



CA04/D Differential Charge Amplifier: 04 System

Differential 2 pole, piezotransducer interface; input range 1/110pC/g normalized up to 10V/pc; bandwidth 0.7Hz/100kHz; noise 0.02pC; common mode rejection 80dB @ 50Hz

The CA/04/D forms the interface section of a common mode interference (cmi) proof, piezoelectric transducer based, balanced measurement channel.

The transducer output must be fully floating and transmitted via screened two core cable to the balanced input charge amplifier. Cmi induced via the transducer case or cable screen may manifest as a probably differing ground reference charge applied to each amplifier input, plus a component applied between inputs, and dependant upon the environment and the type and length of the transmission medium (Fig.1.)

The CA/04/D is capable of substantial cmi reduction (cmr) including compensation of input imbalance due to capacitive asymmetry of the transducer/cable. 80dB @ 50/60Hz is achievable provided transducer cable runs are not excessive, thus introducing phase distortion between the various cmi signal elements and invalidating the minimisation criterion shown in Fig.2.

Transducers may of course be externally insulated from cmi inducing sources, whilst fully floating versions may be terminated in Triaxial /coaxial screened cable and operated as single ended systems.

The resultant elimination of the ground loop is not however total as a capacitive cmi coupling still exists at the transducer.

This list comparative data for piezotronic integral amplifier based systems also, which may be ruled out by temperature limitations. In addition, high temperature and liquid immersion environments impose further constraints.

	Metric	Imperial
Input	differential	
Max input charge nC	10 (signal), 20 (cmi, each input), (2xsignal + cmi ≤ 20)	
Input capacitance/1% gain	10nF	
Normalizing range pC/g	1/100	
Noise level r.t.i./p @ 1pC/g norm	0.01pC rms O/C + 0.01pC rms/1nF 1/P capacitance	
Outputs • O/P1 • O/P2 g/V (6 switch select. Ranges)	100±2% @500Hz mV/g 0.0316, 0.1, 0.316, 1, 3.16, 10±3% @ 500Hz mV/g	10.2±2% @500Hz mV(m/s ²) 0.0316, 0.1, 0.316, 1, 3.16, 1.02±3% @ 500Hz mV(m/s ²)
Peak O/P volts @ Vs = ±15V, O/Ps 1 & 2, V	±12	
Peak O/P current, max, O/Ps 1 &2, mA	±10	
Outcome impedance, O/P 1 & 2	<10Ω+47μF	
Supply Voltage Vs, V	±10/15	
Supply current @ Vs = ±15V,	±11	



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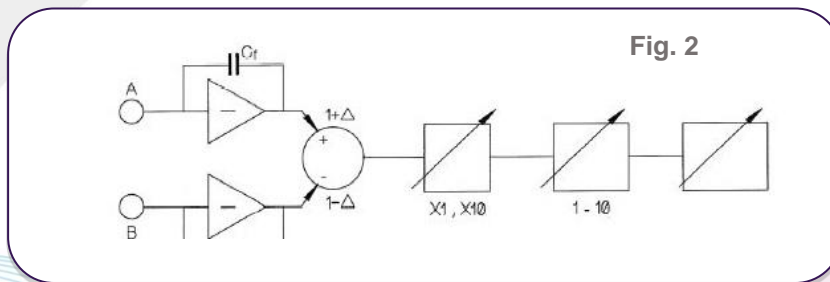
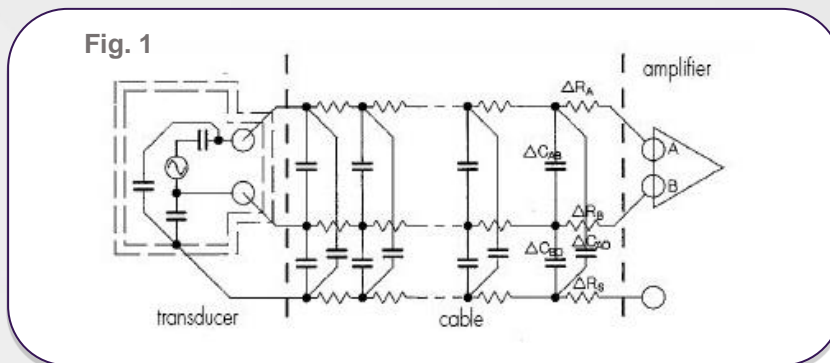
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CA/04/D comprises of two identical charge amplifiers driving a difference amplifier, normalising and range amplifiers plus calibration facility (Fig.3.). /D represents a scaling variation of otherwise identical products.

Input: each input, A & B, is a virtual earth summing junction. Total instantaneous signal summing into each input must not exceed 20nC for correct cmr functioning.

Difference amplifier: this maintains fixed gain for differential signals whilst allowing complementary $\pm 5\%$ individual charge amplifier gain adjustment (ADJ CMR) for cmr minimisation in the presence of cmr input imbalance.

Bandwidth: standard 1 Hz/30kHz bandwidth may need to be reduced to improve signal/noise. Note that any resultant charge amplifier phase difference errors may be degrading cmr.



O/P2 Frequency Response

