MEC 12-75 V DC

Fixed Speed/ Load DC Voltage Controller

INTRODUCTION

The Speed Load Control MEC 12-75 V DC quickly and accurately adjusts engine speed, controlling a generators electrical load using a target DC voltage, not speed. This variable speed operation results in decreased noise, significantly reduces fuel consumption, and increases engine life.

The MEC 12-75 V DC:

- Maintains engine speed whether engine load is increased or decreased, preventing rapid speed fluctuations (hunting)
- Provides a voltage set range from 12 to 75 V DC.
- Includes a simple design with built in potentiometers.

The MEC 12-75 V DC supports a wide variety of small engines such as Kubota, Yanmar, and Mitsubishi. These engines are often used in DC generators, providing highly reliable power to charge batteries, provide drip charge, or temporarily provide power until main power comes back online.

The MEC 12-75 V DC s easily paired with GAC ALN, ALR, and 120 Series linear actuators and supports both 12 and 24 V DC.

SAMPLE ACTUATOR PAIRINGS AND USE

ALN-Series	Engine applications include diesel and gaseous fueled.
ALN-Series	Engines with an PF style pumps equipped with shut down solenoid.
ADC120S-12	Ideal for fuel systems on engines up to 150HP.

SPECIFICATIONS

POWER

Battery supply	12 and 24 V DC
Input Range	12 to 75 V DC
PWM Output	Duty Cycle 0 - 100% Frequency 50 – 450Hz
Operating Temperature	-30 to 85°C [-22 to 185°F]
Maximum Current	6 A DC
Voltage Regulation	0.1 V DC

PHYSICAL

Dimensions	1.02 x 4 x 4.67in [25.91 x 101.60 x 118.62mm]
Weight	12 ozf [347 gf]
Vibration and Shock	10 - 2000Hz, +/-4.0g 20 G, 11ms
Mounting	Vertical mounting preferred
Operating Hours	10,000 hours
Relative Humidity	38°C @ 97-100%
Storage Temperature	-55 to 125°C [-67 to 257°F]

WIRING AND DIMENSIONS

An overspeed shutdown device, independent of the governor system, should be provided to prevent loss of engine control which may cause personal injury or equipment damage. A secondary shutoff device, such as a fuel solenoid, must be used.

CONNECTING THE ACTUATOR

Connect the actuator to the MEC12-75 V DC following your specific actuator's installation instructions. The potentiometers on the MEC12-75 V DC will adjust the voltage to set speed. Reverse voltage protection is built in to the design.

- Electric actuator linkage must be correctly set before adjustments are made to the Speed/Load Controller.
- Mount in a cabinet, engine enclosure, or sealed metal box.
- Vertical orientation allows for the draining of fluids in moist environments.

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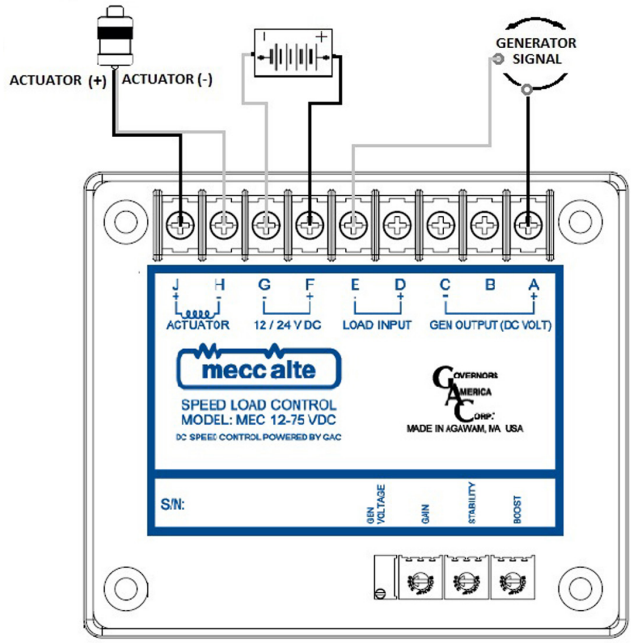
CONNECTING THE ACTUATOR

- Use shielded cable for all external connections to the controller. Use 16 AWG, 12.0ft [3.66m] for 12 V DC systems, 18 AWG, 12.0ft [3.66m] for 24 V DC systems. Increase wire gauge with increased distance:
  - One end of each shield, including the speed sensor shield, should be grounded to a single point on the controller case.
  - Do not overtighten terminal connections. Torque to no greater than 9.0in-lb ±2.5 [1.01 ±0.28Nm].



TERMINAL	CONNECTS TO
A	Generator Signal (+)
B	NA
C	NA
D	NA
E	Generator Signal (-)
F	Battery (+)
G	Battery (-)
H	Actuator (-)
J	Actuator (+)

STARTUP AND ADJUSTMENTS

Once the actuator is mounted on the engine and the controller is connected to the engine, you are ready to start the engine and continue setup.

STARTING THE ENGINE

The controller controls generator voltage, not speed.

1. Set GAIN and STABILITY potentiometers to the middle settings (50% - 6 o'clock) before starting the engine.
2. Set the running speed on the engine to no load.
3. The controller speed setting is factory set at approximately engine idle speed, 14 V DC at nominal for 12 V DC system, 28 V DC nominal for a 24 V DC system.
4. Crank the engine with DC power applied to the governor system. The actuator will energize to the maximum voltage (28 V DC) until the engine starts. The voltage (GEN VOLTAGE) potentiometer is a 25-turn potentiometer, you may have to turn it clockwise several turns before the engine starts.
5. Once the engine starts, power will peak to 28 V DC then back to 50% settings. If the engine is unstable after starting, turn the GAIN adjustment counterclockwise until the engine stabilizes.
6. Use the BOOST potentiometer to further tune the setting 0 – 5 V DC.

NOTE:
The governed voltage setpoint is increased by rotating the GEN VOLTAGE adjustment control clockwise. This is a 25-turn potentiometer; you may have to turn it several turns before noticing a change.

The Speed/Load Controller is operating correctly if the following are true:

- When applying load, engine speed promptly increases without a large initial decrease in RPM.
- When removing load, engine speed promptly decreases without an initial surge.
- Engine speed does not rapidly fluctuate up and down (hunting).

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ADJUSTING FOR STABILITY

Once the engine is at operating speed with no-load, complete the following adjustments.

STEP	ADJUSTMENT
1	1. Rotate the GAIN potentiometer adjustment clockwise until the engine becomes unstable. 2. Gradually move this adjustment counterclockwise until stability returns. 3. Move GAIN an additional 10° (1/8 of a turn) further counter-clockwise to ensure stable performance (270° potentiometer).
2	1. Rotate the STABILITY potentiometer adjustment clockwise until the engine becomes unstable. 2. Gradually move this adjustment counterclockwise until stability returns. 3. Move STABILITY an additional 10° (1/8 of a turn) further counter-clockwise to ensure stable performance (270° potentiometer).
3	Apply rated load: • When applying rated load engine speed should slowly increase without a large initial change in RPM. • When removing load, the engine speed should slowly decrease without a large change in RPM.
4	If instability cannot be corrected or further performance improvements are required, refer to the Troubleshooting section in this guide.

TROUBLESHOOTING

The rpm required to reach any particular voltage is determined by the load: the lighter the load, the lower the rpm needed to reach the specified voltage. The float voltage of a 24-volt battery is typically 27.6 volts.

SYSTEM INOPERATIVE
If the governing system does not function, check the following:
1. DC battery power not connected. Check for blown fuse, switch off power.
2. Low battery voltage.
3. Wiring error.

INSTABILITY

INSTABILITY	SYMPTOM	PROBABLE CAUSE
Fast periodic	Engine jitter at 3Hz or faster.	• Readjust GAIN and STABILITY for optimum control. • Turn off other electrical equipment that may be causing interference.
Slow periodic	Irregular speed below 3Hz.	• Fine tune GAIN using the BOOST pot. • Check fuel system linkage during engine operation for: 1. binding 2. high friction 3. poor linkage
Non-periodic	Erratic engine behavior.	• Increasing the Gain should reduce the instability but not totally correct it. If this is the case, there is likely a problem with the engine. Check for: 1. engine mis-firings 2. an erratic fuel system 3. load changes on the generator set voltage regulator

UNSATISFACTORY PERFORMANCE

SYMPTOM	STEPS	PROBABLE CAUSE
Engine overspeed	Do Not Crank. Apply DC power to the governor system.	Generated residual voltage must be 10 volts or higher for this test.
	Manually hold the engine at the desired running speed.	Measure the DC voltage between actuator terminals on the speed control unit. If the voltage reading is 2.0 to 3.0 V DC check for: 1. SPEED adjustment set above desired speed. 2. Possible defective speed control unit If voltage reading is > 3.0 V DC check for: 1. Actuator binding. 2. Linkage binding. If voltage reading is below 1.0 V DC the speed control unit may be defective.

SYMPTOM	STEPS	PROBABLE CAUSE
Overspeed during start up	Low GAIN setting.	Increase the GAIN setting CW and also turn stability CW as much as possible without causing instability. Check the actuator for binding or friction.
Actuator does not energize fully	DC voltage at the actuator should be 0.8 to 1.5 V DC less than the actual battery voltage, but not less than 8 V DC.	If the voltage is less than the following, check or replace battery: • 7 V for a 12 V DC system, or • 14 V for a 24 V DC system
	Connect actuator terminals to battery. The actuator should move to the full fuel position.	If not: • Actuator or battery wiring in error. See your actuators troubleshooting guide for more testing information. • Actuator or linkage binding. • Defective actuator.
Engine speed below desired governed speed	Measure the actuator output terminals while running under governor control. See your actuators troubleshooting guide for expected measurements.	If voltage measurement is within 2 V DC of the battery supply voltage level, then fuel control may be restricted from reaching full fuel position, possibly due to mechanical governor, carburetor spring, or linkage interference. GEN VOLTAGE adjustment may be set too low.