EMPOS

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MCA4K - 4000-Channel Amplitude Analyzer



The MCA4K is a **compact single-board analyzer** designed for signal processing from spectrometric or scintillation detection probes. The instrument is designed for applications where long-term **stability, reliability, and ease of operation** are important.

The MCA4K can be used not only independently with a scintillation probe, or using an external signal input, but also for applications where it is necessary to monitor the status and control apparatus; the instrument also features **4 digital inputs** and **4 digital outputs**.

The MCA4K is intended for **physical applications** and routine **measurements in industry and laboratory operations**, workplaces of **hygiene and water management professionals**, where **ease of operation** and the ability to adjust the parameters of the pulse amplitude analysis algorithm and other measurement parameters are required. The user or development worker has available **input signal diagnostics** even during measurement using a **built-in digital oscilloscope** and feedback measurement of the set high voltage for the probe.

Thanks to the possibility of input pulse diagnostics (built-in digital oscilloscope) and the software, MCA4K is **suitable** also **for expert education** of all levels for the easy demonstration of pulse amplitude processing algorithms from a scintillation or other probe. For long-term measurements, it is also possible to use **measurements in autonomous mode**, i.e., start the measurement via the USB interface from a connected computer, then disconnect the computer and subsequently reconnect the computer to load the measurement results, or to continue controlling the instrument.

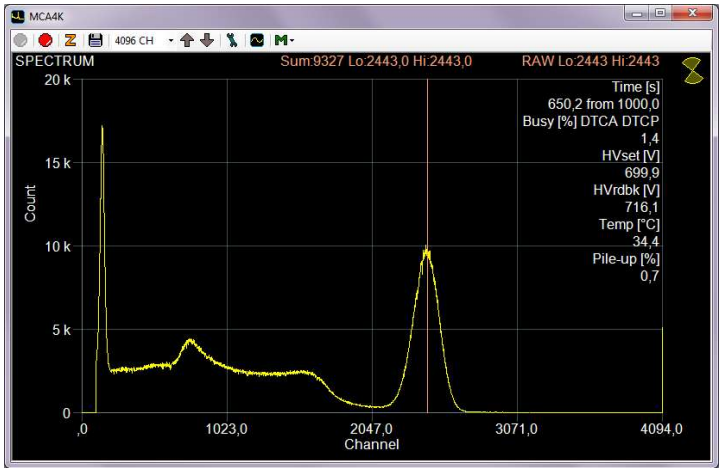
Basic parameters	**Inputs**
AD converter resolution 12 bits (4096 measuring channels), Sampling 80 MHz	Single-wire scintillation probe – high voltage positive, 0 to 1500 V, Max 1.3 mA – Shaping constant 1 μs – pulse undershoot compensation – gain setting (x1, x1.25, x1.7, x2.5, x5)
Internal memory 4096x32 bits (> 4.10^9 imp. /channel)	
Dead time: imposed 25 ns/pulse	
Shortest processed pulse 50 ns	External input: 0 to 5 V, approx. 1.3 mV/channel
Power Supply	**Communication Interface**
12V, stabilized 1A adaptor, current consumption approx. 300 mA	USB 2.0 full speed, 12 Mbit/sec for communication with PC
External lead-acid accumulator 12V	4x TTL input and 4x TTL output for general use
External source 10.8 to 16.8 V	
Overvoltage protection and reverse polarity protection	3x LED indicator HV, Communication, measurement
Operating Conditions	**Diagnostics**
Operating temperature: +5°C to +40°C, Rel. humidity max. 80% (laboratory conditions)	Digital oscilloscope, concurrent function with ongoing measurement
Storage temperature -25°C to +60°C	High voltage and instrument temperature measurement
Warm-up time: 30 minutes	Accumulated pulse counter (pile-up)
Mechanical Parameters	**Signal Processing**
Dimensions wxhxd: 107 mm x 57 mm x 196 mm including connectors	Spectrometric amplitude analyzer
Weight: approx. 500 g, depending on configuration	Correction for analyzer and detector dead time

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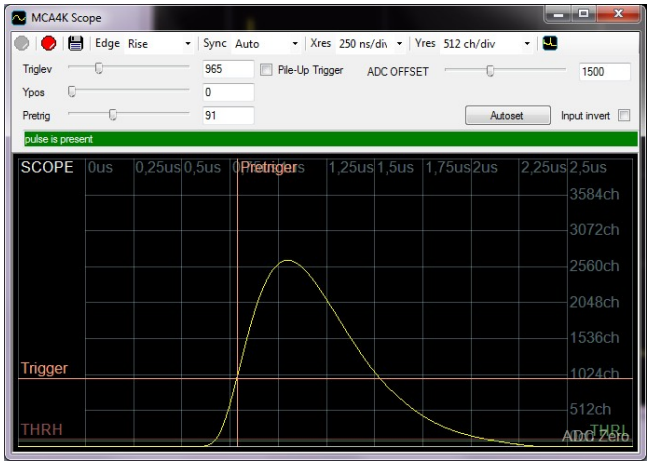
Software

The software package supplied as standard with the instrument includes measurement parameter setup, spectrum measurement, energy calibration for 1 to 6 points on the energy axis, and a digital oscilloscope. The MCA4K is conceived as an open system that enables the user to create their own software. The communication interface description and sample application software are part of the standard supplied documentation.

- Basic spectrometric software with evaluation and processing of accumulated pulses (pile-up):
  - Instrument setup: measurement time, HV, number of channels (256, 1024, 2048 or 4096) and more
  - Save/load instrument setup (*.csv)
  - Save measured spectrum (*.csv, *.chn, *.tka)
  - Browse saved spectra
  - Digital oscilloscope for input signal control with the ability to save the pulse waveform (*.csv)
  - Energy calibration
  - Detector plateau measurement
  - Spectrum measurement
  - Repeated measurement
  - Instrument firmware update
- Programming manual
- Python demo application with source code



Main program window, spectrum measurement



Built-in digital oscilloscope

Optional Extension

Additional (expansion modules) can optionally be installed in the MCA4K instrument.

Further extensions for special applications (by agreement with the customer) are possible, e.g., software, analyzer firmware, additional hardware modules, different probe connections, extended temperature range, or system integration.