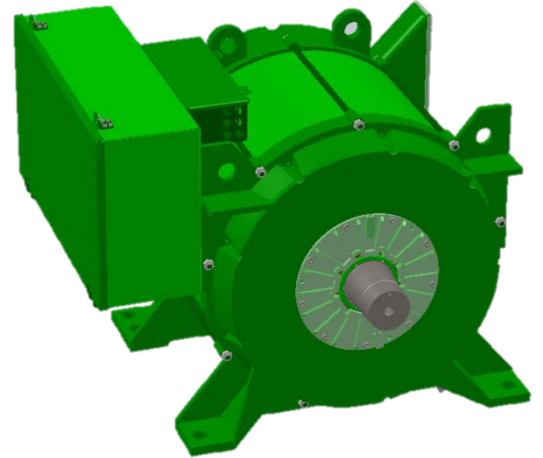


LC Drives

Powering Change

What we offer

- LC Drives builds machines that are designed for rugged environments .
- We custom manufacture for your application and can incorporate the special features that will delight your customers.
- These machines are typically half the size and weight of what they replace – sometime smaller.
- Smaller size and weight also improve efficiency at part load and lower speed. Since there is less iron losses with less iron, the part load efficiency will be dramatically better.
- Our machines are typically 50kW to 5MW in power rating and can be operated as generators or motors. In reality, machine size is determined from the torque requirement so it would be more accurate to say we can build machines from 400Nm to 200,000Nm. These machine range in size from 300mm(12inches) in diameter to 1,800mm(72inches) in diameter.



Motor Cooling System

- Our machines are typically liquid cooled and use standard ethylene glycol / water mixture for coolant – much like your automobile.
- We can build the units with an integrated radiator so you don't need to worry about the coolant supply, or we can supply pipe connections for integration into your overall system.
- If you choose to integrate your own radiator, we can take warm coolant at 60C-80C depending on the application to simplify your system. This is unique in the liquid cooled motor market.

Standard feature for ruggedness

- FORM WOUND windings
- Class H insulation, machine wound, Inverter grade wire and Kapton system
- alloy shaft
- Insulated bearing on non-drive end
- IP56 motor enclosure
- IP56 Stainless steel connection box with bus bar connections for main cables and terminals for RTDs
- Winding RTDs, 100 ohm platinum; 2 per phase

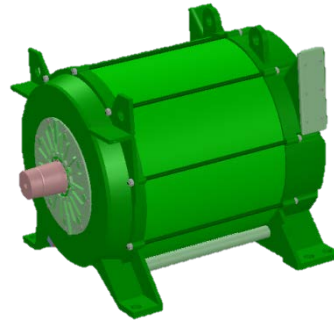
How we make your machine ½ the size

- LC Drives machines use in-slot liquid cooling so heat is removed directly adjacent to where the heat is generated – the windings.
- All traditional liquid cooling approaches require heat to pass through the steel in the stator – steel is a poor thermal conductor.
- LC Drives uses a patent pending approach to accomplish in-slot cooling using a fully brazed manifold for high reliability.
- Higher slot current density allows the machine to be smaller – higher current → shorter machine.
- New materials allow heat to move easier from windings to cooling manifold without compromising electrical insulation.
- Stator design are covered by 6 patent applications

1700kW Marine Propulsion Comparison

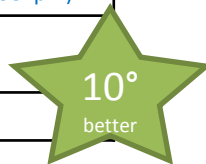


Conventional dual GEB22



LCDrives single unit

	Dual GEB22	LC Drives
Volts (AC)	690	690
Current (Amp)	2240	1900
HP (kW)	2300 (1715)	2280 (1700)
Torque – lbf -ft (Nm)	15097 (20479)	14965 (20292)
Speed @ rated torque (RPM)	0 to 800	0 to 800
Coolant Flow at 20psi–GPM	n/a	25 (95 lpm)
Max coolant inlet temperature	n/a	75C
Max ambient	45C	55C



- Same shaft height as GEB series motors
- 2400 kg vs 5900 kg for dual GEB
- Similar Class H insulation system with LC Drives having lower actual winding temperatures for higher reliability
- Sealed IP56 construction so no contamination inside motor, Coolant: 50% mixture ethylene glycol & water. Compatible with small liquid-liquid heat exchanger
- Configurable junction box for either side
- Shorter in length than single GEB22 machine
- 60% of height requirement because no blowers are required

High efficiency - especially at part load

- Part load efficiencies of GEB are very low due to iron losses not scaling down as fast as copper losses.
- LC Drives machines that have fundamentally less iron in them and therefore have less iron losses. This can have a dramatic affect on part load efficiencies.

GEB/LC Drives Motor Comparison

