

EC5000 Speed controller

Main Features:

- Both isochronous and droop governing
- Smoke reduction at start/speed ramping
- Direct compatibility with Cummins EFC valve
- Remote variable speed capability
- Controls 12,24 and 32 volt systems
- Output short circuit protected
- Reverse polarity protected
- Load sharing capability

AMBAC EC5000 is specially designed to control engines using the Cummins EFC valve. It has the capability to limit starting fuel and thus provide smoke reduction on start-up and the capability to smoothly ramp speed from idle to running speed. Also designed to meet the European Community CE requirements on EMI, it therefore has excellent reliability with respect to electrical transients. An AUX input can be utilized as either an external trim control input or a load sharing control input. Controls are provided to set RUN and IDLE speeds, DROOP, RAMP time and START FUEL quantity in addition to the normal GAIN, STABILITY and DEAD TIME settings for this PID controller. Protection against a jammed actuator or shorted output is also incorporated.

These units are packaged in a rugged, metal case with a conformally coated circuit board which provides excellent environmental protection. Every unit is electrically tested before and after encapsulation and meets AMBAC's traditional high standards for quality and long-term reliability.

Description

The EC5000 operates directly from a battery system, measures the speed of an engine and supplies drive current to the Cummins EFC proportional solenoid actuator which controls engine speed by metering fuel. The output of the controller provides a pulse width modulated current to drive the actuator which responds to the average current to regulate the fuel delivered to the fuel rail.

The engine speed signal is typically taken from a magnetic sensor mounted in proximity to the flywheel teeth. The control unit will accept any signal if the frequency is proportional to engine speed and of the correct amplitude and frequency. This speed is compared to an internal SPEED setting and the difference is amplified to drive the actuator to supply more or less fuel, thus controlling engine speed. Speed is controlled isochronously or in droop mode (when the DROOP control is moved from its full CCW position, the further CW, the more droop). Terminal 1 is grounded (to terminal 5 or 6) for ISOCHRONOUS operation or left open for DROOP mode. A safety feature is provided to turn off the actuator and prevent engine runaway if the speed input signal fails for more than 0.1 seconds. During cranking, the actuator is commanded to the START FUEL current setting to eliminate excess starting fuel smoke. When starting in RUN mode or

when transitioning from IDLE to RUN, a built-in RAMP generator provides a smoothly controlled and adjustable rate of speed change which also prevents excess smoke. Adjustment for GAIN, STABILITY and DEAD TIME allow simple field potimization for a wide range of engine generator or pump combinations.

This unit may be operated with a remote speed control on the FREQ TRIM input (which is subject to speed ramping) and in conjunction with a Synchronizer and a Load sharing Unit⁶.

Performance specifications

Outputs		
Actuator output curren,continuous	max	4.0 Amps
Actuator output curren,peak transient	max	4.0 Amps,current limited
Isochronous/steady state SPEED stability	max	± 0.25%
SPEED drift with temperature	max	± 1.0%
DROOP range ⁶	Nom	10%
RAMP time ⁷		0-25 sec
Inputs		
Magnetic speed sensor voltage(PICK UP)		1 < V < 30 Vrms
Internal RUN SPEED control range		1 kHz – 6 kHz
Internal IDLE SPEED control range	min	500 Hz – 3 kHz
AUX INPUT speed authority ³	typ	± 750 Hz
AUX INPUT gain	typ	-150 Hz/V
FREQ TRIM speed authority ² (terminal 4)	min	+4kHz/-3.5kHz (+250hz/-100Hz for –s, -s1)
FREQ TRIM speed gain	typ	+750 Hz/V (+23Hz for –s,-s1)
ISO/DROOP		Gnd for Isochronous
Supply voltage (BATTERY) ⁴		+7 < V < +37 Vdc, negative ground
Supply current ⁵	typ	60mA
Environmental		
Temperature range		-40 < T < +65 (-40 < T < +150)
Hummidity		0 to 95%, Test Method 103
Vibration		15g, 10-2000Hz, Test Method 204
Sealing		Oil, Water and dust tight

