# KISTLER
measure. analyze. innovate.

# Charge Amplifier Module

Type 5171A...

## 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[1]
- 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.



## 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 [2] | %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 [2] | $pC_{pp}$ | ≤0,5 |
| Reset-Measure jump [2] | pC | <±0,3 |
| Zero point deviation, typ. [2] | pC | <±0,2 |
| Time constant (long) | s | >100 000 |
| Minimal sensor impedance | Ω | >$10^{11}$ |
| Overload | %FS | ≈±105 |
| Crosstalk between channels | pC | <0,5 |

[1] not compatible with NI CompactDAQ™ platform
[2] 1 000 pC range, filters off

**KISTLER**

measure. analyze. innovate.

## 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 | ≤±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 ($f_S$) | | $\dfrac{f_M}{256 \cdot n}, n \in \mathbb{N}$ |

### 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 | µW | <1,5 |
| Thermal dissipation (at 70 °C) | | |
|    Active mode | W | ≤1 |
|    Sleep mode | µW | <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.
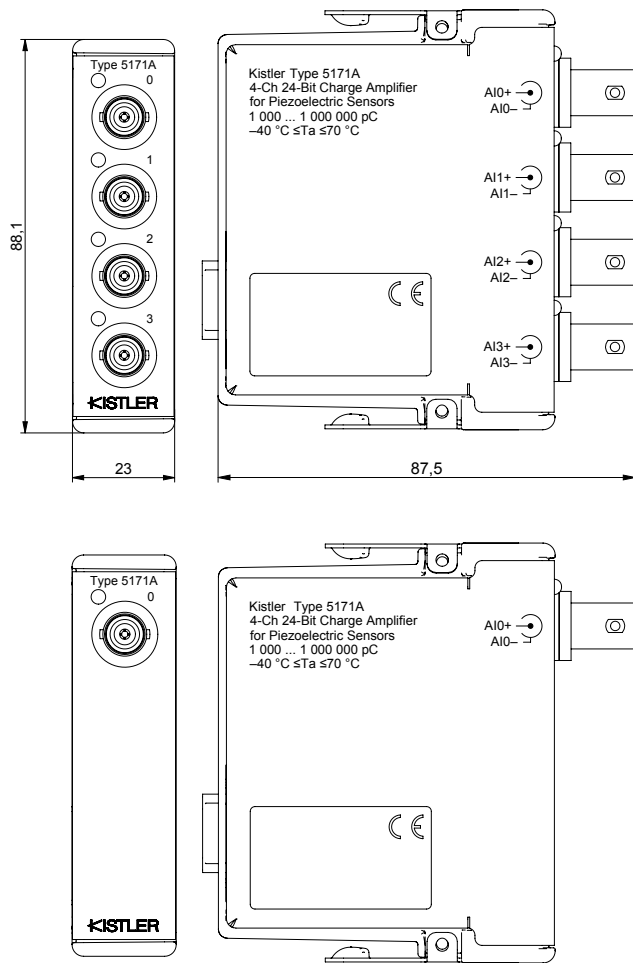
## Block Diagram



Fig. 1:     Block diagram of charge amplifier module Type 5171A...
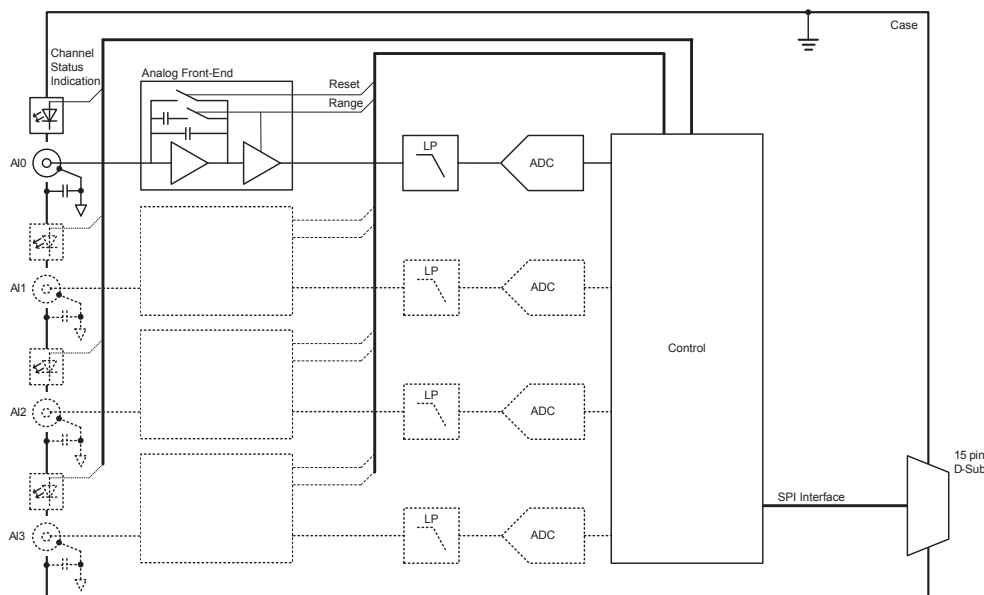
5171A_003-147e-07.16

# KISTLER

## measure. analyze. innovate.

## Dimensions



## Included Accessories
• Quick Start guide
• CD with software examples

## Ordering Key                                    Type 5171A ☐
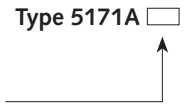
| Single channel | 1 |
|---|---|
| 4-channels | 4 |

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

NI CompactRIO™, LabVIEW™, LabVIEW™ FPGA and LabVIEW™ Real-Time
are registered trade marks of National Instruments Corporation.