Model MPA4, 8 ch acquisition system with 6 ns time tagging

The MPA4 is a Multiparameter Data Acquisition System

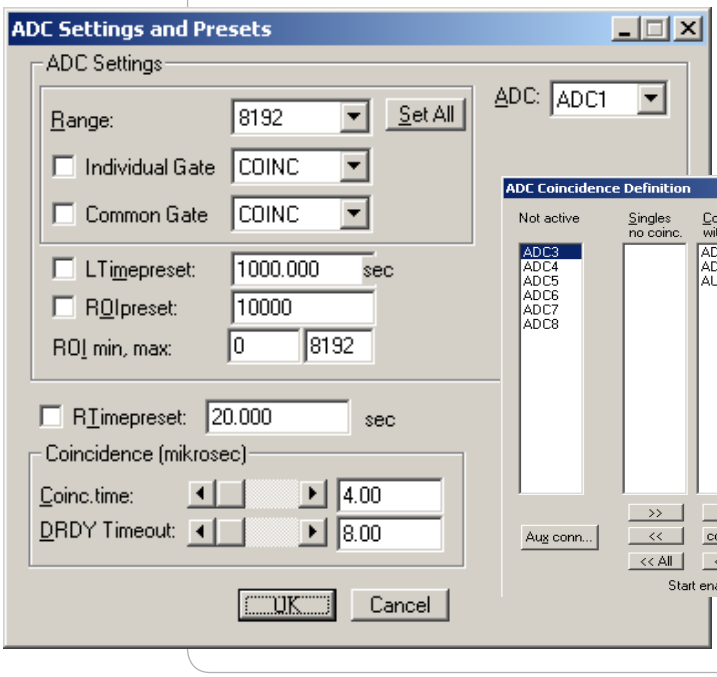
Description: Multiparameter System (4 or 8 channels)

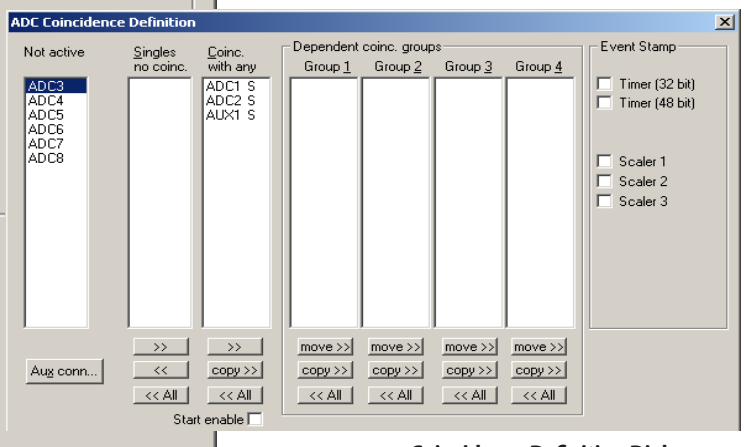
The MPA4 Multiparameter System is designed as an ultra fast list mode system with input ports for 4 or 8 ADCs, multiscalers or time-of-flight devices. 16-bit Ports can be combined to 32- or even 64-bit ports. For dependent single- and multiparameter acquisitions coincidence resolving times from approx. 20 ns (in steps of 20ns) to more than 1.3 ms can be selected. Eight 100 MHz 32-bit scalers are optionally available.

In „single mode" a 64 bit event word is inserted for each ADC. It can contain in addition to the ADC data the time in units of 6.4 ns (32 bits). This mode is very interesting also for multiparameter applications as the time for each individual ADC event is available separately.

In „coincident" mode the event word has a variable length of multiples of 64 bit. It contains the ADC data of valid conversions within the coincidence time window, and may contain in addition the time of the event with 6.4 ns resolution (up to 48 bit), and counter data of up to three scalers. It is possible to select special

ADC Settings and Presets Dialog





Coincidence Definition Dialog

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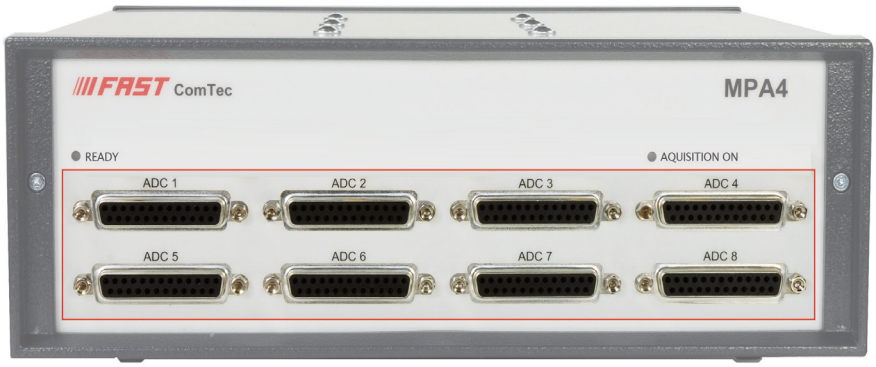


Front view of the MPA4

event patterns to drop unwanted events and reduce the amount of list data.
A 1 kHz timer word is inserted every millisecond. It is used for counting the real- and live time for each ADC. A Realtime preset using this timer is implemented in the hardware. The timer word can contain in addition the scaler #1 data.

Three auxiliary inputs/outputs are available, either as inputs to start a coincidence time window or mark events, or as outputs to monitor selected signals. One of them can be used to reject events.

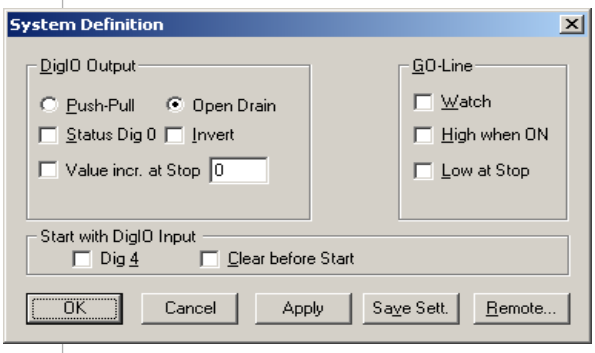
Eight 32-bit 100 MHz Scalers are optionally included. All are presettable and can be gated individually and by a common gate. The presets can be loaded via software or external input. Precise start and stop simultaneously with ADC's and external devices is assured by use of GO-Line.

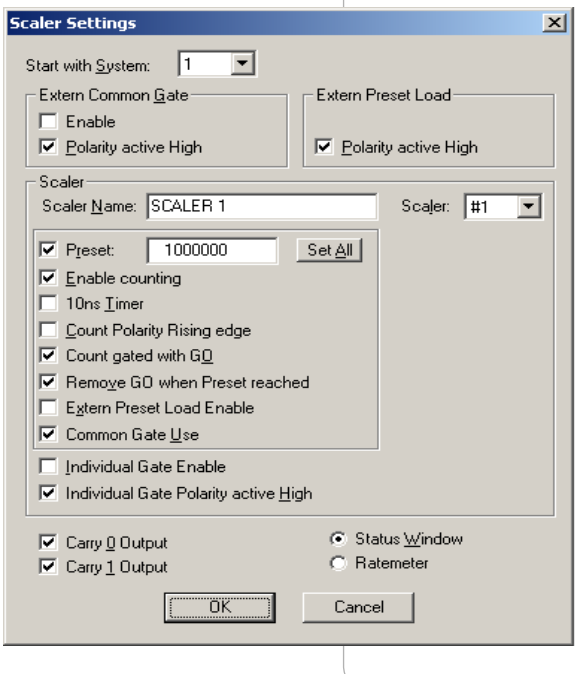
Two scalers can be used as up/down counters with extern controllable count direction. Carry outputs on two scalers enable 64 bit preset capability.

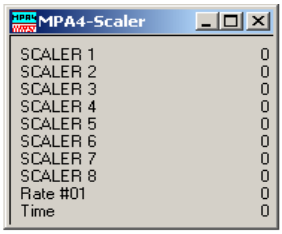
The MPA4 software is a 32-bit operating program developed to run under Microsoft Windows-XP/Vista/7 (32 or 64 bit). It is possible to define several single- and dual parameter spectra which can be simultaneously acquired and displayed. Calculated parameters can be defined to do evaluation of position-dependent detectors or any other applications.
One can accumulate single and multiparameter spectra in the RAM of the PC. Multiple windows of single and dual parameter spectra can be simultaneously displayed. List data can be stored on the local hard disk device or any other directly addressable storage device. Replay software for evaluation of list files is optionally available.

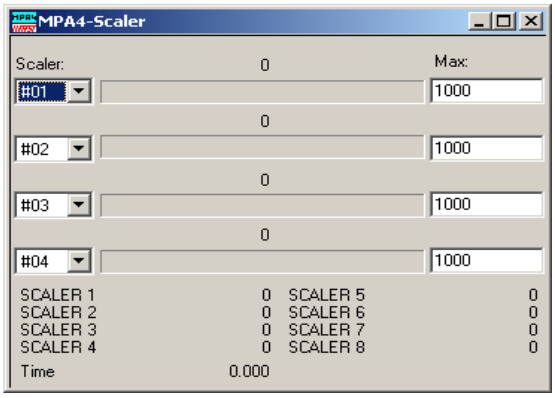
Graphical user interface for setup, datatransfer and spectral data display.
Drivers for LINUX are optionally available .

Dig I/O and GO-Line Settings Dialog









Scaler Settings, Status and Ratemeter

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Performance

Memory: 1024 x 6.4 ns fast FIFO, capable of recording at least 6.4 µsec at full burst rate, plus a 1GB USB-interface FIFO (2GB opt.).

Min. Pulse Width (pos. or neg.): 100 ps
Pulse Width resolution: 100 ps

Count Rate: The burst count rate to the FIFO can be recorded with no loss of data, the average continuous data throughput is up to 35MB/sec to the computer memory. Any data loss due to a full FIFO is signaled in the software.

Features

Ultra fast Multiparameter Multichannel Analyzer

- Different versions allow the flexible configuration of 4 or 8 parameter systems
- Large 2 GB FIFO enables extraordinary high burst count rates and buffering data without without any loss at a continuous throughput of 35 MB/sec.
- Parallel interfaces for (16 bit) ADCs and/or other compatible frontends like Multiscalers, Position Analyzers, Time-of-Flight devices etc.
- 16-bit Ports can be combined to 32- or even 64-bit ports.
- Single mode ADC data optionally with time in units of 6.4 ns (32 bits)
- 1 kHz timer word is inserted every millisecond for counting the real- and live time for each ADC.
- A Realtime preset using this timer is implemented in the hardware.
- The timer word can contain in addition the scaler #1 data.
- Coincidence mode with resolving times from approx. 20 ns (in steps of 20ns) to more than 1.3 ms
- Coincidence data may contain the time of the event with 6.4 ns resolution (up to 48 bit, option), counter data of up to three scalers, and two signal bits from auxiliary inputs.
- Each ADC and two auxiliary inputs can be enabled seperately to start a coincidence time window or not.
- It is possible to select special event patterns to drop unwanted events and reduce the amount of list data.
- Three auxiliary inputs/outputs are available, either as inputs to start a coincidence time window or mark events, or as outputs to monitor selected signals.
- One of them can be used to reject events.
- Eight 32-bit 100 MHz Scalers (option), all presettable. Individual and common gate. Preset load by external input possible (option).
- Precise start and stop simultaneously with ADC's and external devices by use of GO-Line.
- Scalers #2 and #3 can be used as up/down counters with extern controllable count direction.
- Carry out on Scalers #1 and #2 for 64-bit preset capability

Sophisticated MPANT Windows software

- 32-bit operating program developed to run under Microsoft Windows-XP/Vista/7 (32 or 64 bit).
- For each parameter a single- parameter spectra is automatically defined and displayed.
- It is possible to define several single- and dual parameter spectra in addition which can be simultaneously acquired and displayed.
- Calculated parameters can be defined to do evaluation of position-dependent detectors or any other applications.
- ROIs in single- and dualparameter spectra can be defined and evaluated.
- Rectangular, polygonal, circular and ring ROIs in dualparameter spectra.
- Projections and slices
- Conditions can be set on events inside or outside an ROI, conditions can be combined.
- Replay software for evaluation of list files optionally available.

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Specifications Connectors

Frontside of the MPA4

FRONT PANEL:

D-Sub 25: 4x or 8x 25 pin D-SUB (female) for data input and control lines for external ADC)

Rearside of the MPA4

REAR PANEL:

AUX 1, AUX 2, AUX 3: BNC (female) bidirectional TTL I/O several functions can be programmed.

COUNTER inputs: 37- pin D-SUB (female),

Feature connector: 15-pin D-SUB HD (female), 8-bit user configurable digital I/O port (TTL compatible), GO-line, Sync output 2, +5V power (fused), DAC out: 0...2.5V (14 bit)

Gate inputs: 15-pin D-SUB HD (female),

GO-line connector: BNC connector, open drain (wired-AND), 22k Ohm pull-up

Reference clock: BNC connector, I/O, TTL compatible, (10 MHz), input: AC- coupled

Powerconnector: KPJ-4S-S
4 pin high current connector

INTERNAL:

Reference clock:
10 MHz ovenized crystal oscillator, Frequency stability 0.03 ppm @ 0 to 50 °C,

Operating Temperature Range: 0°C to +50°C

Power Requirements: 12V / 6A

Physical: aluminum case,
260mm x 93mm x 265mm, 3.1 kg

Shipping case: 470 x 370 x 160mm, 6.9 kg

Accessories:

- USB 2.0 AB cable 3m (2x)
- Input cable: RG316 (PTFE), 2m, SMA + BNC connector (6 x)
- External power supply: IN: 90 - 264 V AC Out: 12 V DC / 8.4 A
- Operating software on CD
- Operating software on Memory stick
- Handbook

Software:

The 32 bit MPANT software for the MPA4 consists of a hardware-dependent server program with DLL and a general graphics program that controls the hardware via the DLL. List file recording can be done simultaneously with histogramming. A replay function for evaluation of list files is included. The spectra data can be saved into a single data file using different formats like binary and ASCII, single spectra can be extracted. Handling of 2d histograms enable sequential acquisition of seperated sweeps into rows of 2d histograms as well as spectra marked by tag bits or a 2d view of pulse width versus time. Even coincidence acquisition of dualparameter histograms is possible, for example for using position dependent detectors. MACRO commands enable automatic execution of scripts for acquisition and evaluation.

Software options:

- DLL and VI's for LabVIEW, C , Visual Basic and Delphi

  To support the programming of MS-Windows based customer-specific user interfaces in a laboratory automation environment, we optionally deliver documentation such as sourcecode and example programs for Visual Basic, LabVIEW, C and Delphi - see separate datasheet.
- External Control Software

  Optional MCDLAN software enables remote control via Local Area TCP/IP Network or RS232.
- Linux driver software

  A Linux driver and library with console testprogram will be optionally available.

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Order Information		
Model	**Description**	**Order No.**
MPA4-4	Multiparameter-4 system, 4 ADC interfaces, 1GB Fifo, USB, MPA-NT Software	MPA44
MPA4-8	Multiparameter-4 system, 8 ADC interfaces, 1GB Fifo, USB, MPA-NT Software	MPA48
MPA4T-4	Multiparameter-4 system, 4 ADC interfaces, RTC, 5+1 Input 10GHz TOF-Multiscaler, 100ps, 1GB Fifo, USB interfaces, MPA-NT Software	MPA4T4
MPA4T-8	Multiparameter-4 system, 8 ADC interfaces, RTC, 5+1 Input 10GHz TOF-Multiscaler, 100ps, 1GB Fifo, USB interfaces, MPA-NT Software	MPA4T8
MPA4-FIFO2	Option 1GB Fifo extra (2GB total)	MPA4F2
MPA4RTC	Real Time Clock for ADC ports, 48 bits, 6.4 ns resolution	MPA4RTC
MPA4COUNT	Octal Counter / Scaler option for MPA4 / MPA4T, 32 bit, 8 channels, 100 MHz	MPA4C
MPA4UP-DN	Dual UP / DOWN option for MPA4 / MPA4T, requires MPA4COUNT	MPA4UD
MPA4TAG	TAG bit option for MPA4T, 16 bits, 6.4 ns resolution	MPA4TAG
MPA4RPlay	MPA4 / MPA4T Replay software for off-line reconstr. of spectra from listmode, internal	MPA4S5
MPA4RPlayEx	MPA4 / MPA4T Replay software for off-line reconstr. of spectra from listmode, Dongle	MPA4S6
MPA4RPlay+Ex	MPA4 / MPA4T Replay software for off-line reconstruction, Dongle, int.	MPA4S7
MPA4DLL32	DLL for LabVIEW /"C"/ Visual Basic (32 bit) for the MPA4	MPA4S1
MPA4TDLL32	DLL for LabVIEW /"C"/ Visual Basic (32 bit) for the MPA4T	MPA4S3
MPA4LINUX	LINUX drivers for MPA4 - ask for delivery time	MPA4S2
MPA4TLINUX	LINUX drivers for MPA4T - ask for delivery time	MPA4S4

Typical Applications

Typical applications are:

- Ultra fast multiparameter list mode data acquisition with up to 16 external ADCs, multiscalers or Time-of-Flight front-ends
- Ultra fast single parameter list mode data acquisition
- Ultra fast multi-spectrum acquisition + display

LIST-MODE: Max. Throughput: List-Mode data stored in RAM or on hard disk array: 4.400.000 events/s (converted ADC data) integral using up to 8 ADCs in single parameter mode. theoretically up to 15.000.000 events/s integral for list mode recording of up to 8 coincident ADCs, (not adjusted for coincidence time settings).

PHA-MODE: Single parameter mode, Spectrum acquisition from up to 8 ADC's

Multiparameter mode, Spectrum acquisition with display of any (ADC) combination of dual parameter spectra.

Simultaneous single- and multiparameter acquisition and display of single- and multiparameter spectra

Combined List-MODE and PHA MODE data stored in RAM and on hard disk:

Simultaneous storage on hard-disk array and spectrum acquisition in the computer memory with display of any combination of single and multiparameter spectra

Examples of time range settings				
time bits	**tag bits**	**sweep counter**	**Max. Sweep length**	**Data word length**
54	5	0	20.8 days	64 bit
44	16	0	30 minutes	64 bit
36	16	7	6.8 seconds	64 bit
28	16	16	27 msec	64 bit
44	0	0	30 minutes	48 bit
36	8	0	6.8 seconds	48 bit
36	0	7	6.8 seconds	48 bit
28	16	16	27 msec	48 bit
28	0	0	27 msec	32 bit
20	0	8	105 µsec	32 bit
12	0	0	0.4 µsec	16 bit

Options											
Version	**ADC ch**	**TDC ch**	**RTC 6.4ns**	**TAG**	**Counter (8)**	**UP/DN input**	**Sync out**	**Digital I/O**	**2 GB FIFO**	**Replay**	**Oven osc.**
MPA4T-8	8	5	x	o	o	o	x	x	o	o	x
MPA4T-4	4	5	x	o	o	o	x	x	o	o	x
MPA4-8	8	-	o	-	o	o	-	x	o	o	o
MPA4-4	4	-	o	-	o	o	-	x	o	o	o
MPA4-2	2	-	o	-	o	o	-	x	o	o	o
MCS6A	-	5	-	x	-	-	x	x	o	-	x
MCS6A2	-	2	-	o	-	-	x	x	o	-	x

o option **-** not possible **x** installed

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