This paper proposes a new electronic-geared (EG) magnetless machine for electric vehicles. The proposed EG machine can offer the multitooth bipolar-flux (MTBF) operation for the low-gear (high-torque low-speed) situation, and the single-tooth unipolar-flux (STUF) operation for the high-gear (low-torque high-speed) situation. In particular, the balance-position winding arrangement is proposed to enable the machine having balanced flux linkages. Consequently, the proposed machine operates as the brushless ac machine for MTBF operation, leading to offer smoother torque at the low-gear situation. Meanwhile, it operates as the brushless dc machine for STUF operation, leading to produce better torque density at the high-gear situation. Various performances of the proposed EG machine are analyzed, with emphasis on the validity of electronic gearing. The experimental prototype is also built for verification.