

of the duty is an important prerequisite for proper planning. There is hardly a limit to the number of possible duty types.

In high-performance applications, such as traction and robotics, the load and speed demands vary with time. During acceleration of traction equipment, a higher startup torque (typically twice the nominal torque) is required; this is usually followed by cruising and deceleration intervals. As the torque varies with time, so does the motor current (and motor flux linkage level). The electric, magnetic, and thermal loading of the motor and the electric and thermal loading of the power

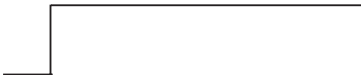







electronics converter are definite constraints in a drive specification.

Table 26.11 categorizes operating duties into eight major types [5].

26.4.2.2 Mean Output

Variation of the required motor output during the periods of loaded operation is among the most frequent deviations from the duty types defined in Table 26.11. In such cases the load

TABLE 26.11 Definition of load cyclic duties: VDE0530, in accordance with IEC 34-1 [5]

Duty Type	Representation	Description
S1: Continuous running duty		Operation at constant load of sufficient duration for the thermal equilibrium to be reached.
S2: Short-time duty		Operation at constant load during a given time, less than required to reach thermal equilibrium, followed by a rest and deenergized period of sufficient duration to reestablish machine temperatures within 2°C of the coolant.
S3: Intermittent periodic duty with a high startup torque		A sequence of identical duty cycles, each including a period of operation at constant load and a rest and deenergized period. In this duty type the cycle is such that the starting current does not significantly affect the temperature rise.
S4: Intermittent periodic with a high startup torque		A sequence of identical duty cycles, each cycle including a significant period of starting, a period of operation at constant load, and a rest and deenergized period.
S5: Intermittent periodic duty with high startup torque and electric braking		A sequence of identical cycles, each cycle consisting of a period of starting, a period of operation at constant load, a period of rapid electric braking, and a rest and deenergized period.
S6: Continuous-operation periodic duty		A sequence of identical duty cycles, each cycle consisting of a period of operation at constant load and a period of operation at no load. There is no rest and deenergized period.
S7: Continuous-operation periodic duty with high startup torque and electric braking		A sequence of identical duty cycles, each cycle consisting of a period of starting, a period of operation at constant load, and a period of electric braking. There is no rest and deenergized period.
S8: Continuous-operation periodic duty with related load/speed changes		A sequence of identical duty cycles, each cycle consisting of a period of operation at constant load corresponding to a predetermined speed of rotation, followed by one or more periods of operation at other constant loads corresponding to different speeds of rotation. There is no rest and de-energized period.