

eBTM

Battery Thermal Management

PLUG & PLAY

COMPACT
& POWERFUL

STAND ALONE



**Universal plug & play thermal management
solution for traction battery packs**

Ensures ideal battery performance and prolongs service life

Traction batteries will only function perfectly in narrow temperature ranges:

Battery cells do not deliver the desired output when cold and may degrade over time when too hot. eBTM monitors the current temperature and actively balances between cooling and heating circuits, thus always hitting the “sweet spot”.

Up to 10 kW heating

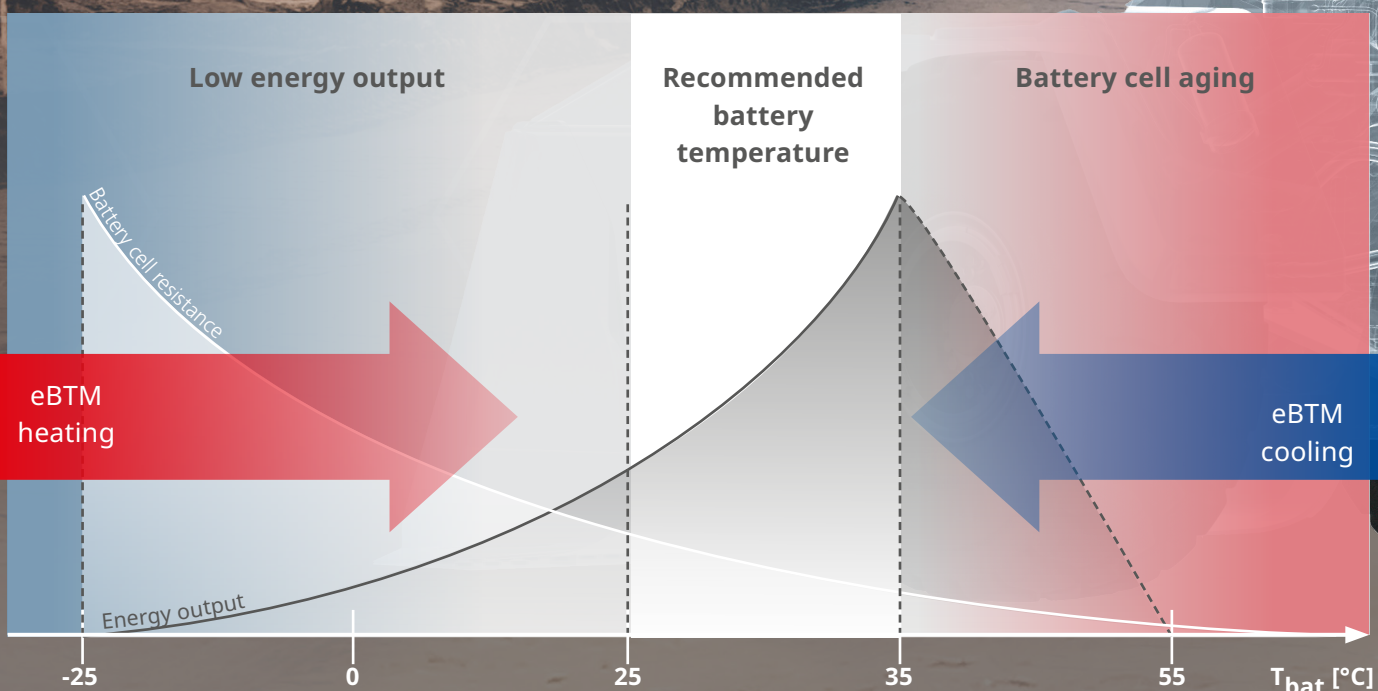
400/800V wide range of voltages

R-1234yf refrigerant

8 kW cooling

12/24 V compatible

500g of refrigerant for low GWP



Stand-alone battery thermo management unit



Cooling

Provides optimal cooling when battery packs are under stress or used during hot weather conditions



Pre-Conditioning

Sets the perfect temperature for battery cells during charging phases or before operation



Heating

Delivers heat during extremely cold ambient conditions



Balancing

Adjusts the temperature dynamically during different driving phases

6X battery packs

Entirely scalable system

Versatile and suitable for every application

eBTM is a precisely tuned system solution for light commercial vehicles, busses, trucks, construction and agricultural vehicles. It is also a perfectly scalable solution: Starting with just one unit, every type of electrical vehicle can be equipped with one or several battery cooling units.

Advantages



Up to

+24%

higher recuperation and charging power in low temperatures²



Up to

+21%

Battery State of Health in hot Climate Conditions⁴



Up to

+41%

charging energy within 1h with active thermal management¹



Up to

2x

faster charging with pre-conditioned battery packs³



Up to

+8.9%

more driving range with high frequency start/stop driving profile⁵

Compliant with automotive and off-highway standards

CE Conformity

2014/35/EU
2006/42/EU
2006/42/EG (off-highway)
2014/30/EU EMV (off-highway)

ECE R10

Homologation
2014/30/EU

ISO 26262

ASIL Level C compliant

ISO 6469-3

Electrical tests

ISO 19453-4

Storage test
24h @ - 40°C
48h @ + 70°C

ISO 19453-4

Operating test
24h @ - 35°C
96h @ + 50°C

ISO 12405-2

Shock and vibration

IEC 60068-2-52

Corrosion test
336h

¹ Performance measured under simulated conditions on a cold day in Stockholm with 80 kW fast charging power

² Performance measured under simulated conditions on a cold day in Stockholm

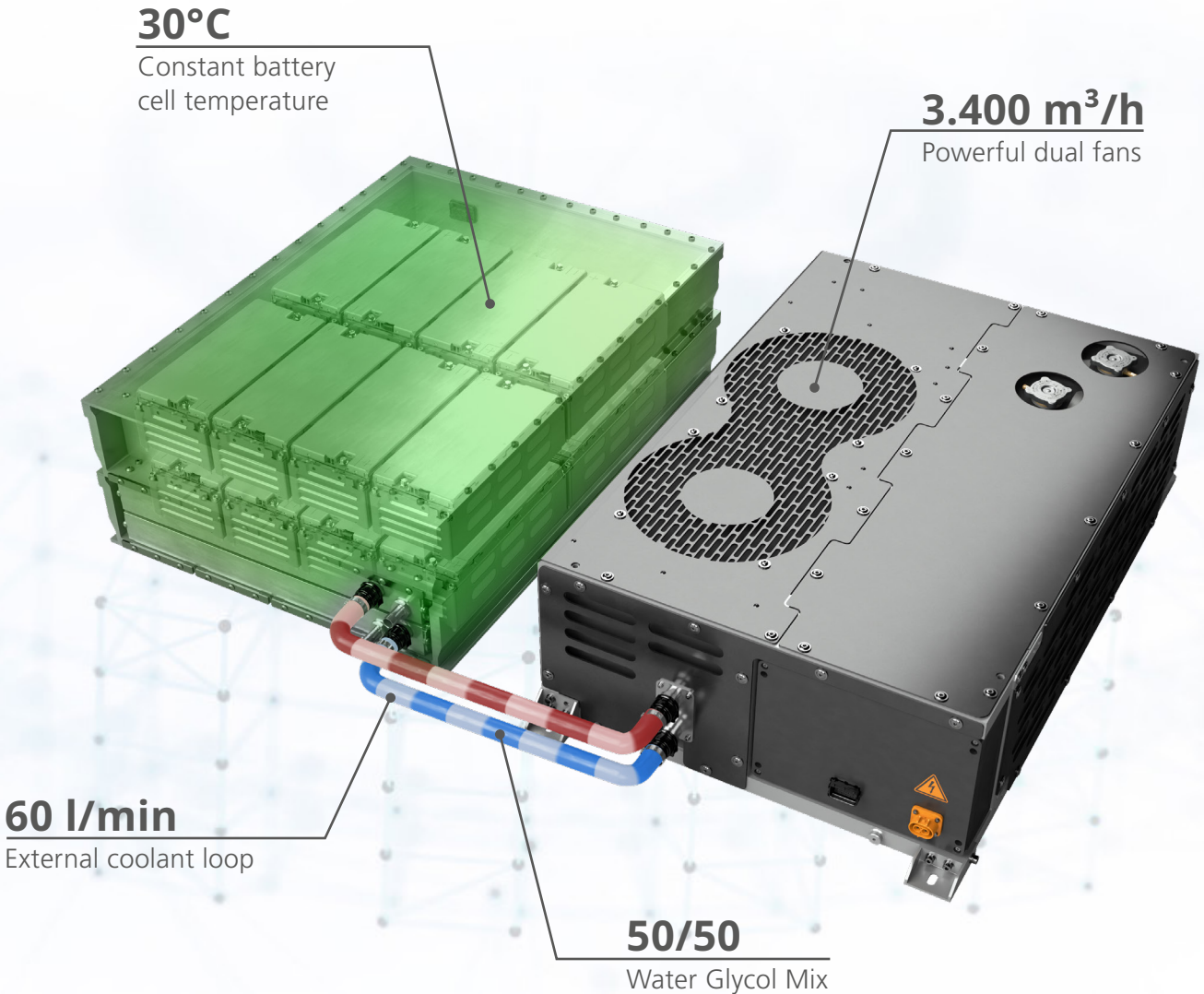
³ Measured under simulated conditions on cold day in Stockholm, from 20% to 80% CSoC

⁴ Performance measured under simulated conditions in Dubai @ +35°C t_{amb}

⁵ Performance measured under simulated conditions on a cold day in Stockholm

Plug & play installation

For the customer's convenience, there are only a few standardized connection interfaces, which allow quick and easy installation and commissioning.



Compact but powerful

Components for coolant & heating circuits, electrical water pumps and control units are already included in eBTM's compact housing.

Variety of installation positions

A compact design and several fixture points ensure flexible installation. This way, the unit can be mounted in any position: e.g., on bus roofs or under the chassis of trucks or LCVs.



Scan for detailed technical animation

Technical specifications

eBTM 400 VDC

eBTM 800 VDC

Functional information

| | | |
|----------------------------|--------------------|--------------------|
| Maximum cooling power | 8 kW ¹⁾ | 8 kW ¹⁾ |
| Maximum heating power | 7 kW | 10 kW |
| Maximum coolant flow | 60 l/min | 60 l/min |
| Nominal coolant flow | 52 l/min | 54 l/min |
| Pressure level outlet eBTM | 0.5 barA | 0.5 barA |
| Ambient temperature range | - 35 ... 50°C | - 35 ... 50°C |
| Maximum altitude (ASL) | 3500m | 3500m |

Electronical information

High voltage

| | | |
|--|-------------------|-------------------|
| Nominal high voltage supply | 365 VDC | 675 VDC |
| High voltage operating range | 300 VDC - 432 VDC | 500 VDC - 850 VDC |
| High voltage undervoltage limit | 200 VDC | 500 VDC |
| High voltage overvoltage limit | 450 VDC | 865 VDC |
| Maximum heating power consumption | 7.5 kW | 10.5 kW |
| Maximum cooling power consumption | 6 kW | 6 kW |
| Min Isolation Resistance (@ 1000 VDC) | 500 kΩ | 500 kΩ |
| Max discharge time (HV < 60 VDC) | 3s (@ 432 VDC) | 45s (@ 850 VDC) |
| Max Voltage withstand | 1900 VAC for 60s | 1900 VAC for 60s |
| Maximum voltage rise | 40 V/ms | 100 V/ms |
| Cx - Capacity | 55 μF | 67 μF |
| Cy - Capacity | 70 nF | 70 nF |
| High voltage connector (eBTM side) | Amphenol ELR2A03 | Amphenol ELR2Y03 |
| Electric pre-charging internal HV components | NOT included | NOT included |

Communication / Low Voltage

| | | |
|---------------------------------------|---------------------------------|---------------------------------|
| Communication with VIB | CAN BUS 2.0B / CAN J1939 | CAN BUS 2.0B / CAN J1939 |
| Baud rate | 250 kbps / 500 kbps | 250 kbps / 500 kbps |
| Low Voltage power in operating modes | 50 W | 50 W |
| Nominal low voltage range | 12 VDC : 9 VDC - 16 VDC | 12 VDC : 9 VDC - 16 VDC |
| | 24 VDC : 18 VDC - 32 VDC | 24 VDC : 18 VDC - 32 VDC |
| Max. low voltage power in sleep mode | 0.6 W (50 mA @ 12 VDC) | 0.6 W (50 mA @ 12 VDC) |
| | 0.24W (10 mA @ 24 VDC) | 0.24W (10 mA @ 24 VDC) |
| Communication connector (eBTM side) | FCI HCCMHPE24BKAFSV | FCI HCCMHPE24BKAFSV |
| Communication connector (counterpart) | FCI 211PC249S0033 ²⁾ | FCI 211PC249S0033 ²⁾ |

General Information

| | |
|---|---------------------------------------|
| Dimensions L x W x H | 1000 mm ³⁾ x 700mm x 300mm |
| Compressor | Scroll |
| Protection IP degree | IP66 |
| Weight | 91 kg |
| Installation position | Roof / Chassis |
| Refrigerant | R-1234yf |
| Refrigerant charge | 500 g |
| Battery fluid | Water/Ethylene Glycol mix at 50-50% |
| Storage temperature range [°C] | - 40 ... 70°C |
| Internal coolant circuit | 3 l |
| External coolant circuit (eBTM share of liquid) | 3.4 l + 0.75 l ⁴⁾ |
| Hydraulic connector | NORMAQUICK PS3 NW20 ²⁾ |
| Low voltage power supply needed | Internal DC/DC installed |

1) $T_{\text{external air}} = 35\text{ °C}$, $T_{\text{set Point}} = 25\text{ °C}$, the set point temperature is the coolant temperature requested from the system

2) Not part of delivery

3) This dimension does not include the presence of the fixing brackets. The fixing brackets measure 50 mm each and can be installed on the longitudinal or the lateral sides

4) The eBTM portion of the external circuit is 3.4 l. An extra 0.75 l must be considered for filling the extra reservoir connected to the external circuit



Contact details

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