

Energy from rotation - the Socomec Flywheel

Now, a new way of protecting loads from power supply failures

Most users seek protection from power supply problems in the classic UPS, with batteries, electronics, software, etc... but there are other options. One alternative solution that has been around for decades is the flywheel technology — basically, a system where energy is accumulated and stored in a heavy rotating unit. The flywheel is a disc of steel or other material, such as carbon, weighing between tens and hundreds of kilograms, depending on the particular technology. The disc is set in rotation by a motor connected to the d.c. bus of the UPS by way of a static converter, and in the event of supply failing, it is able to cut in and cover the power supply for a length of time sufficient to start an auxiliary generator and transfer the load to the backup supply.

The system functions essentially as a dynamic battery, with the wheel continuing to rotate around the clock, ready at any moment to transfer kinetic energy to the load should the main power supply be lost.

Whilst this type of system is more expensive to purchase initially than a set of VRLA batteries with comparable performance, the investment is easily recouped in the long term, given the high efficiency it provides and the fact that maintenance costs are practically zero.

The market currently offers low speed and high speed flywheels, with autonomy rated in tens of seconds. A low speed flywheel spins at around 10,000 rpm and has a power rating of 1-2 MW. These wheels are heavy, and bulky to the point that installation can pose problems.

High speed flywheels run at 30,000 rpm and over. They are lighter components, requiring minimal maintenance and creating fewer installation problems, thanks to their more compact dimensions. On the plus side, flywheels have no memory effect. Swiftly recharged and reliable, they require no air conditioning, have a low environmental impact and give long service (at least twenty years); on the minus side, they are costly and offer limited autonomy.

In this field, Socomec UPS offers the VSS+DC range with rated power from 60 to 1000 kW. The flywheel turns on magnetic levitation bearings, which have the effect of reducing friction. Different solutions are possible, depending on the operating conditions. The first is to provide full backup in the event of an a.c. mains power supply failure. The system is connected to the d.c. bus, and delivers energy whenever the mains voltage strays outside specified tolerance margins. A second solution provided by the VSS+DC is to drive the load until an auxiliary generator set comes into operation. In a third solution, the flywheel is connected in parallel to the batteries. The VSS+DC cuts in to compensate for electrical pollution (harmonics, flicker, blips, etc), preserving the life of the batteries so that their full capacity is available to deal with any prolonged break that may occur. Finally a number of VSS+DC units can be connected in parallel to expand the available power or autonomy of the system.

