

Dumarey Green Power

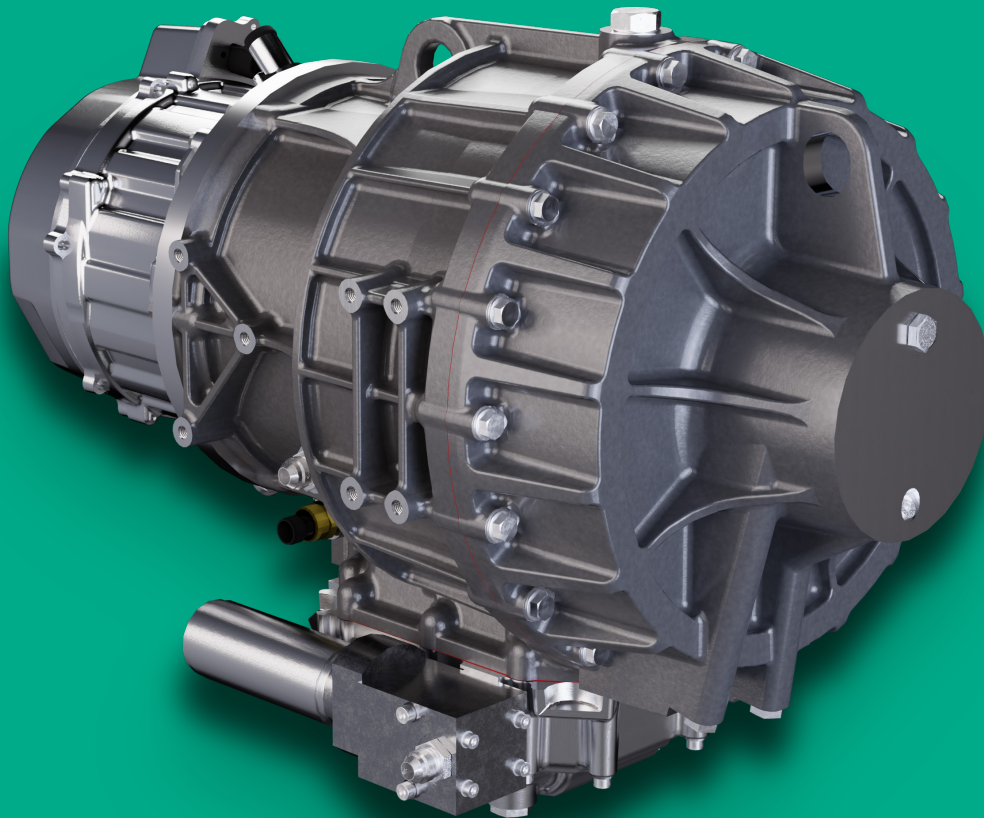
2000 Series

Brochure

Energy stored, **power** delivered,
savings made



Cut Fuel Costs and Reduce CO₂



Reduced fuel consumption.



Huge CO₂ reduction.



Immediate power delivery.



Improved voltage and frequency stability

The 2000 Series is a high capacity flywheel energy storage system that is ready for installation into a number of applications. At Dumarey Green Power we saw great success implementing the 2000 Series' predecessor, the 600 series flywheel module, into our flagship product, the Peak Power 200. The 600 series proved to be such a success that we decided to design a system with higher power and energy storage.

One Product, Numerous Applications



Construction

The 2000 series flywheel can be integrated into large equipment such as tower cranes. The integrated flywheel significantly reduces peak power requirements, enabling the equipment to be powered by smaller sources of power. This in turn cuts operating costs and reduces harmful emissions.



Off-highway

The 2000 series flywheel can be integrated into heavy plant such as excavators, diggers and trucks. The integrated flywheel can capture energy from braking and lowering actions, using this energy to power the vehicle. The outcome is more efficient power delivery and reduced fuel consumption.



Rail

The 2000 series flywheel can be integrated into diesel electric trains. Energy from rheostatic braking can be captured and used in a variety of ways. Energy can be used to power hotel loads whilst the vehicle is in a station, allowing for significant engine-off periods. Energy can also be used to accelerate the train after a braking event, saving fuel and cutting associated emissions.



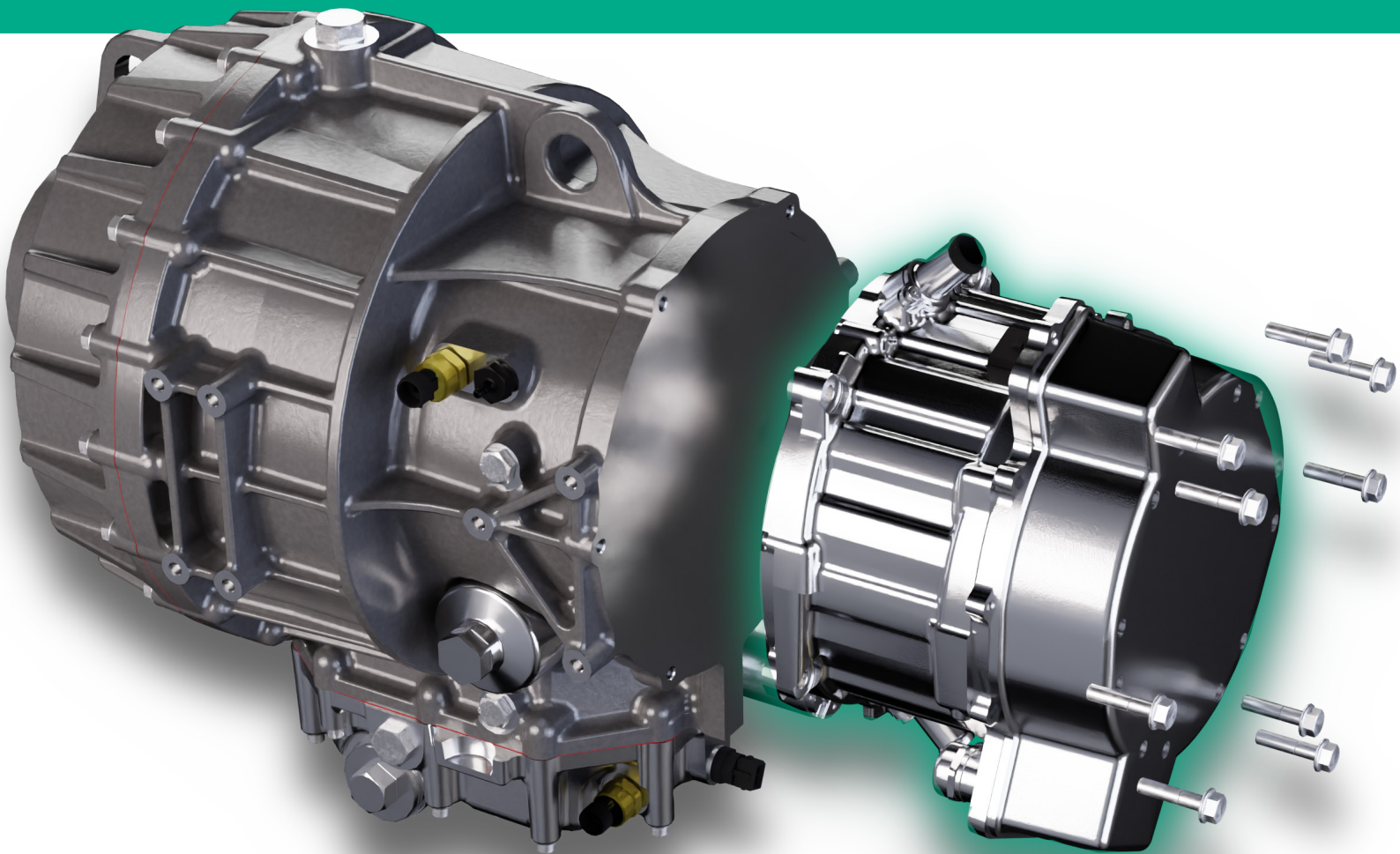
Truck & Bus

The 2000 series flywheel can be integrated into trucks and busses. Energy is captured during braking, and then used as soon as the vehicle accelerates to provide a power boost. The 2000 series can undertake thousands of charge discharge cycles per day with no fatigue and minimal service requirements.

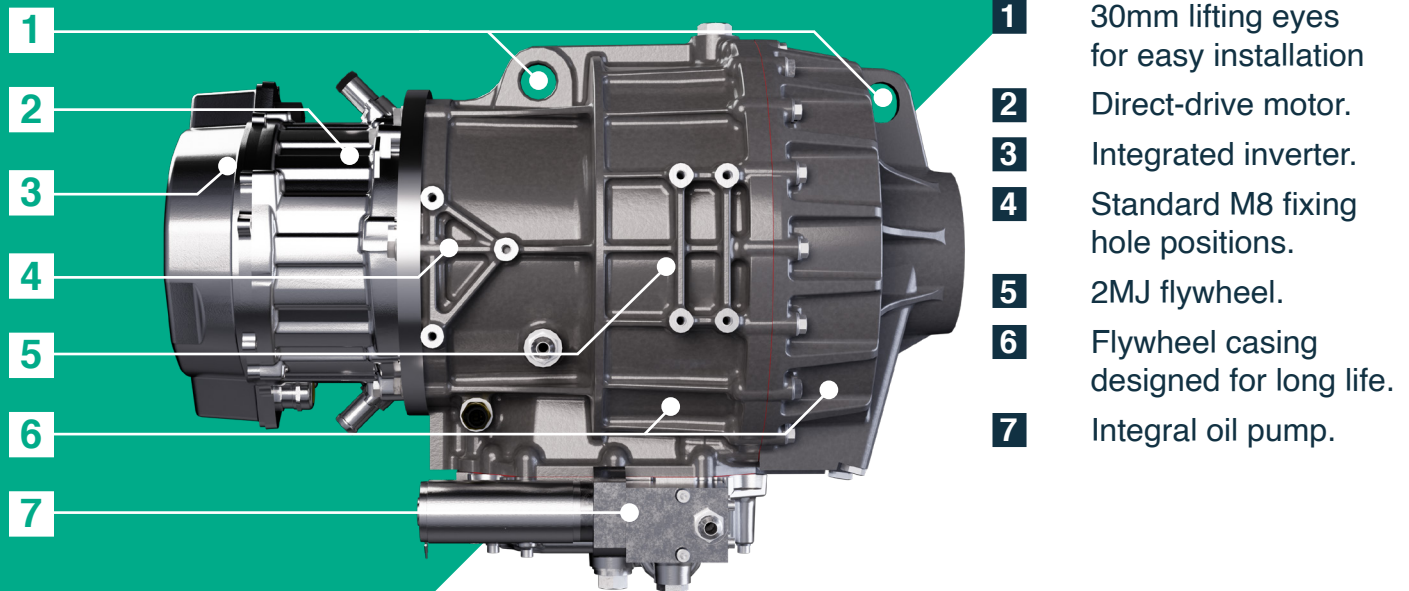
About the system

The 2000 Series is a flywheel energy storage system for use in mobile and stationary applications where dynamic loads are experienced. The 2000 Series is compact, lightweight, and robustly engineered to meet the most stringent of safety and functional standards. Featuring a powerful direct-drive motor with an integrated inverter as well as a high capacity ($>2\text{MJ}$) flywheel, the 2000 Series can be used in any dynamically loaded application to reduce fuel consumption, reduce CO_2 emissions and increase performance.

Applications for the 2000 Series include use on heavy duty construction equipment such as articulated trucks and tower cranes as well as bus, rail and off-highway. Contact Dumarey Flybrid to find out more about how the 2000 Series can be integrated into your application and start reducing your equipment's fuel usage and carbon footprint.



Features



Case Study

The Problem...

Diesel-electric trains need a method to reduce fuel consumption, as well as reduce exposure of harmful emissions to staff and passengers alike.



The Proposed Solution...

A UK Class of Diesel Electric train has between 4 and 7 vehicles (carriages). Each vehicle is powered by a 500kW engine and can perform rheostatic braking of up to 800kW where the energy is dissipated by resistors as heat.

Adding two 200 Series flywheels which are connected to each vehicle's DC bus enables a large proportion of the wasted energy to be captured at >500kW in a smaller package than can be achieved with competing technologies.

Based on operation of 330 days per year and 12 hours per day, simulations show that >£12,500 of diesel can be saved per vehicle per year. For a 4 vehicle train this can result in £250,000 saving over 5 years offering significant financial benefits.

Deploying the recovered energy at stations has the added benefit of reducing exposure of passengers and staff to harmful emissions.

Return on Investment

2000 Series integrated into Peak Power 200 can enable generators that power tower cranes to be reduce in size and save significant amounts of CO₂.

Metric	800 kVA	350 kVA
Diesel usage (Litres)	57,750	26,400
Total fuel cost @ £1.50	£86,625	£39,600
Fuel savings	-	£47,025
Downsizing savings @ £980 pw	-	£49,000
Flywheel rental	-	£25,000
Net Benefit	-	£61,625
CO ₂ savings (Tonnes)	-	84

Running the above downsizing of a 800kVA genset to a 350kVA over 50 weeks yields the following savings.

These calculations are based on a Stage V generator, for alternate calculations, please contact Dumarey Flybrid.

84 Tons of CO₂ is roughly equivalent to:



42,680 kgs of coal burned...



139.7 Homes' electricity use in a year...



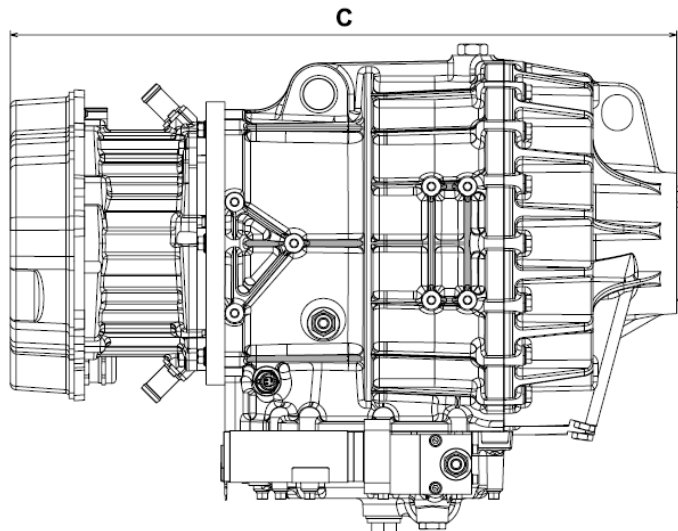
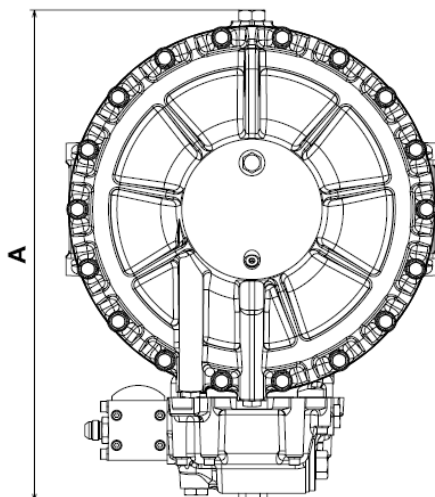
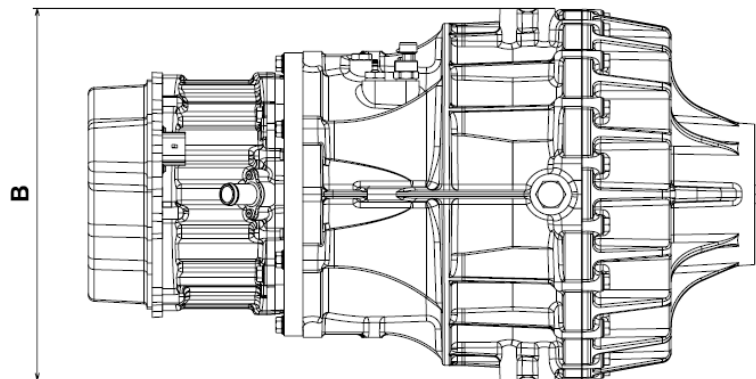
194 Barrels of oil consumed...



58 Petrol cars ran for a year...

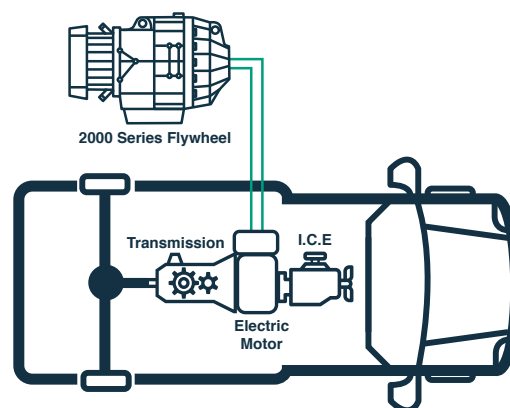
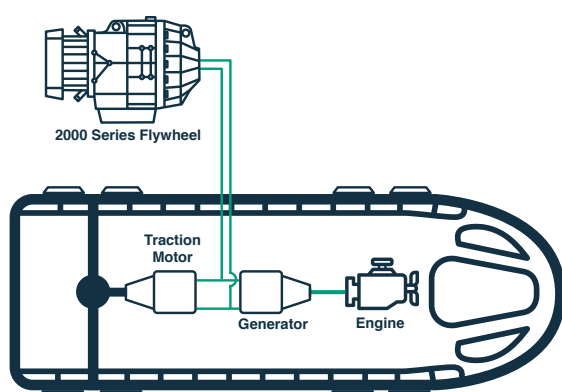
Dimensions & Weight

2000 Series	
A	475mm
B	360mm
C	645mm
Mass	165kg



Connectivity

The 2000 Series is designed to be integrated into the powertrains of electric / hybrid equipment. Typically it connects onto a DC bus of between 300VDC and 1000VDC, charging in response to control system commands to manage energy and boost power. It can be used to load level the power source, allowing for a smaller supply. It can also be used to recover waste energy to improve efficiency and reduce emissions.



Diesel Electric Vehicles

The 2000 Series can be used as the energy storage system on diesel electrics vehicles such as trains.

ICE Powertrains

The 2000 Series can be used to create a high power hybrid ICE vehicle, increasing fuel efficiency by up to 20%.

Specification & Maintenance

General Characteristics

Operating temperature	-20 °C to 80 °C
Designed Life cycle	>10 million cycles
Data	SoC, Power, Voltage, Current
Protocol	CANBus as standard, others upon request
Scope of Supply	Can include cooling system, ECU, Mounting frame - enquire for details

Cooling Systems

Water system coolant	50% Glycol
Oil system	Integrated oil pump

Electrical Characteristics

Peak power rating	200kW (>300kW at high flywheel speed)
Voltage	300-1000VDC
Load reaction time	<5 ms
Energy Capacity	>2 MJ

Maintenance

Oil service every 12 months

Warranty

2 years from delivery

About us

Originally designed for the high intensity life of motorsport, Dumarey Green Power's systems have demonstrated their performance under demanding conditions in various applications in off-highway, power generation, commercial vehicles and passenger cars.

Dumarey Green Power is located next to the Silverstone Circuit in the United Kingdom and is part of the Dumarey Group, a family owned Tier 1 manufacturer and integrator of driveline and powertrain solutions.



DUMAREY