
Vehicle Electrification System Standards

V. Phase Drive Motors and Generators

V.e Electric Machine Speed and Position Sensors

Description:

Mainstream speed and torque control of a 3-Phase electric machine will utilize a sensing system to determine the rotational speed, position, and direction of the rotor. Controlling when stator magnetic fields are triggered and controlling the magnitude of the stator magnetic field is critical to the drivability and safety of the vehicle. Understanding the construction, operation, failure modes, and diagnostic processes for Encoder and Resolver sensors is essential in comprehending electrified vehicle propulsion systems.

Outcome (Goal):

Students will be able to describe and illustrate how Encoders and Resolver sensor systems operate within the electric machine control environment; describe how Encoders and Resolvers are constructed; analyze and evaluate the condition of Encoders and Resolvers by using various diagnostic techniques and tools.

Objective:

Students shall be able to:

1. Identify the location of the sensor on a transmission, transaxle or, drive unit
 2. Describe how the sensors operate and constructed
 3. Demonstrate how to analyze and evaluate the condition of IM using a serial data (scan) tool, oscilloscope, ohmmeter, voltmeter, and frequency meter.
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Task:

Students will be able to describe how electric machine Encoder/Resolver speed, position, and direction sensors are constructed, operate, and fail. Students will also perform testing and analysis of the sensors on live vehicles or test stands using the test equipment and the use of OEM vehicle service and component supplier information via website information while using proper technical terminology, acronyms, and definitions.

Purpose of Speed, Position, and Direction Sensors	
Encoder Sensor	
	Construction
	Operation
	Signal Generation
	Resolution
	Failure Modes
	Diagnostics
	Service
Resolver Sensor	
	Construction
	Operation
	Signal Generation
	Resolution
	Failure Modes
	Diagnostics
	Service

To comment or offer suggestions on this standard, contact Ken Mays:

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