

ENCORE ELECTRONICS INC.
Model FL236
Frequency to Voltage Converter
Period Deviation Converter

- Specifications
- Operation
- Operating modes
- Schematic B16184

SPECIFICATIONS
Model FL236
Frequency to Voltage Converter

INPUT VOLTAGE: Differential input, 0-150v peak maximum

INPUT IMPEDANCE: 110k ohms differential; 0.1uF series capacitors if J2 removed

INPUT THRESHOLD: Cycle-by-cycle adaptive peak threshold voltage is 1/3 of the peak of the previous cycle of the input signal

J2 both installed: 0V with automatic hysteresis adjustment, intended for Variable Reluctance pickups

J2 both removed: AC coupled input, suitable for open-collector sources (with external pullup resistor) or other asymmetrical waveforms

ANALOG OUTPUT: FL236-001, -003, -005 0-10VDC; FL236-002, -004, -006 0-5VDC
Output rated for 100k ohm load

ANALOG SPAN ADJUST: 20-turn front panel trimpot, range of +/-10% from nominal

RESPONSE TIME: Analog output updates once per input period

FREQUENCY RANGE: J3 removed : 0-25kHz (40uSec min period)
J3 installed (-001,-002) : 0-1500Hz (667uSec min period)
J3 installed (-003,-006) : 0-3000Hz (333uSec min period)
J3 installed (-004) : 0-10000Hz (100uSec min period)
J3 installed (-005) : 0-1000Hz (1000uSec min period)

MINIMUM FREQUENCY: 0.025%FS : 6.2Hz for 25kHz range; 0.4Hz for lower ranges

NO INPUT DETECTION: Front panel LED lights steady for over-range, blinks for under-range

RESOLUTION: Internal 41.8MHz crystal oscillator
25kHz,10kHz ranges : signal period measured with 24nSec resolution
1.5kHz,3khz ranges : signal period measured with 383nSec resolution

OPERATING TEMPERATURE: 0 to 50°C

OPERATING MODES: J4 removed : standard F/V converter
J4 installed : delta-T (period deviation)

DELTA-T MODE: Output voltage stays at ½ fullscale for steady input signal period
256 periods measurements are averaged
Output increases to fullscale for a single period +10% from average
Output decreases to zero for a single period -10% from average

POWER REQUIREMENT: FL236-001,-003,-005,-006 14-30VDC ; FL236-002,-004 10-30VDC
Current = 60mA max.

CONNECTIONS: 6 wireclamp screw terminals

PACKAGE: 3.12"H x 2.88"D x 0.88"W DIN-rail mount box

OPERATION

Model FL236 Frequency to Voltage Converter

Configure the FL236 internal jumpers for the desired mode of operation (see next section). This should be done with power and input signal disconnected. The FL236 top cover can be removed by prying apart the two halves with a flat screwdriver or other tool.

For the 14-30VDC powered versions, connect a 24V power supply capable of at least 60 mA to the +24V and 24V COM terminals. For all other versions, connect a +12VDC power supply to the +12V Nom and Pwr Com terminals.

Connect the FL236 IN+ and IN- terminals to the desired signal source. A third COM terminal is available between IN+ and IN- to terminate a shield, if desired. If the source is an open collector output (as found on some optical encoders or Hall effect sensors), an appropriate pull up resistor should be connected at the signal source, to produce a voltage pulse. Check your source's documentation for resistor value and connection information.

Connect the output terminals to the desired readout, recording, or control device. FL236 version determines output scale factor : FL236-001, FL236-003 and FL236-005 are 0-10V while FL236-002, FL236-004 and FL236-006 are 0-5V.

Input signal triggering

If no signal is detected, a front panel LED lights and briefly blinks off several times a second. If the LED is on steady, the input signal is too fast for the FL236 selected range.

The signal conditioning circuitry is designed for use with Variable Reluctance probes, magnetic pickups, and other zero-crossing signals. For these inputs, leave both J2 jumpers installed. For non-zero-crossing signals (1/rev, Hall effect, or other open-collector sources with external pullup) remove both J2 jumpers to make an AC-coupled input stage.

Optional operating modes

Internal jumper J3 can be removed to select 25kHz fullscale frequency, or installed to select 1500Hz fullscale frequency (3kHz on FL236-003 and FL236-006, 10kHz on FL236-004, 1kHz on FL236-005). This change should be made with the unit turned off, as it will only be checked during powerup.

Internal jumper J4 can be removed to select standard F/V operation, or installed to select delta-T (period deviation) operation. This change should be made with the unit turned off, as it will only be checked during powerup.

F/V operation

The analog output voltage is a linear representation of input frequency. 0-25kHz (or the selected lower fullscale frequency, with J3 installed) produces a 0-10VDC (or 0-5VDC for FL236-002 -004 and -006) output.

The analog output is updated once per input period. Because of this rapid update rate, this mode may be used to demodulate FM signals, as long as the carrier + modulation stays within the FL236 frequency range. Signals faster than fullscale will limit at +fullscale voltage, with an indication on the front panel LED.

Delta - T operation

Delta-T is used to identify asymmetry of gear teeth, or movement of blade tips, or other mechanical phenomena. If a pulse is 2% late in the pattern, it will produce one pulse period that's 2% longer, followed by one pulse period that's 2% shorter. These period deviations will be indicated by voltage steps on the analog output.

256 incoming pulse periods are averaged. Overall, the average period value will remain the same. At low signal frequencies (low RPM) it will take longer for the analog output to stabilize after a speed change. For example, a gear with 32 teeth turning at 120 rpm will produce a 64Hz signal. This will require 4 seconds of steady-state operation to measure 256 pulses, and stabilize its output at the new average period.

For a constant frequency input signal, the analog output voltage stays at half-scale (5VDC for 0-10V range, or 2.5VDC for 0-5V range). When a single incoming period is longer than the average, the analog output will increase, up to fullscale for +10% deviation from average. If the incoming period is shorter than the average, the analog output will decrease, as far as 0V output for -10% deviation.

