FACT SHEET

TRACTION BATTERY SOLUTION

With a flexible traction battery solution, the energy storage system can be tailored for each customer's needs.

Batteries built by Volvo

Using state-of-the-art battery cells, the traction batteries are designed and assembled by Volvo.

The battery is a lithium-ion battery where lithium nickel cobalt aluminium oxide ($LiNiCoAlO_2$), also called NCA, is used as the cathode material. NCA gives high specific energy, excellent fast charging capability and a long life span.

The battery has a modular design, providing good flexibility.

PRODUCTIVITY

- State of the art batteries, providing reliable operation and good range.
- Excellent fast charging capability.

ENVIRONMENT

- Zero tailpipe emissions.
- Batteries manufactured in a sustainable way, throughout the entire supply chain.

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The design of the battery offers several advantages. The cubic shape improves the flexibility when it comes to combinations and packaging on the frame. Each battery has a separate and removable service box that is easily accessible, enabling easier removal and local repair. Also, the battery is designed to allow a large extent of remanufacturing and refurbishment, which improves the life of the battery and increases its second life useability.

In all stages of developing and manufacturing the battery, great care is taken to make sure that the raw materials are extracted using sustainable methods and that the batteries are produced with a minimal impact on the climate.

SPECIFICATION

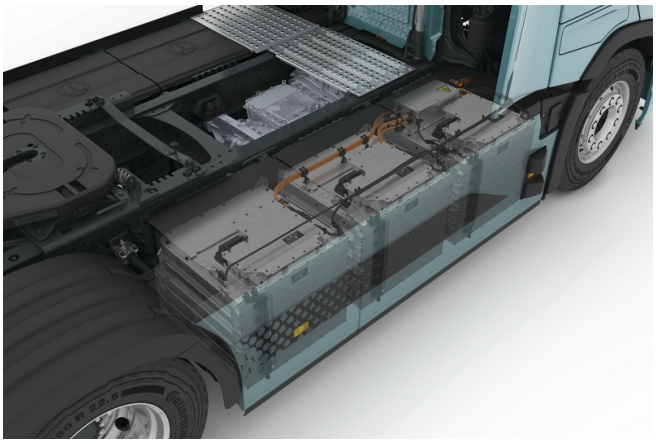
Type	Lithium-ion (NCA)
Nominal energy*	90 kWh
Nominal capacity*	137.8 Ah
Dimension (length x depth x height)*	768 x 684 x 668 mm
Approximate weight*	500 kg
Operating temperature	-30 to +55 °C

*** Per battery**

The right setup for each operation

The modular design of the batteries makes it easy to adapt the number of batteries and hence the total energy to each customer's needs.

The vehicle can have four, five or six batteries, each battery having a nominal energy of 90 kWh, giving a total installed nominal energy of 360 kWh, 450 kWh or 540 kWh. The batteries are mounted on the sides of the chassis, between the front and rear axles.



Example of three batteries mounted on the right-hand side of the chassis.

When the state of charge of the battery is either very low or very high, chemical reactions that have a negative impact on the battery life-length escalate. To make sure that the batteries maintain their health and capacity for longer, not all of the total installed energy is useable. Thus, the useable battery energy is lower than the installed nominal energy.

The optimum number of batteries for each customer and operation is given by the tool Electric Range Simulator, developed by Volvo.

Efficient charging

The onboard charging system of the vehicle and the batteries allow for powerful charging, regardless of if it is AC charging or DC charging. For AC charging, Mode 2** and Mode 3**, charging is supported with up to 43 kW. DC charging, Mode 4**, allows up to 250 kW.

With AC charging, which typically is used for overnight charging, it takes about 9-10 hours to fully charge the traction batteries. To fully charge the batteries using DC charging takes about two hours, but 80% state of charge can be reached within about one hour and a half hour. This is due to the fact that as the state of charge of the batteries reaches 80%, the charging slows down to protect the battery cells.

**** As defined by the international standard for electric vehicles (IEC 61851).**

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Sales variants
Energy storage, left-hand side

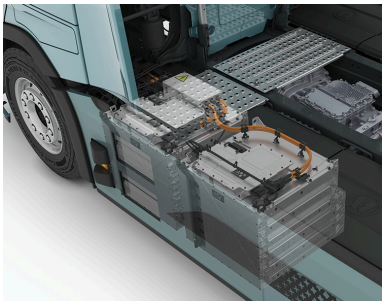
ESML-L2	Energy storage middle left, two batteries
ESML-L3	Energy storage middle left, three batteries

Sales variants
Energy storage, right-hand side

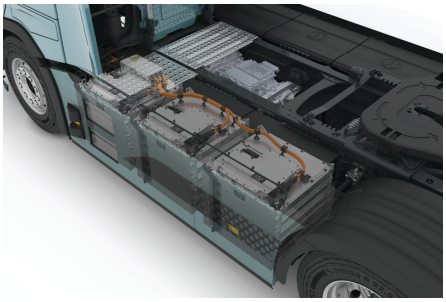
ESMR-L2	Energy storage middle right, two batteries
ESMR-L3	Energy storage middle right, three batteries

Sales variants
Total energy

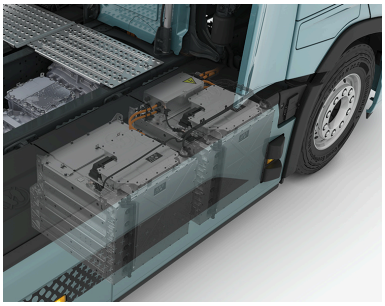
ESS360K	Energy storage system, total installed nominal energy 360 kWh
ESS450K	Energy storage system, total installed nominal energy 450 kWh
ESS540K	Energy storage system, total installed nominal energy 540 kWh



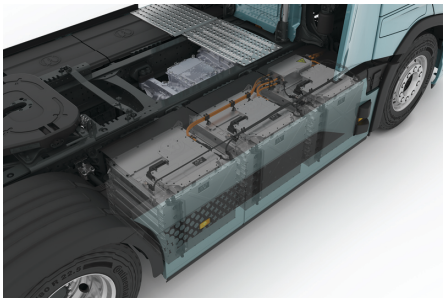
ESML-L2



ESML-L3



ESMR-L2



ESMR-L3