4E Electric Motor Systems EMSA

insights

Motor System – largest energy savings

A large number of individual components form together the Electric Motor System shown by the red line in the figure below. 30 % and more energy can be saved by optimizing the entire motor system.

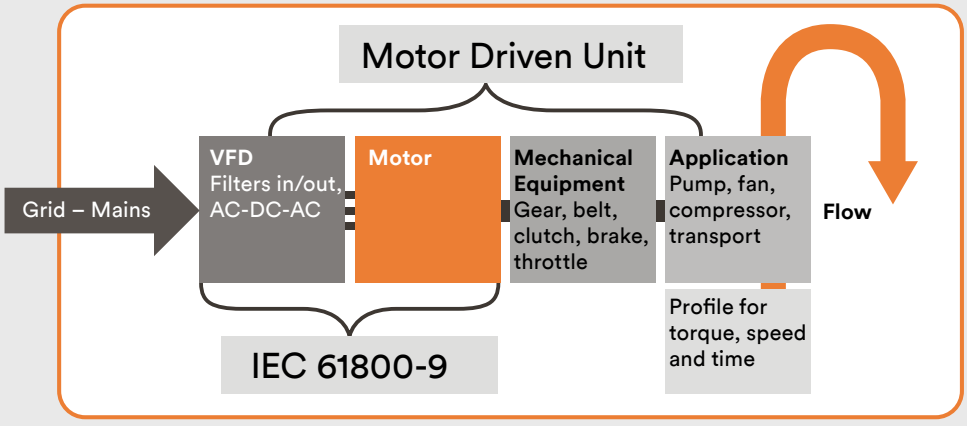
Electricity starts at the entry point of the grid, passes the transformer, the uninterruptible power supply and the power factor correction and is fed into the mains cable that distributes it to the variable frequency drive (VFD). The VFD supplies the electric motor with current and voltage at a specific frequency in order to make it rotate for the delivery of the required profile of torque and speed.

On the user end, the key element is the supply of a water flow in a pump or an air flow by a fan. The energy consumption is heavily dependent on the necessary volume, the required speed of the flow in the pipes and ducts, the added resistance by valves, throttles, dampers, et cetera and the necessary daily cycle of operation. Here, major improvements can be made by strictly delivering the necessary flow at the required time and to avoid any operation without proper use. Also, the precise sizing of pipes and ducts reduces the necessary pressure. In water pumps with closed loops and air ventilating systems, the necessary electric motor power grows with the third power of the flow. This means that careful sizing of the required flow pays with large energy savings.

Substantial energy savings come from the optimum use of the mechanical elements between the motor and the application. Gears, transmission belts, clutches, brakes, and especially throttles cause additional energy losses in the motor system. Continuous electronic load control with a VFD eliminates throttles, bypasses and dampers and their respective losses.

The crucial element is the application itself: the pump, the fan, the compressor, etc. that needs precise sizing according to the required load profile and operating point. Modern engineering tools allow for precise selection of pump wheels and fan impellers according the necessary task.

The figure below also shows the Motor Driven Unit which consists of the VFD, the motor, the necessary mechanical equipment and the application. A first global standard IEC 61800-9 is planned to cover the interaction between the motor and VFD.



Motor System