

## Terminator Multimode Encoder Signal Filters

The filters remove all types of the ever-present electrical noise (common and differential mode, dV/dt transients, ground loop and common supply generated) in the encoder signal lines as well as the corrupting effects of mechanical vibration (phantom movement, dither) in motion control applications such as multi-axis gearing in the personal care industry, flying saws, welders, extruders and cable/tube production.



Terminator Multimode Filter in Cast Al IP65 Enclosure

The filters reconstruct the encoder signals to reflect the correct encoder position and speed signaling. Performance is safeguarded and problems such as:

- Motion system position drift,
- Home reference loss,
- False triggering of the receiving inputs, and
- Receiving input saturation, latch-up or failure

are eliminated.

The filters are wired in-line between the encoder and the processing equipment and interface in a standard way with the encoder outputs and the processing equipment inputs. They have no special installation requirements and have small physical dimensions.

The Terminator line of multimode filters are all-in-one, value-for-money products, each device addressing all and any combination of known encoder application issues. They process digital quadrature encoder signals with the following features:

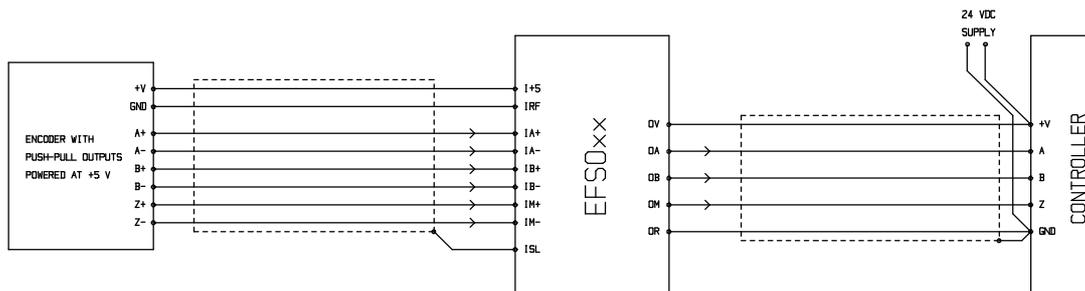
- **Dual voltage 115/230 VAC twin isolated supply.** The twin supply powers the two internally isolated, input and output, filter sections and can power the monitored encoder with regulated 5 VDC or unregulated 10/15 VDC,
- **Four selectable modes of digital processing**
  1. Unfiltered: the outputs are buffered replicas of the inputs,
  2. Filtered: the encoder inputs are processed for electronic noise only,
  3. Recovered x1: the encoder inputs are processed for electronic noise and mechanical position to recover corrupted motion sequences.
  4. Recovered x4: Same as the Recovered x1 mode, but with output resolution quadrupling (clock/direction or up/down signal pair at four times the input quadrature frequency).
- **Test mode.** The filter outputs can simulate the function of a 1024 ppr encoder,
- **Direction reversal** to save rewiring/reconnection of reverse counting encoder signals,
- **Supply, signal and unique worn/faulty encoder indication.** Five LEDs indicate the status of the power supply, the three encoder channels and the presence of out-of-sequence signaling, typically caused by a worn or faulty encoder,
- **Cast aluminium enclosure** of IP65 protection and high noise immunity. Its dimensions are 171 x 121 x 55 mm (approximately 6.7 x 4.7 x 2.2 inches).

The Terminator line is offered in a range of options which also allow them to be used as interfaces between different encoder and PLC/drive input card signal types. These are:

Model	Single ended input types	Differential input types	Universal 5 V output types	5-30 V output types	Available speed grades
EF24	All 10-28 V types	10-28 V		All types	Low
EFDO		EIA422	EIA422, all single 5V		High, Standard
EFSO	All 5 V, 5-30 V NPN and Push-Pull only	EIA422		PNP, Push-Pull	Low
EFU5	All 5 V, 5-30 V NPN and Push-Pull only	EIA422	EIA422, all single 5V		High, Standard

The maximum quadrature input frequency which can be processed by the filters depends on the filter speed grade and function mode as follows:

Speed Version	Unfiltered	Filtered	Recovered x1	Recovered x4
Low	300 kHz	250 kHz	200 kHz	62.5 kHz
Standard	10 MHz	1.5 MHz	1.2 MHz	375 kHz
High	10 MHz	3.0 MHz	2.4 MHz	1.5 MHz



Typical application of an EFSOxx filter powering a physically remote encoder (connected via long cables), processing its differential output signals and interfacing them to a 24 V single input controller.

Model		Description
<b>Clock/direction x4 output</b>	<b>Up/down x4 output</b>	Terminator Multimode encoder signal filter with ..
EF2402-ALU-L	EF2402U-ALU-L	High speed, Universal 10-28 V inputs and Universal 5-30 V outputs.
EFDO02-ALU-H	EFDO02U-ALU-H	High speed, EIA(RS)422 inputs and Universal 5 V outputs.
EFDO02-ALU-S	EFDO02U-ALU-S	Standard speed, EIA(RS)422 inputs and Universal 5 V outputs.
EFSO02-ALU-L	EFSO02U-ALU-L	Low speed, Universal 5 V inputs and PNP/Push-Pull 5-30 VDC single ended outputs.
EFU502-ALU-H	EFU502U-ALU-H	High speed, 5 V inputs and Universal 5 V outputs.
EFU502-ALU-S	EFU502U-ALU-S	Standard speed, Universal 5 V inputs and Universal 5 V outputs.

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