

FULLY AUTOMATED INSTRUMENTATION AMPLIFIERS

FEATURES

- Fully programmable
- Gains 1 to 10,000
- Voltage substitution calibration
- 300 Volt common mode
- 100 kHz bandwidth
- Eight low-pass filters
- Dual buffered outputs
- Digital output monitor
- Optional control & display panel
- High-level instruction set



DESCRIPTION

Series 9335 is a fully programmable, modular instrumentation amplifier for use with transducers and other low-level signal sources. An on-board microprocessor automates operation, reducing setup time and assuring high-quality measurement data. Programming and control are by IEEE-488 or RS232 interface using a high-level programming language. The optional control panel enables setting and display of operating parameters locally with display of the amplifier output.

The 9335 has a 2-wire plus shield differential input. It has programmable gain, filter and voltage calibration. Automatic zero uses a successive approximation technique to achieve low offset for all gain and filter settings.

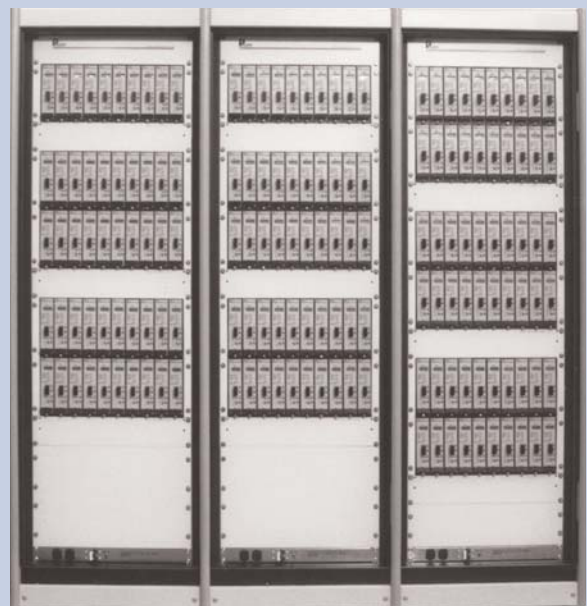
Gain is continuously programmable from 1 to 10,000 with 0.05% resolution or one of 32 preset gains may be selected. Ten preset gain steps are factory calibrated providing $\pm 0.1\%$ accuracy. The remaining gain steps may be user calibrated or employed as variable gains for engineering units calibration. The amplifiers operate from grounded or floating sources providing 120-dB rejection for common mode voltages to ± 300 Volts.

Buffered Data and Tape outputs supply ± 10 Volts full scale. Each output may be selected for wideband or filtered response. The standard filter is a four-pole, Bessel low pass with eight programmable bandwidths and wideband. Other filter characteristics are available by special order. Output voltage can be read over the computer interface and on the optional control panel. The control panel sets and displays gain and filter frequency; controls zero, calibration and input modes and displays the output voltage level.

Channels may be programmed individually or as a group using IEEE-488 or RS232. An adapter is available providing Ethernet connectivity. Programmed operating parameters are kept in non-volatile memory and are automatically restored when the system is powered up or reset.

User programming is supported by a high-level instruction set and National Instruments LabView driver. The 9335 may be employed as the front-end for a Series 6000 data acquisition system in which case PI660 software programs and operates the 9335.

Ten channels, each with integral isolated power supply, mount in a 7-inch high rack enclosure. Multiple enclosures can accommodate up to 160 channels on each bus address. Interface adapters are available for Ethernet and USB 2.0. Consult Pacific's web site or sales office for more information on these alternative interfaces.



SPECIFICATIONS

SIGNAL INPUT

Configuration2 Wires plus shield.
 Input Imped.50 Megohms shunted by 200pF.
 Source Imped.1,000 Ohms in any unbalance. Input may be grounded or floating.
 Protection±50 Volts differential, and ±350 Volts common mode.
 Voltage Cal.Program instruction selects alternate calibration input to the differential amplifier for application of an external calibration signal.
 Monitor.....Terminals on the front panel for transducer output.

GAIN

Gain Range.....1 to 10,000 with 0.05% resolution.
 Gain StepsTotal of 32 gain steps, 10 of which are preset at factory. Balance may be programmed by user.
 Gain Accuracy.....Ten factory calibrated gains with ±0.1% accuracy: 1, 2, 5, 10, 20, 50, 100, 200, 500, and 1000.
 Stability±0.02% for six months. Temperature coefficient is ±0.004%/°C maximum.
 Auto ZeroAmplifier output is automatically set to zero. Performed at power up and gain or filter setting change.
 Linearity±0.01%.

OUTPUTS

Data Output±10 Volts at 10mA. Output impedance less than 1 Ohm.
 Tape Output±10 Volts at 10mA. Output impedance less than 1 Ohm.
 Monitor (Analog)Terminals on the front panel for data output.
 Monitor (Digital)Output voltage displayed on control panel and returned by program command.
 BandwidthJumper selected wideband or filtered response for each output.
 ProtectionProtected against continuous short. No instability with capacitive loads to 0.22µF.
 Output IsolationLess than 100nA RMS leakage to power or rack ground at 60Hz line frequency.

DYNAMIC RESPONSE

Bandwidth3dB at 100kHz for all gains to 1,000. Bandwidth decreases proportional to gain above 1,000.
 FilterFour-pole Bessel (24dB/octave) low pass filter with programmable bandwidths of 10Hz, 30Hz, 100Hz, 300Hz, 1kHz, 3kHz, 10kHz, 30kHz, and wideband.
 Settling Time75µS to within ±0.1% final value.
 OL Recovery100µS to within ±0.1% for a 10 times overload to ±10 Volts.
 OL IndicationLatched status flag set and front panel LED illuminated when output exceeds ±10.5 Volts. LED is illuminated for 500mS or duration of overload, whichever is longer. Status flag reset by program command.
 Slew Rate.....6 V/µS.

ZERO

SettingAutomatic zero to ±1µV RTI or ±0.5mV RTO whichever is greater at power up and change of gain or filter setting.
 Stability±5µV RTI, ±0.5mV RTO at constant temperature. Temperature coefficient is ±1µV/°C RTI and ±0.15mV/°C RTO. Zero shift for any gain or filter setting is less than ±2mV RTO.
 Source Current±1nA and ±0.5nA/°C.

COMMON MODE (350 OHM SOURCE UNBALANCE)

Rejection120dB DC to 60Hz for gain 1,000 and above. At lower gains, CMR is 63dB plus gain in dB. CMR decreases at a rate not exceeding 6dB/octave from the specified value at 60Hz.
 Voltage±300 Volts DC or peak AC operating.

NOISE (350 OHM SOURCE)

0.1Hz to 10Hz1µV RTI plus 0.5mV RTO, peak.
 0.1Hz to 10kHz2µV RTI plus 0.3mV RTO, RMS.
 0.1Hz to 100kHz ..4µV RTI plus 0.6mV RTO, RMS.

GENERAL

Control PanelMonitor mode: Four-digit display is menu selected to indicate gain, filter frequency and calibration state. Program mode: Menu selection of all operating parameters and modes. Three switches provide up and down menu or parameter selection and enter. LED indicators: Indicate status of calibration, overload and power.
 ProgrammingThe interface coupler is installed in the Master rack enclosure for program control using IEEE-488 or RS232 protocols. The instruction has the format of a command followed by multiple parameters. All programmed operating parameters and calibration status can be read back by program command.
 Rack EnclosuresEnclosures for 19" wide RETMA rack mounting hold ten amplifiers using 7-inches of panel height. Depth is 26-inches. The initial ten channels require a Master enclosure which provides the IEEE-488 & RS232 interfaces. Subsequent channels, up to 160 total, mount in Slave enclosures that are provided with interconnecting cables to the Master enclosure. Input, output, interface, and power connectors are mounted on the rear panel. Rack enclosure frame is connected to power ground. A screw fastener secures each channel.
 Power Req.120 or 230 VAC, ±10%, 47 to 400Hz, 10 Watts. Panel indicator is illuminated when power is on and interface is enabled.
 Input Conn.R-93-012 has 3-pin XLR style input connectors. Mating connectors are supplied.
 Output Conn.Isolated BNC, 2 per channel.
 Temperature0°C to +50°C operating, storage from -25°C to +71°C.
 HumidityUp to 95% without condensation.
 Dimensions.....7" high x 1.63" wide x 17.75" deep.
 Weight5 lbs.

ORDERING INFORMATION

TRANSDUCER AMPLIFIER

9335Instrumentation Amplifier.

OPTIONS

QControl and Display Panel.

RACK ENCLOSURES

R93-012MMaster Rack Enclosure with IEEE-488 and RS232 interface, XLR input connectors, 115/230 VAC.
 R93-012SSlave Rack Enclosure, XLR input connectors, 115/230 VAC.
 FM3FFan Assembly, 115VAC.

ACCESSORIES

9000-156PCI IEEE-488 Interface Card with cable, Windows 2000/XP.