Based on the short survey “Stromtrend EU 27” by prognos AG, the Verband Deutscher Maschinen- und Anlagenbau e.V. (German Engineering Federation, VDMA) expects an increase in energy demand in Europe of 13 percent, from 3,306 TWh per year in 2007 to 3,736 TWh per year in 2030. In the face of such numbers, scarce resources, and rising energy prices, there is no avoiding the need for more efficient use of energy. In addition to the energy-saving overall solutions by Siemens, modern industrial switching technology also contributes by consistently reducing power loss.

Minimizing power loss

Innovative contact materials reduce the contact resistance in the main circuit and thus lower the waste heat in the control cabinet, among other things. Together with new drive electronics of the contactor coils, optimized bimetallic strips on the protection equipment or alternatively with electronic current detection, the newly developed switching devices reduce power loss by up to 10 percent. Even in the auxiliary contacts, the developers achieved improvements through high-quality materials and grooved contact surfaces. This further increases contact reliability, which positively impacts the availability and productivity of machines and plants.

The most energy-efficient contactors of the Sirius modular system have an electronic coil drive, which reduces power loss by up to 92 percent. The ease of use and the expanded capacity are likely to be of use to operators as well. For example, the sizes S0 and S00 of the Sirius 3RT2 contactors up to 38 A have been completely redone. With the same mounting width of 45 mm, it is now possible to...
switch 7.5 kW (S00) instead of the previous 5.5 kW, and 18.5 kW (S0) instead of the previous 11 kW.

**Easy connection of load branches**

The new contactor technology of the Sirius innovations modular system is plug-in throughout. For example, load branches can be connected quickly using adaptors. Even current monitoring relays or overload relays can be attached from below to the completed load branch. Here, too, energy efficiency plays an important role. Devices with electronic triggers reduce their own power loss by up to 80 percent. This results moreover in a substantially larger setting range.

In the case of the Sirius 3RA6 compact branch, the power loss is reduced by up to 80 percent in comparison to that of conventional branches. This is possible due to the integration of short-circuit protection, electronic overload protection, and switching during normal operation in one device. Consequently, it is possible with a modern solution to save energy even when starting motors directly.

**Demand-based operation**

Today, there are soft starter solutions that enable the demand-controlled operation of electric motors without negatively impacting the mechanics. They cut electrical and mechanical peak loads by up to 60 percent. The Sirius 3RW soft starters, for example, reduce the power loss of such devices by up to 92 percent during operation. This makes an intelligent bypass system possible, which disconnects the current flow from the thyristor when the motor is at speed and conducts it through an integrated contactor.

In many cases, larger drives are supposed to absorb the mechanical load due to peak loads during starting and stopping. However, if a motor is subjected to strongly changing loads or runs in the partial-load range below 50 percent of the motor rating, its energy demand is higher than necessary. Here, too, a soft starter or frequency converter solution would be preferable.

For example, for pump drives, savings of up to 70 percent are realistic with a need-based solution. The converters that can be used here require a power module and a control unit with auxiliary power to convert frequencies. However, if due to a good design the pump performance is close to the rated power output of the motor, a soft starter saves energy through its own significantly lower power losses.

**Simple solutions for higher energy efficiency**

The examples show that modern solutions in the area of industrial switching technology can substantially increase energy efficiency. Siemens has aligned its Sirius innovations modular system with the new market requirements. Regarding environmental aspects as well as economic efficiency and service reliability, the devices are already at the upper limit of what is possible today. Still, the efficiency levels are being increased constantly because energy efficiency will be even more important in the future to remain competitive.

**Savings of up to 5,000 euros per year**

An example from the pump technology area, where a solution with four converter drives is compared to an alternative with one converter plus three soft starters, clearly shows the advantages soft starters can have for the energy balance. Both systems have a total output of 360 kW, which can be activated as needed. In the soft starter solution, three pumps, which can be connected individually per soft starter, operate the base load of the water supply via a cascade circuit. The fourth pump, which can be regulated depending on the speed, takes on the actually required variable load. In practice, this reduces energy costs by up to 5,000 euros per year (sample calculation with 12 ct/kWh) and reduces the annual CO₂ emissions by approximately 26 tons. Compared to the solution with the four frequency converters, the total energy costs are reduced by approximately 65 percent; in addition, the purchasing costs are 12,000 euros lower.

**Minus 65 percent**

<table>
<thead>
<tr>
<th>4 converters</th>
<th>1 converter + 3 soft starters</th>
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</thead>
<tbody>
<tr>
<td>Total energy costs 100%</td>
<td>Total energy costs 35%</td>
</tr>
<tr>
<td>Purchasing costs 100%</td>
<td>Purchasing costs 30%</td>
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