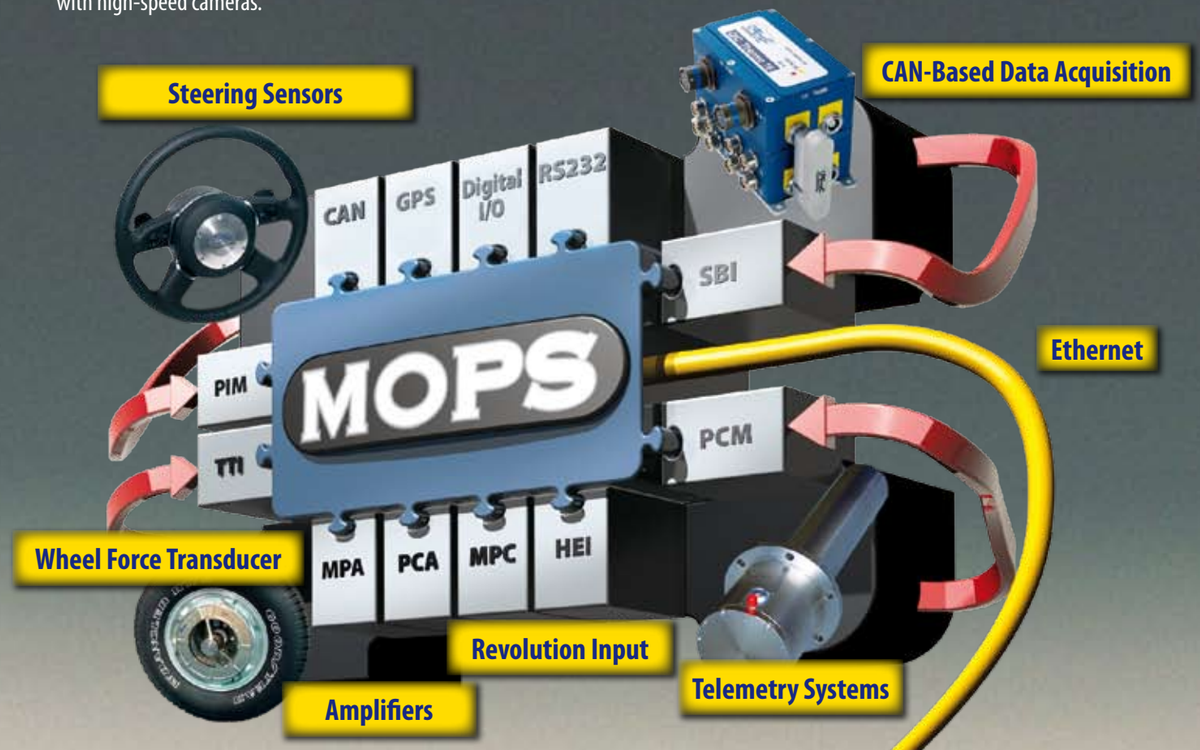
Over a long route of approximately 6,000 km every type of surface, covering the entire spectrum of modern motorways from city streets and cross-country routes up to muddy beaten runways, was experienced. The adjacent pictures show that the Mercedes team had to overcome some small adventures along the way!

More than 100 measuring points like pressures, accelerations, spring travels, loads were acquired by strain gages, merged with CAN parameters, GPS coordinates, speed, distance, time and a total of 24 forces and moments from the 4 wheel-force transducers.
The MOPS based measuring system worked perfectly, despite various demands, fulfilling all user requirements even under the harshest conditions!

MOPS

THE UNIVERSAL DATA ACQUISITION SYSTEM

Regarding the upper picture you can imagine that the MOPS modules may easily be assembled like a jigsaw puzzle: Thus any sensor system can be connected to the MOPS, because optimized amplifiers are available for all common sensors. All data will be acquired simultaneously, stored onto hard-disk or transferred via telemetry, also in combination with high-speed cameras.



A bi-directional data transfer with implemented error correction is typical of the new telemetry technology following the WLAN standard, thus providing a 100% reliability on data transmission. Both the acquisition and the receiver side of the system

are equipped with so-called “transceivers”. Continuous data exchange ensures that all transmission errors will be recognized and eliminated. A dynamic buffer of 1 MW reliably prevents any data loss due to overrun.

CERTIFICATE

ISO 9001:2000

DEKRA Certification

hereby certifies that the company

CAEMAX TECHNOLOGIE

CAEMAX Technologie GmbH

business field:
Development, manufacture, maintenance and distribution of systems used in the field of measurement engineering

location:
Bunzlauer Platz 1 * D-80992 München

has successfully implemented the above mentioned quality management system according to the standard (12/2000) and applies it effectively. The conformity was inspected during the certification audit documented in audit report no. A08031093. This certificate is only valid in connection with the successful performance of the surveillance audits.

This certificate is valid from: 17.09.2008
This certificate is valid until: 14.11.2010
Last audit day: 05.09.2008

Date of the first certification: 12.05.1999
Certificate registration no.: 90599281/3 duplicate

DEKRA Certification GmbH
Stuttgart, 09.09.2008

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QMS-TGA-ZM-05-91-00

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MOPS with "Integrated Investment Protection"

Particulary important for all members of the MOPS generation: Also the „oldest" MOPS systems will be upward compatible. After an upgrade of the firmware of „old" MOPS systems, you can integrate the modules of the newest generation ! Of course all service at CAEMAX is done according to the ISO 9001 standard. If you want to upgrade the MOPS PCMCIA- or PCI interface to an ethernet interface or if you need a new calibration please call us – we will help you !

CAEMAX TECHNOLOGIE

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