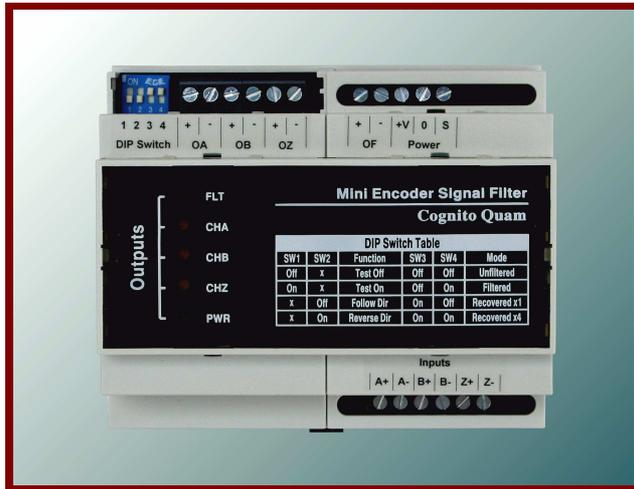


Mini Multimode Encoder Signal Filters

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.



Mini multimode filter in IP40 plastic DIN rail 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 Mini 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:

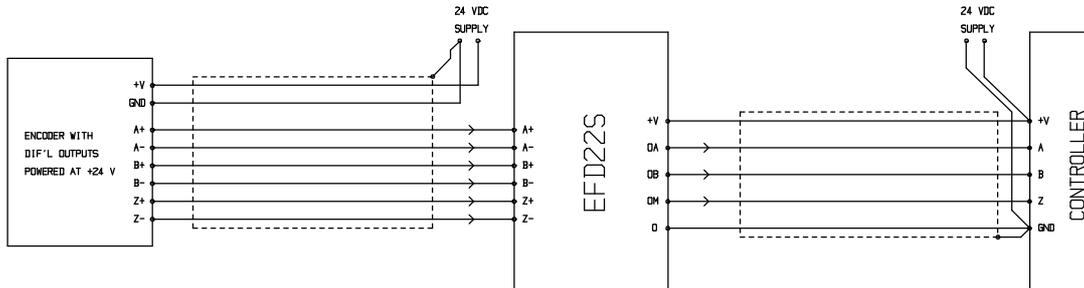
- **Isolated input and output stages** to interrupt unavoidable system ground loops and eliminate related noise as well as protect the driven controller from high voltage transients with 0.1 V/ns dV/dt immunity,
- **Four selectable modes of digital processing**
 1. **Unfiltered:** the outputs are buffered 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 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. The fault state is repeated as an isolated, uncommitted optotransistor output,
- **Small DIN rail mountable plastic enclosure** of IP40 protection. Its dimensions are 105 x 90 x 58 mm (approximately 4.1 x 3.5 x 2.3 inches).

The Mini 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:

Mini Multimode Encoder Filter Model Selection Table					
Model	Single ended input types	Differential input types	Single ended output types	Differential output types	Power supply
EFD44		EIA422		EIA422	5 VDC (input) and 5 VDC (output)
EFD42S		EIA422	10-28 V PNP and Push-Pull only		5 VDC (input) and 10-28 VDC (output)
EFD42D		EIA422	All 10-28 V	10-28 V	5 VDC (input) and 10-28 VDC (output)
EFD24	All 10-28 V	All 10-28 V		EIA422	10-28 VDC (input) and 5 VDC (output)
EFD22S	All 10-28 V	All 10-28 V	10-28 V PNP and Push-Pull only		10-28 VDC (input) and 10-28 VDC (output)
EFD22D	All 10-28 V	All 10-28 V	All 10-28 V	10-28 V	10-28 VDC (input) and 10-28 VDC (output)

The maximum quadrature input frequency which can be processed by the filters depends on the selected function mode as follows:

Maximum Quadrature Input Frequency Capability per Filtering Mode				
Speed Grade	Unfiltered	Filtered	Recovered x1	Recovered x4
Basic	300 kHz	125 kHz	100 kHz	31.3 kHz



Typical application of an EFD22S 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.

Mini Multimode Encoder Filter Ordering Information		
Model	Description	
Clock/Direction x4 output	Up/Down x4 output	Mini multimode encoder signal filter, DIN rail enclosure, with ..
EFD44-DIN-B	EFD44U-DIN-B	EIA422 in, EIA422 out.
EFD42S-DIN-B	EFD42SU-DIN-B	EIA422 in, single ended 10-28 V PNP/Push-Pull output.
EFD42D-DIN-B	EFD42DU-DIN-B	EIA422 in, Universal 10-28 V out.
EFD24-DIN-B	EFD24U-DIN-B	Universal 10-28 V in, EIA422 out.
EFD22S-DIN-B	EFD22SU-DIN-B	Universal 10-28 V in, single ended 10-28 V PNP/Push-Pull out.
EFD22D-DIN-B	EFD22DU-DIN-B	Universal 10-28 V in, Universal 10-28 V out.

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