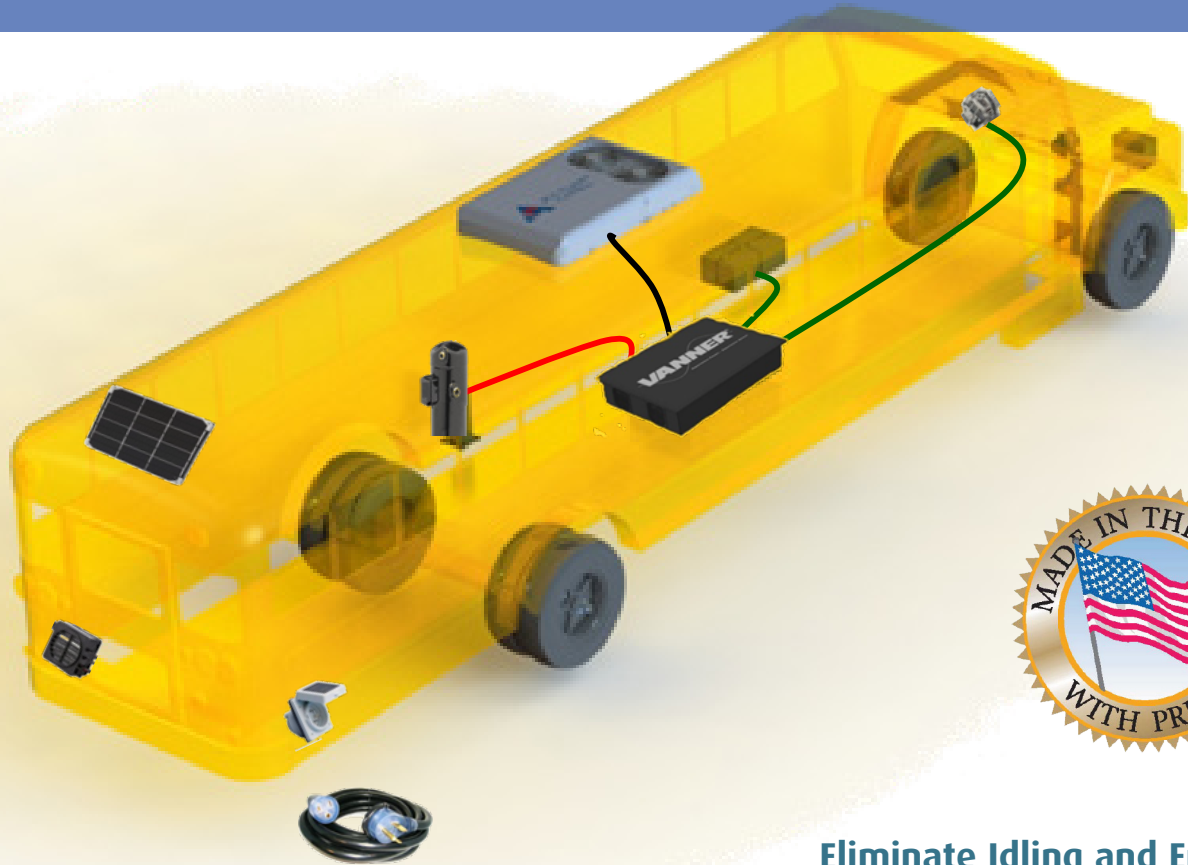


# REVOLUTION



## REVOLUTION VEHICLE ELECTRIFICATION SYSTEM

Introducing the Revolution vehicle electrification system, a revolution in emission and idle reduction technology for school buses. Developed to provide idle free operation of HVAC and all bus electrical accessories.

Vanner, the leader in vehicle power management for transit bus, has partnered with ACC Climate Control, a Valeo brand, leaders in innovative HVAC systems, to provide school buses with idle free air conditioning and all necessary accessories with the engine off.

### Eliminate Idling and Emissions....

- ✓ During pupil pick-up & drop off.
- ✓ When operating wheelchair lifts.

### Lower Maintenance Costs....

- ✓ Eliminate complex AC refrigerant routing.
- ✓ Sealed AC compressor for long life.

### Easy Operation...

- ✓ No special driver training required.
- ✓ One-button activation with LED status.



## HIGHLIGHTS



### System Design Benefits

- **High Power Generator**
  - Ample energy at Idle for HVAC & accessories
  - OEM 12V alternator, starter, & battery are not modified.
- **HVAC Motor Drive (220VAC/ 3Ph output for HVAC)**
  - Ample energy for pupil compartment air conditioning & other DC & AC accessories
  - Dependable power at Idle & when operating in high temperatures and humid environments
  - Components are removed from the high heat, under hood environment
- **Engine-Off Operation (Pre-trip cool down)**
  - Actual engine off run time TBD by aux battery AH capacity
- **Supplemental Power Support (Optional in Gen 2 System)**
  - Shore Power / Solar Panels / Additional Aux batteries
- **Fail Safe Design**
  - In the unlikely event of an inoperable Revolution system, the bus can still be operated and complete its route.
  - Eliminate the risk of being stranded if traction batteries are unexpectedly depleted.
- **Proven System Concept**
  - Operating reliably in transit bus systems since 2010.
  - Avoid high costs & uncertainty of experimental technology.



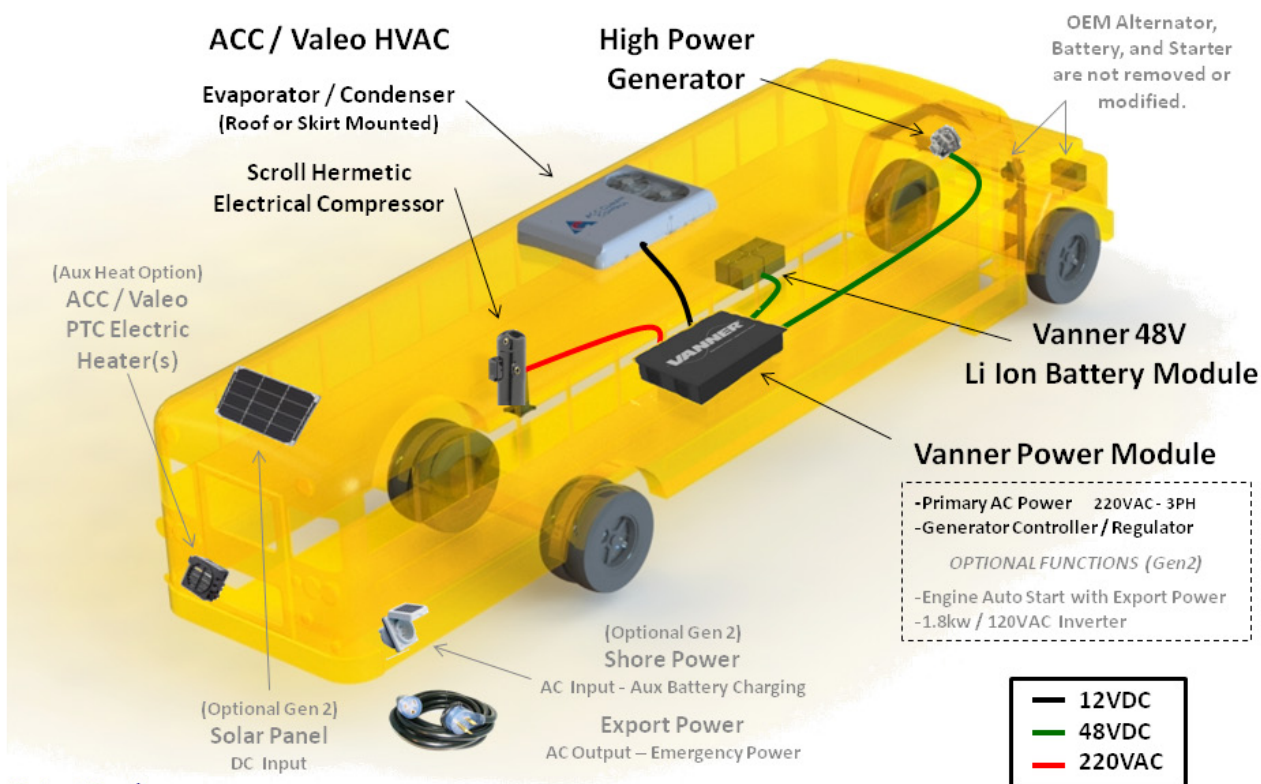
### Driver & Operation Benefits

- **Dual Mode (Engine on/off capability for HVAC & accessories)**
  - Engine off operation when loading/unloading pupils
  - while drivers are staged and waiting
  - Operation of all 12V accessories with engine off
- **Emergency Power System (Optional in Gen 2 System)**
  - 220VAC / 3Ph power is available for export in emergency situations, to power critical buildings and facilities.
  - Engine auto-start for continuous power. Driver-free operation with multiple safety and anti-theft interlocks.



### Installation Benefits

- **Less Complex AC/DC Power System...**
  - One power system for entire vehicle
  - Can be mounted in multiple locations
  - Under 60VDC components-Safe technology to maintain at the bus fleet's facility
- **Less Complex HVAC System...**
  - More efficient & reliable scroll HVAC compressor & solid state of the art power conversion technology
- **Auxiliary Batteries can be mounted in multiple locations**
  - Additional auxiliary batteries can be added for additional engine-off operation time if required.



Patent Pending