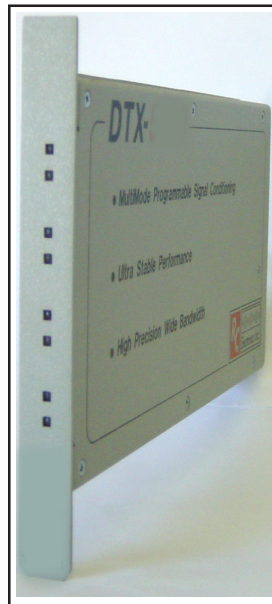


### Description

The 6322 four channel programmable gain instrumentation amplifiers integrates three distinct input stages (x0.04, x1, x100) to extend both the range of available gains and overall bandwidth beyond the limits of simpler designs. Included are user-selectable AC or DC input coupling, sensor voltage excitation, input offset compensation and programmable low pass output filtering. An input attenuator is used for high common mode voltage applications while dedicated x1 and x50 instrumentation amps are used for higher gain-bandwidth applications. Including a programmable excitation voltage source with the ability to adjust for DC input offsets gives a complete solution for most resistive type sensors.

### Design Features

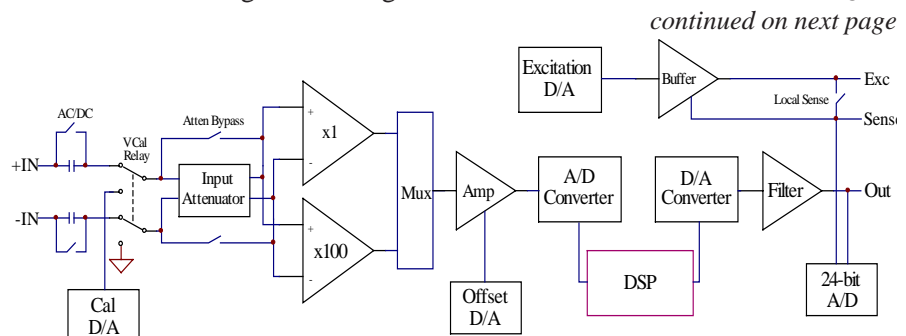
The 6322 utilizes onboard DSPs (one per channel) to configure the input circuitry and handle amplifier gain and offset compensation. A mechanical latching relay is used to select AC or DC coupling to ensure that the input signal is not affected by the switching circuitry. High performance front-end analog components are combined with digital signal processing techniques and an ultra-stable calibration reference source to maintain system accuracy. Front-panel LEDs indicate signal presence and activity level, and warn of module operational problems. All circuitry is housed in a shielded enclosure for improved reliability and noise reduction



6322 Four Channel Extended Range Instrumentation Amplifier

### Stable Amplifier Circuitry

After AC/DC coupling, the signal is amplified by separate fixed-gain precision instrumentation amplifiers. Offset adjustment is done after pre-amplification to isolate the offset voltage generator from the sensor. For input voltages above 10 volts, the signal is first sent through a divide-by-25 input attenuator, which allows input signal levels as high as 250v peak to be processed. The configured differential input signals are then fed to either a x1 or x100 instrumentation grade pre-amp avoiding the use of switched resistors in the most noise and temperature sensitive portion of the circuit. Using a fixed-gain



6322 Technical Diagram

### Features

- **Extended Range**  
Gain: 0.04 to x10,000  
Frequency: DC to 400 kHz
- **Ultra-stable Low Noise Amps**  
Output Noise: 1 mV rms  
Stability: 50 ppm/°C
- **Programmable Output Filter**  
Range: 1 Hz to 400 kHz
- **Sensor Voltage Excitation**
- **Input Offset Compensation**
- **LED Status Indicators**
- **Compact Rugged Enclosure**

instrumentation amp as the first stage provides maximum rejection of common-mode noise on the input lines while still allowing an acceptable range of input offset compensation to be applied after pre-amplification

### DSP - Programmable Gain

After offset correction, the signal is fed to a variable gain amplifier controlled by an onboard DSP. A 16-bit high-speed Sigma-Delta converter is then used to convert the amplified signal to a digital value. Digitizing the signal for signal processing allows all gain correction and output filtering to be done digitally, thereby improving system accuracy. The Digital Signal Processor uses stored offset and gain

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calibration factors to correct the digitized data values and generate a digitally filtered output that is ready for conversion back into an error-corrected analog output voltage

## Output Circuit

The processed digital output is converted back to an analog voltage by a high-speed 16-bit Digital-to-Analog Converter. A four-pole low-pass filter/buffer-amp removes the digitizing steps in the reconstructed signal, along with any high-frequency noise. As with the input circuit, temperature-stable components are used to ensure that system calibration holds over a wide temperature range.

## DSP – AutoZero /AutoGain

Using a programmable offset voltage allows the DSP to automatically servo the amplifier output to zero adjust any input offset voltage imbalance. In a like manner, the DSP can adjust the amplifier gain to a targeted value upon application of a known calibration signal.

## Voltage Excitation with Remote Sense Capability

The 6322 provides four independent programmable excitation voltage sources for use in powering input sensors. Each source is controlled by a 16 bit DAC with an output range from 0 to 10 Volts and 100 mA output buffering. Remote sense can also be selected to provide feedback accounting for IR losses over conductor lines between amplifier and sensor.

## System Calibration

High accuracy is obtained during the conversion process by implementing a unique end-to-end calibration scheme within the 6322 conditioner. A precision programmable voltage source is connected to the input, and two calibration voltages (0v and 80% of full-scale input) are fed in, amplified by the input stages, converted by the A/D, processed by the DSP, converted back to analog and then measured by a high-accuracy 24-bit A/D converter. The input and output voltages are compared with the resulting gain and offset correction values saved in the DSP memory for real time data correction.

## Specifications

### General

Gain Range	0.04 to 10,000
Frequency Response	DC to 400 kHz
Common-Mode Rejection	90 dB@ 100 Hz
Common Mode Voltage	200v (Gain <1) 10v (Gain >1)
Accuracy	0.02%
Linearity	0.01%
Stability	50 ppm/°C
Input Coupling	AC or DC, programmable
Input Noise	10 uV rms
Input Protection	250V max.
Output Noise	1 mV rms
Output voltage range	±10v @ 50 mA
Output impedance	50 ohms

### Input Offset Compensation

Programmable	+/- 125v (Gain <1)
Programmable	+/- 2.5 v (Gain 1 to 100)
Programmable	+/- 250 mV (Gains 100 to 10,000)

### Low-Pass Filter

Type	Digital, programmable
Range	1 Hz to 400 kHz
Roll-off	96 dB / octave, programmable

### Signal Overload

Indicator	Front-panel LED
Trip level	0.1v to 10v, Programmable

### Calibration Source:

Type	Internal voltage reference
Voltage range	0 to 2.5v, programmable
Accuracy	0.01%
Stability	10 ppm /°C

### Excitation

Type	Programmable Voltage
Voltage range	0 to 10v@100 mA
Sense	Local or Remote
Accuracy	0.02%
Short protection	Yes

### Environmental:

Operating temperature	0 to 50°C
Storage temp	-25 to 85°C
Humidity	0 to 90% non-condensing

### Physical Characteristics

Package	Shielded, 6 sides
Dimensions	0.8" x 4.2" x 9.5"
Weight	1.3 lbs