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# Charge Amplifier

Type 5010...

## Dual Mode Charge Amplifier with PIEZOTRON® Operating Mode

Versatile, simple to use multi-range, line powered amplifier that converts Kistler sensor signal into proportionally controlled voltage.

The dual mode allows for signals from either charge (high impedance) type pressure, force or acceleration sensors or voltage (low impedance) types to be processed.

- High and low impedance sensors
- Dynamic and quasistatic measurements
- Automatic zero adjustments
- RS-232C interface
- Ultra high accuracy and low noise
- Ground isolates I/O connectors
- DC and line-powered versions


### Description

The 5010B is versatile, line-powered, dual mode amplifier for use with high impedance (charge mode) or low impedance (voltage mode) sensors. In the charge mode, the unit converts the input charge signal into a voltage proportional to the measurand. The voltage mode provides sensor source current for powering low impedance sensors.

The dual mode charge amplifier can be used to measure dynamic pressure, force, strain and acceleration from piezoelectric sensors. A long time constant mode permits the user to measure short duration static (quasi-static) events. The scale and sensitivity settings are designed to provide a direct readout in volts per mechanical unit eliminating mathematical manipulations. An isolated RS-232C interface with Microsoft Windows™ based software provides for control and sensing of the front panel settings. A rear panel receptacle is provided for remote control of the Reset and Operate modes.

A micro-controller controls all 5010B functions and constantly monitors the unit's condition. Additionally, it continuously checks for input overload and condition of low impedance sensors. LEDs provide operational status while the LCD provides an indication of error overload, sensitivity, scale, time constant, bias and baud rate when RS-232C is activated.

Each unit is extensively tested using an automatic test and calibration system to ensure the highest possible accuracy and quality. Furnished with each unit is a detailed NIST traceable calibration certificate.

### Application

The primary use for the 5010B charge amplifier is to convert the charge signal from a high impedance piezoelectric force, pressure or acceleration type sensors into a high level output voltage and provide excitation power along with signal processing for voltage mode type sensors. When the 5010 is used with a voltage mode sensor, the signal polarity as it passes through the amplifier becomes inverted. The dual mode charge amplifier is considered a laboratory type instrument and if used in an industrial environment it should be well protected.

### Technical Data

| Type | Units | 5010B |
|---|---|---|
| Measurement Range | pC | ±10 ... 999 000 |
| Scale Settings | | |
| 1,2,3,4,5 sequence | MU/V (1) | 0.0002 ... 100 00 000 |
| Sensor Sensitivity | pC/MU | 0.01 ... 9990 |
| | mV/MU | 0.01 ... 9990 |
| Input: | | |
| Connector Charge, voltage | | BNC neg., gnd. isolated |
| Impedance Charge mode | Ω | 70 |
| Impedance Voltage mode | Ω | 100k parallel with 1 nF |
| Voltage max. | V | 50 |
| Insulation Resistance at input | Ω | $10^{14}$ |
| Sensor power Voltage Mode | mA | 4 (2 ... 18 optional) |

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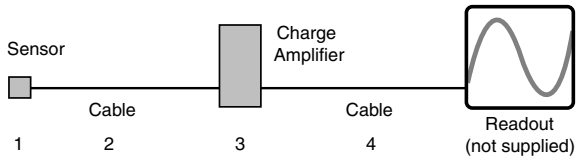
## Technical Data

| Type | Units | 5010B |
|---|---|---|
| Frequency Response: | | |
| Standard filter, | | |
| Type 5311 (...3dB) | Hz | 180, 000 |
| Accuracy | % | ≤±0.50 |
| Time Constant (range dependeant): | | |
| Long | s | 0 ... 100000 |
| Medium | s | 1 ... 10000 |
| Short | s | 0.01 ... 100 |
| Time Constant Resistor: | | |
| Long | s | $>1^{14}$ |
| Medium | s | $1^{11}$ |
| Short | s | $1^{9}$ |
| Noise: | | |
| referred to with input shield | $pC_{rms}$ | 0.0036 |
| 1 pC/V max. (2) | $\mu V_{rms}$ | 500 |
| 100 pC/V typical (2) | $\mu V_{rms}$ | 300 |
| 100000 pC/V typical (2) | $\mu V_{rms}$ | 200 |
| Drift MOSFET leakage current | pC/s | <±0.03 |
| Zero Offset in Reset typical | mV | 0.50 |
| Output: | | |
| Connector | | BNC neg., gnd. isolated |
| Impedance | Ω | 100 |
| Voltage Range | V | ±10 |
| Current Limit | mA | 5 |
| Display | type | LCD 16 characters |
| Serial Interface (RS-232C) | | |
| Connector | | 9 pin D-Sub. |
| Baud Rates | | 150 ... 9600 |
| Maximum Cable Length | m/ft | 20/65 (2500pF) |
| Remote Control Connector | | DIN 45322 6-pol neg. |
| Temperature Range Operating | °F | 32 ... 122 |
| Temperature Range Storage | °F | -4 ... 158 |
| Humidity Non-condensing | % | 10 ... 90 |
| Power Line: | | |
| Voltage | VAC | 89 ... 135 |
| Frequency | Hz | 48 ... 62 |
| Power Consumption max. | VA | 14 |
| Weight without case | lb/kg | 2.8/1.27 |
| Dimensions without case | in | 2.8 x 5.1 x 7.25 |

(1) MU = mechanical unit (e.g., psi, lb, g, etc)
(2) Referred to output with input shileded

1 g = 9.80665 m/s², 1 inch = 25.4 mm, 1 gram = 0.03527 oz, 1 lbf-in = 0.1129 Nm

## Ordering Information




sp = specify cable length in meters

| | | |
|---|---|---|
| 1 - | sensor | charge mode or voltage mode type |
| 2 - | 1631Asp | charge mode cable, 10-32 pos. to BNC pos. |
| | 1631Csp | premium charge mode cable, 10-32 pos. to BNC pos. or |
| | 1761B... | general purpose voltage mode cable, 10-32 pos. to BNC pos., |
| 3 - | 5010B1 | 1 channel with case and RS- 232C interface |
| | 5010B0 | same as above without case |
| | 5814B1 | three channel with case (operates only in charge mode) |
| 4 - | 1511sp | output cable, BNC pos. to BNC pos. |

### Supplied Accessories

| | |
|---|---|
| 1508 | power cord |
| 5311 | plug-in filter |
| 1564 | remote reset connector |

### Optional Accessories

| | |
|---|---|
| 5730 | rack adaptor for 6 each 5010B |
| 5663 | Remote control box |
| 1455A5 | 5 m remote control cable |

Plug-In low pass filters; see chart at below

### Plug-In Filter Options-Bandwidth Limiting Filters

| Model | Frequency |
|---|---|
| 5311 | 180 kHz |
| 5311A(x)kHz | 1, 1.5, 2.2, 3.3, 4.7, 6.8, 10, 15, 22, 33, 47, 68, 100, 150, 220, 330 |
| 5313A(x)Hz | 10, 15, 22, 33, 47, 68, 100, 150, 220, 330, 470, 680 |

Low pass, 12 dB/Octave Roll-off
x = cut-off frequency (-3db)

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