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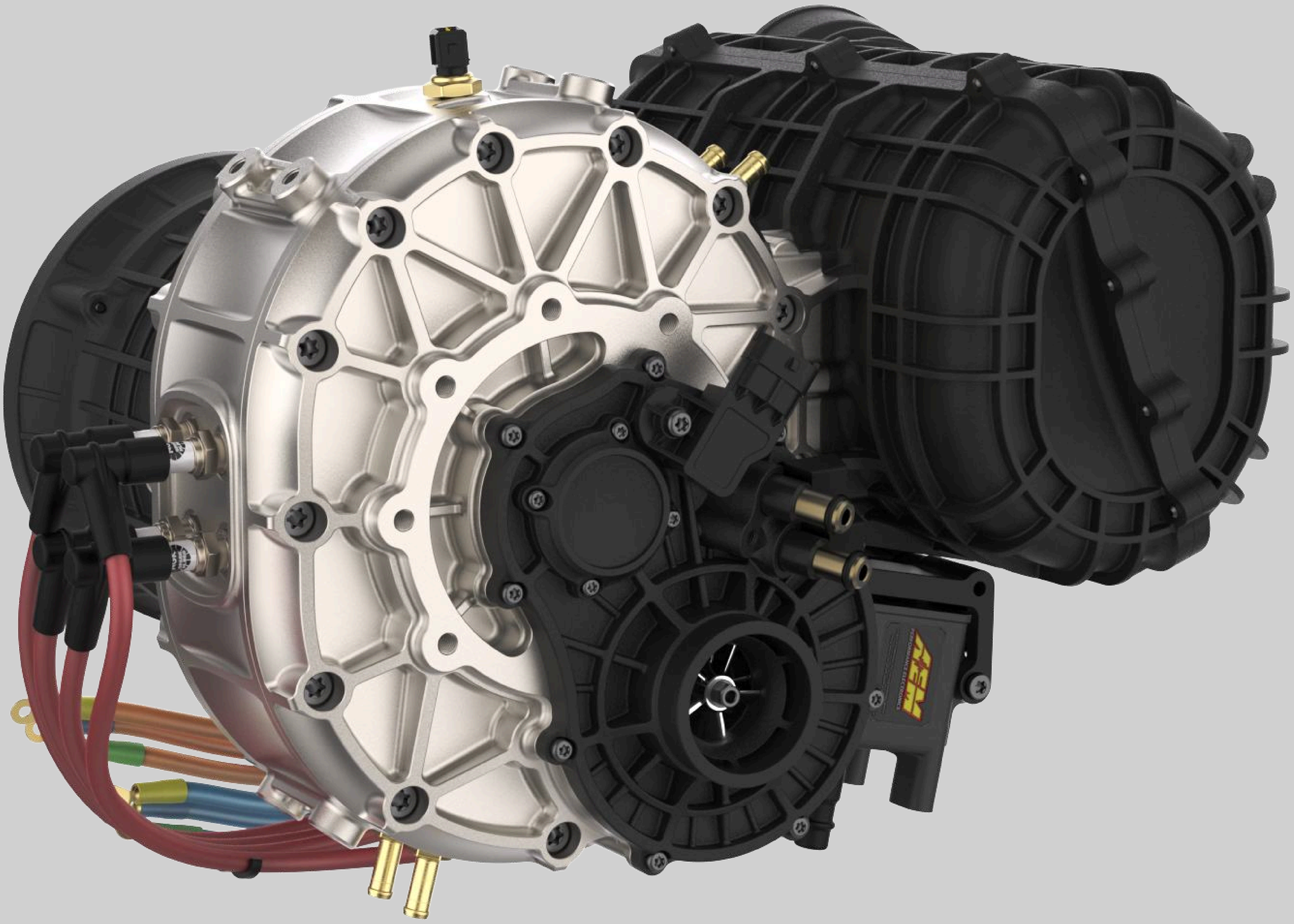


UAVHE RW 1-500 APU

80kW Integrated Hybrid Power System for Multirotor UAVs

More details

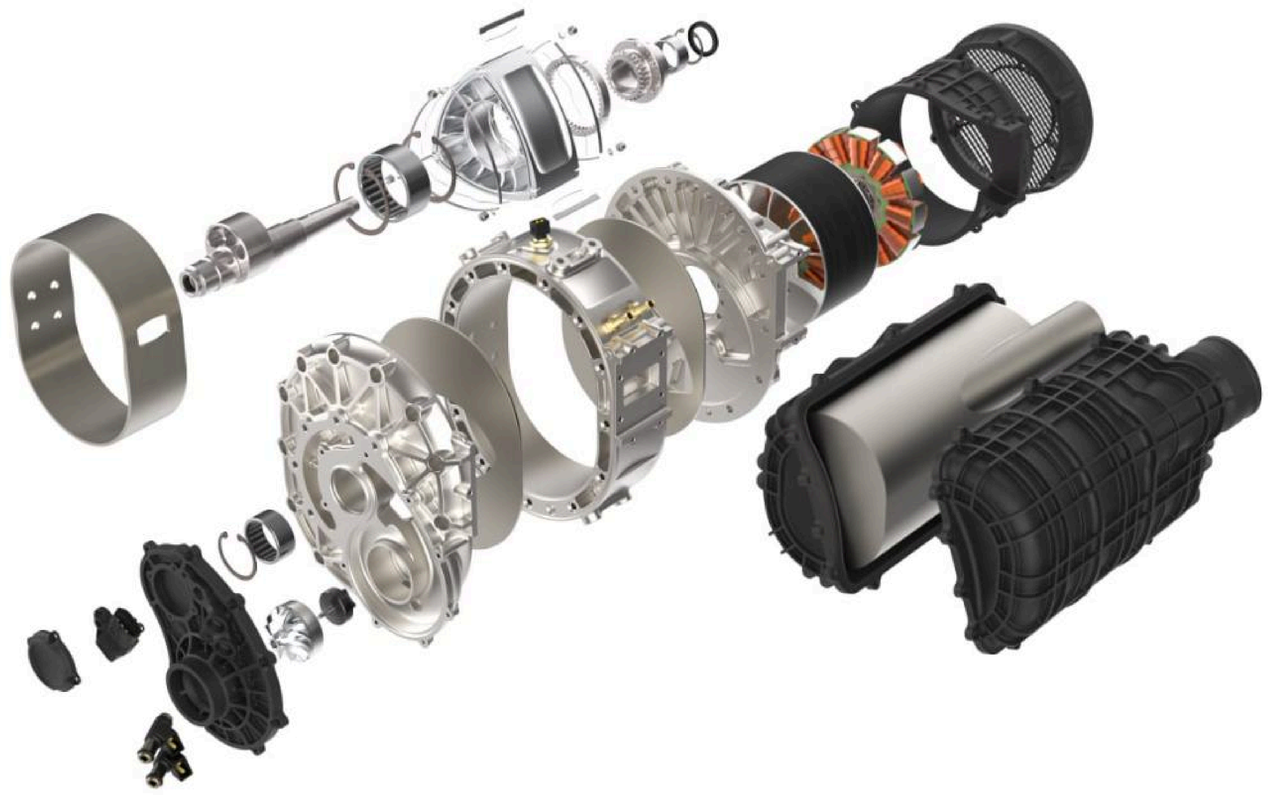
Overview

The RW1-500 is a complete hybrid power system that combines a rotary engine, high-efficiency generator, power electronics, and energy management unit in a single compact assembly.

It provides primary electrical power, distribution control, and battery management for multirotor UAV platforms operating in continuous or extended-range missions.

Lightweight and compact, the RW1-500 delivers up to 80 kW of continuous DC power with high fuel efficiency and low acoustic and thermal signatures.

The system operates fully autonomously, managing generation, distribution, and storage without external control input.



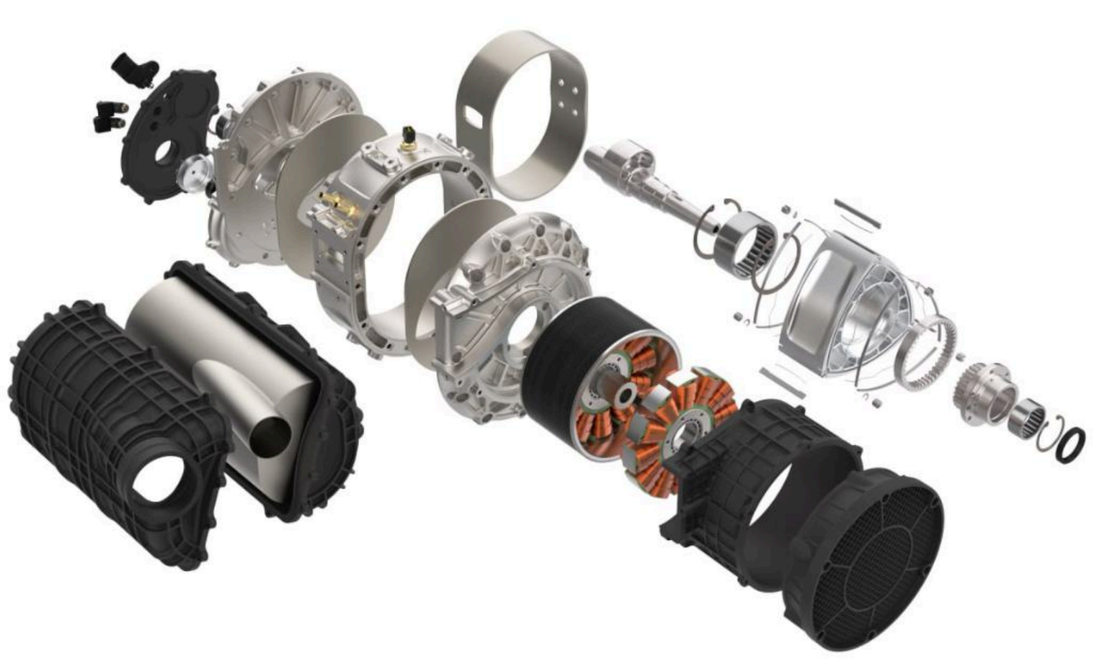
Design Features

The RW1-500 integrates a rotary engine and generator within a single housing and directly coupled shaft.

Thermal control is provided by an external dual-loop liquid cooling system with independent pumps and fans.

The ECU/PDU unit—available in liquid- or air-cooled configurations—contains the rectifier, power distribution electronics, control module, and integrated lithium starter battery.

This modular arrangement separates heat zones, simplifies installation, and provides stable, autonomous power regulation.



Core Features

– Integrated rotary engine and generator within a single housing.

– Cast-iron sleeve and end housings with aluminum structural casing for thermal stability and stiffness.

– Dual-loop liquid cooling system with independent pumps and ECU-controlled heat management.

– Forced-air cooling for generator stator and rotor.

– Exhaust enclosed in a cooled shroud; generator cooling air passes around the muffler and exits coaxially with exhaust gases, reducing infrared signature.

– ECU/PDU with rectifier, power distribution, control electronics, and integrated lithium starter battery.

– e-Supercharger providing throttle-less power control and altitude compensation.

– Generator rotor integrated as a dynamic counterbalance for vibration-free operation.

– Progressive combustion chamber geometry for efficient and stable burning.

– Premix/automix lubrication with internal fuel-based seal and bearing lubrication.

– Tungsten-carbide apex seals with DLC-coated slots and titanium springs.

– Redundant ignition system with four spark plugs per section.

– Full thermal and system diagnostics managed by ECU with autonomous regulation of pumps, fans, and e-supercharger.

– Low acoustic signature and zero vibration due to balanced architecture and multi-chamber silencer design.

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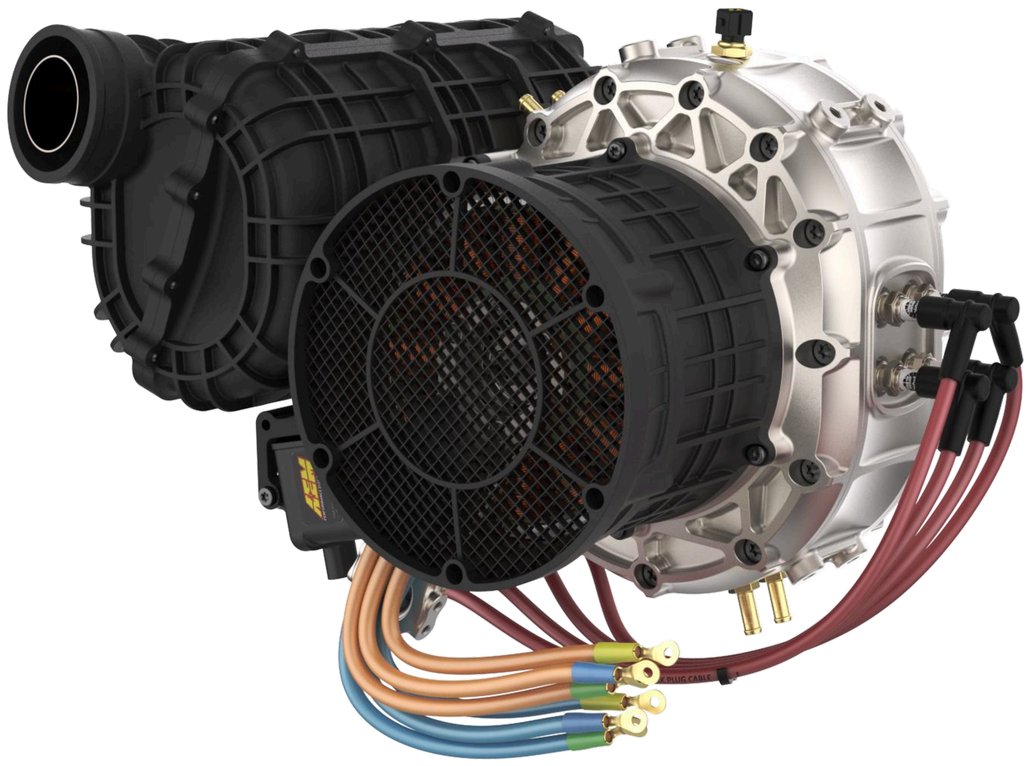
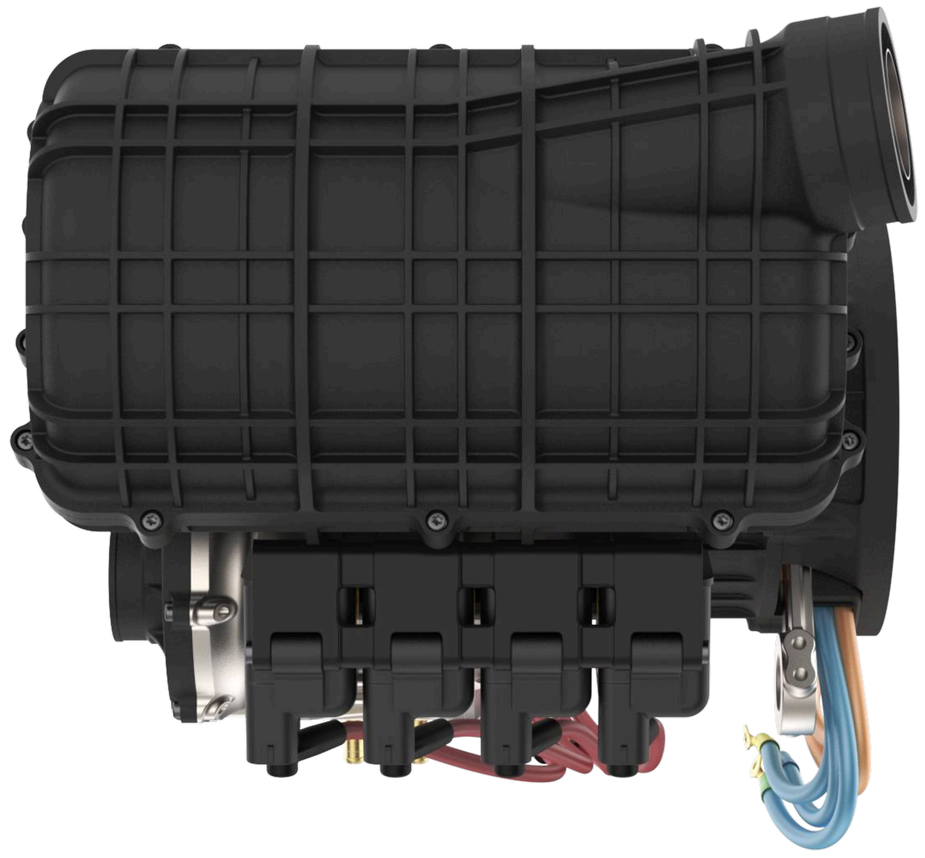
More details

Specifications

Parameter	Value
Electrical Output	80 kW continuous electrical output (DC)
Engine Type	Single-rotor, liquid-cooled rotary engine
Rated Speed	10,000 rpm
Fuel	Jet A-1, JP-5, JP-8, SAF
Configurable Output Voltage	48 / 96 / 144 / 192 VDC
Specific Fuel Consumption	295 g/kWh (based on electrical output)
Dry Weight	36 kg (engine-generator assembly including intake, exhaust, controller, and radiators; excluding fluids)
Dimensions	450 × 370 × 500 mm (overall envelope, engine-generator)
Cooling System	Dual-loop liquid cooling (engine); forced-air cooling (generator); liquid or forced-air configurable cooling (ECU/PDU)
Operating Temperature	–40 °C to +60 °C
Operating Altitude	Up to 7,000 m
Vibration Tolerance	up to ±6 g (any axis)
Service Interval	200 h
MTBO	1,000 h





System Interfaces

The RW1-500 provides CAN bus, RJ45 TCP/IP, and Modbus RS-485 communication interfaces, compatible with most autopilot and power management protocols. Extended telemetry and analytics deliver real-time data on voltage, current, temperature, and overall system state.

The power section includes 16 independent 48 VDC ports, reconfigurable as 8 × 96 VDC or 4 × 144/192 VDC groups.
All ports use Surlok connectors and support software-defined voltage adjustment within 40–58 VDC, controllable during operation.

Each channel includes programmable limits for current and voltage, full protection against over-current and short-circuit, and complete telemetry feedback.
Maximum continuous current per port is 150 A.

The integrated battery management system supports up to 256 packs (12 S each) with bi-directional load ports, allowing controlled power flow between generator, batteries, and consumers under algorithm-based management.

Multiple RW-series modules can operate in parallel with hot-swap capability and automatic load balancing.

Designed in accordance with MIL-STD-810 and MIL-STD-461 environmental and electromagnetic standards.
Cold start to 95 % output achieved in under 75 s; hot restart (ECU active, engine off) — under 6 s.

Verified through full endurance and vibration testing under MIL-STD-810G profiles.

Configuration and Delivery Options

Each RW1-500 system can be configured to match customer integration requirements.
For prototype evaluation and development, UAVHE offers the Engineering Evaluation Demo Kit — a complete operational package including the production-grade engine-generator, ECU/PDU, fuel system (pumps, filters, lines, and pressure regulators), cooling system (radiators, pumps, and hoses), intake and exhaust assemblies, wiring harness, and control software for startup and testing.

Standard evaluation configuration price:
32 500 EUR, Ex-Works Barcelona.

Detailed specifications, manuals, and 3D STEP models are available at www.uavhe.eu/products/RW500APU

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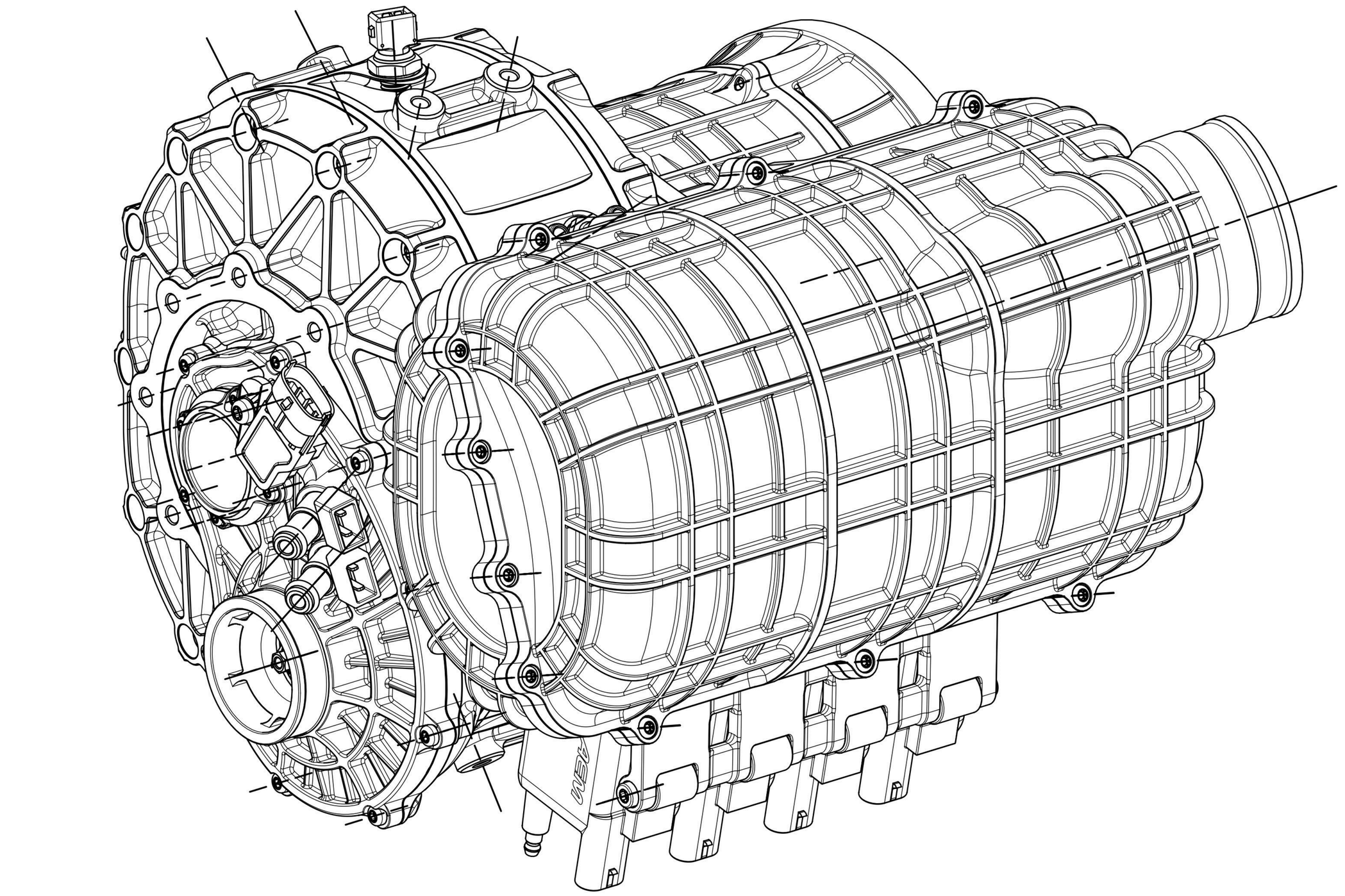
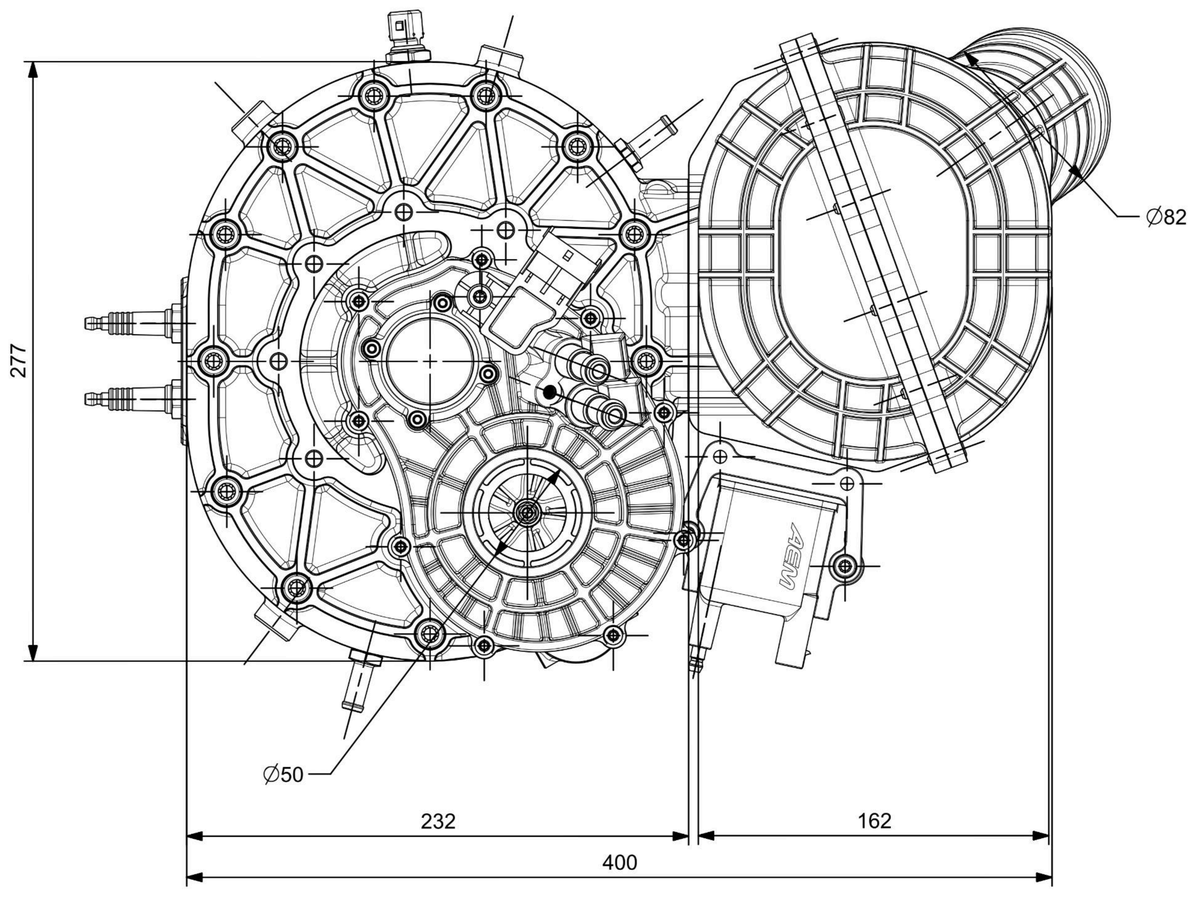
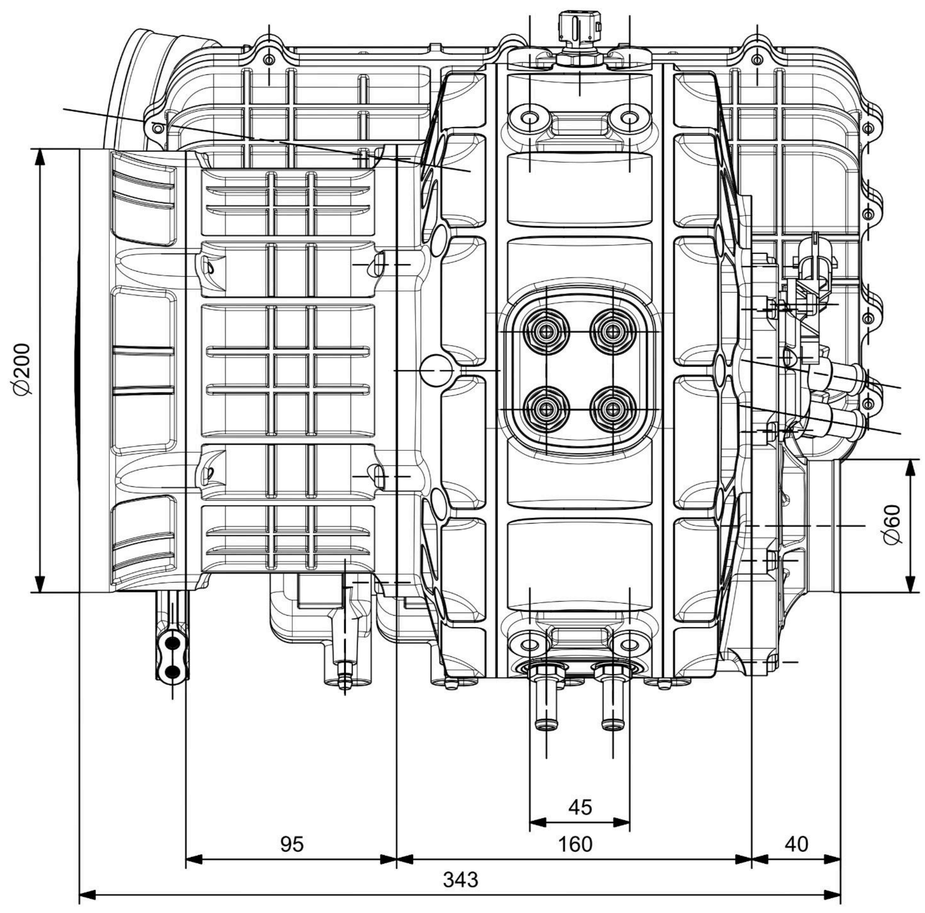
Dimensions and Layout







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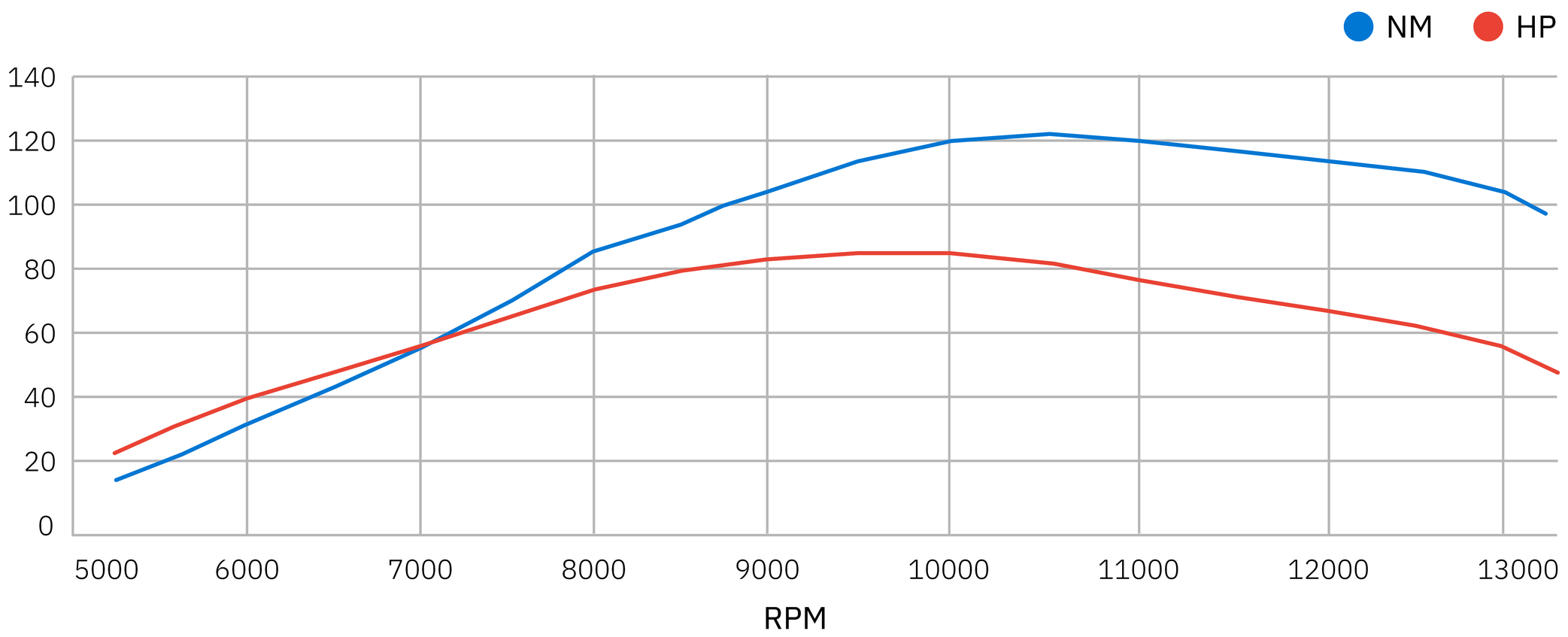
Performance Data

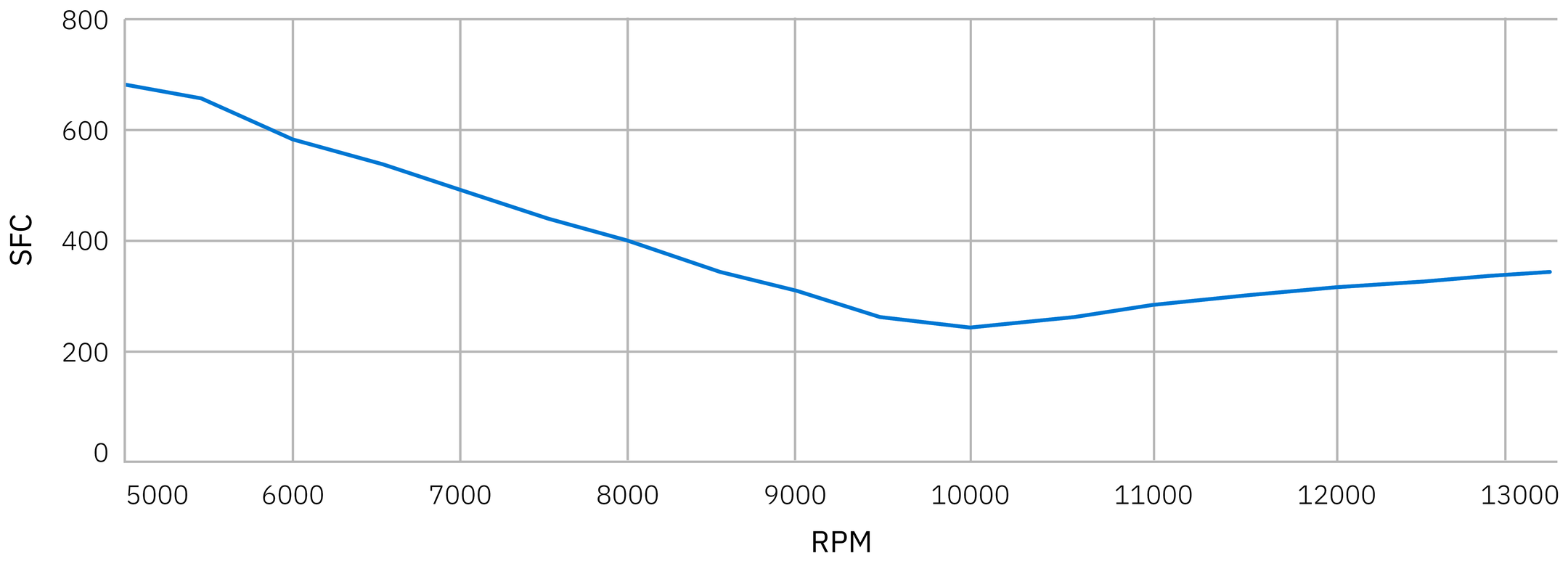
RPM	*HP*	*kW*	*Nm*	*SFC g/kWh*	*l/h (kerosine)*
5000	15.0	11.2	21.4	690	9.7
5500	22.0	16.4	28.5	643	13.2
6000	33.0	24.6	39.2	598	18.4
6500	45.0	33.6	49.3	553	23.2
7000	56.0	41.8	57.0	505	26.4
7500	70.0	52.2	66.5	455	29.7
8000	85.0	63.4	75.7	398	31.5
8500	95.0	70.8	79.6	347	30.7
9000	105.6	78.7	83.6	310	30.5
9500	114.6	85.5	85.9	285	30.5
10000	120.1	89.5	85.5	270	30.2
10500	121.7	90.8	82.5	282	32.0
11000	120.3	89.7	77.9	289	32.4
11500	119.3	88.9	73.9	298	33.1
12000	115.5	86.1	68.5	308	33.2
12500	110.0	82.0	62.7	314	32.0
13000	105.0	78.3	57.5	329	32.2
13500	97.0	72.3	51.2	335	30.3

DC, kW	*RPM*	*Engine load %*	*SFC (g/kWh el.)*	*Fuel L/h*
5	5200	48.5	998	6.2
10	5600	69.9	841	10.5
15	6100	69.7	760	14.3
20	6600	66.6	683	17.1
25	7200	63.1	612	19.1
30	8500	46.7	453	17.0
35	9000	48.0	392	17.1
40	9500	50.5	355	17.7
45	9700	55.7	339	19.1
50	9900	60.9	323	20.2
55	10000	66.4	313	21.5
60	10000	72.4	308	23.1
65	10000	78.4	304	24.7
70	10000	84.5	302	26.4
75	10000	91.7	299	28.4
80	10000	96.5	295	29.5

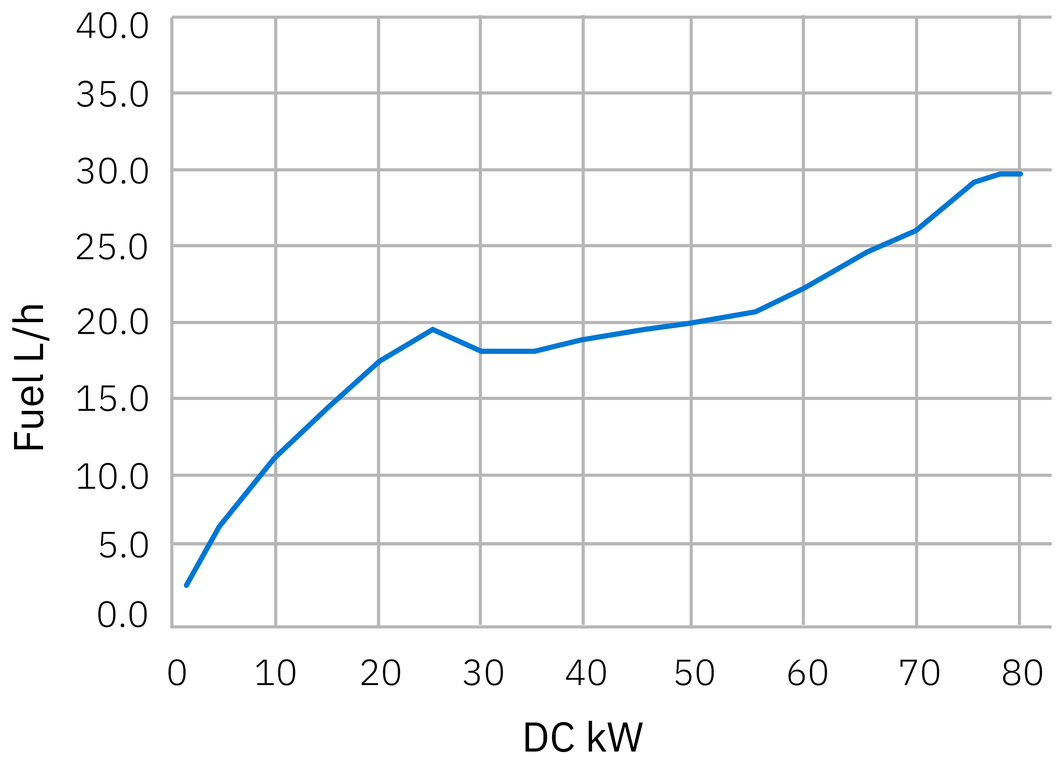
NM and HP to RPM



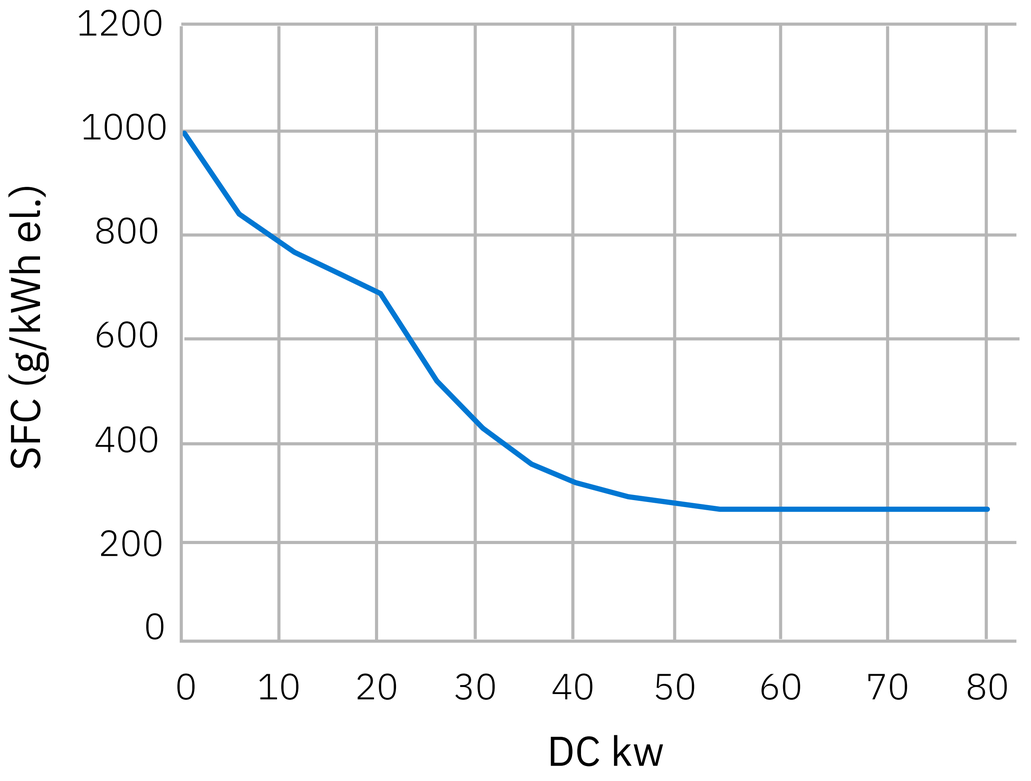
SFC g/kW to RPM



Fuel L/h vs DC kW



SFC g/kW to RPM



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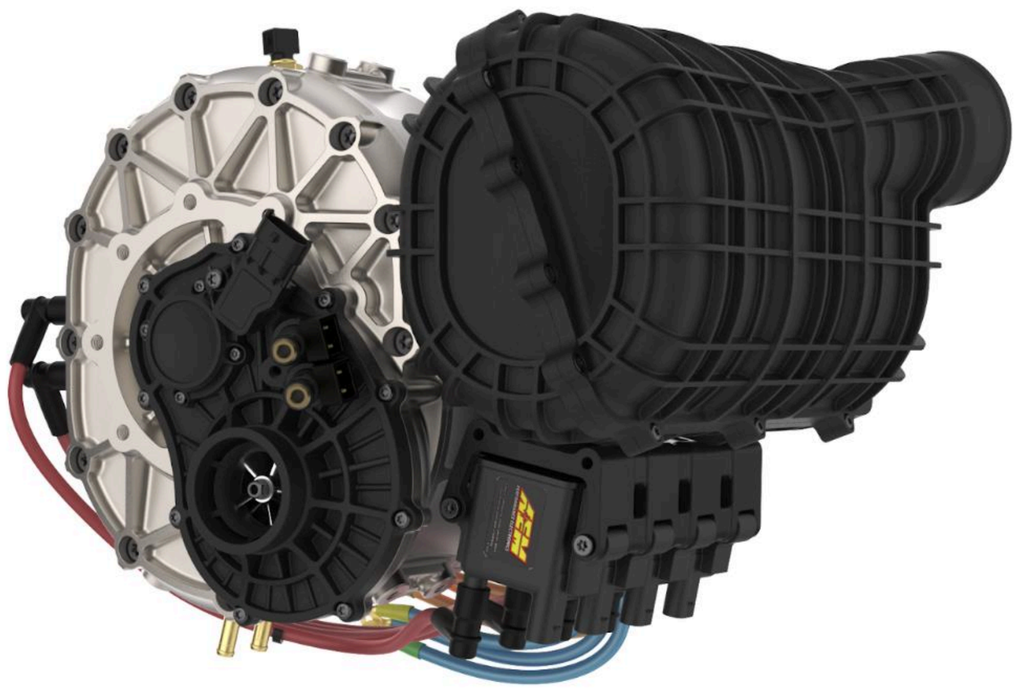
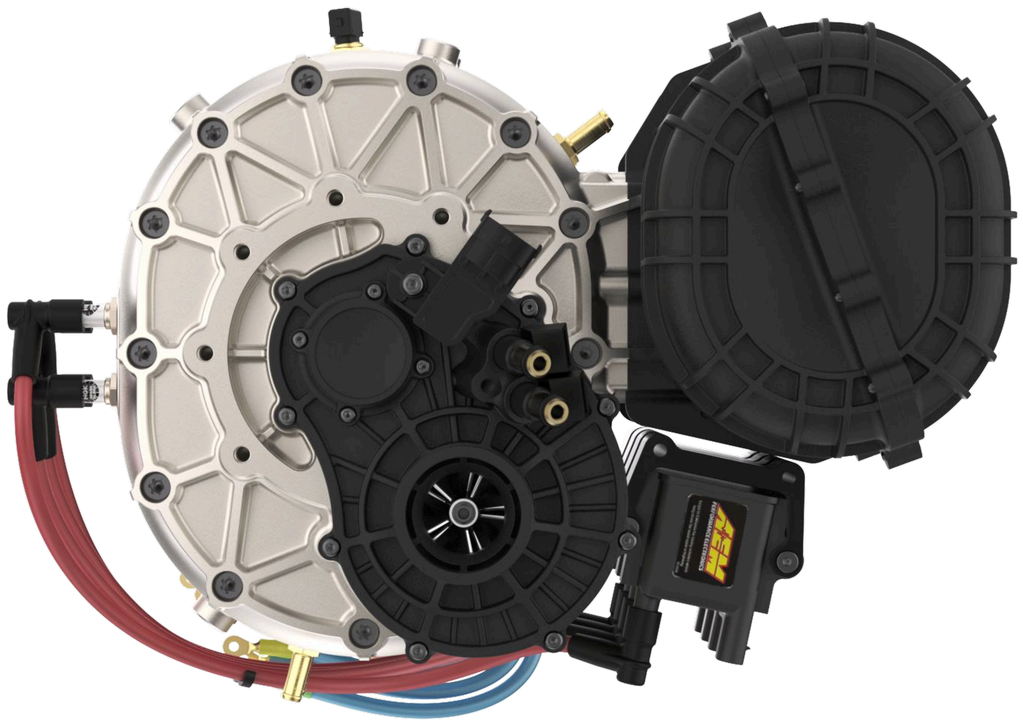
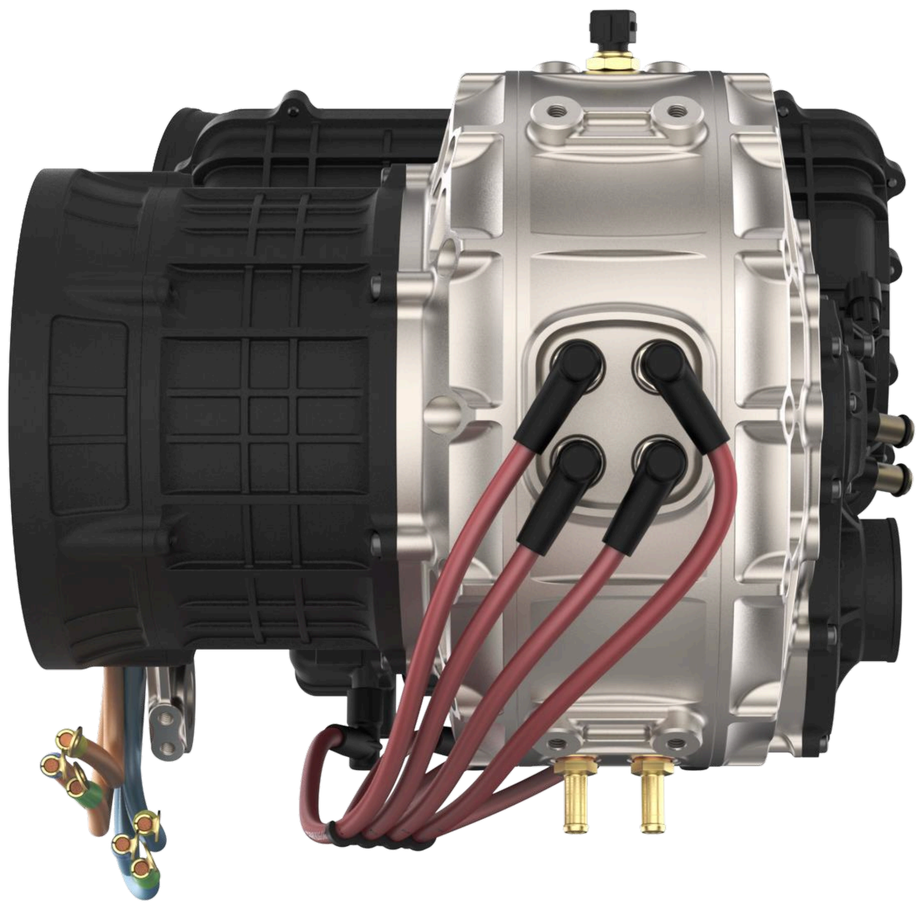
Visual References







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