KiNOVA Pro

Type 5809A20A...

Flexible Acquisition Hardware for NVH

KiNOVA Pro is a versatile and expandable data acquisition hardware for NVH applications, designed to fulfil the requirements of engine bed, in-vehicle or laboratory measurements.

Key technical features:
- Rugged device, suitable for engine bed, in-vehicle or laboratory applications
- Portable, extendable, stackable
- Customizable with a variety of cards
- Standalone operation: built-in processor and solid-state storage
- Internal battery and OLED display
- USB and Ethernet communications

KiNOVA Pro/Data Acquisition Hardware

KiNOVA Pro is a rugged data acquisition system designed to ensure accurate NVH measurements under any measurement setting.

The hardware is configurable and can be customized based on the measurement needs. KiNOVA Pro can host up to 32 Voltage/IEPE channels per unit and ensures compatibility with Kistler's IEPE accelerometers besides other common sensors for NVH applications. Higher channel count can be reached by stacking multiple units. Moreover, a variety of cards allow further extending the type of inputs and output. Every unit hosts two built-in tacho inputs to acquire data or trigger the system externally. If higher tacho resolution is needed Kistler offers an additional four channels tacho input card with ultra-high resolution.

KiNOVA Pro supports three operating modes. Connected by USB or Ethernet to the computer it can be used as a front-end data acquisition or as a monitoring system. In addition, thanks to the built-in processor, it is possible to run the system in standalone mode to operate the measurements disconnected from any device and preserving the data on the internal storage.

Data acquisition is managed by KiNOVA Acquisition, which also supports remote channel statistics for monitoring applications.

Transport case and housing

KiNOVA Pro comes with a case ensuring high levels of protection during transportation and in-field measurement. KiNOVA Pro is MIL-SPEC 81-41 approved and IP56 rated. Besides providing ample storage for the accessories, it allows operating the system while in the case.

Technical data

Hardware chassis

Inputs		4 configurable card slots per unit (max. 32 ch per unit) 2 built-in tacho input per unit
Expansion		Stackable by Ethernet and USB
Max. sampling rate		Depending on the card: 300 k samples/sec/channel @24-bit 800 k samples/sec/channel @16-bit (different sampling rates can run on separate cards)
Tacho inputs		2 channels (built-in)
Tacho mode		IEPE, Direct
Tacho sampling rate		– 16x the sampling rate, when sampling rate is <50 k Sps – Same as the sampling rate, when sampling rate is >50 k Sps
Tach Input range	V	24
Communications		USB, Ethernet (Gigabit), Wireless (with Nano USB adapter, optional)
Supply voltage		Internal battery, external +/- 10V to +/- 36V DC, AC mains (adapter supplied)
Dimensions (H x W x D)	mm	115 x 360 x 225
Weight	kg	5 (depending on configuration)

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Technical data (continuation)

Processor		Intel Atom E3825, 1.33 GHz
Storage	GB	128 (solid-state)
Battery		Up to 4 hours (depending on configuration)

Environment and general data

Shock and vibration		MIL-STD-810G
Operating temperature	°C	-10°C ... 45°C – cold start -20°C ... 45°C – warm start
IP rating		IP 31
Humidity		95% RH, non-condensing
Power consumption	W	<80 W (worst case)

Intel Atom is a registered trademark of the Intel Corporation.

KiNOVA Pro includes:
- KiNOVA Pro – data acquisition system
- Connecting cable – USB-A to USB-B (2 m)
- Ground cable (2 m)
- Power supply with IEC cable (country specific)
- DC power cable
- Ethernet crossover cable (2 m)
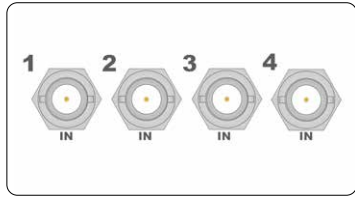- Rugged transport case

Optional Input and Output cards:
One KiNOVA Pro unit can feature up to 4 cards chosen from the following selection.

The chassis has two tacho inputs Tacho 1 and Tacho 2 to have a tacho input available on Tacho 1 either an 1, 1H, 2, 2H, 3 or 4 card needs to be fitted in slot 1. Similarly, to have a tacho input available on Tacho 2 either an 1, 1H, 2, 2H, 3 or 4 card needs to be fitted in slot 2.

For general NVH applications we advise to feature a KiNOVA Pro with two cards no. 3 (8 channel ADC + Tacho, IEPE, Direct, TEDS). This gives a total of 16 IEPE channels plus two additional built-in tacho inputs.

Technical data

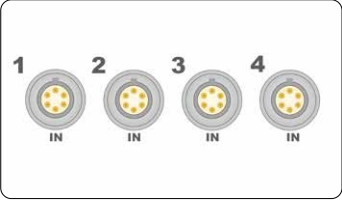| Card No. 1: 4 channel ADC + Tacho, IEPE, Direct	
Description	4 channel analogue input card with 1 tacho Designed for universal use, this card has built-in signal conditioning for almost all types of transducer. It has the capability of high sample rates – up to 400 kSps at 16-bit – and synchronous parallel sampling with an additional tachometer input. It also offers a choice of AC or DC coupling to direct voltage inputs and support for IEPE transducers, including those with TEDS.
Input channels	4
Connector	BNC
Input range	±10 mV to ±10 V (common range ±10 V)
16-bit sample rate	400 k samples/sec/channel
24-bit sample rate	100 k samples/sec/channel
Effective bandwidth	0.4 x sample rate
Anti-aliasing attenuation	>100 dB
AC coupling high pass filter	20 db/dec -3dB at 0.3 Hz or 1Hz
DC/AC Input	Yes/Yes
IEPE/Charge Input	Yes/No
Programmable excitation/ bridge completion	No/No
24-bit Dynamic range	105 dB at 10 Ks/s
24-bit Noise floor	-120 dB at 10 Ks/s
16-bit Dynamic range	92 dB at 10 Ks/s
16-bit Noise floor	-110 dB at 10 Ks/s
Non-linearity	<1 bit
Accuracy	±0.1% FSD
DC Offset control	±50% FS in 32,768 steps
Tacho channels	1
Tacho input range	±28 V
Supports TEDS	Yes
Auto-zero	Yes
Gain Steps	13
Absolute max. input range	±24 V
Power usage (worst case)	6 W

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Technical data

Card No. 1H:

4 high speed channel ADC + Tacho, IEPE, Direct

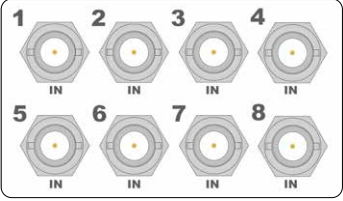| Description	4 channel high speed analogue input card with 1 tacho
	This card is a high speed version of card number 1. The main distinguishing feature is the sampling rate – the capabilities reach up to 300 kSps at 24-bit and 800 kSps at 16-bit. This increases the measurement accuracy to an ultra-exact performance.
Input channels	4
Connector	BNC
Input range	±10 mV to ±10 V (common range ±10 V)
16-bit sample rate	800 k samples/sec/channel
24-bit sample rate	300 k samples/sec/channel
Effective bandwidth	Up to 160 kHz
Anti-aliasing attenuation	>100 dB
AC coupling high pass filter	20 db/dec -3dB at 0.3 Hz or 1Hz
DC/AC Input	Yes/Yes
IEPE/Charge Input	Yes/No
Programmable excitation/ bridge completion	No/No
24-bit Dynamic range	105 dB at 10 Ks/s
24-bit Noise floor	-120 dB at 10 Ks/s
16-bit Dynamic range	92 dB at 10 Ks/s
16-bit Noise floor	-110 dB at 10 Ks/s
Non-linearity	<1 bit
Accuracy	±0.1% FSD
DC Offset control	±50% FS in 32,768 steps
Tacho channels	1
Tacho input range	±28.5 V
Supports TEDS	Yes
Auto-zero	Yes
Gain Steps	13
Absolute max. input range	±24 V
Power usage (worst case)	5 W

Technical data

Card No. 2:

4 channel ADC + Tacho, IEPE, Direct, Bridge

Description	4 channel analogue input card with 1 tacho, plus bridge
	This card shows the main features of the previous one and includes bridge completion and transducer excitation. Each of the 4 channels provides bridge completion configurations of quarter, half and full bridge, internal calibration shunt resistors and selectable bridge resistance of 120, 350 or 1,000 Ω. Each channel also provides program selectable supply voltage of 5 and 10V for transducer excitation.
Input channels	4
Connector	Lemo 6-pin
Input range	±10 mV to ±10 V (common range ±10 V)
16-bit sample rate	400 k samples/sec/channel
24-bit sample rate	100 k samples/sec/channel
Effective bandwidth	0.4 x sample rate
Anti-aliasing attenuation	>100 dB
AC Coupling high pass filter	20 db/dec -3dB at 0.3 Hz or 1 Hz
DC/AC Input	Yes/Yes
IEPE/Charge Input	Yes/No
Programmable excitation/ bridge completion	Yes/Yes
24-bit Dynamic range	105 dB at 10 Ks/s
24-bit Noise floor	-120 dB at 10 Ks/s
16-bit Dynamic range	92 dB at 10 Ks/s
16-bit Noise floor	-110 dB at 10 Ks/s
Non-linearity	<1 bit
Accuracy	±0.1% FSD
DC Offset control	±50% FS in 32,768 steps
Tacho channels	1
Tacho input range	±28 V
Supports TEDS	Yes
Auto-zero	Yes
Gain Steps	13
Absolute max. input range	±24 V
Power usage (worst case)	8 W

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Card No. 2H:

4 high speed channel ADC + Tacho, IEPE, Direct, Bridge

Description	4 channel high speed analogue input card with 1 tacho, plus bridge
	This card is a high speed version of card number 2. The main distinguishing feature is the sampling rate – the capabilities reach up to 300 kSps at 24-bit and 800 kSps at 16-bit. This increases the measurement accuracy to an ultra-exact performance. Each of the 4 channels provides bridge completion configurations of quarter, half and full bridge, internal calibration shunt resistors and selectable bridge resistance of 120, 350 or 1,000 Ω. Each channel also provides program selectable supply voltage of 5 and 10 V for transducer excitation.
Input channels	4
Connector	Lemo 6-pin
Input range	±10 mV to ±10 V (common range ±10 V)
16-bit sample rate	800 k samples/sec/channel
24-bit sample rate	300 k samples/sec/channel
Effective bandwidth	Up to 160 kHz
Anti-aliasing attenuation	>100 dB
AC Coupling high pass filter	20 db/dec -3dB at 0.3 Hz or 1 Hz
DC/AC Input	Yes/Yes
IEPE/Charge Input	Yes/No
Programmable excitation/ bridge completion	Yes/Yes
24-bit Dynamic range	105 dB at 10 Ks/s
24-bit Noise floor	-120 dB at 10 Ks/s
16-bit Dynamic range	92 dB at 10 Ks/s
16-bit Noise floor	-110 dB at 10 Ks/s
Non-linearity	<1 bit
Accuracy	±0.1% FSD
DC Offset control	±50% FS in 32,768 steps
Tacho channels	1
Tacho input range	±28.5 V
Supports TEDS	Yes
Auto-zero	Yes
Gain Steps	13
Absolute max. input range	±24 V
Power usage (worst case)	8 W

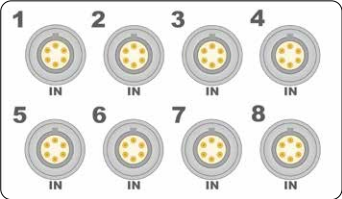## Technical data

Card No. 3:

8 channel ADC + Tacho, IEPE, Direct, TEDS

Description	8 channel analogue input card with 1 tacho
	This card reaches industry standard for NVH applications, ensuring high quality, repeatability and high resolution. It is the standard card advised for KiNOVA Pro and given the high channel density it allows reaching the maximum channel count per hardware unit (32 per unit). It also offers a choice of AC or DC coupling to direct voltage inputs and support for IEPE transducers, including those with TEDS.
Input channels	8
Connector	BNC
Input range	±10m V to ±10 V (common range ±10 V)
24-bit sample rate	100 k samples/sec/channel
Effective bandwidth	0.4 x sample rate
Anti-aliasing attenuation	>100 dB
AC Coupling high pass filter	20 db/dec -3 dB at 0.3 Hz or 1 Hz
DC/AC Input	Yes/Yes
IEPE/Charge Input	Yes/No
Programmable excitation/ bridge completion	No/No
24-bit Dynamic range	102 dB at 10 Ks/s
24-bit Noise floor	-120 dB at 10 Ks/s
Non-linearity	<1 bit
Accuracy	±0.1% FSD
DC Offset control	±100% FS in 32,768 steps
Tacho channels	1
Tacho input range	±28 V
Supports TEDS	Yes
Auto-zero	Yes
Gain Steps	4
Absolute max. input range	±24 V
Power usage (worst case)	6 W

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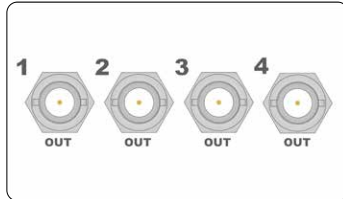measure. analyze. innovate.

Technical data

Card No. 4:	
8 channel ADC + Tacho, Direct, Bridge	
Description	8 channel analogue input card with 1 tacho
	This card shows the main features of the previous one and includes bridge completion and transducer excitation. Each of the 8 channels provides bridge completion configurations of quarter, half and full bridge, internal calibration shunt resistors and selectable bridge resistance of 120, 350 or 1,000 Ω. Each channel also provides program selectable supply voltage of 5 and 10 V for transducer excitation.
Input channels	8
Connector	Lemo 6-pin
Input range	±10 mV to ±10 V (common range ±10 V)
24-bit sample rate	100 k samples/sec/channel
Effective bandwidth	0.4 x sample rate
Anti-aliasing attenuation	>100 dB
AC Coupling high pass filter	20 db/dec -3 dB at 0.3 Hz or 1 Hz
DC/AC Input	Yes/Yes
IEPE / Charge Input	Yes/No
Programmable excitation/ bridge completion	Yes/Yes
24-bit Dynamic range	102 dB at 10 Ks/s
24-bit Noise floor	-120 dB at 10 Ks/s
Non-linearity	<1 bit
Accuracy	±0.1% FSD
DC Offset control	±100% FS in 32,768 steps
Tacho channels	1
Tacho input range	±28 V
Supports TEDS	Yes
Auto-zero	Yes
Gain Steps	4
Absolute max. input range	±24 V
Power usage (worst case)	12 W

Technical data

Card No. 5:	
4 channel Advanced Tacho card	
Description	4 channel advanced tacho input card
	This card is ideal for acquiring positional information and time relative positional information of rotating machineries. Torsional and angular vibration can be measured precisely, thanks to this high-speed and high-resolution card. It can measure the pulses with a resolution of 4ns!
Tacho input channels	4
Connector	BNC
Resolution	4 ns
Tacho input range	±30.1 V
Absolute max. input range	±50 V
Slope selection	-ve
Dynamic noise rejection	Yes
Power usage (worst case)	1.3 W

Technical data

Card No. 6:	
4 channel DAC output card	
Description	4 channel DAC output card
	This output card is ideal to replay analogue signals. Used for applications such as modal analysis or general noise and vibration analysis, where source or shaker control is required. Generated or captured signals can be replayed as analogue voltage signals.
Analogue output channels	4
Connector	BNC
24-bit sample rate	48 k samples/sec/channel
Analogue output range	±4 V
Power usage (worst case)	1.8 W

5809A20A_003-480e-03.22

Technical data

Card No. 7: 8 channel thermocouple card	
Description	8 channel Thermocouple input card
	This card gives the option for temperature data to be integrated and synchronised with noise and vibration data. The industry standard connectors of this card allow measuring eight thermocouple inputs simultaneously.
Input channels	8
Connector	IsoThermal Block
Input range	Thermocouple
24-bit sample rate	500 samples/sec/channel
DC/AC Input	Yes/Yes
IEPE / Charge Input	No/No
Programmable excitation/ bridge completion	No/No
Non-linearity	<1 bit
Accuracy	±0.1% FSD
Supports TEDS	No
Auto-zero	No
Gain Steps	2
Power usage (worst case)	6.2 W

Technical data

Card No. 8: 8 channel digital I/O card with multi-way	
Description	8 channel digital input and output card with multi-way
	This card is analogue to card no. 6 and offers a multi-way input or output to integrate different systems with a higher flexibility.
Digital input channels	8
Digital output channels	8
Digital output range	TTL compatible
Connector	2 x 9-way D-type
Power usage (worst case)	1.8 W

Technical data

Card No. 9: 2 channel CAN Bus input card	
Description	2 channel CAN Bus input card
	This card offers two separate operating CAN Bus inputs to monitor and capture two independent systems. Supporting monitoring tasks where messages are read and logged from the BUS and operating in PID mode allows to request automatic PIDs under user control.
Link interface	ISO 11898
Bus rates	125 k, 250 k, 500 k, 1M bit/s
Operating modes	Passive – log all traffic Active – request PID
Active – request PID	2 x 9-way D-type
Power usage (worst case)	1.3 W
CAN Bus inputs	2

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USB CAN-BUS logging system

The system can be made compatible with a specific Kvaser USB CAN device, upon license activation. The external CAN-BUS acquisition device can be connected to the KiNOVA system and powered via USB port. The CAN-BUS device supports CAN2.0A (1 Mbps), CAN2.0B (1 Mbps) and CAN-FD (8 Mbps). It is also ISO 11898-2 compliant and J1979 OBD-II compatible. The KiNOVA Acquisition software (see below) allows users to import DBC files and select the necessary signals. Moreover, users can view the CAN data together with other data measured by the KiNOVA system.

KiNOVA Acquisition/Advanced Acquisition Software

KiNOVA Acquisition is an advanced acquisition software, which provides full flexibility of data capture and live visualization. KiNOVA Acquisition allows setting up the channels of a KiNOVA Pro, making sure that all relevant details, like calibration and trigger information, are included.
KiNOVA Acquisition allows visualizing live data in complete freedom. Multi-window functionalities allow customizing the display with desired quantities: waterfalls, order analysis, speed curves, meters, time-domain, frequency-domain, octave bands, digital panels and much more. KiNOVA Acquisition comes with an export utility to allow to save the measured data as *.sdf, *.bunv, *.mat", .tdm and *.csv format.
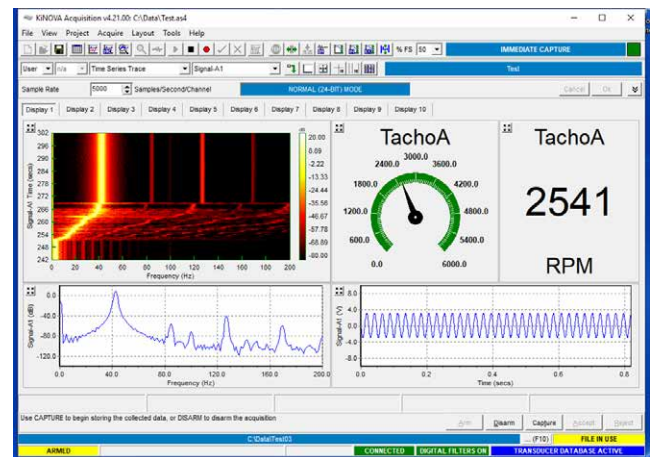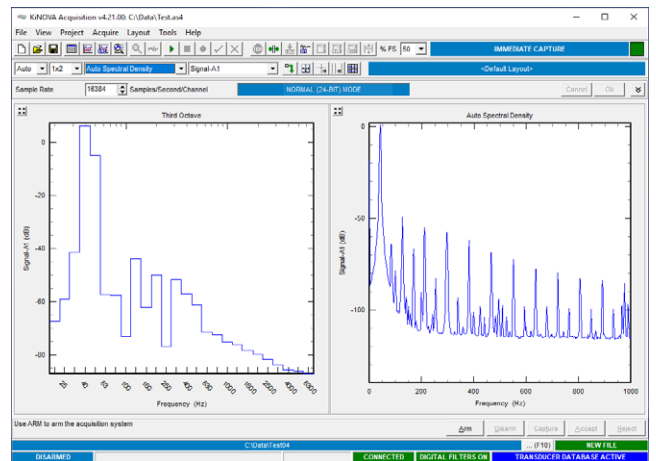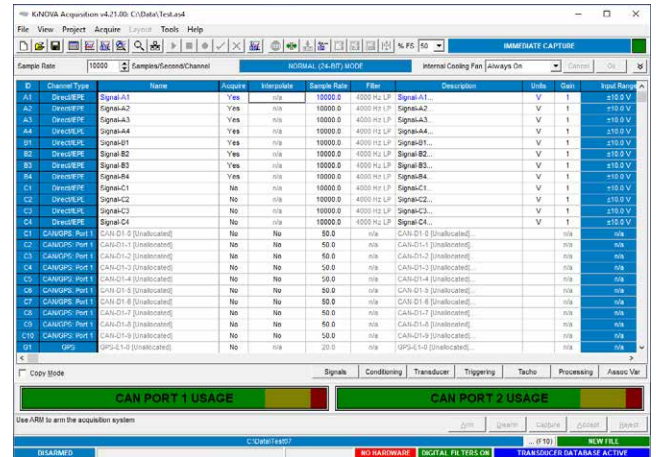
KiNOVA Acquisition is designed to:
- Setup the channels and triggers
- Fully customize data visualization
- Support you with sensor calibration
- Export data

Technical data
KiNOVA Acquisition features

Channel setup	Signal setup assistant, acquisition control deck, Pre- and Post-triggers, Start/Stop trigger on tacho signal, Auto-range
Graphical display (displays can be fully customized)	Time series trace, time series snapshot, time series trend, trend and speed, frequency spectra, Nth octave, RMS meter, sound intensity, cross spectra, signal vs signal, modulus/phase snapshot, transfer function, waterfall, order track, order-based snapshot, speed curve, digital panel, data grid, overrange grid, multi-signal histogram, triggered data capture, review results (optional), record event information
Calibration	Audio, tone, DC, shunt, multi-channel

5809A20A_003-480e-03.22

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Continuation Technical data

Additional features/ functions	TEDS reader, Expression editor and virtual channels, CAN-bus parameter definition and setup, Transducer database, Acquisition scheduler for standalone mode, Replay mode, DAC replay output suite (optional) for signal generation, Remote statistics for monitoring function, Alarm profiles (optional)

KiNOVA Acquisition include:
- KiNOVA Acquisition – advanced acquisition software
- Export utility - exporting measured data to common formats
- Installation USB stick
- License dongle

Optional packages for NVH:	Type/Mat. No.
• KiSUITE	2840A…
Analysis software for NVH	
• KiNOVA hardware warranty	
• KiNOVA hardware calibration	
• KiSUITE software support	
• KiNOVA and KiSUITE training	
• Interconnection cable	
(connecting two KiNOVA Pro`s)	5809AZ100
• External CAN-BUS logger	
USB CAN-BUS logger device	5809AZ320
KiNOVA Acquisition extension	2840AZ320
• Wireless connection	
Nano USB adapter	5809AZ220
KiNOVA Acquisition extension	2840AZ220

Compatible products for NVH Impact hammers	Type/Mat. No.
IEPE impact hammers	9722A…/9724A…

Single-axis IEPE accelerometers
• PiezoStar miniature, through hole, high thermal stability	8715A...
• Quartz, general purpose	8702B…/8704B...

Triaxial IEPE accelerometers
• PiezoStar miniature, high thermal stability	8766A…
• Ceramic, general purpose	8763A...

Ordering key — KiNOVA Pro Type 5809A20A □-□-□-□

Input/output cards (slots A to D):

No card	0
4ch ADC+Tacho IEPE Direct	1
4ch high speed ADC + Tacho IEPE Direct	1H
4ch ADC+Tacho IEPE Direct Bridge	2
4ch high speed ADC + Tacho IEPE Direct Bridge	2H
8ch ADC+Tacho IEPE Direct	3
8ch ADC+Tacho IEPE Direct Bridge	4
4ch Advanced Tacho	5
4ch DAC output card BNC	6
8ch thermocouple card	7
8ch Digital I/O card multi-way	8
2ch CAN bus input card	9
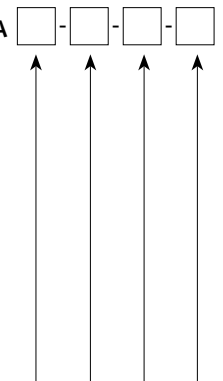
KiNOVA Acquisition   **Type 2840A50**

For further information and questions on the KiNOVA product line and Kistler sensors, please visit our website or contact us at kinova@kistler.com.