MODEL 4302A

Dual 24 dB/Octave Filter
1/10 decade steps

DL Instruments
Phone: (607)539-1108
Email: info@dlinstruments.com
www.dlinstruments.com

The Model 4302A Dual Filter is a high performance general purpose filter for use in the laboratory as well as in multiple channel data acquisition applications.

Covering the 10Hz to 1 MHz frequency range, the 4302A consists of a pair of identical 24dB/octave filter channels, each of which can be connected in series to

produce a single 24 dB/octave bandpass, a 48 dB/ octave high pass, or a 48 dB/octave bandpass filter with selectable gain of 1, 10, or 100.

AC/DC input coupling switches on the front panel make it possible to use one or both channels as AC or DC coupled low pass filters. In the AC mode, large DC offsets can be accommodated, and the filter will have a low frequency cutoff at approximately 0.07Hz.

The frequency response may be selected to have maximally flat amplitude (Butterworth Mode) or maximally flat time delay (Bessel Mode).

Butterworth (Normal) or Bessel (Pulse) Modes can be selected by front panel switches. Frequency and pulse response curves are shown below.

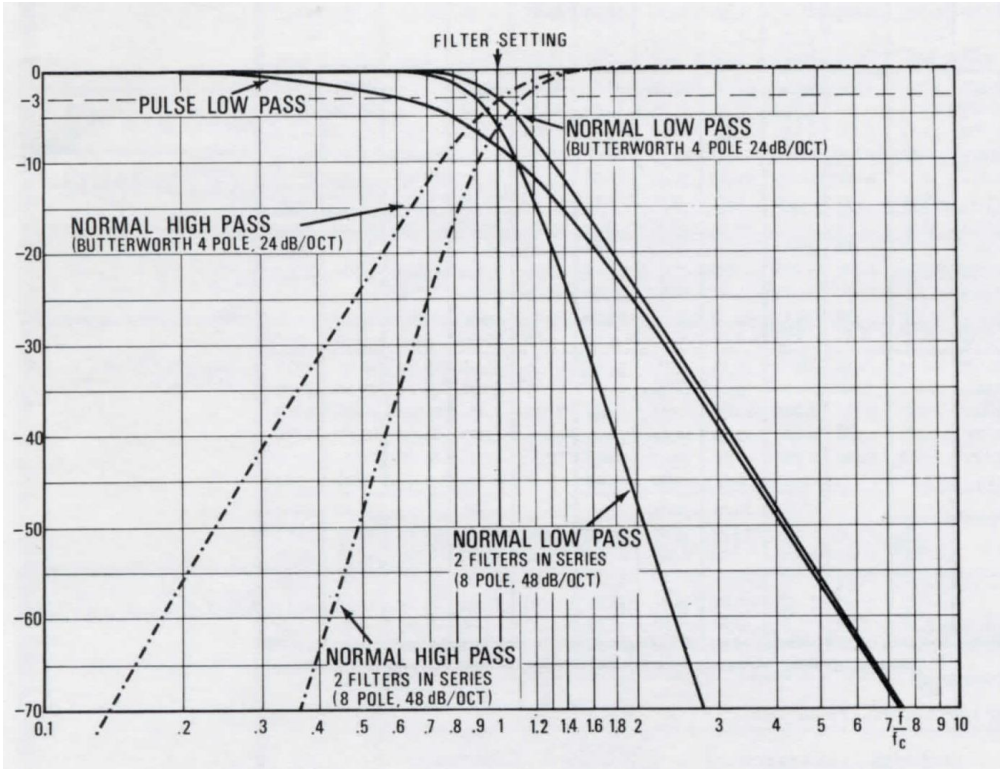

Figure 1 Normalized Response

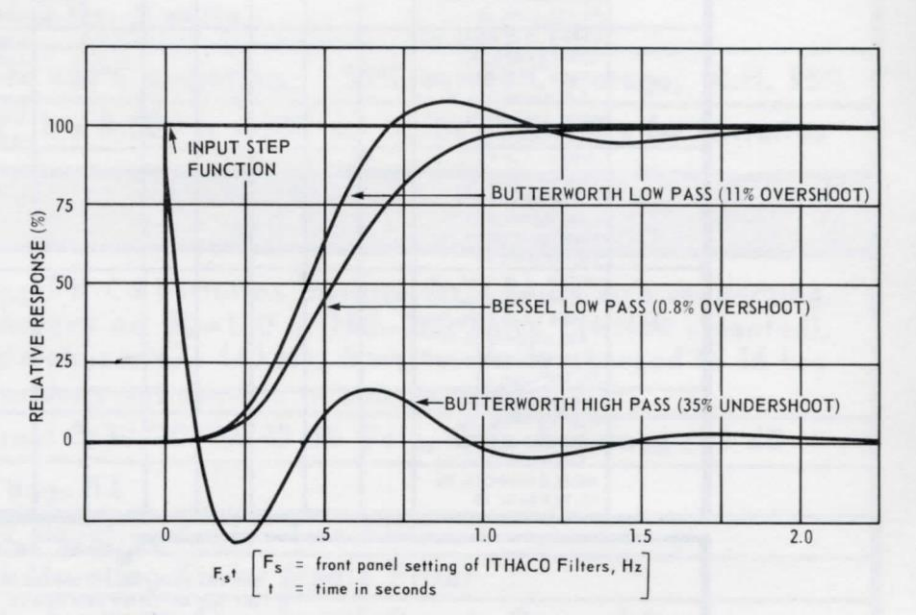

Figure 2 Step Response of 4 Pole Filter

The low – pass Butterworth mode response is a 4 – pole Butterworth with a -3 dB frequency selectable from 10Hz to 1MHz in 1/3 octave steps. The low – pass Bessel mode has a maximally flat time delay in order to reduce distortion of pulses. The -8.4 dB frequency may be set from 10Hz to 1MHz in 1/3 octave steps. Both LP responses may be DC or AC coupled. For convenience a ground state was added to the input coupling

The high – pass Butterworth mode response is a 4 – pole Butterworth with a -3dB frequency selectable from 10Hz to 100kHz.

The passband voltage gain of each filter may be set to X1 and X10. The distortion is extremely low, especially in X10 gain where harmonics approaches -90dB at 20V P-P output.

Specifications of the Model 4302A are uniformly outstanding. Of particular interest are its very low distortion - .005% at 20 volts peak to peak output, 25µvolts self noise, 100 dB outband rejection performance, and 100 dB crosstalk attenuation. Frequency accuracy is ±3% of setting.

Filter Modes	Low Pass (Butterworth)	4 pole Butterworth LP for maximum flat amplitude response	
	Low Pass (Bessel)	4 pole LP with maximum flat time delay (Approaches Bessel)	
	High Pass (Butterworth	4 pole Butterworth HP (Upper -3 dB at approx. 950kHz (-4dB typical at 1MHz)	
Frequency Settings	1.00, 1.25, 1.60, 2.00, 2.50, 3.15, 4.00, 5.00, 6.30, 8.00, 10.0		
Frequency Range	**Multiplier**	**Frequency Range**	
	$X10^1$	10 - 100Hz	HP or LP
	$X10^2$	100 - 1kHz	HP or LP
	$X10^3$	1kHz - 10kHz	HP or LP
	$X10^4$	10kHz - 100kHz	HP or LP
	$X10^5$	100kHz - 1MHz	LP only
Corner Frequency Accuracy	± 3% (Butterworth: -3.01 dB; Bessel: -8.36 dB) except 100kHz to 1MHz. Typical frequency response between 100kHz and 1MHz will be within ± 2 dB of the ideal response shown in figure 1		
Attenuation Slope	24 dB/octave; 80dB/decade each filter. Cascade for 48dB/octave low-pass or high pass: For 48dB/octave low-pass, set filters equal. Cutoff frequency is 10% lower than setting in Figure 1 for 48dB/octave high - pass, set filters equal. Cutoff frquency is 10% higher than setting in Figure 1		
Maximum Attenuation	Better than 100 dB to 100kHz. Typically 80dB at 1MHz (Measured at X10 Gain, 10Hz LP)		
Voltage Gain	Switch selectable 1 or 10; ± 3%		
Distortion (Typical)	X 1 Gain: Less than 0.03%, 1kHz X10 Gain: Less than 0.005%, 1kHz (20V p-p, no load or 10Vp-p into 600Ω		
Hum & Noise	Less than 75µV rms (100kHz NBW) X 1 Gain Less than 25µV rms (100kHz NBW) X10 Gain		
Input	Modes	AC (0.07 cutoff), DC; selected by front panel switching	
	Maximum Input Voltages (Diode Protected Input	DC Mode: 20V pk to pk for linear operation. AC Mode: ± 200 VDC and 20V pk to pk signal	
	Impedance	22MΩ in parallel with 30pF	
	Connector	BNC on front panel.	
Output	Maximum Output Swing	20V pk to pk, no load; 10V pk to pk into 600Ω	
	Impedance	600Ω ±1%, DC coupled	
	Offset	Less than 50mV typical	
	Connector	BNC on front panel and rear panel.	
Power	100 VAC		
	120VAC		
	220 VAC		
	240VAC		
Fuse	125mA, slow blow		
Environment	0°C to 55°C Operating; -55°C to +85°C Storage; R. H. 95%		
Dimensions & Weight	3.5" high X9.5" wide X 15" deep Gross weight 15lbs.		

Table 1 Specification (per Cannel)

The unit may be battery operated with the addition of the Option 10 Battery Pack. This allows the unit to run on batteries only, line power only, or while recharging.

4302A OPTION 10 BATTERY PACK

The retrofittable Nickel Cadmium Battery Pack installs inside the chassis, and is charged from 4302A power supply.

Battery charge time (fast charge) < 15 hours
Battery operation time >25 hours
Weight 1.2kg (2 lb. 10 oz)

For more information please contact:

DL INSTRUMENTS LLC
646 76 Road
Brooktondale, NY 14817
USA

Phone: (607)539-1108
Email: info@dlinstruments.com

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