

Model 6036 is a four-channel, programmable charge amplifier, filter and digitizer with a second input for piezoelectric sensors with integrated electronics (IEPE).

The high-performance charge amplifier can be used to measure dynamic acceleration, pressure, force and strain from piezoelectric transducers. Two charge-to-voltage input ranges optimize performance according to transducer sensitivity. A programmable time constant enables it to make quasi-static measurements. The charge amplifier has 3X overhead preventing its overload by signals in excess of full scale. A software "overload" flag informs the operator if the input signal exceeds a selected threshold. A reset switch is provided to discharge the accumulated charge when using long time constants.

The 6036 provides two modes of charge amplifier calibration. Voltage insertion mode injects dynamic signals through a precision resistor, input cables and transducer verifying the voltage gain and integrity of the input circuit. Charge calibration mode injects dynamic signals through a precision capacitor into the charge input simulating the output of a charge transducer. The voltage input for IEPE transducers has static or dynamic voltage substitution calibration. All static and dynamic calibration signals can be provided by external sources that are easily removed to be sent out for periodic certification.

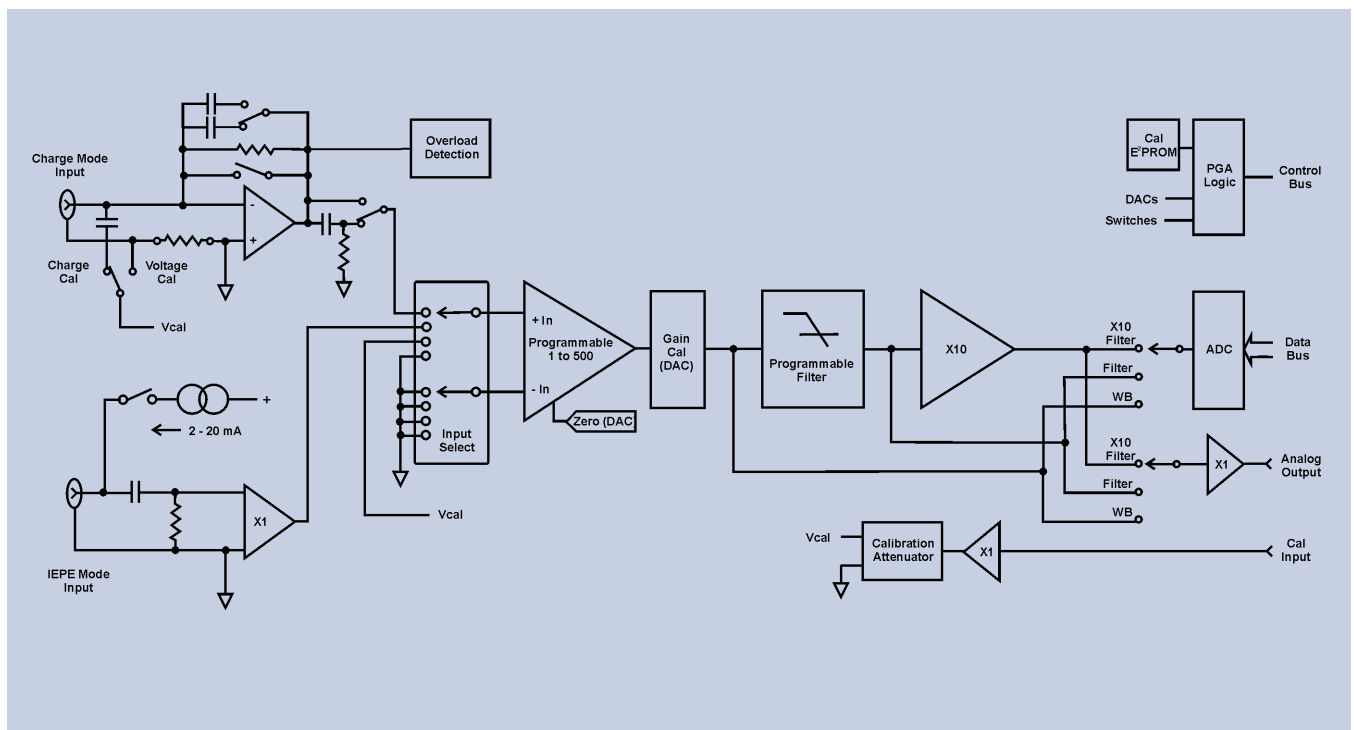
The IEPE input is for piezoelectric sensors with built-in charge amplifiers. It provides 2 to 20 mA excitation with 26 Volt compliance to the transducer. A voltage amplifier has gains of 1 to 5,000 with 100 kHz bandwidth up to gain 1,000. The voltage amplifier is calibrated by static or dynamic voltage substitution.

The standard low-pass filter is a four-pole Bessel with one programmable bandwidth. An optional 4-pole, Bessel filter has continuously programmable bandwidth from 10 Hz to 20 kHz. A post-filter gain of 10 can be selected independently for digitized and analog outputs. A high speed analog-to-digital converter digitizes the amplified and filtered signal for output to the 6000 data bus. In addition, each channel has a ± 10 Volt calibrated analog output.



FEATURES

- Dual inputs, charge and voltage
- 2-20mA current source for IEPE transducers
- 0.1 to 5,000 mV/pC charge gain
- 1 to 5,000 voltage gain
- 100 kHz bandwidth
- Charge and voltage insertion calibration
- Input overload detection
- Programmable, 4-pole low-pass filters, 10 Hz to 20 kHz
- 200K Samples per second with 16-bit resolution
- ± 10 Volt analog output



CHARGE MODE

Charge	Two ranges: 1 mV/pC (high) and 0.1 mV/pC (low).
Gain Range	0.1 mV/pC to 5,000 mV/pC with 0.05% resolution.
Gain Steps	Calibrated gains of 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000, 2,000, and 5,000 mV/pC with $\pm 0.1\%$ accuracy.
Stability	$\pm 0.005\%/^{\circ}\text{C}$.
Linearity	0.1% of full scale at 1 kHz.
Noise (10 kHz)	0.02 pC RMS plus 0.006 pC RMS per 1000 pF of source capacitance referred to input.
Max. Input	100,000 pC on low range (0.1 to 50 mV/g) and 10,000 pC on high range (100 to 5,000 mV/g)
Overload	Overload flag set when output of charge amplifier exceeds programmed threshold. Flag cleared by program command.
O.L. Reset	Program command provides immediate recovery when using long time constants.
Source Imped.	Less than 30,000 pF. Greater than 10 Meg Ohms
Input Protection	± 30 Volts common mode without damage.
Charge Cal	Signal from external calibration source applied through a 1,000 pF $\pm 0.1\%$ capacitor to the charge input.
Voltage Cal	Signal from external calibration source applied in series with the input transducer for testing transducer, cable, connections and amplifier. Cannot be used with a grounded transducer.

IEPE MODE

Configuration	Voltage input, AC-coupled, 2-wire with shield.
Excitation	Current source 2 to 20 mA, 6 mA supplied. Requires 28 Volt DC power option in the enclosure.
Input Impedance	100K Ohms.
Range	± 2 mV to ± 10 Volts.
Gain	Programmable from 1 to 5,000 with 0.05% resolution.
Gain Steps	Calibrated gains of 1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000, 2,000, and 5,000 with $\pm 0.1\%$ accuracy.
Gain Stability	$\pm 0.02\%$ for 30 days, $\pm 0.005\%/^{\circ}\text{C}$.
Linearity	$\pm 0.01\%$ for gains <1,000, $\pm 0.02\%$ for gains 1,000 and above.
Noise (10 kHz)	2.0 μV RMS referred to input.
Input Protection	± 30 Volts without damage.
Voltage Cal	Signal from external calibration source is applied to the amplifier input

CALIBRATION SOURCE

Input	Differential, 2-wire with shield. Located on the rear panel of enclosure.
Impedance	25K Ohms when any channels on module are selected for calibration. 10,000 Meg Ohms when channels not selected.
Attenuator	Programmable 1, 0.1 and 0.01, attenuation with $\pm 0.02\%$ accuracy. Attenuator output may be connected to bus for external monitoring.

PERFORMANCE

Bandwidth	0.5 Hz to 100 kHz (-3 dB) for gains to 1,000.
Slew Rate	5 V/ μs .
Zero	Automatic zero to ± 1.0 mV.
Zero Stability	$\pm 1\text{mV}$ at constant temperature, $\pm 0.2\text{mV}/^{\circ}\text{C}$.
Noise	0.3 mV RMS referred to output.
Common Mode	60 dB for common mode up to ± 10 Volts and 200 Hz.
Analog Output	± 10 Volt full scale programmable for filtered or wideband response.

FILTER (STANDARD)

Type	Four pole, low-pass Bessel (24 dB/octave). Other filters types are available.
Frequency	One programmable filter bandwidth, 20 kHz and wideband.
Gain	Post-filter gain of 10 may be selected independently for each output.

FILTER (OPTION PHFBE4)

Type	Four pole, low-pass Bessel (24 dB/octave). Other filters types are available.
Frequency	10 Hz to 1 kHz, 1 Hz resolution, 1 kHz to 20 kHz, 5 Hz resolution, $\pm 2\%$ accuracy.

ANALOG-TO-DIGITAL CONVERTER

Sample	± 50 nS channel-to-channel time correlation.
Resolution	16 bits, two's complement output.
Rate	Programmable up to 200 kS/s per channel.
Linearity	$\pm 1\frac{1}{2}$ LSB ($\pm 0.004\%$)
Continuity	Monotonic to 15 bits.

GENERAL

Mounting	Occupies one slot in Series 6000 enclosures.
Connectors	Input connectors are SMA 1/4-36 for charge and auxiliary inputs. Outputs are a 9-pin Type D. Output mating connectors supplied.
Temperature	0°C to $+50^{\circ}\text{C}$ operating.

ORDERING INFORMATION

6036	Four-Channel Dual Mode Charge Amplifier-Digitizer, 16-bit, 200 kS/s.
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OPTIONS

6000-PHFBE4	Continuously Programmable Filter, 10 Hz to 20 kHz.
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