EBUS, INC.

PLUG-IN ELECTRIC FUEL CELL BUS SPECIFICATION

EBUS22FC
ZERO EMISSION TRANSIT BUS

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EXECUTIVE SUMMARY

Ebus Fuel Cell buses are plug-in electric buses, with the fuel cell and batteries configured electrically in series. Regenerative braking is used for reclamation of available energy from typical deceleration of the bus. The bus can operate on "battery only" part of the day, potentially extending the life of the fuel cell stack.

Low maintenance SAFT Nickel Cadmium batteries can store 60 kilo-Watt hours of energy. Properly cared for, the batteries will last up to 2,000 charge/discharge cycles. This equates to about seven (7) years in typical service.

The fuel cell "engine" consists of a Ballard PEM Mark9 SSL fuel cell stack with a nominal output of 19.3 KW.

The "Balance of Plant" required with the fuel cell stack consists of:

Fuel management (re-circulation, humidification) subsystem
Air management (compression, humidification) subsystem.
Cooling subsystem
Power electronics
Controls hardware and software
Hydrogen storage

Ebus designs and provides the balance of plant for the fuel cell "engine". These auxiliary systems include metering and conditioning of the air and hydrogen to the cell stack, water and thermal management, electrical integration and power management/controls for load sharing between the fuel cell system and battery system.

PEM fuel cell stacks can last a relatively long time under limited and tightly controlled operational constraints. The integration of the fuel cell with the balance of plant is critical to long life. The unique characteristics of this application provide the potential to achieve 5,000 hours of operation. The system design allows for the fuel cell stack to be exchanged rapidly with minimal disturbance of the balance of plant.

SPECIFICATIONS

Overall length	22 feet
Overall height	122 inches
Overall width w/o mirrors	92 inches
Seating Capacity	22 seated passengers
Unobstructed Door opening	34 inches
Wheelchair capacity	1 tie down
Interior width	89 inches
Interior headroom	77 inches
Minimum floor height	12 inches *
Kneeling differential	4 inches
Wheelbase	147.375 inches
Turning Radius – curb to curb	28 feet
Ground clearance	8 inches
Overhang front	67 inches
Approach angle	13 degrees
Overhang rear	45 inches
Departure angle	18 degrees
Nominal curb weight	15,300 pounds
GVWR	20,500 pounds

SPECIFICATIONS

Wheelchair positions:	1
Destination sign:	Luminator Electronic MAX3000
Hydrogen Storage:	2 tanks @ nominal capacity of 8.1 KG @ 5,000 PSI
Battery System:	2 parallel strings of 50 100AH SAFT Nickel-Cadmium Liquid-cooled Modules
System Voltage:	300 volts
Maximum Forward Speed:	45 mph
Gradeability:	Up to 18 Percent
Range:	150 to 250 miles on Fuel Cell only. Range can be extended through Opportunity Charging of batteries.
Energy efficiency:	0.7 -1.4 kWh/Mile (gross DC) *

* Range will vary based on Vehicle Duty Cycle, Operator Proficiency, and A/C usage.