



Diesel Hybrid-Electric Drive System

ISE ThunderVolt® Transit Bus Hybrid Diesel (TB-HD)

If diesel is your fuel of choice, or your goal is the best possible fuel economy, then ISE's diesel hybrid technology is the answer.



ISE ThunderVolt® TB40-HD
New Flyer 40' bus

Low Emissions

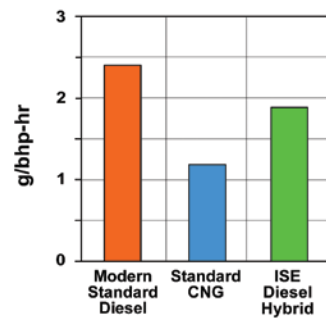
Faster Acceleration

Smooth And Quiet Operation

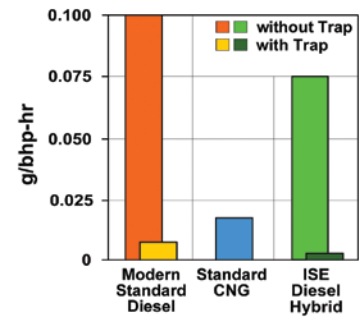
Greater Fuel Economy Improvement

ISE's primary product offering is a complete integrated drive system that contains all the components necessary to operate a vehicle utilizing hybrid-electric.

NOx



PM



Motive Drive System

NO TRANSMISSION REQUIRED

4:1 Combining gearbox between drive motors and differential
 DUO Inverter 2 x 170 KVA
 Motor Dual AC Induction Motors
 Rated Power 170 kW / 228 hp
 Peak Power 300 kW / 402 hp
 Rated Torque 440 Nm / 324 lb-ft
 Peak Torque 900 Nm / 664 lb-ft

Power Source: Engine/Generator

Engine Cummins ISB 260H 5.9 liter
 Fuel Ultra Low Sulfur Diesel
 Generator Hamilton Sunstrand 120 kW
 Direct drive.

Vehicle Network and Control

EVCU (Electric Vehicle Control Unit) SAE J1939 2.0b
 multiplexing between vehicle
 and hybrid drive system
 DICO (Drive Controller Gateway) Interface between
 the vehicle communications
 bus and the drive controller
 high speed network
 RDS (Remote Diagnostic System) SAE J1939 based
 and GPS Automatic Vehicle network monitoring,
 Location Data and Fault storage,
 Ethernet, RS485, EIA232

Performance at GVW *all accessories running*

TB40-HD

(40-ft)

Starting Grade 18%
 Top Speed, mph 65
 Acceleration, sec. (0-30 mph) < 20
 Range, miles (typical, 100 gal tank) > 400

Emissions NOx: 2006 EPA certification
 1.8 g/bhp-hr (CA) and 2.4 g/bhp-hr (outside CA)
 PM: 0.01 g/bhp-hr w/exhaust aftertreatment

Noise Very quiet inside & outside,
 Altoona test data.

Maintenance Expected lower maintenance
 than standard drive system
 - no transmission, longer brake life,
 electric accessories, longer engine life

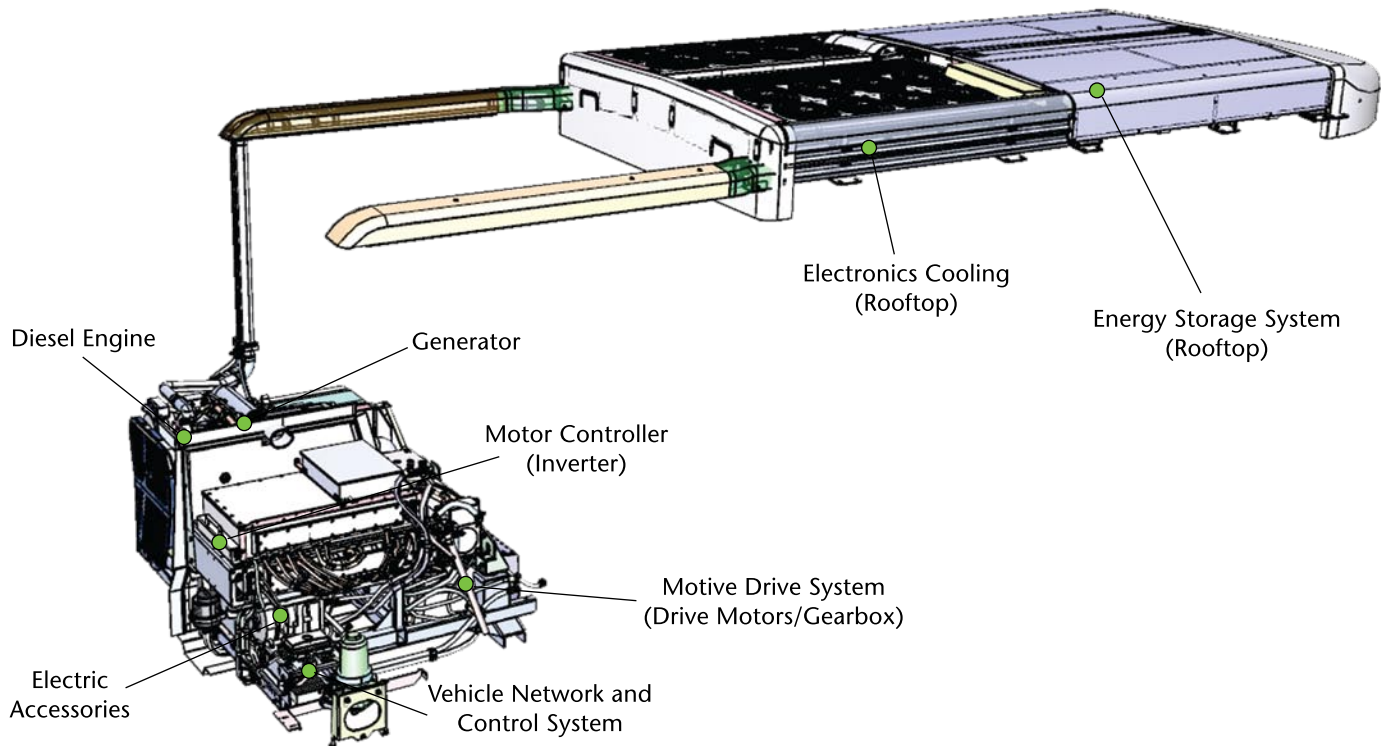
Energy Storage

Ultracapacitors 200 kW ISE ThunderPacks®
 Maxwell Ultracapacitors

Electric Accessories

230 VAC Independent of engine,
 90% efficiency, low noise,
 low maintenance, long life
 Air Compressor Scroll, No oil, 14.7 CFM@115 PSI
 Hydraulic Pump Vane, 4 or 6 GPM, 1750 PSI
 Air Conditioning Electric

COMPONENTS OF THE DIESEL HYBRID-ELECTRIC DRIVE SYSTEM



Transportation recharged.™

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