Michigan Electric School Bus Roundtable

May 2023

Rhombus Energy Solutions

Rhombus Energy Solutions
BorgWarner

Leaders in High Power Electronics for the EV Industry

- Rhombus **founded in 2012** and acquired by **BorgWarner** in 2022
- **UL-certified bi-directional** with Vehicle-to-Grid (V2G) capabilities and **charge only** high-power DC Fast Chargers
- Industry best **10-year warranty** available
- Only DC Fast Charger company that is **vertically integrated** – design, certification, manufacture, warehouse and service
- Industry best lead times – **4 to 8 weeks** (1)
- Nearly 1,500 systems deployed worldwide
- First DCFC to qualify for the National Electric Vehicle Infrastructure (**NEVI**) Formula (2)

High Power Direct Current Fast Charging

1741SA
Industry First /
Only High Power
Bidirectional DCFC

MADE IN USA

Note:
(1) Volumes < 5 units, higher volumes based on forecast
(2) $5 billion to states over five years to establish EV charging stations every 50 miles along the interstate highway system or within one mile of an interstate exit. All 50 states, along with the District of Columbia and Puerto Rico, submitted plans

BorgWarner


BorgWarner
In Numbers
~49k
Employees
$14.8
Billion in
2021 Sales
93
Locations
22
Countries

High-Power USA Manufacturing Capabilities

Dearborn, MI

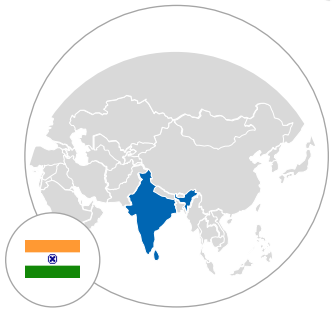
- In-house manufacturing and engineering facility
- Service and support
- UL-certified, high power lab

San Diego, CA – Rhombus HQ

- R&D engineering center

Ahmedabad, India - Rhomboid

- Dedicated subcontractor relationship for engineering services



3,000

DCFC units capacity per annum

6,000

DCFC units additional expansion capacity

70,000

Square feet of in-house manufacturing, test, service, and distribution space

Fully in-house manufacturing, UL-certified testing facilities and warehouse

Dearborn, MI Campus Capabilities

Rhombus 60kW PCS and Dispenser

DEARBORN CAMPUS

Customer Care Center

Operations & Assembly

End-of-line-testing

High voltage test lab

Interoperability testing

KEY CAPABILITIES

1. **Fast time to market** from short and optimized cycles between design to launch
2. **Setting the industry standards** through close collaboration with UL for testing and certification
3. **Highly flexible manufacturing capacity and processes** across different product types
4. Advanced inventory management and **on-site customer stored material fulfillment**
5. **Full customer service & support** throughout the entire product lifecycle

Industry best lead-times 4 to 8 weeks

60 kW V2G DCFC

MADE IN USA

1741SA
Industry First /
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Bidirectional DCFC

V2G

RES-DCVD60-480-V2G Specifications	
Rated power (kW)	60 (one channel)
Voltage range (Vdc)	270 – 870
Utility grid voltage (Vac)	480 – 3p
Utility grid frequency (Hz)	60
Power factor range	± 0.5
Grid isolation	Galvanic, integrated
V2G capable	Yes
Switching Tech	IGBT
Cooling	Air
Certifications	UL 2202 UL 2231, CSA 22.2, UL 1741- SA

In production

125 kW V2G DCFC

MADE IN USA

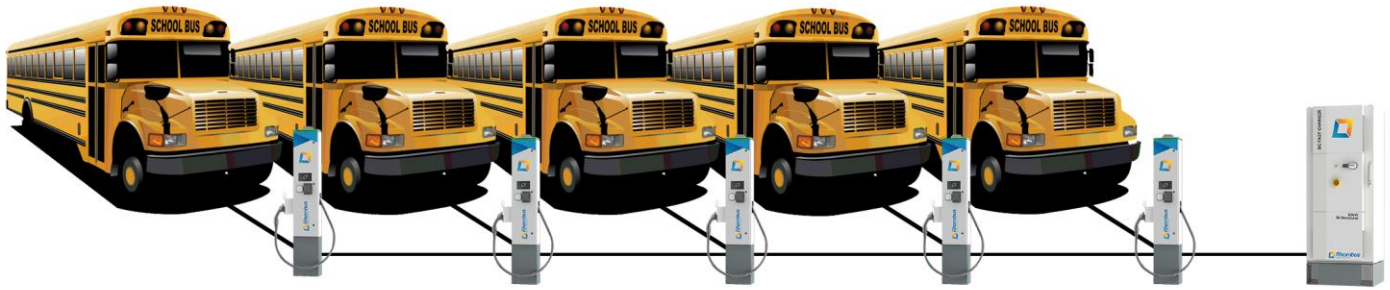
1741SA
Industry First /
Only High Power
Bidirectional DCFC

V2G

RES-DCVD125-480-V2G Specifications	
Rated power (kW)	125 (one channel)
Voltage range (Vdc)	270 – 930
Utility grid voltage (Vac)	480 – 3p
Utility grid frequency (Hz)	60
Power factor range	± 0.5
Grid isolation	Galvanic, integrated
V2G capable	Yes
Switching Tech	IGBT
Cooling	Air
Certifications	UL 2202 UL 2231, CSA 22.2, UL 1741- SA

In production

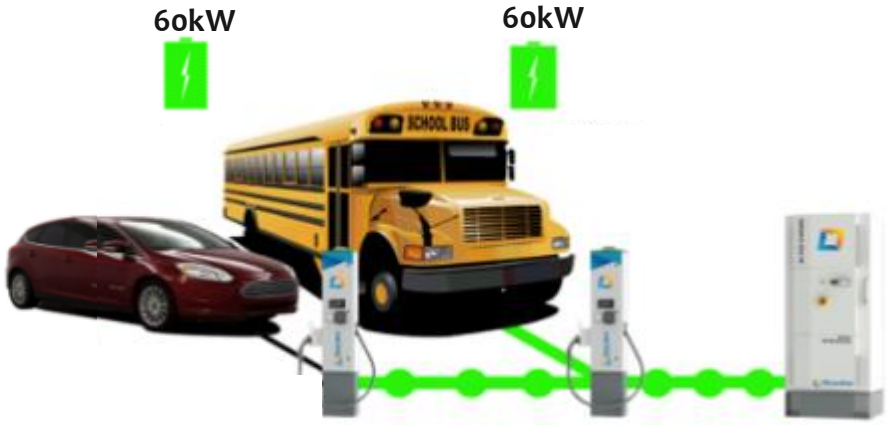
Sequential versus Simultaneous Charging



60kW/125kW

Sequential Charging

- Enables charging vehicles one a time
- Target application – fleets such as School bus, Vocational trucks for those with defined duty cycles and depot times
- Lower Cost of acquisition



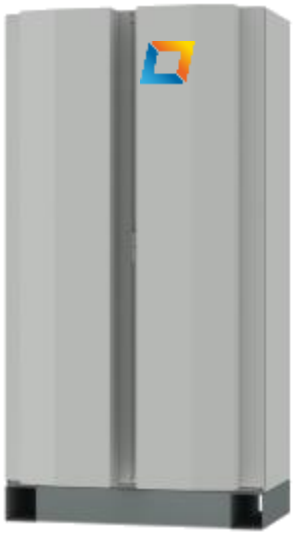
120kW

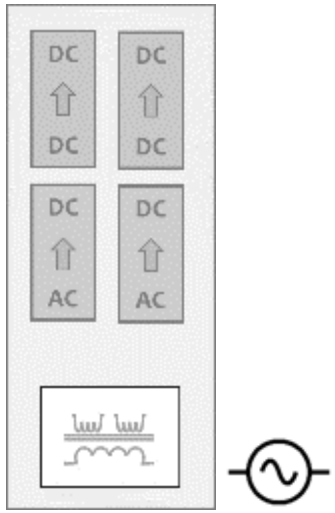
Simultaneous Charging

- Enables charging two vehicles at same time
- Target application – public use, limited duty cycles, mixed vehicles

120 kW Configuration

Simultaneous charging up to two outputs





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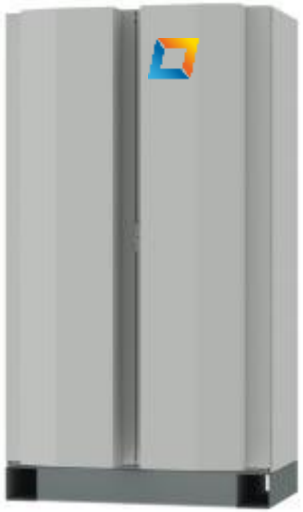
Specifications	
Rated power (kW)	120
Voltage range (Vdc)	250 – 920
Utility grid voltage (Vac)	480 – 3p
Utility grid frequency (Hz)	60
Power factor range	± 0.5
Grid isolation	Galvanic, integrated
Pending certifications	UL 2202 UL 2231, CSA 22.2, UL 1741- SA

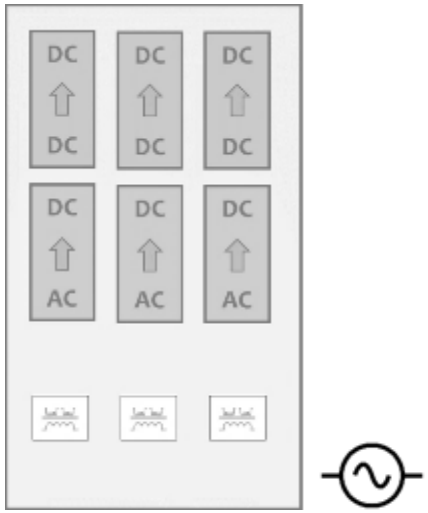
Dispenser Output Options
1x 120kW
2x 60kW (simultaneous)

Charge-only available Q4 2023 – V2G available Q3 2024

180 kW Configuration

NEVI Compliant





MADE IN USA

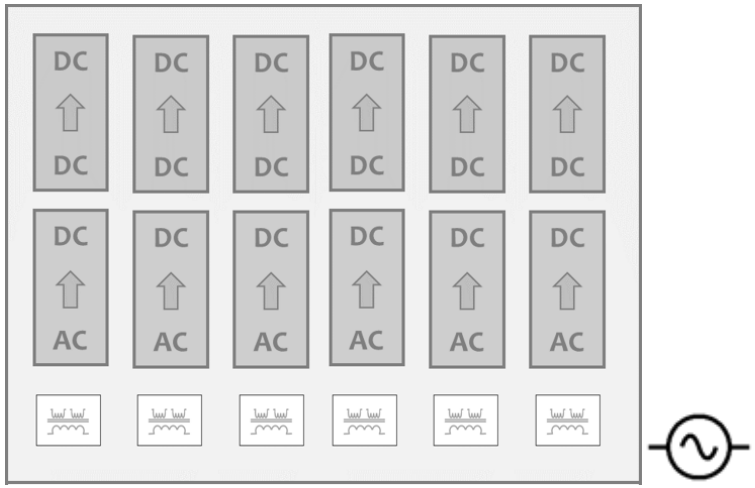
Specifications	
Rated power (kW)	180
Voltage range (Vdc)	250 – 920
Utility grid voltage (Vac)	480 – 3p
Utility grid frequency (Hz)	60
Power factor range	± 0.5
Grid isolation	Galvanic, integrated
Pending certifications	UL 2202 UL 2231, CSA 22.2, UL 1741- SA

Dispenser Output Options
1x 180kW

Charge-only available Q1-2024 – V2G available Q2 2024

360 kW Configuration

Simultaneous charging, NEVI Compliant



Specifications	
Rated power (kW)	360
Voltage range (Vdc)	250 – 920
Utility grid voltage (Vac)	480 – 3p
Utility grid frequency (Hz)	60
Power factor range	± 0.5
Grid isolation	Galvanic, integrated
Pending certifications	UL 2202 UL 2231, CSA 22.2, UL 1741- SA

Dispenser Output Options
1x 360kW
2x 180kW (simultaneous)

Available Q3 2024


Rhombus
Energy Solutions
BorgWarner
Thank You