FLJ-R Series
Higher Order, Resistor-Tuneable Filter

FEATURES

- **135dB, 100dB/octave high order, lowpass filter**
- **1/3 octave bandwidth (Q=4.32) bandpass filter**
- **Can set cutoff (fc) frequency with 6 or 8 external resistors**
- **Ultra-compact size, high-function hybrid construction**

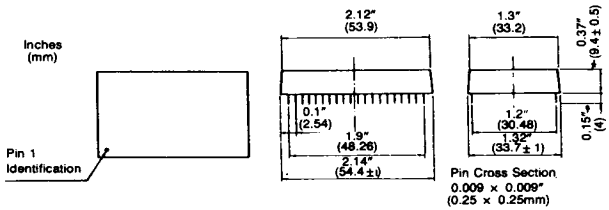
GENERAL DESCRIPTION

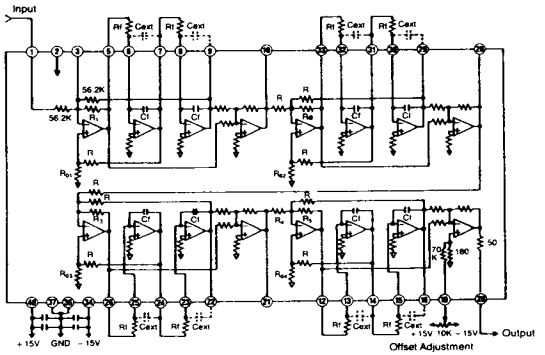
The FLJ-R series filters are of the highest order and have the highest attenuation characteristics among the entire group of DATEL filter products. Through the use of hybrid techniques, even though compact in size, the FLJ-R series filters have complete 8-pole lowpass and 3-pole pair bandpass filter functions. The cutoff (central) frequency can be set with only 6 or 8 external resistors.

Bandpass ripple in the lowpass filter is 0.1dB and boasts outstanding performance with the distortion ratios for all models being a mere 0.005%. Each model is composed of the Suffix 1 and Suffix 2 types and varies according to cutoff frequency setting range. The Suffix 1 model has a range from 10Hz-2KHz and the Suffix 2 model has a range from 100Hz-20KHz. The FLJ-R series filters are optimum as anti-aliasing filters in A/D conversion circuits of data acquisition systems.

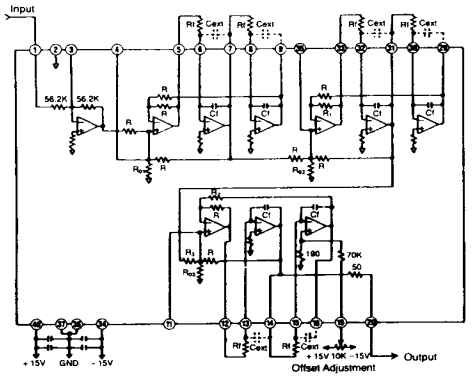
The FLJ-R3BA1, 2 are 1/3 octave, bandpass filters that meet IEC-225 Standard requirements.

MECHANICAL DIMENSIONS

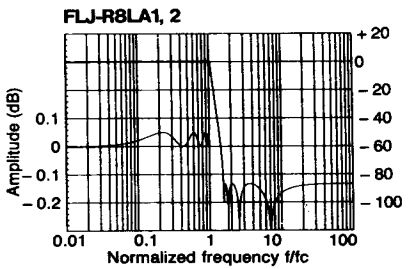




FLJ-R8LA, B Block Diagram with External Connections (Fig. 1)



FLJ-R3BA Block Diagram with External Connections (Fig. 2)



SPECIFICATIONS

Typical at 25°C and ±15V supply voltage unless otherwise specified.

ABSOLUTE RATINGS

Supply voltage (±Vs) ..... ±18V
Input voltage ..... ±Vs

FILTER CHARACTERISTICS	
fc setting range	Suffix 1: 10Hz-2KHz Suffix 2: 100Hz-20KHz
fc setting	8 equivalent lowpass or 6 equivalent bandpass external resistors
fc setting accuracy	±2%max.

PASS BAND CHARACTERISTICS		
	FLJ-R8LA,B	FLJ-R3BA
Gain	0dB±0.1dBmax.	0dB±1dBmax.
Gain after Rf adjustment	—	0dB±
Ripple p-p	0.15dB	—
Ripple ≤0.9fc	0.3dBmax.	—
Ripple after Rf adjust	0.1dB	—
Distortion ratio	0.005%@1KHz	*Same as left

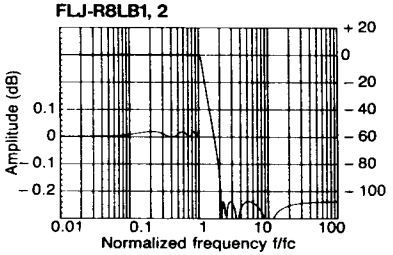
ROLLOFF CHARACTERISTICS			
	FLJ-R8LA	FLJ-R8LB	FLJ-R3BA
Attenuation rolloff	135dB/oct	100dB/oct	—
Q	—	—	4.32(BW1/3oct)
Attenuation volume	86dB@1.56fc	92dB@2.0fc	18dB/octBW
Minimum attenuation	86dB	106dB	—
Attenuation at 10fc-1MHz	80dBmin.	86dBmin.	80dBmin.

INPUT CHARACTERISTICS	
Input impedance	50KΩmin.
Maximum input voltage	±10Vmin.

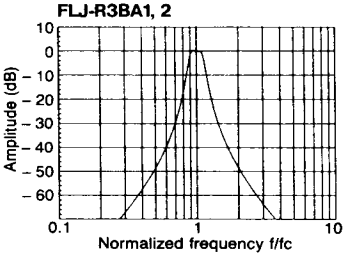
OUTPUT CHARACTERISTICS	
Output impedance	100Ωmax.
Maximum output voltage	±10Vmin.
Noise (input shorted)	140μVrms max. (BW10-500KHz)
Offset voltage	±10mV zero adjustable

POWER SUPPLY AND ENVIRONMENTAL CONDITIONS	
Supply voltage (operating range)	±15V (±5V-±18V)
Power consumption current	40mA (FLJ-R8), 25mA (FLJ-R3)
Operating temperature/ Humidity range	-20°C to +70°C, 10%-95%RH
Storage temperature/ Humidity range	-30°C to +80°C, 10%-80%RH

FLJ-R8LB1, 2



FLJ-R3BA1, 2



TECHNICAL NOTES

1. Setting the cutoff (central) frequency is accomplished with 8 external resistors which are equal in value for lowpass filters and 6 external resistors which are equal in value for bandpass filters. The relationship between the resistance Rf of the external resistors and the cutoff frequency fc is as follows:

Suffix 1 model (10Hz-2KHz) $Rf = \frac{15.9 \times 10^3}{fc}(K\Omega)$ *Suffix 2 model (100Hz-20KHz)* $Rf = \frac{159 \times 10^3}{fc}(K\Omega)$

where fc is measured in Hz.

The FC setting range can be shifted to a lower band by adding external capacitors Cext. The equation shown below should be used for reference.

Suffix 1 model $Cext = \frac{159}{(Cext + 0.01) \times fc}(K\Omega)$ *Suffix 2 model* $Cext = \frac{159}{(Cext + 0.001) \times fc}(K\Omega)$

where Cext is measured in μF and fc in Hz.

In this case, the external capacitors should have high dielectric characteristics. It is recommended to use multilayer ceramic capacitors. Further, tolerance of these capacitors should be within ±0.25%. For filters such as these of higher order and with high attenuation characteristics, the uniformity of the tolerance of external resistors and capacitors has an effect not only on the accuracy of the setting range, but also on the size of pass band ripple.

2. Use series type power supplies for the ±15V power supplies because switching-type power supplies are not recommended. Install 4.7μF tantalum and 0.01μF multilayer ceramic bypass capacitors. It is recommended that these be installed in parallel, and as close to the filter as possible, between the ±15V power supplies and ground.
3. Use metal film resistors with a tolerance better than 1% for the 6 or 8 fc setting resistors.

ORDERING INFORMATION

Low Cutoff Frequency Type (10Hz-2KHz)
- FLJ-R8LA1: 135dB/oct., 8-pole
- FLJ-R8LB1: 100dB/oct., 8-pole
- FLJ-R3BA1: 3-pole pair bandpass

High Cutoff Frequency Type (100Hz-20KHz)
- FLJ-R8LA2: 135dB/oct., 8-pole
- FLJ-R8LB2: 100dB/oct., 8-pole
- FLJ-R3BA2: 3-pole pair bandpass

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