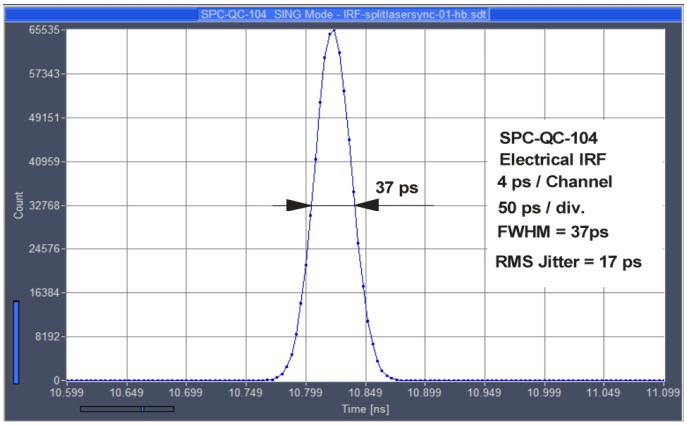
SPC-QC-004 TCSPC / Time-Tagger Module

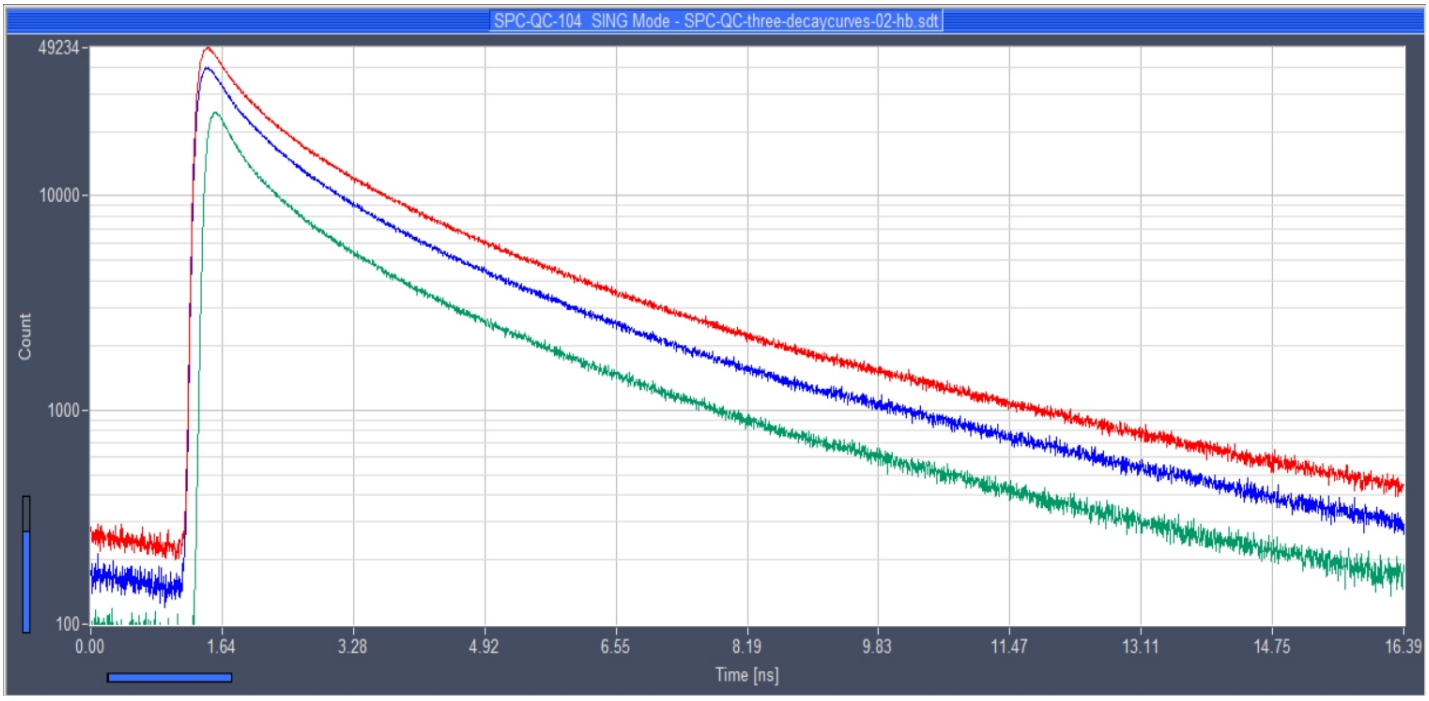
3 Channel Time-Correlated Single Photon Counting Module
4 Channel Time-Tagging Module

Three parallel TCSPC / FLIM channels plus one synchronisation / reference channel
or
Four absolute-timing channels
Ultra-high discriminator bandwidth
Excellent timing stability
Low dead time
High peak count rate

Recording of optical waveforms
Excitation-multiplexed recording
Multi-wavelength recording
Photon time and parameter tagging

Fluorescence decay measuremet
LIDAR
Anti-bunching experiments
Coincidence experiments
fNIRS and NIRS experiments
Single-molecule spectroscopy
Fluorescence correlation





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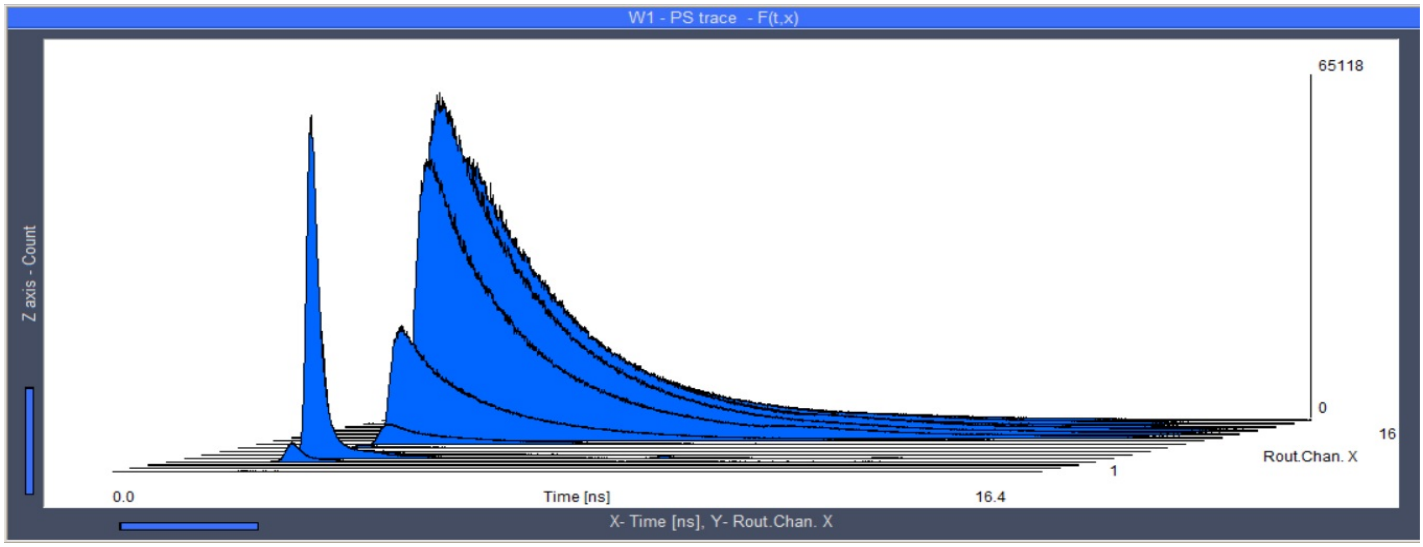
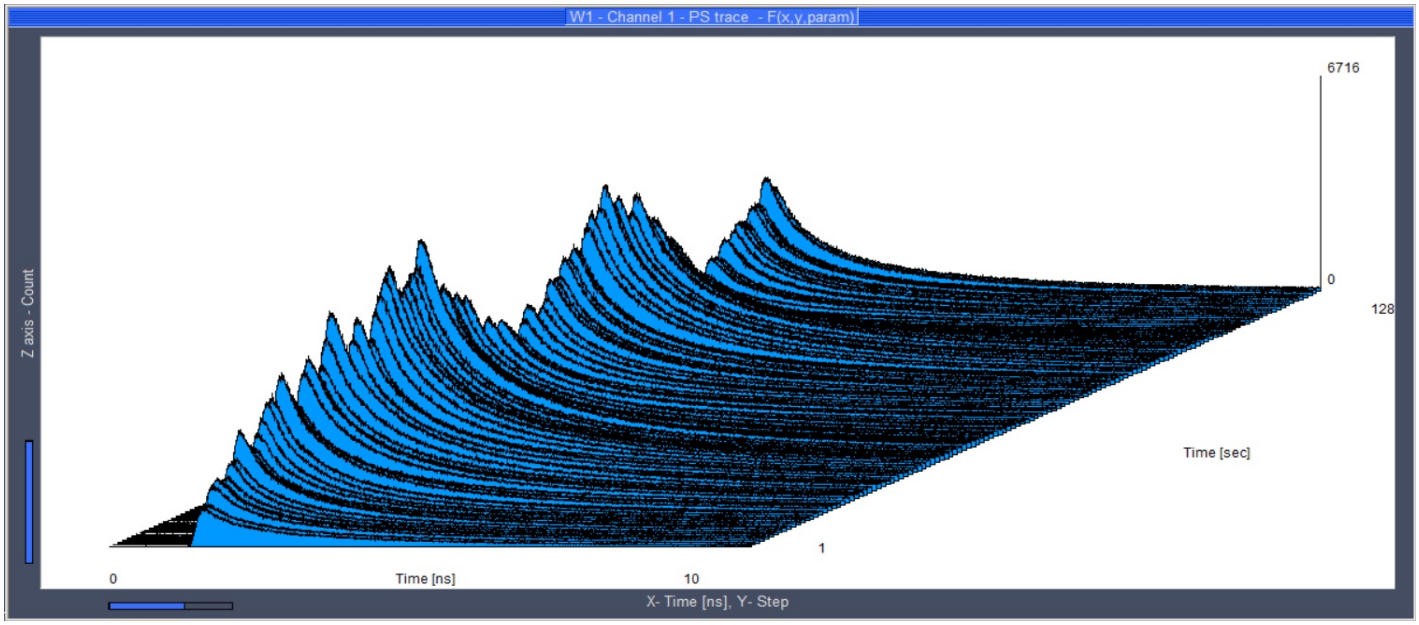
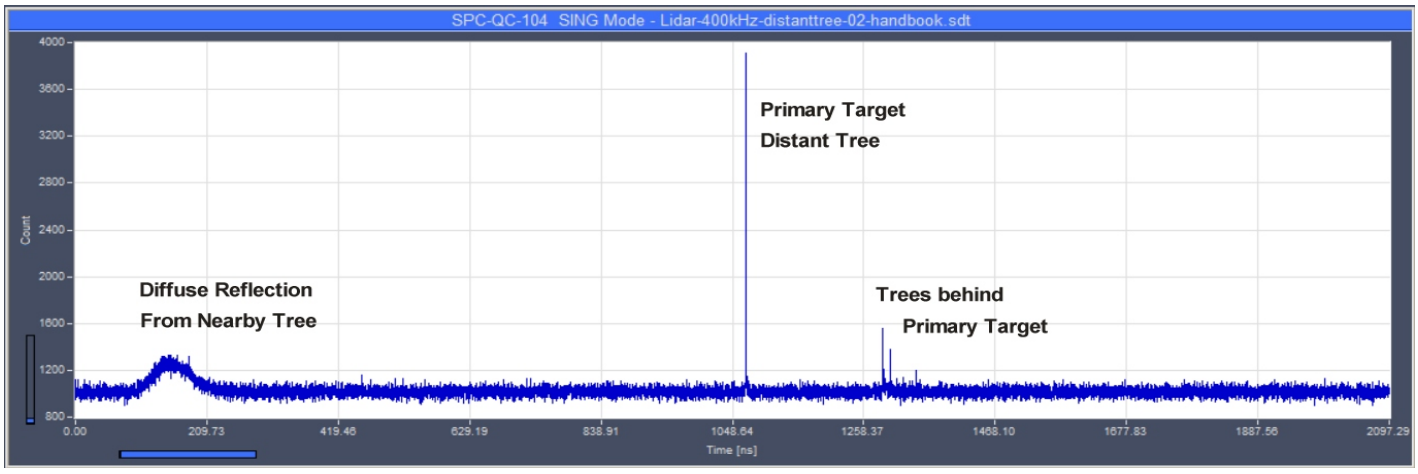


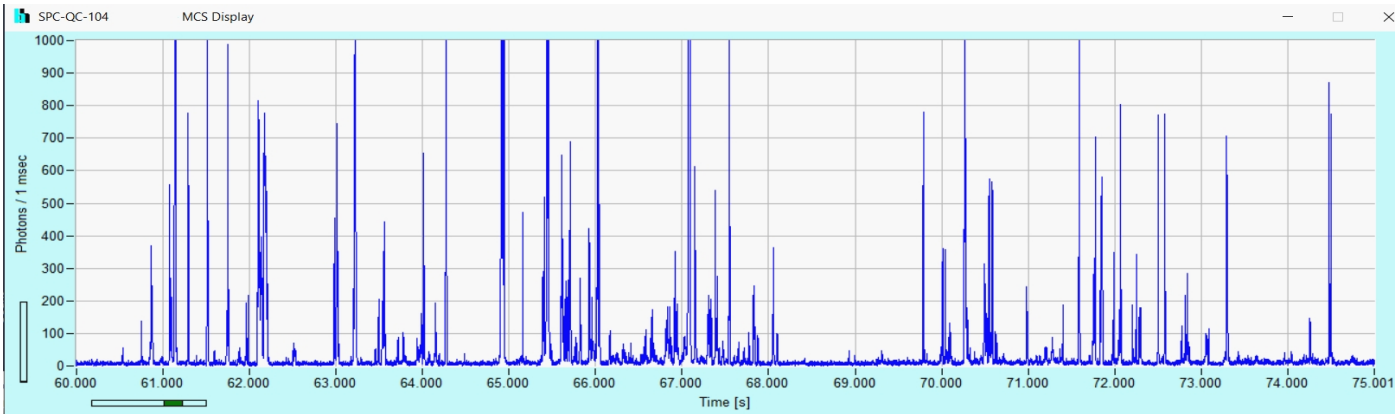
Fluorescence Decay, Multi-Wavelength Deection



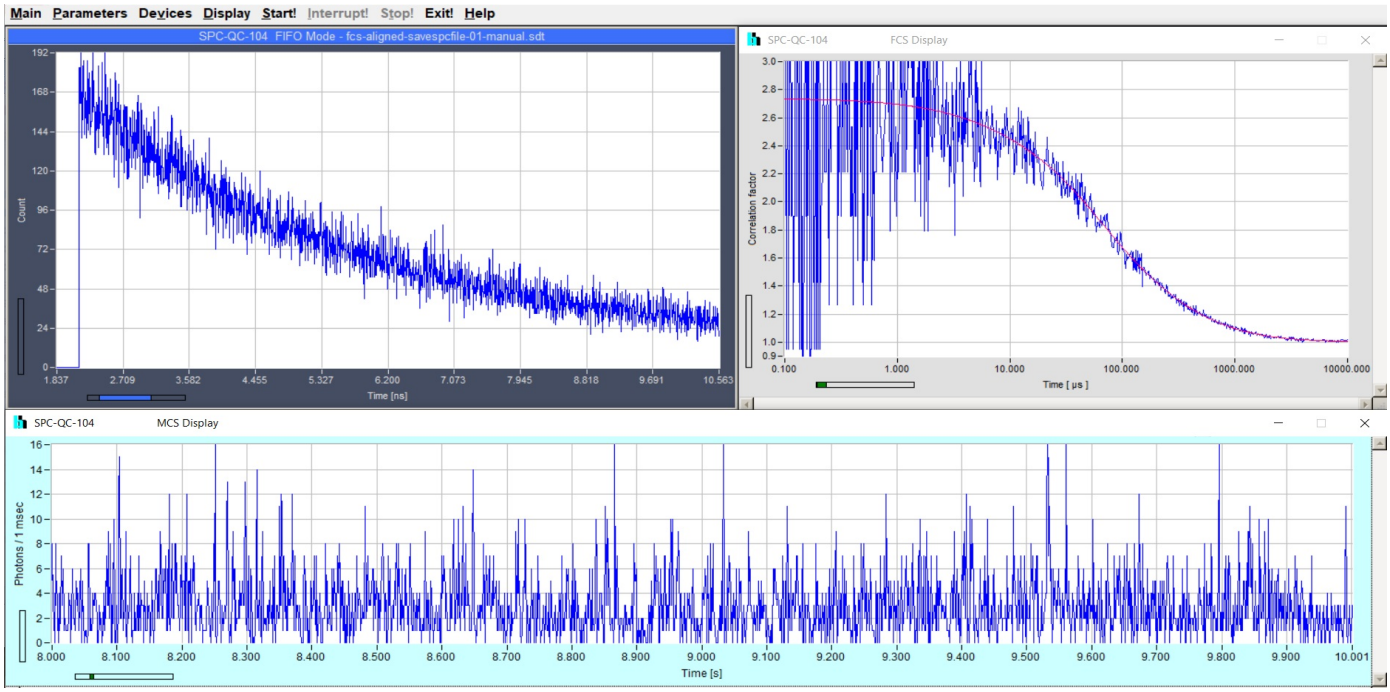
Fluorescence Decay, Time-Series Recording



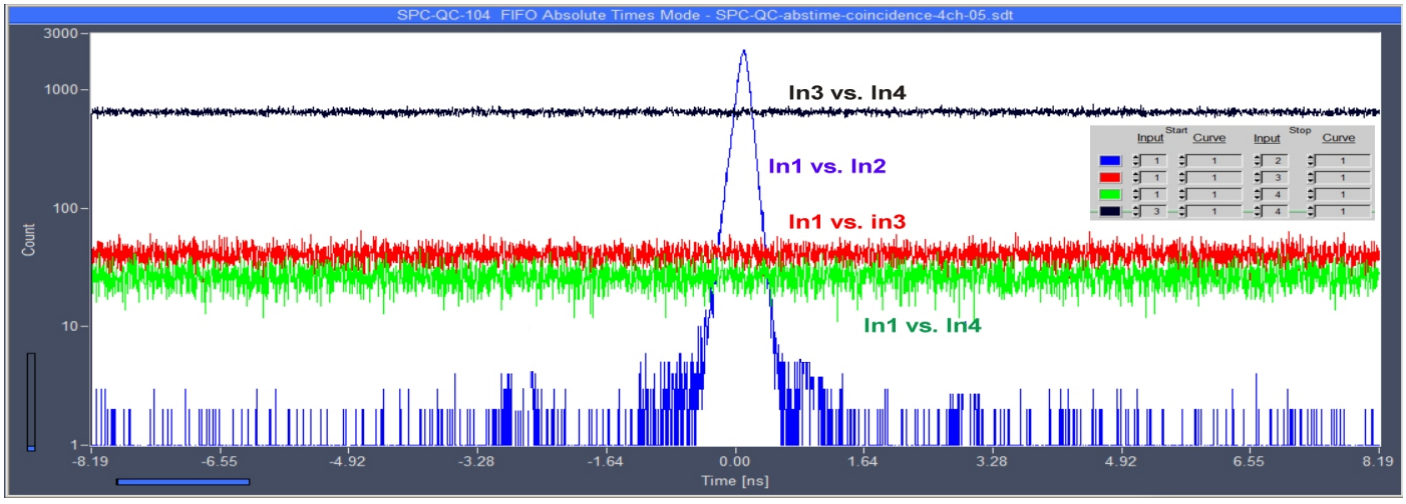
LIDAR



Fluorescent Particles, diffusion through Laser Focus



Fluorescence Decay / Fluorescence Correlation Measurement



Coincidence Measurement

SPC-QC-004 TCSPC / FLIM Module

Photon Channels

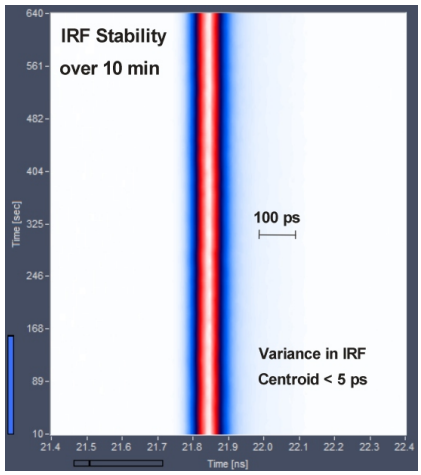
No. of channels	3 or 4
Principle	Constant Fraction Discriminator (CFD)
Discriminator Input Bandwidth	4 GHz
Optimum Input Voltage Range	- 30 mV to - 500 mV
Min. Input Pulse Width	200 ps
Threshold	0 to - 250 mV
Zero Cross Adjust	- 100 mV to + 100 mV

Synchronisation Channel / Fourth Photon Channel

Principle	Constant Fraction Discriminator (CFD)
Discriminator Input Bandwidth	4 GHz
Optimal Input Voltage Range	- 30 mV to - 500 mV
Min. Input Pulse Width	200 ps
Threshold	0 to - 250 mV
Zero Cross Adjust	-100 mV to + 100 mV
Frequency Range	0 to 120 MHz
SYNC Frequency Divider	1 - 2 - 4

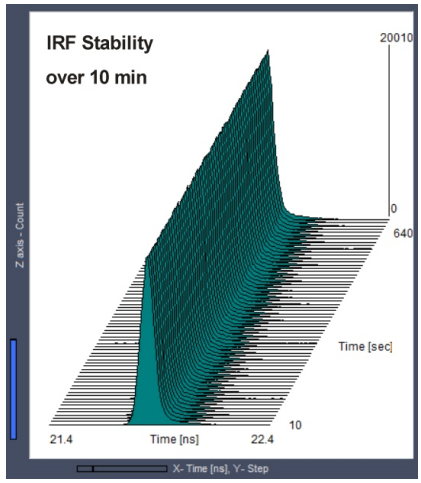
Time-Measurement Circuitry

Principle	Time-to-Digital Converter
IRF Width, FWHM	< 39 ps, FWHM
RMS Timing Jitter	< 18 ps, RMS
Time Range, at 4096 time channels	16 ns to 68 us
Min. Time / Channel	4 ps
Timing stability, range 16 ns, over 10 minutes	<5 ps RMS
Diff. Nonlinearity	< 1 % RMS
Dead Time	8 ns



Data Acquisition (Histogram Modes)

Method	on-board multi-dimensional hardware histogramming process
Peak Count Rate, each channel	120 MHz
Saturated count rate, continuous	40 MHz
Max. Counts / Time Channel (Counting Depth)	2^{16}-1
Max. No. of Time Channels	65,536
Overflow Control	none / stop / repeat and correct
Collection Time	0.1 us to 100,000 s
Display Interval Time	10 ms to 100,000 s
Repeat Time	0.1 us to 100,000 s
Synchronisation with Scanning (Imaging Mode)	pixel, line and frame clocks from scanning device
Routing	4 bit TTL
Count Enable	1 bit TTL
Experiment Trigger	TTL



Data Acquisition (FIFO / Parameter-Tag and Absolute-Time Mode)

Method	Parameter-tagging of individual photons, continuous writing to disk
Online Display	Decay function, FCS, Cross-FCS, PCH, MCS traces
FCS Calculation	Multi-tau algorithm, online calculation and online fit
Number of Counts of Decay / Waveform Recording	unlimited
Peak Count Rate	120 MHz
Sustained Count Rate (Bus-Transfer Limited)	10 MHz
Max. Counts / Time Channel (Counting Depth)	unlimited
Max. No. of Time Channels	4096
On-board FIFO Buffer Capacity (Photons, per Channel)	750,000
Macro Timer Resolution, Internal Clock	2 ns, overflows marked by MTOF entry in data stream
Routing	4 bit, TTL/CMOS
External Event Markers	4 bit, TTL/CMOS
Experiment Trigger	TTL/CMOS

Operation Environment

Operating System	Windows 10, Windows 11
Bus Connector (Slot type)	PCI-ex
Total Power Consumption	approx. 12 W from +12V
Dimensions	205 mm x 110 mm x 15 mm

Related Products

SPC-QC-104 three/four-channel TCSPC / FLIM module, SPC-180N, SPC-180NX, SPC-180NXX TCSPC modules, HPM-100 hybrid detectors, DCC-100PCIe detector controller
BDS-SM ps diode lasers,BDS-MM picosecond diode lasers, SPCImage NG data analysis software

Related Literature

SPC-QC-104, user manual. 92 pages, available on https://www.becker-hickl.com
W. Becker, The bh TCSPC Handbook, 11th edition (2026). 1058 pages, available on https://www.becker-hickl.com. Please contact bh for printed copies.
The bh TCSPC Technique, Principles and Applications. Overview brochure, 27 pages, available on https://www.becker-hickl.com

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