

Charge Amplifier Module

for National Instruments' CompactRIO™ Embedded Control System

This universal charge amplifier module can be used wherever mechanical quantities are measured with piezoelectric sensors. Piezoelectric sensors produce an electric charge which varies in direct proportion with the load acting on the sensor. The 5171A module converts this charge directly into digital values that can be processed by the National Instruments CompactRIO™ platform.

- Single or 4 channel charge amplifier
- Direct integration into NI CompactRIO™ platform
- 24-bit analog-to-digital conversion with up to 50,8 kSps per channel
- Configuration, control & operation by LabVIEW™, LabVIEW™ Real-Time and LabVIEW™ FPGA
- Code example for a typical CompactRIO™ application
- Low noise and low drift
- Status indication per channel via LED

Description

The Kistler Type 5171A... allows a very convenient integration of piezoelectric sensors into NI CompactRIO™ applications. The charge signals of the sensors are directly digitized with 24 bit and can then be processed by the FPGA and the real-time operating system. For the best possible resolution, four hardware measuring ranges have been implemented. Latest innovations in the analog front-end allow impressively low drift values.

Type 5171A... fully integrates into CompactRIO™ embedded control systems. Reset/Measure signal, range selection and data transfer are all controlled and programmed with the appropriate LabVIEW™ tools. Provided example VI's allow a quick integration into the own projects.

For the users convenience the channel status is indicated by an LED on the module itself.

Type 5171A...



Technical Data

Connections

Number of channels		1 (5171A1) 4 (5171A4)
Input connector type		BNC neg.
CompactRIO™ interface		15 pin D-Sub

Charge Input

Measuring ranges	pC	±1 000 ... 1 000 000
Measurement uncertainty	%FSO	<±1
Temperature coefficient, typ.	ppm/K	<50
Linearity error ¹⁾	%FSO	<±0,01
Drift	pC/s	<±0,03
Frequency range (-3dB)	Hz	
Range FS ≤10 000 pC		≈0 ... 20 000
Range FS >10 000 pC		≈0 ... 2 000
Input referred noise ¹⁾	pC _{pp}	≤0,5
Reset-Measure jump ¹⁾	pC	<±0,3
Time constant (long)	s	>100 000
Minimal sensor impedance	Ω	>10 ¹¹
Overload	%FS	≈±105
Crosstalk between channels	pC	<0,5

¹⁾ 1 000 pC range, filters off

Technical Data (Continuation)

Data Acquisition

ADC resolution	Bits	24
Type of ADC		Delta-Sigma
Sampling mode		Simultaneous
Internal master timebase (f_M)		
Frequency	MHz	13
Accuracy	ppm	$\leq \pm 100$
Data rate range (f_s)		
using int. master timebase	kSps	1,638 ... 50,781
using ext. master timebase	kSps	(0,391 ... 52,734) not supported
Data rates (f_s)		$\frac{f_M}{256 \cdot n}, n \in \mathbb{N}$

LED Status Indication

Module identified		yellow flashing
Power-On/Idle Mode		yellow constant
Reset		blue flashing
Measure		blue constant
Overload		red constant

Operation

Configuration, control & operation is all programmed in the graphical programming tools LabVIEW™, LabVIEW™ Real-Time and LabVIEW™ FPGA. Example VI's are provided.

Power Requirements

Power consumption from chassis		
Active mode	W	≤ 1
Sleep mode	μ W	$< 1,5$
Thermal dissipation (at 70 °C)		
Active mode	W	≤ 1
Sleep mode	μ W	$< 1,5$

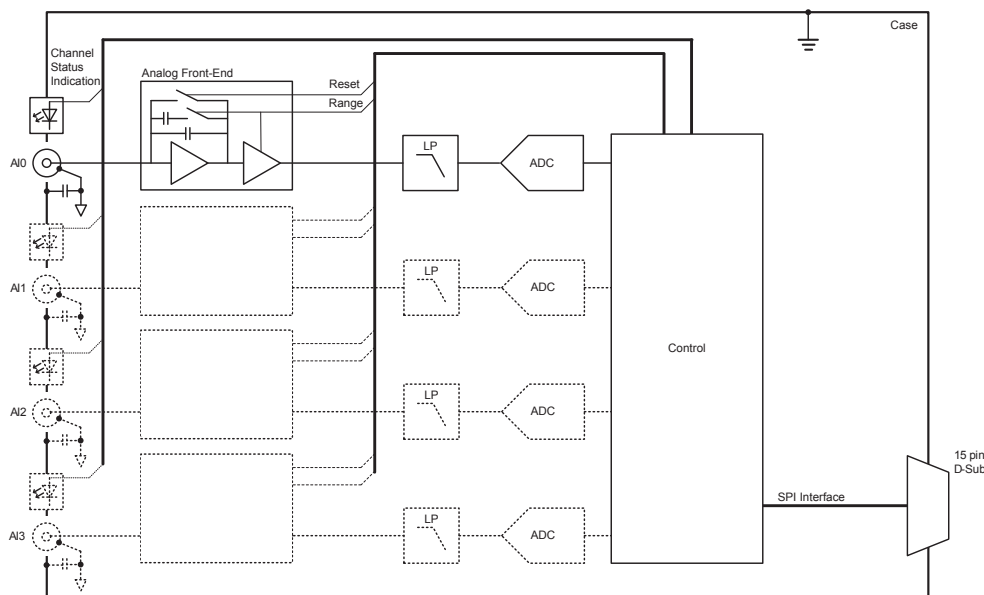
General Data

Operating temperature range	°C	-40 ... 70
Storage temperature range	°C	-40 ... 80
Rel. humidity, not condensing	%	≤ 90
Degree of protection (EN 60529)		IP40
Outer dimensions (WxHxD)	mm	23x88,1x87,5
Weight	kg	0,2

Application

Wherever piezoelectric force, pressure, acceleration or torque signals need to be measured together with other signals and processed in real-time, Type 5171A... in combination with NI CompactRIO™ is an excellent choice. Due to the rugged design, the system can be perfectly used in a production environment but also for mobile data-acquisition applications or the use in a research laboratory.

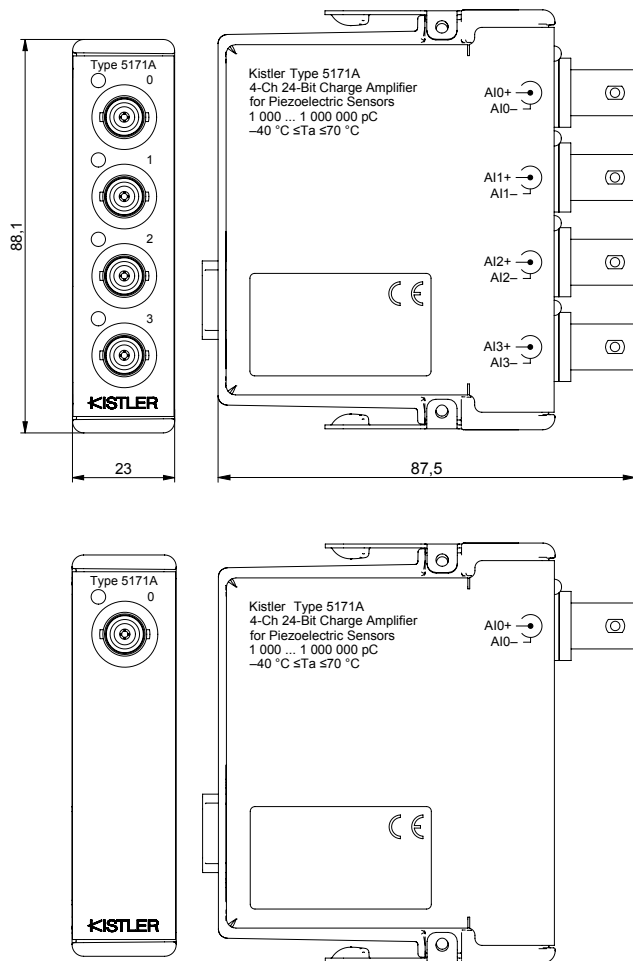
Block Diagram



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Fig. 1: Block diagram of charge amplifier module Type 5171A...

Dimensions



Included Accessories

- Quick Start guide
- CD with software examples

Ordering Key

Single channel	1
4-channels	4

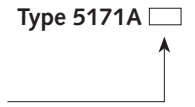


Fig. 2: Dimensions of Kistler charge amplifier module Type 5171A...

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