

# Electric accessories for conventional powertrains

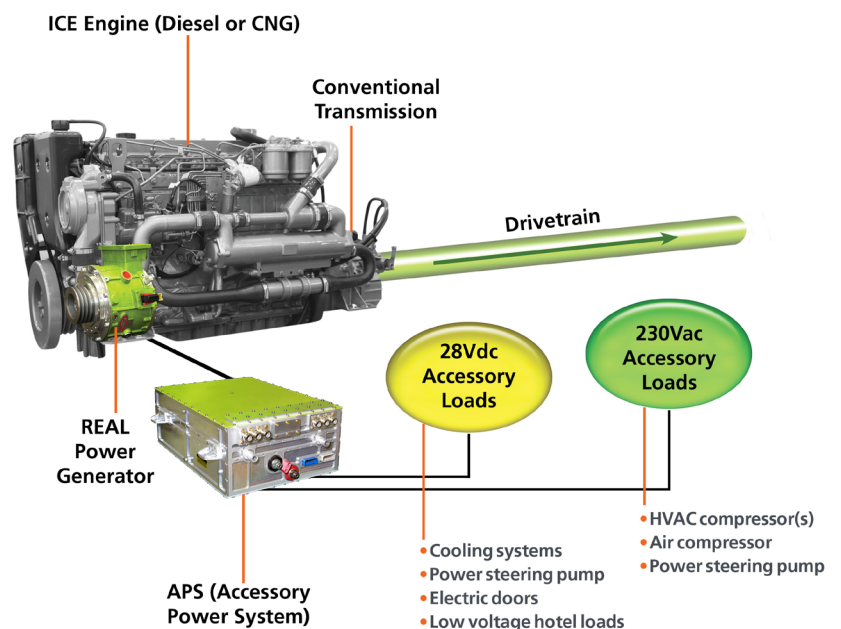
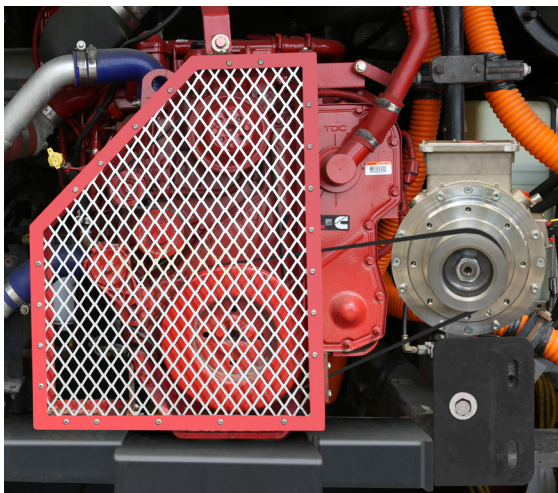
## REAL

REAL - Reduced Engine Accessory Load – is a simple system designed to enable heavy duty vehicle manufacturers to fully electrify vehicle accessory systems on conventionally-powered vehicles. It works equally well on both diesel and CNG vehicles, including buses and coaches, and provides a first step towards full vehicle electrification where fully battery power might be impractical or unaffordable. Electrification of vehicle accessories helps to lower vehicle operation and maintenance costs, as well as reducing noise, vibration and harshness. The REAL system is based upon our proven Series Electric drive system, comprising a high-voltage permanent magnet generator coupled to our Accessory Power System (APS), and replaces the vehicle's conventional 28V alternator and aircon compressor. The APS integrates all power processing and management functionality in a single unit, which supplies power for all vehicle accessories including electric aircon, air compressors, engine cooling systems, power steering and supplemental heaters.

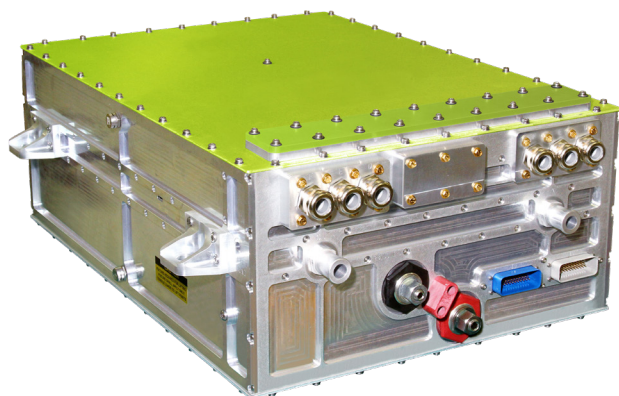
### Benefits

A simple and economic solution to enable the electrification of accessories on conventional vehicles

- Operates equally well on both diesel or CNG-powered vehicles
- Uses proven power management hardware –over 5,000 systems in service
- Reduces scheduled and unscheduled maintenance costs
- Reduces external noise emissions and reduces internal noise, vibration and harshness
- Eliminates hydraulic oil in the engine compartment with its associated safety concerns



## Accessory power system **APS**



### Specifications:

- 60 kW generator inverter stage: 4 quadrant control, 600 Vdc nominal output
- 510 Amps (14 kW) of 28 Vdc: replaces belt driven alternators
- Provides ample power for:
  - Electric engine cooling fans
  - Aircon system fans/blowers
  - Electric power steering
  - All other vehicle 28 Vdc systems
- 30 kW (37.5 kVA) of 230 Vac: 3-Ph, 60 Hz (nominal), with 900V/ $\mu$ s dV/dt filter and variable V/Hz capable output
- Provides sufficient power for:
  - Electric power steering
  - Electric air-compressor
  - 1x or 2x fully-electric aircon systems

### Ratings:

- Coolant: water ethylene or propylene glycol 57 lpm (15 gpm)
- Coolant temperature for full performance:
  - -40°C to 65°C (-40°F to 149°F)
  - 45°C (113°F) nominal
- External ambient -40°C to 75°C (-40°F to 167°F)

### Size:

- Height: 254mm (10in)
- Width: 495mm (19.5in)
- Length: 686mm (27in)
- Weight (wet): 82kg (167lbs)

## High-voltage permanent magnet **generator** (600V)



### Ratings:

- High-voltage DC @ engine RPM
- 27 kW @ idle 800 RPM
- 36 kW @ hi-idle 1000 RPM
- 43 kW @ 1200 – 2100 RPM

### Accessory Demand:

- 43 kW APS-4 max corner point
- 27/17 kW-dc typical for 60'/40' bus accessory load

### Size:

Similar size/weight to conventional 500A class 28V alternators

- Diameter: 321mm (12.625in)
- Length: 353mm (13.875in)
- Weight: 59kg (130lbs)

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