

T-71-11-07



# IA175 ULTRA-LINEAR ISOLATION AMPLIFIER WITH EXTERNAL SYNC CAPABILITY

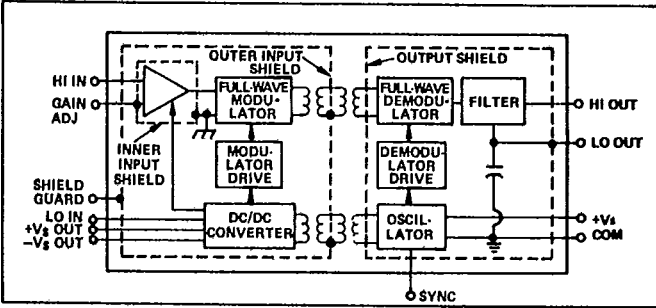
Fully Compatible with 12-Bit Acquisition Systems

## FEATURES

- UL Component Recognized
- Provision for External Synchronization
- High Linearity: 0.005% Peak, Typical
- High Input/Output Isolation: 5000VDC continuous, 3000VAC RMS
- 1000:1 Programmable Gain
- Low Drift:  $\pm 0.01\%/^{\circ}\text{C}$  Maximum
- 126dB Common-Mode Rejection

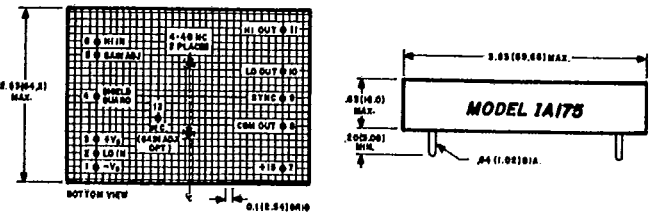
The Model IA175 Isolation Amplifier features very high linearity, input/output isolation, and common-mode rejection, very low drift, and externally programmable gain. Its 0.005% linearity assures compatibility with 12-bit data acquisition systems, and its ability to operate at common-mode input voltages up to 5000 VDC enables operation with single sources in high voltage systems and other hazardous locations. Common-mode rejection is at least 120 dB with source imbalance of up to 5000 ohms. Input voltage noise is  $1\mu\text{V}$ , 10Hz to 1 kHz, and current noise is 10 pA for the same range. The gain of the amplifier is programmable from 1V/V to 1000V/V by means of an externally connected resistance value. The internal oscillator used to provide modulation and demodulation for input isolation can be synchronized with those of associated Model IA175 amplifiers by means of an external trigger, to avoid imposition of beat-frequency phenomena on the output signals. An independent  $\pm 14\text{VDC}$ ,  $\pm 15\text{ mA}$  supply in the input section, with the same voltage isolation as the amplifier input, is used to power an external transducer, or preamplifier.

## BLOCK DIAGRAM IA175



### CONNECTION NOTES:

1. Gain Adjustment Resistor ( $R_g$ ) is connected between GAIN and LO-IN pins.
2. If no output-offset adjustment is required, connect LO-OUT to COMMON pin. Otherwise, consult factory.



## CHARACTERISTICS

(Typical, @ 25°C,  $V_s = +15\text{ VDC}$  unless otherwise noted.)

<b>GAIN (Non-Inverting)</b>	
Range	1 to 1000V/V
Formula	$1 + (30k\Omega/R_g)$
Deviation from Formula	$\pm 1\%$
vs. Temperature (0 to +70°C)	$\pm 0.005\%/^{\circ}\text{C}$
vs. Temperature (0 to +70°C)	$\pm 0.01\%/^{\circ}\text{C}$ max.
Nonlinearity, $\pm 5\text{V}$ Output	$\pm 0.01\%$ max.
Nonlinearity, $\pm 10\text{V}$ Output	$\pm 0.02\%$ max.
<b>INPUT VOLTAGE RATINGS</b>	
Linear Differential Range	$\pm 10\text{V}$ min.
Max. Safe Differential Input rms.	
Continuous	125V rms
Peak Pulse, 5 ms Duration, One Pulse/Sec	$\pm 600\text{V}$
Max. CMV, Inputs to Outputs/Power Common	
Peak AC, 60 HZ, 1 Minute	3,000V
Peak DC Continuous	$\pm 5,000\text{V}$
CMR, Inputs to Outputs, 60 Hz	
Balanced Source Impedance	126dB
5k $\Omega$ Source Imbalance	120dB
CMR, Inputs to Guard, 60 Hz	
5k $\Omega$ Source Imbalance	80dB
Max. Leakage Current, Inputs to Common	
115 VAC, 60Hz	8 $\mu\text{A}$ max.
<b>INPUT IMPEDANCE</b>	
Differential	$10^9\Omega \parallel 3\text{ pF}$
Overload	27k $\Omega$
Common Mode	$10^{11}\Omega \parallel 20\text{ pf}$
<b>INPUT BIAS CURRENT</b>	
Initial, @ +25°C	$\pm 2\text{ nA}$
vs. Temperature (0 to +70°C)	$\pm 0.01\text{ nA}/^{\circ}\text{C}$
<b>INPUT NOISE</b>	
Voltage,	
0.01 Hz to 10Hz	3 $\mu\text{V}$ p-p
10Hz to 1kHz	1 $\mu\text{V}$ rms
Current	
0.01Hz to 10Hz	1pA p-p
<b>FREQUENCY RESPONSE</b>	
Small Signal, -3dB Gain = 100V/V	1kHz
Full Power, 20V p-p Output	500Hz
Slew Rate	30mV/ $\mu\text{s}$
<b>OFFSET VOLTAGE, REFERRED TO INPUT</b>	
Initial, @ +25°C	$\pm (1 + 5/G)\text{ mV}$
vs. Temperature (0 to +70°C)	
Gain = 1V/V ( $\mu\text{V}/^{\circ}\text{C}$ max.)	$\pm 35$
Gain = 100V/V ( $\mu\text{V}/^{\circ}\text{C}$ max.)	$\pm 15$
At other Gains ( $\mu\text{V}/^{\circ}\text{C}$ max.)	$\pm (15 + 20/G)$
vs. Supply Voltage	$\pm (1 + 20/G)\mu\text{V}/\text{V}$
<b>RATED OUTPUT</b>	
Voltage, 50k $\Omega$ Load	$\pm 10\text{V}$ min.
Output Ripple, 20 kHz	10mV p-p
Output Impedance	1.0k $\Omega$
Max. CMV, Output Common to Power Common	
Peak AC or DC Continuous	$\pm 50\text{Vpk}$
<b>ISOLATED POWER CIRCUIT</b>	
Voltage, $\pm 15\text{ mA}$ Load	$\pm 14\text{ VDC}$
Accuracy	$\pm 5\%$
Current	$\pm 15\text{ mA}$ min.
Regulation	
No load to full load	+0, -2%
$\Delta$ Gain	$\pm 0.005\%$
$\Delta$ Output Offset	$\pm 100\mu\text{V}$
$\Delta$ Input Offset	$\pm 5\mu\text{V}$
<b>POWER SUPPLY, SINGLE POLARITY</b>	
Voltage, for rated performance	+ 15VDC, $\pm 0.5\text{V}$
Voltage, operating	+ 12 to + 18VDC
Current, quiescent	70mA
Current, full load	100mA
External Sync. Frequency	7 - 8 kHz, 5VDC @ 50% duty cycle
<b>TEMPERATURE RANGE</b>	
Rated Performance	0°C to 70°C
Storage	-55°C to +85°C
<b>CASE DIMENSIONS</b>	
	3.5" x 2.5" x .62"
<b>MATING SOCKET</b>	
	S132
<b>NOMINAL WEIGHT</b>	
	1.3 ounces