TRAMS AND E-BUSES

PRIMOVE BATTERY

Optimised for maximum performance and lifetime

Our comprehensive rail transit and e-mobility expertise lies behind our industry leading products and services.

WHY CHOOSE PRIMOVE BATTERY SYSTEMS?

High performance

The *PRIMOVE* battery systems have been designed to provide maximum performance using the latest Nickel Manganese Cobalt (NMC) Li-Ion cell developments. A comparatively small battery is therefore sufficient to power the vehicle and to allow full braking energy recuperation. High charging rates reduce recharging time to a minimum.

Lifetime guarantee

By optimizing operational parameters and providing advanced liquid cooling functionality the achievable battery lifetime is extended to up to 10 years.

Optionally, a battery lifetime guarantee can be provided.

Safety first

The *PRIMOVE* battery systems were developed and tested according to the highest automotive and rail safety standards. The multi-level safety concept covers all aspects of functional, electrical, chemical, mechanical and occupational safety considerations, making it one of the safest battery systems on the market today.

Smaller and lighter

The compact design of the battery modules combined with an enclosure concept making use of an innovative sandwich structure results in a light and small package.

Modular

The *PRIMOVE* battery systems follow a modular approach, allowing parallel and series connection of battery packs. This ensures the highest flexibility when fulfilling requirements of varying applications.

primove
true e-mobility

BOMBARDIER
the evolution of mobility

PRIMOVE BATTERY FOR E-BUSES

At Bombardier, we are extending vehicle electrification and its benefits beyond rail. With the *PRIMOVE* high power battery systems for e-buses, planned stops are turned into charging opportunities without requiring additional vehicles, interrupting service or affecting dwell times.

The *PRIMOVE* Battery 60 and 90 are lithium-ion traction battery systems designed to minimize integration efforts on any type and size of electric bus while providing high performance, safety and lifetime. Using *PRIMOVE* inductive charging, the battery size can be kept to a minimum while allowing the e-bus to operate 7 days per week 24 hours a day.

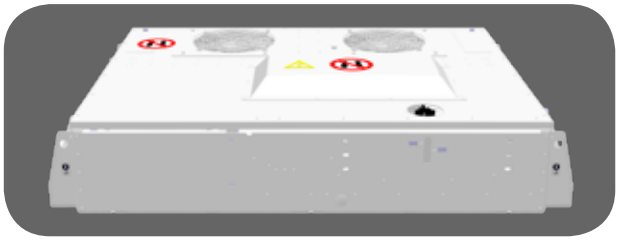
Battery system features

The *PRIMOVE* Battery 60 and 90 systems include all parts required for simple integration and reliable long lasting operation in all climate zones.

- One two or three 30 kWh battery packs
- One BMS master controller (installed on pack)
- One thermal conditioning unit (TCU)
- HV wiring harness set
- LV wiring harness set
- *PRIMOVE* care package

TCU Road

Cooling capacity	kW	8
Heating capacity	W	500
Supply voltage compressor	V AC	400
Supply voltage other	V DC	24
Coolant flow rate	l/h	2000 - 3000
Max. coolant pressure	bar	1
Weight	Kg	165
Dimensions l/w/h	mm	1435/1110/360
Operating temperature[1, 2]	°C	-30 - 45



Application specific advantages

- Battery system capacity is chosen according to customer requirements
- Reduced cost by regularly recharging a small battery pack, rather than installing more capacity
- Long battery lifetime due to optimised operational concepts and advanced thermal conditioning solution.

Battery		60	90
Number of packs		2	3
Energy content in	kWh	60	90
Nominal battery voltage	V DC	660	660
Discharge current cont.	A DC	220	220
Discharge current 300 s	A DC	280	280
Supply voltage for control	V DC	24	24
Control bus		CAN	CAN
Liquid cooled		Water/Glycol	Water/Glycol
Weight battery	Kg	720	1080
Dimensions per pack l/w/h	mm	1680/780/246	1680/780/246

PRIMOVE BATTERY FOR TRAMS

Trams have always operated electrically but now overhead wires are not required any more. The *PRIMOVE* battery delivers all required power for tram applications. Recharging can take place under short catenary sections in the stations or 100% catenary free using the *PRIMOVE* inductive charging technology.

The *PRIMOVE* rail battery 50 provides a power source intended for on traction bogie. Each of the two battery packs has its own power and control interfaces for separate connection to the traction converters. The *PRIMOVE* battery 50 is the smallest and lightest light railway traction battery system on the market today.

Battery system feature

The *PRIMOVE* Battery 50 system includes all parts required for simple integration and reliable long lasting operation in all climate zones.

- Two 24.5 kWh battery units on common frame, providing separate HV interfaces
- Two BMS master controller (installed on pack)
- One thermal conditioning unit (TCU)
- HV wiring harness set
- LV wiring harness set
- Battery connection box
- *PRIMOVE* care package

Application-specific advantages

- 100 % catenary free operation (CFO) with *PRIMOVE* inductive charging
- 90 % CFO with catenary conductive charging
- 100 % recuperation of braking energy
- No vehicle performance reductions under battery power
- Long lifetime due to optimised operational concepts, advanced cooling solution and regular recharging

BATTERY 50

Total energy content	kW	2 x 24,5
Nominal battery voltage	V DC	532
Discharge current cont.	A DC	2 x 120
Discharge current 300 s	A DC	2 x 162
Supply voltage for control	V DC	24
Control bus		CAN
Liquid cooled		Water/Glycol
Total battery weight	Kg	2x330
Total battery dimensions	mm	1780/440/610

TCU Rail

Cooling capacity	kW	8
Heating capacity	W	500
Supply voltage compressor	V AC	400
Supply voltage other	V DC	24
Coolant flow rate	l/h	1600
Max. coolant pressure	bar	1
Weight	Kg	170
Dimensions l/w/h	mm	1700/430/600
Operating temperature[2]	°C	-30 - 45

[1] Battery 60 has 2 packs; battery 90 has 3 packs [2] Operation above 45°C up to 55 °C ambient with reduced performance

Nanjing, China

- 30 *PRIMOVE* battery systems
- Each 5-car tram equipped with 2 modular battery systems of 49 kWh each
- 90 % CFO – charging via pantograph during acceleration and during normal dwell times at tram stops while passengers get on and off
- Start of passenger service: August 2014

Mannheim, Germany (pilot project)

- 2 *PRIMOVE* battery systems of 49 kWh on 5-car tram
- Charging tests via pantograph at dynamic and static mode
- Start of tests: spring 2014

Braunschweig, Germany

- 1 *PRIMOVE* battery system 60 on one 12-metre e-bus
- 4 *PRIMOVE* battery systems 90 on four 18-metre e-buses
- *PRIMOVE* inductive charging with 200 kW at depot, end stop and 1 intermediate bus stop
- Start of passenger service: March 2014

Mannheim, Germany

- 2 *PRIMOVE* battery systems 60 on two 12-metre e-buses
- *PRIMOVE* inductive charging with 200 kW at depot, end stops and 4 intermediate bus stops
- e-buses are also equipped with *PRIMOVE* propulsion 140
- Start of passenger service: June 2015

Berlin, Germany

- 4 *PRIMOVE* battery systems 90 on four 12-metre e-buses
- *PRIMOVE* inductive charging with 200 kW at end stops and depot
- Start of passenger service: August 2015

© 2015, Bombardier Inc. or its subsidiaries. All rights reserved. Printed in Germany/11643/GGO /10-2015/en

Bombardier Transportation
Schöneberger Ufer 1
10785 Berlin, Germany

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

www.primove.com

BOMBARDIER
the evolution of mobility

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