

powerMELA E-Machine



**Contact:**

Luca Avegno  
 Motronica Director  
 Tel.: +39 335 6327314  
 E-Mail: l.avegno@motronica.com

## Moving towards the future we want

### Electrification of agricultural vehicles

**E**missions of greenhouse gases are increasing faster than expected and the effects on climate change are emerging sooner than could be supposed. The most industrialized countries have issued specific laws to reduce energy needs. With a sense of responsibility and a spirit of innovation Motronica has tried to make its own contribution by proposing solutions and products developed by its partner STW, in worlds in which an electric vehicle is not only a non-polluting means but also an economic and functional advantage. Founded in 2001 in Italy, Motronica operates on the international market and provides support for the design and implementation of automation systems, digitalization and electrification, benefiting from the vast skills acquired in the past in numerous and diversified projects.

The value of the solutions is guaranteed by the use of tools and development processes that derive directly from the automotive and aerospace industry. The peculiarity of Motronica consists in the supply of components and solutions for the development of applications in highly demanding and mission-critical environments, with guaranteed quality and reliability. Motronica thanks to a twenty-year partnership with STW, a German specialist for electric drive technology and an established expert for innovative and robust electrification solutions for mobile machines for over 15 years, proposes a scalable technological platform, also from an economic point of view.

In fact, it is now common knowledge that in this technological electrification phase, only modular and flexible solutions applicable to several vehicle types can reach industrial production volumes. No matter where your machines are, in the mountains, on the flat, on or off-road, Motronica can help you adapt your systems to the needs of the future. Benefitting from its pluriannual experience and from well tested electrification products for hybrid or full- electric mobile machines, through its support Motronica is able to follow development and integration of electrification solutions worldwide.

### Motronica's approach

Motronica's approach to electrification solutions is based on small steps:

- *Analysis* - where the idea develops
- *Calculation of the system* - where the solution is built
- *Pilot development* - where the system is implemented
- *Serial development* - where the future is shaped

This approach allows, in different scenarios, to support the integration of new skills and technologies in a modular, flexible and personalized way.



SimonE  
 STW's vehicle

Image rights: STW GmbH



powerMELA-DC/DC Converter

Motronica's ability to supply different types of electrification products such as motors and generators, energy distribution and security systems, transformers and inverters, Integrated electronics that allows to provide a complete, flexible and customizable proposal for the electrification of a wide range of agricultural machines and accessories.

## PowerMELA machines

In the family of components dedicated to electric motors and generators, Motronica proposes the powerMELA E machines by STW.

These are permanent-excitation synchronous machines that provide a compact solution thanks to the integrated inverter. Optionally combined with a transmission and designed for high continuous yield thanks to oil cooling, they are specially designed to function as generators or main and auxiliary engines for use in mobile machines.

These machines are designed for four-quadrant operation and can be operated via the CAN bus with nominal values for torque, voltage and speed control.

A special feature of the powerMELA E-machine solution is the integrated inverter, for which a DC voltage, fieldbus (CAN) and cooling system connection is sufficient.

Complex wiring is obsolete; space and weight are saved and a high and insuperable power density is achieved. (around 1kg per KW).

To provide a constant high power, thermal losses must be dissipated directly after their generation. Even with particularly high efficiency and 97% efficiency, several kilowatts in heat must be dissipated. This is why the powerMELA E-machine, thanks to oil cooling, allows direct cooling of the live components inside the machine.

Due to the high electrical power required, both current and voltage or both need to be adapted accordingly. The powerMELA E-machine gives priority to an increase in voltage, since it can reach a working voltage up to 800 volts, the cable sections are reduced and high performance networks can be created with limited effort.

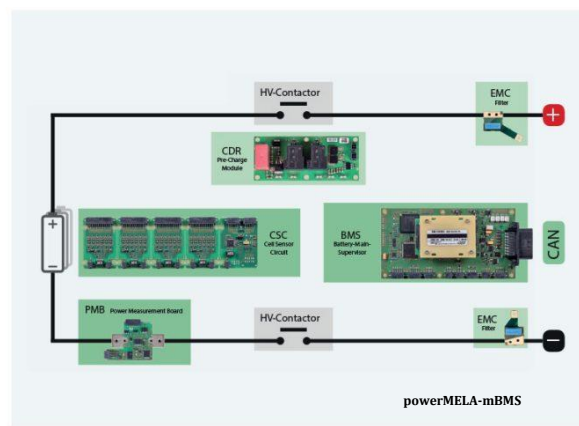
Thanks to a special insulation design, high operating voltages and interference

## Tractors of the future

Electric machines come into play in applications where they demonstrate their reliability in the harsh environment of tractor use.

Some manufacturers of electric powered tractors, designed for efficient and sustainable agriculture, have chosen powerMela products as core of their electrification solutions. These tractors reduce the amount of work for farmers and increases yield.

The use of wind, sun and biomass to provide energy presents important challenges for our society. Agricultural companies are increasingly playing a key role as energy suppliers. A battery-powered electric tractor that uses energy from regenerative energy sources is attentive to both the environment and the climate. When the power generated is consumed directly on site, the solution becomes particularly efficient. In the future is also possible that the tractor can act as a flexible energy center for farms. For example, during periods when the tractor does not work, milking machines and cooling units may be powered by the battery.



suppression of the network, powerMELA guarantees reliability and fault-free operation. In the family of components dedicated to the distribution of energy Motronica proposes the powerMELA-DC/DC-Converter that has been specially designed for use in hybrid and Full electric vehicles, thanks to its galvanically separated switching regulator. With its wide range of input voltages and its customizable output voltage, the converter can completely replace the alternator function. The different versions available can be adapted to use on mobile work machines and can be used both as battery chargers and as a source for low voltage devices (12v-24v-48v).

## PowerMELA-mBMS

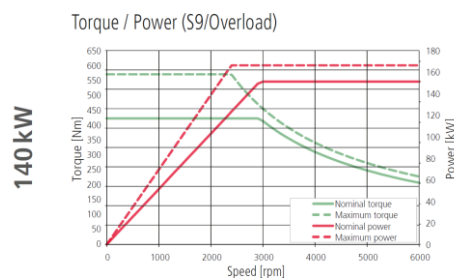
In the family of components dedicated to integrated electronics Motronica proposes the PowerMELA-mBMS, a mature and complete solution for the battery. It covers all electrical functions of a lithium-ion battery, from sensors to supervision of memory status up to the balancing of cells to the self-diagnosis of the electronics with an insulating protection.

Motronica will support you when you install your battery system. Motronica offers cost-effective series development and production based on the mBMS reference design, the quickest and easiest way for a sophisticated and tailor-made solution.

The Battery Main Supervisor (BMS) is the central control unit of the battery system. It includes three processors for the highest levels of reliability and security.

It collects all the information from the sensor modules, the cell sensor circuits and the power measurement board, calculates the state of the battery system and controls the high voltage contactors.

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140KW powerMELA-E Machine Torque/Power diagram

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