



# PGA-16

## 16-Channel Instrumentation Amplifier With Programmable Gain and AC/DC Coupling

- Instrumentation amplifier on each of 16 channels
- Software-selectable gains of 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 per channel
- Programmable AC or DC coupling
- Use several boards together for higher channel count
- Driver software for DOS, Windows 3.1/95/NT, LabVIEW, and HP VEE
- Menu-driven software with easy-to-use graphical interface



The PGA-16 is a 16-channel instrumentation amplifier with differential input, single-ended output, programmable AC or DC input coupling and pre-filter gain. The PGA-16 may be used as an input conditioner for any A/D converter or for our AAF-16 anti-alias filter card.

Each channel of the PGA-16 has its own instrumentation amplifier with differential inputs. Using the included software, you can configure each channel independently for a gain of 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, or 1000.

Performance on the PGA-16 is outstanding from DC to 200kHz, and a skew rate of 9V/microsec allows the card to handle large, fast signals.

### Support Software

Alligator Technologies has developed both menu-driven and driver-level software for controlling key functions on the PGA-16.

**Menu-Driven Software.** WSETPGA16 for Windows 95/NT/3.1 and DOS uses a single setup screen with pop-up menus for selecting such key parameters as gain setting, AC or DC coupling and board address. Once selected, a combination of settings can be saved as a PGA-16 description file. Once saved, the settings stored in this file can be easily applied to other boards by selecting the file.

**DOS and Windows Drivers.** If you prefer to develop your own programs, the PGA-16 comes with DOS and Windows 95/NT/3.1 linkable libraries that provide high-level functions for configuring and controlling the PGA-16. Example

application programs are provided for popular compilers, including Visual C++, Visual Basic, and Pascal.

**LabVIEW Driver.** PGA-16.LLB provides a virtual instrument (VI) library that allows National Instruments' LabVIEW® graphical programming software to operate with the PGA-16. "Wiring" in the PGA-16's icon allows for direct control over the board's functions.

**HP VEE Driver.** WSETPGA16 for HP VEE provides both a 16- and 32-bit interface for the HP VEE visual programming environment. The PGA-16 UserObjects are powerful and easy to use, and provide the necessary tools to build an integrated data acquisition system under HP VEE.

### Configuration

The PGA-16 plugs into the PC and is programmable through the ISA bus. For multi-channel systems and non-PC-based applications, the PGA-16 also plugs into the AT-SYS-1000, a turnkey system that provides cost-effective signal conditioning under control of a remote computer or as a stand-alone unit.

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## Advantages of Pre-filter Gain

Many data acquisition boards provide multiple input ranges by using software-programmable gain amplifiers. While this kind of gain lets you change the input range, it also can present a new problem: amplification of electrical noise added by the measurement system to the signal.

If the gain is on the A/D board (**post-filter gain**), it amplifies not only the signal, but also any noise added by common measurement-system sources, such as the signal conditioner, the computer interconnections, or the A/D input circuit. On the other hand, if the gain is directly on the signal (**pre-filter gain**), only the signal is amplified. Pre-filter gain, which the PGA-16 provides, can make the low-level signal override the measurement-system noise, providing a dramatic improvement in signal-to-noise ratio. Post-filter gain cannot, since it amplifies the measurement-system noise along with the signal.

In addition, the A/D board post-filter gain usually multiplexes multiple channels into a single amplifier. The settling time of the amplifier can cause artificial signal errors unless delays are built into the sampling control. With the PGA-16, each channel has its own full-tile amplifier, eliminating this restriction

## Signal Connection

Inputs from the signal sources connect to the PGA-16 via a 44-pin high-density D-sub connector, which extends out of the rear of the computer. If you are using an AAF-16 filter, you can connect PGA-16 outputs to AAF-16 inputs either externally via a 26-pin connector or internally via a 34-pin dual-row ribbon-cable connector.

**For more information, contact Alligator Technologies or your local Alligator Distributor**

## Specifications

### Input Characteristics

|                                  |                                                                                      |
|----------------------------------|--------------------------------------------------------------------------------------|
| Input connection .....           | Differential                                                                         |
| Gain steps .....                 | 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, or 1000                                     |
| Gain tolerance .....             | ±0.1%*                                                                               |
| Common-mode rejection.....       | 86 dB typ @ gain = 1                                                                 |
| Common-mode voltage .....        | ±12V max                                                                             |
| Input voltage (at gain = 1)..... | ±10V                                                                                 |
| Input DC offset.....             | ±1.5 mV max, ±0.5 mV typ                                                             |
| Input protection .....           | ±70V DC or RMS continuous, power on or off; ±150V DC when programmed for AC coupling |
| Input impedance .....            | 4 MΩ differential (2 MΩ each side to analog ground)                                  |
| Input bias current.....          | ±2 pA typ., ±100 pA max.                                                             |
| Input offset current.....        | ±1 pA typ., ±100 pA max.                                                             |
| Frequent range (-3dB):           |                                                                                      |
| Gain 0.5 -5.....                 | DC to 1.2 MHz                                                                        |
| Gain 10 - 100.....               | DC to 600 kHz                                                                        |
| Gain 200 - 1000.....             | DC to 250 kHz                                                                        |
| Amplifier slew rate .....        | 9 V/microsec typ                                                                     |
| Output load .....                | 2KΩ min for full output, 1000 pF max                                                 |

### Environmental

|                            |                               |
|----------------------------|-------------------------------|
| Operating temperature..... | 0° - 70°C                     |
| Storage temperature.....   | -55° - 100°C                  |
| Relative humidity .....    | Limited to 95% non-condensing |

### Physical

|                      |                                                                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions .....     | 13.0" (W) x 4.5" (H)                                                                                                                                     |
| I/O connectors ..... | 44-pin high-density D-sub (input)<br>26-pin high-density D-sub (external output)<br>34-pin dual-row 0.1" ribbon-cable connector output (internal output) |

### Operating Power

|                              |       |
|------------------------------|-------|
| Maximum current requirements |       |
| +12V .....                   | 0.8A  |
| +5V .....                    | 30 mA |

\* Except gain = 0.5

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