

# PRIMOVE PROPULSION

## Converter modules



.....

**BOMBARDIER *PRIMOVE* offers reliable high performance motor converter modules based on long term rail development know-how and widespread field experience out of several thousand rail vehicles in daily operation. Adapting this knowledge to e-buses results in powerful and reliable products applicable to most of the bus platforms and electric motors on the market.**

.....

### WHY CHOOSE PRIMOVE MOTOR CONVERTERS?

The water-cooled converter modules consist of a four phase IGBT two-level converter, filter capacitor, input current sensor, output current sensors, input voltage sensor, temperature sensor, IGBT gate-drive-units and motor control unit. They are short circuit protection (hard and soft) at the output of the converter module.

Designed for usage within our powerful *PRIMOVE* propulsion package, stand-alone variants are also available on request.

The integration of the ZF axle AVE130 and central motor are already configured and tested (ECE R85 certificate available). The application of central motor drive set-ups is also available.

#### Main features:

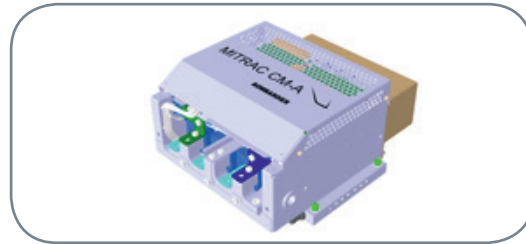
- Lightweight, high continuous power density
- Four independent IGBT phases
- Short circuit protection at the main terminals
- Onboard diagnostics available
- SAE J1939 interface via gateway
- Housing with IP 69 optional
- Fullfills common EMC Standards (ECE R10 and EN 50121)
- Functional safety assessment and development according to ISO 26262, IEC61508
- Competitive control platform including MC Control (PWM, field orientation) for ASM, PM, BC control, DC/DC optional

## THE TECHNOLOGY BEHIND

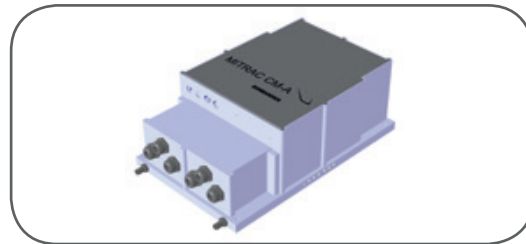
The *PRIMOVE* converter modules have been extensively tested against the application requirements thanks to the comprehensive in-house testing environment, comprising hardware in the loop as well as Li-Ion battery test, and high power propulsion test facilities. This also enables us to quickly react on special customer requirements and applications.

TECHNICAL DATA	CM 140	CM 200
Nominal DC-link voltage	660 Volt	660 Volt
DC-link voltage working range	400 - 820 Volt	400 - 820 Volt
AC output voltage range	0 - 500 V	0 - 500 V
AC output frequency	0 - 400 Hz	0 - 400 Hz
AC output current (rms)	300 A	400 A
AC output current (peak)	450 A	600 A
Max. switchable current	600 A	900 A
Switching frequency (AC)	2 - 5 kHz	2 - 5 kHz
Switching frequency (BC)	1 - 3 kHz	1 - 3 kHz
IP rating	IP 00 <sup>1</sup>	IP 00
Working temperature range	-40 - +85°C <sup>2</sup>	-40 - +85°C <sup>2</sup>
Storage temperature	-40 - +85°C	-40 - +85°C
Dimensions	190x350x420	190x350x420
Weight	17 kg	20 kg

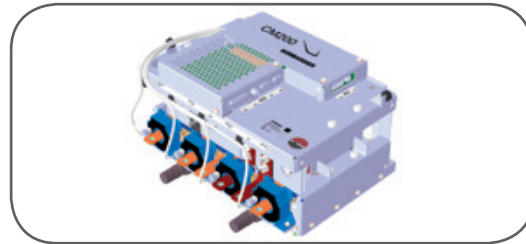
<sup>1</sup> IP 69 available; <sup>2</sup> Derating above 70°C



CM 140



CM 140 as IP 69 solution



CM 200

### Mannheim, Germany

- Commercial operation of fully electric bus for everyday passenger services, even on demanding bus routes since June 2015
- *PRIMOVE* propulsion system 140-2 for a 12 meter e-bus
- Four inverter modules CM 140
- Integration of ZF AVE 130 Axle

### Bombardier Transportation

Schöneberger Ufer 1  
10785 Berlin, Germany

Tel + 49 30 986 07 0  
Fax + 49 30 986 07 2000

[www.primove.com](http://www.primove.com)

BOMBARDIER and PRIMOVE are trademarks of Bombardier Inc. or its subsidiaries.

**BOMBARDIER**  
the evolution of mobility