



Title:MultiFlex ETH 1000 Series IIR Filter DesignerProducts(s):All MultiFlex ETH 1000 Series motion controllersKeywords:MultiFlex, IIR Filter, Error Signal, Embedded Web BrowserID#:TN1082Date:January 20, 2012

Summary

MultiFlex ETH 1000 series motion controllers provide a convenient interface through its embedded web browser to design and implement PID loop IIR filters.

More Information

Tuning a closed-loop servo motor frequently involves incorporating a digital filter in the position error feedback signal to the PID loop. The MultiFlex ETH 1000 series controllers support up to 6 cascaded bi-quadratic IIR filter stages and these can be calculated and implemented easily using the embedded Filter Designer, shown below.

🗿 MultiFlex ETH 1000 Seri	ies - Filter Designer - Microsoft Internet Explorer	
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PMC	MultiFlex ETH 1000 Series Motion Controller Motion Controller	
Overview Servo Axis Control Stepper Axis Control Filter Designer	Filter Designer	
	The transfer function of a biquadratic IIR digital filter stage can be expressed in the following form: $H(z) = -\frac{Y(z)}{X(z)} = -\frac{a0 + a1(z^{-1}) + a2(z^{-2})}{1 + b1(z^{-1}) + b2(z^{-2})}$ In addition to the axis number and filter type, the following parameters must be entered below in order to specify the filter: PID Rate PID motor control loop frequency: default 4000 Hz F _c • low pass and high pass filters: cutoff frequency • band pass and band stop filters: not required • band pass and band stop filters: filter bandwidth	
	If Zero Filter is On, the filter being designed will be loaded as the first and only stage and if Off, it will be cascaded to any previously defined stage for that axis. The filter coefficients will be generated and optionally loaded into the controller to implement the filter when the calculate button is selected. Axis 1 ▼ Filter Type Low Pass ▼ PID Rate (Hz) 4000 ▼ F _c (Hz) 0 BW (Hz) 0	X
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Precision MicroControl Corp. Intelligent Motion Control Since 1987 2075-N Corte del Nogal Carlsbad, CA 92011 • USA **Tel: (760) 930-0101** Fax: (760) 930-0222

E-Mail: support@pmccorp.com Web: http://www.pmccorp.com





The user simply specifies the axis, PID loop rate, cutoff frequency and bandwidth in addition to the type of filter desired which can be combination of

- Low pass
- High pass
- Band pass
- Band reject (notch)

Once the data is entered and the Calculate button is chosen, the filter coefficients are generated and displayed, as shown below. The user then has the option of implementing the filter in the controller for testing. The filter will only be stored in volatile memory and will not be present after the system is restarted. The command mnemonics are displayed, however, allowing the user to cut-and-paste the filter definition into an MCCL macro file that can be made non-volatile after suitable performance is achieved.



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