

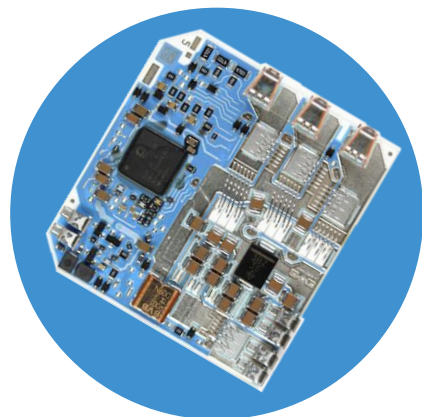
## Fast Facts

### MCU - Motor Control Unit

**Power range 35 - 200W / > 200W**

By Electrification of hydraulic and mechanic actuators in the power train of combustion engines fuel savings and CO2 emission reduction can be reached.

For reliability and lifetime reasons many times electrical commutated machines are used (BLDC-brushless direct current motors) instead of direct current machines (with mechanical commutators).



### Motor Control Unit

An MCU takes care of the electronic control of the driving speed. To ensure the operation of a BLDC motor following functions have to be implemented in the MCU:

- 1) Power electronics inverter: B6 circuit for 3~motors, B4 circuit for 1~motors
- 2) Electronics and signal conditioning of the power electronic
- 3) Protective circuit for short circuit, over-current, low voltage, over voltage, temperature
- 4) DC link & EMC components
- 5) Communication to superior control unit

The information for the speed control is calculated via sensorless Back-EMF\* and current measurement. Self protecting functions are integrated in the hardware as well as in the software. MCUs are designed for 12 V, 24 V and 48 V vehicle voltage, the power range reaches from 35W to 1.000W.

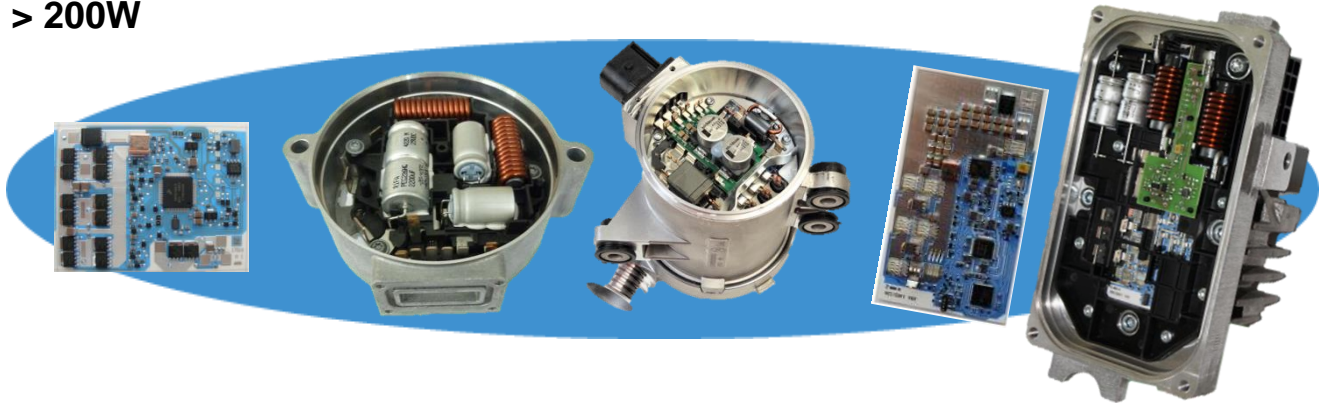
\*EMF = elektromagnetic field

### Special Features

MCU:	Electrical I/O:
• Inverter: MOSFET switch: 30 V, 40 V, 75 V, 100 V	• LV supply: welding termination
• Resistive current measurement: 5-100 A	• 1 or 3 motor phases: welding termination
• Insulation voltage control: especially at 48 V systems	• Communication: 4-8 pole welding termination
• Temperature control: Tboard, max=157 °C	- CAN
	- PWM, LIN
<b>Cooling:</b>	
• Heat management: Tcooling element, max=150 °C	

# MCU - Motor Control Unit

> 200W



## MCU > 200W

The MCU controls 3-BLDC motors with a motor design with 2 or 3 poles at the rotor and 6 or 9 teeth at the stator. As substrate a 96 % Al<sub>2</sub>O<sub>3</sub> aluminium oxide ceramic is used.

All components are verified referring to little difference in the temperature coefficient, so that a lifetime of minimum 7.000 h at high temperature (150 °C) can be reached.

According to power and temperature requirements power electronic components can be done as bare die or as housed elements. The passive EMC components are fixed into the frame by welding and/or soldering and/or gluing.

The operation of the MCU takes place via block, trapezoidal or sinusoidal commutation algorithm.

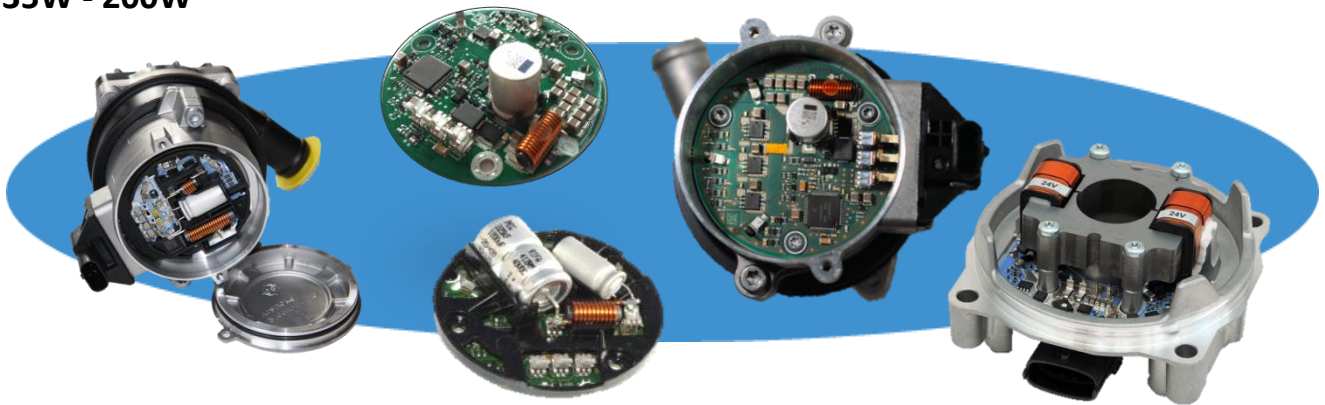
These circuits are used in electrical water pumps, air and vacuum pumps with a vehicle voltage of 12 V, 24 V and 48 V.

## Special Features

MCU:	Electrical I/O:
<ul style="list-style-type: none"> <li>• Inverter: MOSFET switch: 40 V, 75 V, 100 V</li> <li>• Resistive current measurement: 15-100 A</li> <li>• Insulation voltage control: especially at 48 V systems</li> <li>• Temperature control: Tboard, max=157 °C</li> </ul>	<ul style="list-style-type: none"> <li>• LV supply: welding termination</li> <li>• 1 or 3 motor phases: welding termination</li> </ul>
	<ul style="list-style-type: none"> <li>• Communication: 4-8 pole welding termination               <ul style="list-style-type: none"> <li>- CAN</li> <li>- PWM, LIN</li> </ul> </li> </ul>
Cooling:	
<ul style="list-style-type: none"> <li>• Heat management: cooling element, max=150 °C</li> </ul>	

# MCU - Motor Control Unit

35W - 200W



## MCU 35W - 200W

The MCU controls 3~BLDC motors with a motor design with 4 or 6 poles at the rotor and 6 or 9 teeth at the stator or 1~BLDC motors with 2 terminal pairs and asymmetric air gaps with 2 concentrated stator windings.

As substrate a 96 % Al<sub>2</sub>O<sub>3</sub> aluminium oxide ceramic or an organic substrate is used.

All components are verified referring to little difference in the temperature coefficient, so that a lifetime of minimum 7.000 h at high temperature (150 °C) can be reached.

The operation of the MCU takes place via block, trapezoidal or sinusoidal commutation proceeding.

Due to FOC software methods a less complex circuit (without wire bonds) can be realised by SMD capable EMC and DC-links.

These circuits are used in electrical water pumps, for turbo charger intercooling and for the cooling of electrical systems (batteries, electric motors, DC/DC converters) in electro and hybrid vehicles with a vehicle voltage of 12 V.

## Special Features

<b>MCU:</b>	<b>Electrical I/O:</b>
<ul style="list-style-type: none"> <li>• Inverter: MOSFET switch: 40 V</li> <li>• Resistive current measurement: 3-15 A</li> <li>• Insulation voltage control: especially at 48 V systems</li> <li>• Temperature control: Tboard, max=157 °C</li> </ul>	<ul style="list-style-type: none"> <li>• LV supply: welding termination</li> <li>• 1 or 3 motor phases: welding termination</li> <li>• Communication: 4-8 pole welding termination <ul style="list-style-type: none"> <li>- CAN</li> <li>- PWM, LIN</li> </ul> </li> </ul>
<b>Cooling:</b>	
<ul style="list-style-type: none"> <li>• Heat Management : cooling element, max=150 °C</li> </ul>	