LEROY SOMER®
Permanent Magnet Solutions
Dyneo®

LSRPM series

A magnetic synchronous variable speed solution at the cutting edge of centrifugal pump application technology

Pumping applications represent nearly a quarter of industry's electricity consumption. In these applications drive systems therefore constitute, even more than anywhere else, a significant source of energy savings.

♦ High-efficiency motors

At the current time, the use of **EFF1 motors**, which are very simple to install, is being encouraged by various European organisations, as a means of reducing greenhouse gases. However, in some cases the energy savings made are less than impressive. In fact, the difference in energy consumption between an EFF2 class motor - the most commonly used at present - and an EFF1 motor is less than a few percentage points.

Moreover, in centrifugal applications such as pumps or fans, the decision to replace an EFF3 or EFF2 motor with an EFF1 motor on an existing installation may, in some cases, turn out to be less efficient than expected:

The on-load speed of a high-efficiency motor is usually higher than that of a motor with the same power rating and lower efficiency. By way of example, the on-load speed of a 15 kW 2-pole motor is 2953 min-1 with the EFF1, as against 2928 min-1 with the EFF2. Assuming that the hydraulic unit has not been changed, this 1% difference in the speed leads to a 3% increase in the power absorbed, since the power is in proportion with the cube of the speed ratios. However it should be noted that the increase in the power absorbed may be compensated for by the resulting increase in flow rate and pressure, thus reducing the pump operating time.

♦ Control using variable speed

Another way to reduce electricity bills is **variable speed control of a pumping or ventilation installation**: three times more energy savings are potentially available.

A simple pressure sensor can be used to control the pressure in a pumping installation. The pump speed should be adapted to suit the actual demand, characterized by changes in the pressure.

This pressure measurement can also be used to control excess pressure and hence set the system to stand-by to prevent the pipes from bursting. Similarly, if there is insufficient pressure, the system will protect itself by shutting down and avoiding any risk of flooding.

Since the drive controls the acceleration and deceleration phases, there is no need for storage tanks designed to guard against water hammer phenomena.

♦ DYNEO ®, magnetic synchronous variable speed solutions

Variable speed is enjoying a new popularity with the arrival of **motors specifically designed for this kind of use**: **DYNEO ®**

At the forefront of commercially-available technologies, **DYNEO ®** combines **all LEROY-SOMER's permanent magnet synchronous drive and motor solutions**. One of the components of **DYNEO ®**, **LSRPM** is a series of magnetic synchronous motors which benefits from the induction motor's tried and tested IP 55 mechanism.

Using synchronous technology, this motor is by definition a non-slip motor. The rated speed will therefore be scrupulously applied at the drive shaft, optimising the application's energy consumption.

Another major benefit of this technology is the **exceptionally high efficiency level**. Because of the magnets, the rotor losses are non-existent in the **LSRPM** whereas they represent 1/3 of the losses in an induction motor, whether EFF2 or EFF1. Note that the use of a variable speed drive causes a voltage drop which usually results in lower efficiency of the induction motor.

Since the **LSRPM** motor was designed for control via a drive, **its efficiency is higher than that of an EFF1 asynchronous solution with the equivalent power rating**.

The difference in efficiency is 2 to 4 points higher, at the rated speed point of 1500 or 3000 min-1. Moreover, **the efficiency of the LSRPM motor is much more stable than an induction motor when the speed varies**. This difference in efficiency is as much as 12 to 15 points at mid-speed.

Thanks to this improvement in efficiency, **the specific output power can be increased** or **the motor dimensions reduced**. Depending on the power rating and speed, the frame size is reduced by 1 to 3 sizes compared to an asynchronous solution.

This high specific output power allows for new mounting options, such as coupling with a single flange for power ratings up to 170 kW, rather than 55 kW in asynchronous drives. Another example: a 250 kW 3000 min-1 induction motor characterised by a 355 mm frame size and weighing 1400 kg is now achievable with **DYNEO ®** technology in a 280 mm frame size weighing 400 kg.

Lastly, thanks to variable speed and the **DYNEO ®** solution, it is now possible, with a single **LSRPM** motor, to extend the pump operating speed from 3000 min-1 to 3600 min-1. Other possibilities are also opened up to the designers of hydraulic units, given the operating speed of **LSRPM** motors, which can reach and exceed 5500 min-1.

DYNEO ® LSRPM series: **the cost effective, high-performance variable speed solution** which fully meets the expectations of users and manufacturers of centrifugal pumps, has the following characteristics:

- Power rating between 0.75 and 400 kW
- Torque between 1 and 1400 N.m
- Speed between 1 and 5500 min-1
- Frame size between 90 and 315 mm
- IP 55 construction, IK 08 in accordance with IEC 60034