



Conforms to EC Directive on
Electromagnetic Compatibility

ISO 9001



ADVANTAGE SERIES

**Model EC5010
Speed Controller
Fuel Limiting
Speed Ramping**

Features

- Both Isochronous and Droop governing
- Smoke reduction at engine start up
- Adjustable ramp generator included
- Remote variable speed capability
- Controls 12, 24 and 32 volt systems
- Output short circuit protected
- Reverse polarity protected
- Load sharing capability

High performance, multifunction electronic engine speed governors are necessary to meet today's environmental requirements for emergency and remote site gensets and pumps. The EC5010 and AMBAC's actuators satisfy those critical needs and provide tight regulation and excellent transient response.

AMBAC's EC5010 was specifically designed to limit fuel and thus provide smoke reduction on start-up and built-in ramping 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, nonconductive case and potted to provide 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.

NOTES:

- FOR TWO WIRE POTENTIOMETERS
USE CONNECTIONS: 1 & 4 100K
2 & 4 5K/10K
- FOR THREE WIRE POTENTIOMETERS
USE CONNECTIONS: 2, 3 & 4 5K/10K
- IF POTENTIOMETER DOES NOT FUNCTION,
ADJUST RUN

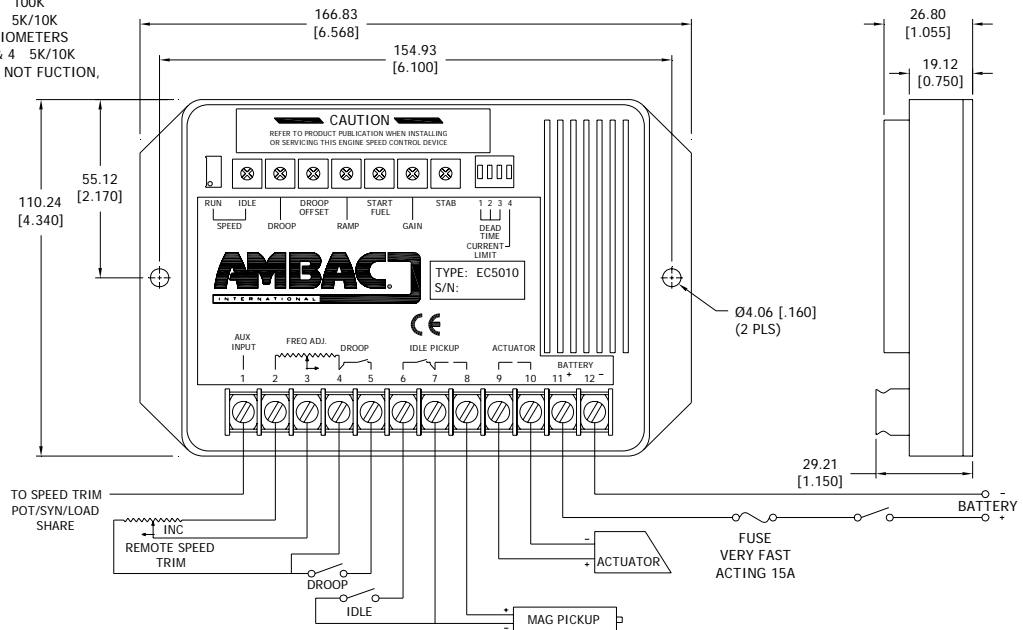


Figure 1. Outline Dimensions and Typical Connections

Description

The EC5010 operates directly from a battery system, measures the speed of an engine and supplies drive current to a proportional solenoid actuator which controls engine speed by acting on the throttle lever or other fuel metering control. The output of the controller provides a pulse width modulated current to drive the actuator which responds to the average current to position the engine throttle. The output provides up to 7 Amps of continuous current and is suitable to drive AMBAC's AGB, AGD, AGS, AGL and AGK actuators, as well as those from other manufacturers.

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 input 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). On -S and -S1 versions 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 optimization 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 Unit.

Performance Specifications

Outputs		
Actuator output current, continuous	max	7 Amps
Actuator output current, peak transient	max	7.5 Amps, current limited
Isochronous/steady state SPEED stability	max	± 0.25%
SPEED drift with temperature	max	± 1.0%
DROOP range ⁶	nom	10%
SYN ENABLE voltage	nom	10V @ rated speed, 0V otherwise
RAMP time ⁷		0-25 sec
Inputs		
Magnetic speed sensor voltage (PICKUP)		1 < V < 30 Vrms
Internal RUN SPEED control range		1 kHz - 6 kHz ¹
Internal IDLE SPEED control range	min	500 Hz - 3 kHz ¹
AUX INPUT speed authority ³	typ	±750 Hz ¹
AUX INPUT gain	typ	-150 Hz ¹ /V
FREQ TRIM speed authority ² (terminal 4)	min	+4kHz/-3.5kHz ¹ (+250hz/-100Hz ¹ for -S, -S1)
FREQ TRIM speed gain	typ	+ 750 Hz ¹ /V (+23Hz ¹ /V for -S, -S1)
Supply voltage (BATTERY) ⁴		+7 < V < +37 Vdc, negative ground
Supply current ⁵	typ	60 mA
Environmental		
Temperature range		-40°C < T < +65°C (-40°F < T < +150°F)
Humidity		0 to 95%, Test Method 103
Vibration		15g, 10-2000Hz, Test Method 204
Sealing		Oil, water and dust tight

Notes

- 1 Mag sensor frequency in Hz = (engine RPM) x (number of teeth on flywheel) / 60
- 2 With internal SPEED control set to 4000 Hz, AUX INPUT open
- 3 With internal SPEED control and FREQ TRIM inputs set to 4000 Hz
- 4 Reverse polarity and transient protected
- 5 Actuator current must be added to this value
- 6 Based on max DROOP setting (315Hz/A) and 2A actuator current change from no load to full load, 6000 Hz
- 7 If RAMP time is near 0, excessive overshoot may result

Ordering Information

EC 5010

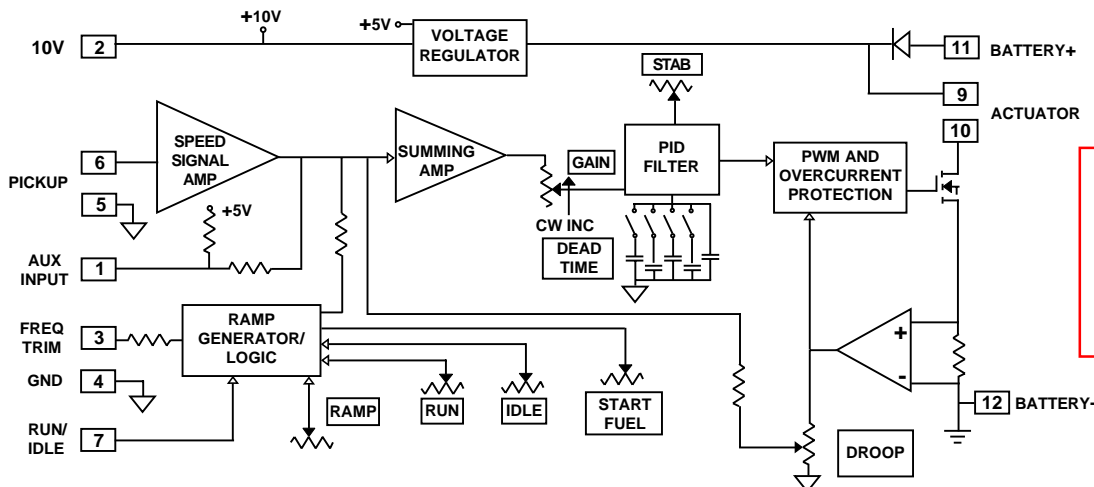
Model Number Variant

Variant

0 = Standard

1 = Switchable Droop

Consult Factory for Other Options



DEAD TIME Switch Settings

70	30	20	10	D.T. WEIGHT
↓	↓	↓	↓ (OFF)	1
↓	↓	↓	↑ (ON)	2
(BINARY PATTERN)				
↑	↑	↑	↑	60*
*Weight 60 equals 13.5 μF				

Figure 2. Simplified Schematic