

General Motors Electric Power Steering (EPS)

Torque Sensor

The power steering control module (PSCM) uses a torque sensor as its main input for determining the amount of steering assist. The steering column has an input shaft, from the steering wheel to the torque sensor, and an output shaft, from the torque sensor to the steering shaft coupler. The input and output shafts are separated by a torsion bar, where the torque sensor is located. The sensor consists of a compensation coil, detecting coil and 3 detecting rings. These detecting rings have toothed edges that face each other. Detecting ring 1 is fixed to the output shaft, detecting rings 2 and 3 are fixed to the input shaft. The detecting coil is positioned around the toothed edges of detecting rings 1 and 2. As torque is applied to the steering column shaft the alignment of the teeth between detecting rings 1 and 2 changes, which causes the detecting coil signal voltage to change. The PSCM recognizes this change in signal voltage as steering column shaft torque. The compensation coil is used to compensate for changes in electrical circuit impedance due to circuit temperature changes from the electrical current and voltage levels as well as ambient temperatures for accurate torque detection.

EPS Motor

The EPS motor is a 12-volt brushed DC reversible motor with a 58-amp rating. The motor assists steering through a worm shaft and reduction gear located in the steering column housing.

Power Steering Control Module (PSCM)

The PSCM uses a combination of torque sensor inputs, vehicle speed, calculated system temperature and the steering calibration to determine the amount of steering assist. When the steering wheel is turned, the PSCM uses signal voltage from the torque sensor to detect the amount of torque being applied to the steering column shaft and the amount of current to command to the EPS motor. The PSCM receives serial data from the engine control module (ECM) to determine vehicle speed. At low speeds more assist is provided for easy turning during parking maneuvers. At high speeds, less assist is provided for improved road feel and directional stability. Neither the PSCM nor the EPS motor are designed to handle 58 amps continuously. The PSCM will go into overload protection mode to avoid system thermal damage. In this mode the PSCM will limit the amount of current commanded to the EPS motor which reduces steering assist levels. The PSCM also chooses which steering calibration to use when the ignition is turned ON, based on the production map number stored in the BCM. The PSCM contains all 8 of the steering calibrations which are different in relation to the vehicles RPOs.