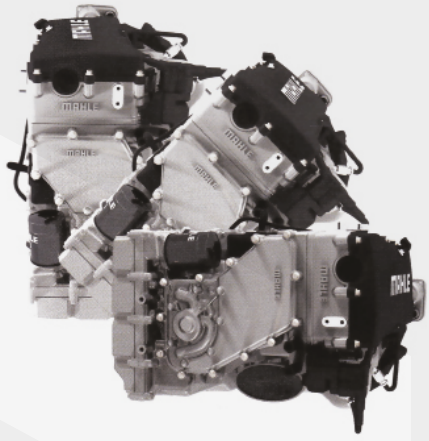
MAHLE Powertrain
Compact Range Extender Engine

> Specifically designed for EV applications
> Compact and lightweight
> Flexible installation options



>> Flexible installation & orientation

Compact Range Extender Engine

Extended-range electric vehicles (E-REVs) partly overcome the limitations of current battery technology by enabling reduced battery storage capacity to be used, whilst still maintaining an acceptable vehicle range.

The E-REV is essentially a vehicle that functions as a fullperformance electric vehicle when energy is available from an on board rechargeable energy storage system, typically a battery, and having an auxiliary energy supply that is only engaged when battery energy is depleted. It is desirable that for the majority of time the vehicle will operate in a purely electric-only mode and that the user recharges the vehicle (by connecting to an external supply) when it is not in use, e.g. over-night. Thus, the battery should be sized to cope with the majority of daily usage that the vehicle will encounter, and only rely on the range extender for infrequent, longer journeys.

- 4-stroke gasoline engine
- 900 cc twin cylinder
- 30 kW or 40 kW output
- With electric supercharger 50 kW output
- Horizontal or vertical installation capability
- Weight 50 kg (70 kg with generator)
- Compact design

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Technical Specifications

Technical specifications	
Engine displacement:	900 cc
No. of cylinders:	2 in-line, 4-stroke, gasoline
Bore/Stroke:	83.0 / 83.0 mm
Compression ratio:	9.8 : 1
Fuel injection:	Port fuel injection
Installation angle:	Verticle or horizontal
Engine Control:	MAHLE Flexible ECU
Maximum power:	30 kW [4000 min^{-1}]
Dimensions:	327 x 416 x 481 mm
Engine dry weight:	50 kg (70 kg with generator)
Fuel consumption:	240 g/kWh minimum
Emissions target:	Euro 6

>> Range extender engine in demonstrator vehicle

Benefits

- Overcomes future engine requirements & challenges
- Sized to be suitable for typical C-segment passenger car
- Analysis of fleet vehicle drive data using drive style analysis toolset
  - › Identifies typical daily usage pattern of passenger cars
  - › Enabled requirements for electrical components & Range extender to be determined
- Key attributes of range extender:
  - › Low cost
  - › Small package volume
  - › Good NVH attributes
  - › Reasonable fuel efficiency
- Design incorporates fully integrated axial flux generator
  - › Housed within the crankcase of the engine
  - › Small & lightweight
  - › Cost-effective solution
- Oil system enables engine to be installed vertically or horizontally for increased package flexibility

>> MAHLE range extender demonstrator vehicle

Summary

The range extender engine is specifically designed for EV applications with flexibility when it comes to installation options. This compact and lightweight engine is a cost-effective solution that is built to meet requirements for the future.

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