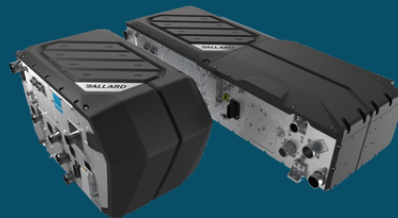




# Fuel Cell Power Module for Heavy-Duty Motive Applications

Ballard's FCmove®-HD+ is the next-generation heavy-duty fuel cell power module for use in zero-emission motive applications. The FCmove®-HD+ offers a durable, compact, and easy installation solution for system integrators and vehicle OEMs, backed by Ballard's proven experience, unmatched product performance, and service quality promise.



## Features

### Lower Lifecycle Cost

With better fuel economy and fewer maintenance requirements, total cost of ownership is 40% lower than previous product generations.

### Simplified Integration

This complete package, with all subsystems fully integrated, has interfaces located on one panel to provide easier access for connections as well as maintenance.

### Robust Components

Designed with a new generation of more robust Balance of Plant components to improve reliability.

### System Integration Flexibility

Available either in a low-profile or small footprint form factor to enable greater flexibility in commercial truck and bus vehicle designs.

### Freeze-Start Capability

Freeze-start from -25°C, with no need to plug in the vehicle or use special start procedures.

### Humidification

Integrated humidification system provides maximum system performance and durability through a wide range of environmental conditions.

### Fuel Efficiency

Two to three times more efficient than CNG/diesel engines, fuel cell buses reduce overall fuel consumption.

### High Performance

Robust PEM fuel cells deliver the power, range, and efficiency demanded by fleet operators.

### Proven Reliability & Durability

Demonstrated through exceptional fuel cell stack lifetime, with >25,000 hours of operation and 97% module availability in service.

### High Temperature Operation

Permits a smaller cooling package for integration flexibility and generates HVAC heating, significantly improving overall vehicle fuel economy.

### Climate Protection

IP6K9K-rated enclosure system guards against premature deterioration of key module components in extreme climates.

### High Pressure System

Offers better performance, fuel efficiency and durability by preventing degradation of the fuel cell power module.

### Remote Diagnostics

Direct or wireless (WiFi or cellular) connection allows customer to monitor performance data remotely, and anticipate and plan preventative maintenance.

### Safety Features

Integrated safety system with ventilation fans, and hydrogen sensor built into the module to ensure highest safety and ease of installation.

## Product Specifications<sup>1</sup>



### Performance

|                              |               |
|------------------------------|---------------|
| Rated power                  | 120 kW        |
| Peak efficiency <sup>2</sup> | 57%           |
| Lifetime <sup>3</sup>        | >25,000 hours |

| Physical                              | Engine Bay          | Rooftop             |
|---------------------------------------|---------------------|---------------------|
| Dimensions with air filter (LxWxH)    | N/A                 | 2015 x 822 x 444 mm |
| Dimensions without air filter (LxWxH) | 1082 x 693 x 650 mm | 1709 x 792 x 359 mm |
| Weight <sup>4</sup>                   | 249 kg              | 287 kg              |

### Environmental

|                                      |               |
|--------------------------------------|---------------|
| Environmental operating temperature  | -30°C - +50°C |
| Minimum ambient start-up temperature | -25°C         |

### Fluids

|                                    |                                                                     |
|------------------------------------|---------------------------------------------------------------------|
| Fuel type                          | Gaseous hydrogen                                                    |
| Fuel composition                   | ISO 14687:2019 Grade D<br>SAE J2719_201511                          |
| Fuel supply pressure               | 7-10 bar                                                            |
| Oxidant type                       | Air                                                                 |
| Coolant type                       | Ethylene glycol concentrate fuel cell grade<br>balanced by DI water |
| Maximum coolant outlet temperature | 88°C                                                                |

### Standards

|                                           |                                                                                                                          |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Codes, standards, directives <sup>5</sup> | ISO23273:2013, ISO6469-2:2018,<br>ISO6469-3:2018, SAE J2578, UN ECE Reg<br>10, UN ECE R134, (EC) No 1907/2006<br>(REACH) |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|

### Communication

|                   |        |
|-------------------|--------|
| Control interface | CANbus |
|-------------------|--------|

<sup>1</sup> Specifications are subject to change.

<sup>2</sup> Includes purge losses.

<sup>3</sup> Product lifetime is based on operation under standard operating conditions. Operation outside specified limits may reduce product lifetime and performance. Please contact Ballard for an application-specific assessment.

<sup>4</sup> Dry.

<sup>5</sup> The Product is designed and manufactured with reference to applicable provisions of the standards listed, to the extent relevant to the Product as a component. As many of these standards apply at the vehicle or system level, the Product in isolation is not intended to demonstrate full compliance with such standards. Certification and compliance of any system incorporating the Product remains the responsibility of the integrator. This information is provided for general guidance and does not constitute certification of compliance with these standards.