

FACT SHEET

TRACTION BATTERY SOLUTIONS



With flexible traction battery solutions, the energy storage system can be tailored to each customer's needs.

Batteries built by Volvo

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

The battery is a lithium-ion battery in which lithium nickel cobalt aluminium oxide (LiNiCoAlO_2), also called NCA, is used as the cathode material. NCA delivers high specific energy, excellent fast-charging capability and a Long Life span.



The battery has a modular design, which offers a high degree of flexibility.



PRODUCTIVITY

- State-of-the-art batteries that provide 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 battery design offers several advantages. The cube shape offers greater flexibility when it comes to configuring battery combinations and packaging on the frame. Each battery has a separate and removable service box that is easily accessible, which enable easy removal and local repair. The battery is also designed to facilitate a large extent of remanufacturing and refurbishment, which improves the lifespan of the battery and increases its second-life usability.

Great care is taken in all stages of battery development and manufacturing to ensure that the raw materials are extracted using sustainable methods and to minimise the climate impact of the battery production process.

SPECIFICATION

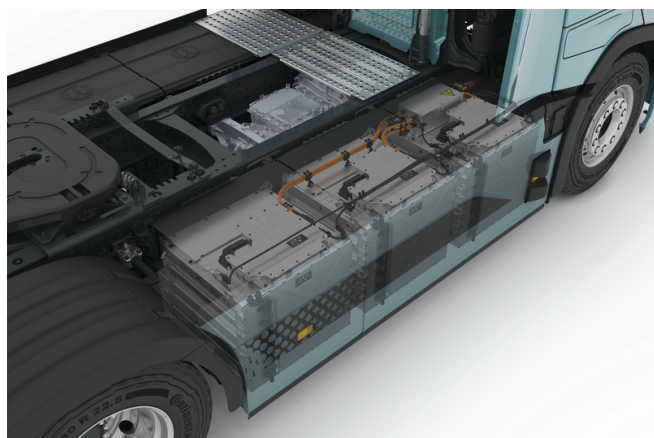
Type..... Lithium-ion (NCA)
 Nominal energy*..... 90 kWh
 Nominal capacity*..... 137.8 Ah
 Dimensions (length x depth x height)*..... 768 x 684 x 668 mm
 Approximate weight*..... 500 kg
 Operating temperature..... -30 to +55 °C

* Per battery

The right setup for each operation

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

The batteries are mounted on the sides of the chassis, between the front and rear axles. Each vehicle can carry between two and six batteries, with a nominal energy of 90 kWh per battery. This gives a total installed nominal energy range of 180 kWh to 540 kWh.



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

When the state of charge of a battery is either very high or very low, chemical reactions that have a negative impact on battery life will escalate. To ensure that the batteries maintain their health and capacity as long as possible, not all of the total installed nominal energy is accessible. Thus, the useable battery energy is lower than the installed nominal energy.

The optimum number of batteries for each customer and operation is calculated using the Volvo tool Electric Range Simulator.

Efficient charging

The on-board charging system enables powerful charging, regardless of whether 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.

Overnight charging, which is typically used at 40-50kW, takes about 9-10 hours to fully charge the traction batteries. To fully charge the batteries using a 250kW takes about two hours, but an 80% state of charge can be reached after about one and a half hour. This is due to the fact that when the state of charge of the batteries reaches 80%, the charging rate slows down to protect the battery cells.

The table below gives an indication of the charging time at three different charging powers. Please note that the actual results may vary depending on the charger used and environmental conditions.

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

	40kW	150kW	250kW
3 BP	120-130 min	14-55 min	30-35 min
4 BP	140-150 min	55-65 min	35-40 min
5 BP	160-170 min	65-75 min	40-45 min
6 BP	180-190 min	75-90 min	45-50 min

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Energy storage optimisation

The standard variant is ESOP-R, which offers 380 kWh of usable battery energy with a 6-battery configuration. It also reduces the gross vehicle weight of a 4x2 truck from 23 tonnes to 21 tonnes.

Additionally, there is an optional variant called ESOP-P, available in markets certified for 23 tonnes, which provide 369 kWh of usable battery energy with a 6-battery configuration. ESOP-P affects the markets of the Netherlands and Luxembourg.

Sales variants

- ESOP-R** Energy storage optimization, range
- ESOP-P** Energy storage optimization, payload

Sales variants

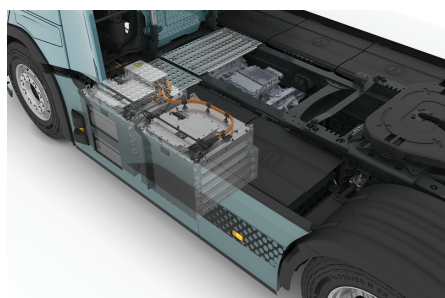
Energy storage, left-hand side

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

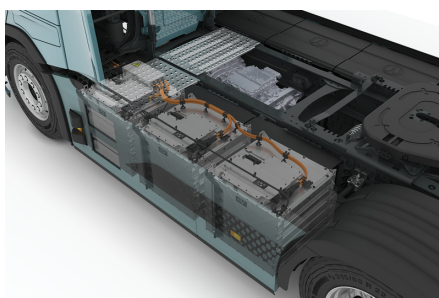
Sales variants

Energy storage, right-hand side

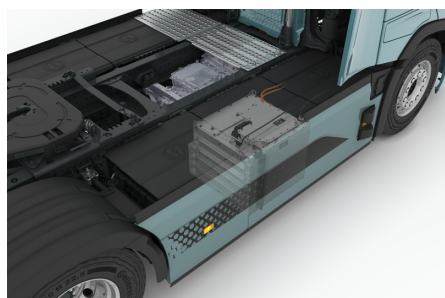
- UESMR** No battery on the right-hand side
- ESMR-L1** Energy storage middle right, one battery
- ESMR-L2** Energy storage middle right, two batteries
- ESMR-L3** Energy storage middle right, three batteries



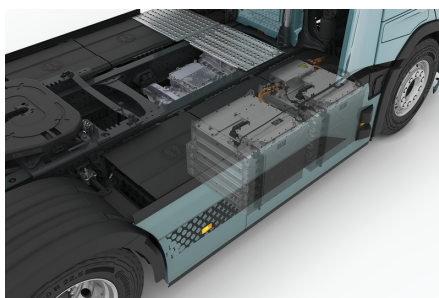
ESML-L2



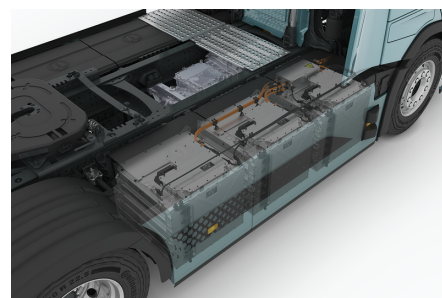
ESML-L3



ESML-L1



ESML-L2



ESML-L3

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Sales variants

Total energy

ESS180K	Energy storage system, total installed nominal energy 180 kWh
ESS270K	Energy storage system, total installed nominal energy 270 kWh
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

	Number of batteries	Installed nominal energy (kWh)	Maximum useable energy* (kWh)
ESS180K	2	180	117
ESS270K	3	270	183
ESS360K	4	360	250
ESS450K	5	450	309
ESS540K	6	540	380

* The actual useable energy depends on factors such as battery temperature and battery state of health.

Charging time

This table shows the time needed to charge to different States of Charge (SOC) with various charging options.

Charger	ESS180K	ESS270K	ESS360K	ESS450K	ESS540K	Comment
43 kW AC charger						43 kW maximum consumed from grid.
0-100% SOC	3.5 h	5.4 h	7.3 h	9 h	11 h	
250 kW DC charger						Charger with at least 350 A current capability and voltage up to at least 750 V.
0-80% SOC	65 min	65 min	65 min	75 min	90 min	
80-100% SOC	30 min	30 min	30 min	30 min	30 min	
150 kW DC charger						Charger with at least 225 A current capability and voltage up to at least 750 V.
0-80% SOC	65 min	75 min	90 min	110 min	130 min	
80-100% SOC	30 min	30 min	30 min	35 min	35 min	