

MINIDAU® Advanced – The New Milestone

- 32 or 96 Analog Channels
- Sampling Rates from 30 sps to 100 ksp/s
- Signal Bandwidth 42,5 kHz
- Signal Overload Detection
- Extended Excitation Modes
- 4 Quadrant Shunt Emulation
- Upgrade of existing Systems possible



MINIDAU® Advanced

GENERAL

Kayser-Threde has been manufacturing crash test data acquisition systems since 1976. The demands on such systems have steadily risen over the years. The Kayser-Threde engineers have continuously implemented state-of-the-art technology to fulfil these demands. 1998 Kayser-Threde's redesign of the on-board measuring equipment led to a completely new data acquisition system, the MINIDAU® (Miniaturized Data Acquisition System). It was developed in close cooperation with our worldwide customers. Having delivered more than 40000 data acquisition channels to more than 80 customers since, Kayser-Threde is the world leader in this field.

Now a brand new option for this system is available: The MINIDAU® Advanced. It offers all the features of a standard 16-bit MINIDAU® plus several extended functions for users with extended requirements.

Since Kayser-Threde believes that the protection of investments is extremely important for our customers, it is possible to upgrade existing MINIDAU®s with the advanced features by simply exchanging amplifier modules. This means that every MINIDAU® that has been delivered up to now is "Advanced ready" - all customers can benefit from the new features.

SIGNAL CONDITIONING

Many features of the MINIDAU® Advanced are the same as of a MINIDAU® Classic: 32 or 96 analog and 16 digital inputs. Each analog channel comprises a programmable input amplifier, bridge excitation, 16 bit A/D converter for simultaneous sampling.

The amplifier gain precision is better than 0.2% and the input impedance above 10MΩ. The gain values can be programmed in steps from 1 to 10000. An internal reference voltage is used for precise control of the amplifier setting. Neither potentiometers nor trimmers nor mechanical switches are used inside the device. All adjustments are implemented by software, automatically or by command.

The **bridge excitation** voltage is programmable separately for each channel. All 8 channels of an amplifier board can be used for the classical voltage excitation modes.

Four out of these channels can deliver extended excitation modes. This includes a high voltage mode up to 20V and a constant current excitation mode.

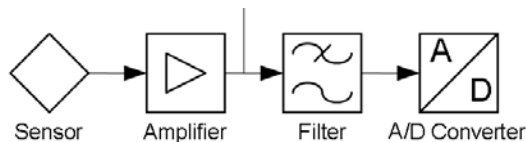
Bridge completion for half bridges can be switched internally.

MINIDAU® Advanced

Shunt measurement and check is implemented as a full 4 quadrant circuit with internal emulation of customer specific shunt resistor values. External shunt resistors are supported as well.

The **signal bandwidth** of the amplifier has been extended to 42,5kHz. With conventional designs this would require sampling rates above 200kHz. Due to the state of the art oversampling A/D converter design including adaptive filtering this bandwidth of the amplifier can be efficiently used sampling at 100kHz. This feature allows the measurement of acoustic events e.g. due to airbag inflation during the crash test.

SAE J211 recommends **detection of overload conditions**, e.g. caused by high frequency parts that overlay the actual signal. The MINIDAU® Advanced amplifier introduces an overload detection. It is implemented between the amplifier part and the filter part removing high frequency disturbing signals. Overload conditions are sampled and stored together with the actual measurement data to allow in deep study of this phenomenon.



In contrast to former designs, the low-pass filter is a pure anti-aliasing filter with an adaptive cutoff frequency that fits to the currently selected sampling frequency. All necessary additional filtering, e.g. according to SAE filter classes, is done during post processing.

SAMPLING AND STORAGE

Sampling and Storage of measurement data has been implemented similar to the proven design of the conventional Minidau, using volatile sram memory during pretrigger and non volatile Nand flash memory for data storage. Batteries are not needed to retain the data, even for many years!

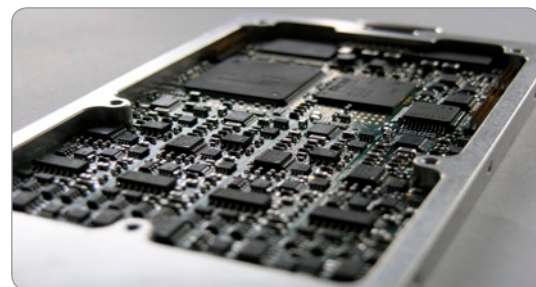
The MINIDAU® Advanced can store data for a 50s cycle even at the full sampling rate of 100kHz which allows the user to start recording data before the vehicle or sled is actually started (Called „double trigger“ or „recorder mode“ in oposite to the conventional „single trigger“ or „transient mode“).

This ensures that the measuring system functions correctly and prevents data loss, even in case of possible malfunctions of the trigger signal. This is the main error cause, apart from user errors.

The trigger point is registered and recorded. Once a valid trigger point is stored in the MINIDAU® data memory, the user can select only the actual measured data for transfer to a PC, it is not necessary to read out the complete data memory.

CONTROL SOFTWARE

Please **note** that all advanced features of this amplifier can only be used with Kayser-Thredes new CrashDesigner software or other software packages using the Dacore2 application interface !



	32 Channel System	96 Channel System
Mass	4300 g	10600 g
Mass / Channel	135 g	110 g
Dimensions	272 x 111 x 93 [mm]	272 x 224 x 120 [mm]
Volume / Channel	88 cm ³	76 cm ³

MINIDAU[®] Advanced – Specifications

AMPLIFIER

Type	: DC amplifier
Maximum input voltage	
signal voltage	: ±5 V
Input impedance	: 10 MΩ
Gain steps	: V = 1.0..9.9 in steps of 0.1, 10...10000 in steps of 1
Gain Accuracy V ≤ 1000	: ±0.2%
Input noise	: max. $20 nV_{\text{eff}} / \sqrt{\text{Hz}} \cdot \sqrt{f}$ @ 25° C (input short circuit)
Passband attenuation	: max. 0.1 dB @ 5 kHz max. 0.7 dB @ 40 kHz

BRIDGE EXCITATION

Type	: DC, programmable voltage each channel
Output voltage	: 0V/2V/2.5V/5V/10V
Bridge completion	: Half or full bridge, switchable
Accuracy	: ±(0.1% + 3 mV)
Maximum rated output	
current	: 40 mA
Current limitation	: At approx. 55 mA short circuit protected
High Voltage Mode	: 4 channels per Amplifier +12V ... +20V (±0.5%) max. 25 mA short circuit protected
Constant Current Mode	: 4 channels per Amplifier 1 mA...20 mA (±0.2%±3 μA) max. 19 V short circuit protected
ICP (integr. circuit piezoelectronic) Sensors supported	

FILTER

Type	: Adaptive Filter
Standard Characteristic	: 6-pole Butterworth Other characteristics on request

ANALOG/DIGITAL CONVERSION

Resolution	: 16 bit
Sampling rate	: 30 Hz..100 kHz simultaneous sampling of all channels

AUTO ZERO

Principle:	
Analog offset compensation, each channel selectable	
Range referred to input:	
<i>Gain:</i>	<i>Max. Offset:</i>
1 – 5.12	: 380 mV - 4 V (dynamic)
5.12 – 110	: max. 4 V
110 – 1100	: max. 400 mV
1100 – 10000	: max. 40 mV
Accuracy:	
±0.10% referred to full scale of A/D-conversion range (with error compensation in the host software)	

SHUNT RESISTOR

Principle: Four quadrant shunt emulation for two internal or external resistors	
Shunt resistor	: Customer specific value (e.g. 150 kΩ)
Switch resistor	: 300 Ω max.

SIGNAL OVERDRIVE DETECTION

Principle:	
Window comparator before antialias filter, two flags(+/-) sampled and recorded together with measurement data.	

CALIBRATION VOLTAGE

Principle:	
Internal calibration voltage eight steps between 0 V and 2.5 V. External calibration voltage connectable via one common connector to all analog inputs.	

SENSOR IDENTIFICATION

Principle:	
Dallas, Denton and MSC supported in specific modes	

Detailed specifications (subject to change)

MINIDAU® Advanced – Specifications

DIGITAL INPUT

Principle:
16 free available digital bits, simultaneous acquisition together with the analog channels

Input characteristic:
Opto coupler with isolated power supply for 8 inputs each

Isolation voltage : 100VAC

DATA HANDLING

On Line:
Transfer of up to four analog channels to the host PC

Resident onboard memory (non volatile):
Memory size 5Mword/channel (= 50 seconds duration of measurement at 100kHz sampling rate)

Type : Flash-EEPROM

Pretrigger memory (volatile): min. 0.4s
Type : SRAM

Trigger: 2 analog trigger channels (programmable threshold and parameters)
2 digital trigger channels
1 software trigger
1 trigger bus for triggering of other devices

COMMAND AND DATA INTERFACE

Ethernet : 10BASE2, ISO/IEC 8802-3

POWER SUPPLY

Supply voltage : 18...36VDC

Power consumption : 44 / 130W max. (32 / 96)

Internal battery:
LithiumIon battery, integrated charger,
5 minutes operating time with all functions

MECHANICAL ENVIRONMENTAL LOAD

Shock : 100g peak sine half wave
for 6ms

Vibration : 5.4g, 30 min. each axis
(5 to 1000Hz)

SIZE & MASS

Length (32 / 96) : 272 / 272 mm

Width (32 / 96) : 111 / 224 mm

Height (32 / 96) : 93 / 120 mm

Mass (32 / 96) : 4300 / 10600 g

Mass / channel (32 / 96) : 135 / 110 g

Area / channel (32 / 96) : 9.5 / 6.4 cm²

Volume / channel (32 / 96) : 88 / 76 cm³

TEMPERATURE

Operating temperature : 0° to +40°C

Storage temperature : -20° to +45°C

Detailed specifications (subject to change)