



Technical Journal

TITLE:
Driving distance in Pure mode / Hybrid mode

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PARTNER: 3 US 7510 Volvo Car USA		ISSUE DATE: 2020-03-04	STATUS DATE: 2020-03-11
FUNC GROUP: 3113	FUNC DESC: Battery, high voltage	Page 1 of 8	

“Right first time in Time”

Attachment

File Name	File Size
FAQ State Of Health Hybrid Batteries WITH Answers Rev6_en.pdf	0.5621 MB
VIDA_instruction.pdf	0.2077 MB

Vehicle Type

Type	Eng	Eng Desc	Sales	Body	Gear	Steer	Model Year	Plant	Chassis range	Struc Week Range
224	BK						2019-2099		0000001-0999999	201835-209952
224	BR	B1FPHEV					2019-2099		0000001-0999999	201835-209952
225	BK						2019-2099		0000001-0999999	201835-209952
238	BC	B1BPHEV					2017-2099		0000001-0999999	201646-209952
238	BC	B1BPHEV					2017-2099		0000001-0999999	201710-209952
238	BR	B1FPHEV					2018-2099		0000001-0999999	201710-209952
246	BK						2018-2099		0000001-0999999	201717-209952
246	BR	B1FPHEV					2018-2099		0000001-0999999	201717-209952
256	BC	B1BPHEV					2016-2099		0000001-0999999	201524-209952
256	BR	B1FPHEV					2018-2099		0000001-0999999	201524-209952



CSC Customer Symptom Codes

Code	Description
YN	High voltage battery/Discharged/poor charge
IV	Text window and warning symbol/Text message
3L	Technician information/Repair information/Not for warranty use
2V	Technician information/Software/Vehicle communication/Not for warranty use

VST Operation Number

DTC Diagnostic Trouble Codes

Control Module	Code	Fault Type
BECM	P0A7F62	Permanent
BECM	P0A8000	Permanent

Rows beginning with * are modified

Note! If using a printed copy of this Technical Journal, first check for the latest online version.

Text

DESCRIPTION:

Use this Technical Journal if a customer states that the driving distance in Pure mode or Hybrid mode is too short.

Follow instruction under “Service” to find explanation for the hybrid battery state of health. Frequently asked question regarding state of health could be found under “Attachment” FAQ State of health hybrid batteries with answers Rev6.

SERVICE:

The High Voltage battery in the Hybrid car is a Li-ion battery.

The battery strategy in the car is optimized for high capacity over the vehicle lifespan.

The battery capacity will however decrease and factors that impact the decrease in capacity are, among others:

- Age
- Number of charging cycles
- Temperature

Driving distance in Pure/Hybrid mode will become shorter as the battery gets older.

This decrease is a normal battery aging process.

Driving distance in Pure/Hybrid mode is also depending on how the car is driven and how the power consumers are used.

For more information regarding drive cycle and other outside factors, see owner’s manual.

In Vida you can find the High voltage battery state of health for all hybrid cars. See attachment “VIDA instruction”.



The BECM has two DTC's that will be set when the capacity is below certain thresholds. See Diagnostic Trouble Codes.

Abbreviation:

SOH = State Of Health Remaining capacity in percent 100% = New battery

SOC = State Of Charge Charge level in the battery in percent 100% = Fully charged battery

Note:

SOC has nothing to do with the capacity of the Li-ion battery

Warranty claim info:

This TJ is for information only.

VEHICLE REPORT:

Yes, please submit a Vehicle Report if the service solution described in this TJ has no effect. Use concern area "Vehicle Report" and sub concern area "Support needed", use function group 3113.

To view TJ attachments continue to next page. This TJ has two attachments.



V O L V O

The screenshot displays the Volvo diagnostic software interface. The top navigation bar includes 'Home', 'XC40, 2019, B315M24, TDCR1 X', and 'Arta'. Below this, the vehicle information is shown: VIN: VV1K288FK2126540, Model/Year/Ch: XC40, 2019, 126540. A search bar contains '2. Write: "Power..."'. The interface is divided into several sections:

- Left Panel:** A navigation menu with categories like 'Planning', 'Diagnosics', and 'Components'. 'Fault Tracing' is highlighted under 'Diagnosics' with a callout '1. Fault Tracing'.
- Function List:** A table listing various functions and their associated OCIO codes. The entry '19 Battery Energy Control Module (BECM)' is highlighted in blue, with a callout '4. Select: BECM' pointing to it.
- Diagnostic Sequences:** A list of diagnostic tasks. The entry 'High voltage battery: state of health (SoH)' is highlighted in red, with a callout '6. Select: HV SoH' pointing to it. A button labeled '5. Diagnostic Sequences' is also visible.

Function	OCIO
191 Powertrain: Driving, Twin Engine	521
8217 Air: icon	545
Ambient: icon	548
Battery disconnecting unit (BCU), front	548
Battery disconnecting unit (BCU), rear	548
19 Battery Energy Control Module (BECM)	538
B178 Bypass valve, high voltage battery	301
Cell module, A	878
Cell module, B	878
Cell module, C	878
Cell module, D	878

TJ 29815

FAQ - related to the State Of Health of Volvo Cars Hybrid Batteries

Questions we receive from dealers and customers

Q **What does the State of Health mean?**

A SOH is an indicator of how much Battery capacity is left, however it shall not be treated as an absolute quantity!

= *The condition of a battery.*

= **SOH = Current max Capacity / Initial max Capacity**

Volvo Cars does not expect to come close to critical SOH during the warranty period

Q **Is there any State of Health limitation after which a car cannot be driven?**

A PHEV can always be driven without limitations as a normal fuel-driven vehicle, even if a Battery degenerates to a low state of health.

Q **Can a Customer see (or be informed by a Dealer, or interpret from a Maintenance Invoice) the State of Health of his/her car?**

A No. At present Volvo Cars has decided to offer SOH information only for a dealer/technician. A dealer/technician will have suitable ability to clarify customers' possible technical concerns.

Q **Is it possible to have a car with a high SOH and high mileage, and an equal one with a low SOH and low mileage?**

A Yes. Many Parameters affects a Battery health, not just mileage. E.g. charging cycles and tougher driving style shortens a Battery life.

Q **What is the expected lifetime of a new Volvo cars PHEV Battery?**

A Volvo cars PHEV batteries are designed to last the entire lifetime of the car

Yet, a battery life depends on numerous facts. E.g. how often the vehicle is being used, charging, maintenance, temperature and the driving pattern.

Q **What means with the so called "End of Life" (EOL) of a HV battery?**

A End of Life of PHEV batteries is reached when the actual total capacity is well below half of the original total capacity, or if the actual peak power is well below one third of the original peak power.

Q Does SOH give an indication on how far I can drive on electric?

A Yes. A lower SOH means also a lower electric range.

To get the range percentage see also the so called State of Charge (SOC).

Q What is SOC?

A "Knowing the Battery State of Charge is like knowing the amount of Fuel in your fuel tank"

= Batteries Charging Status

A fully charged Battery has always 100% SOC, but an old Battery is charged faster compared to a new one due to the Battery decreased capacity

Q Can a customer find SOC?

A Yes, SOC is available on DIM (*Driver Information Module*).



S60, S90, XC40, XC60, XC90
V60 (2019)

Q Do seasons affect PHEV range?

A Yes, 30-40% of the range can be reduced due to the seasonal variation during winter (e.g. the range can be 45 km during summer, and only 30 km during winter conditions)

Q Are there any other parameters affecting the range?

A Yes.

E.g. Speed, driving style (such as many stop-and-goes), hilly environment, heavy cargo, usage of AC or auxiliary heater etc.

Q What happens with a battery which is replaced in a workshop, and then sent back to Volvo cars?

A All Batteries globally are sent to regional hubs in which they are diagnosed to identify the fault and decide upon further handling.

Q **What do we answer if a customer asks what a replacement battery costs?**

A The price quoted to the customer must reflect the real local retail price for the repair.

Q **How to response dissatisfaction with the electric range?**

A A battery diagnostics is performed to understand if there are any problems with the battery. If issues are detected, the warranty procedure applies.

Q **Do lithium ion batteries need to be fully charged before first use?**

A No

Q **Can you overcharge a PHEV?**

A No

Q **Where do I recharge PHEV?**

A PHEVs can be plugged into a household outlet using dedicated charging cables.

Most customers recharge overnight in their garage, carport or driveway, but naturally future BEVs are going to be compatible with public chargers as well. Approximately 80 percent of all charging today happens at home (*or at work*).

Q **How much does the PHEV Battery weigh?**

A Approximately 130Kg (290lbs)

Q **Is the Battery flammable?**

A A battery will only be flammable through mistreatment or outside intrusion. Electric vehicle batteries are less flammable than regular fuel.

Q **Can Electric Vehicles self-charge?**

A In a certain sense; PHEVs and BEVs recapture some of their energy back into the batteries by regenerative braking. PHEVs may also charge using a charging function from the gas engine

Q **What is regenerative braking?**

A Electric motors use energy to create vehicle motion. When a Vehicle is reducing speed the motion can be used to generate electricity, which will be fed back to the battery. Consequently the vehicle's range is extended.

Q **How are Hybrid Batteries connected?**

A Hybrid Batteries are connected in series, one positive to one negative. For each added battery cell the voltage increases

Q **What are MHEV, PHEV and BEV?**

A **MHEV** Mild Hybrid Electric Vehicle Battery is used during acceleration and to support the 12V system

PHEV Plugin Hybrid Electric Vehicle Either the electric motor alone, the ICE* or combination of both

BEV Battery Electric Vehicle Electric mode only

*ICE *Internal Combustion Engine*

Q **What are a Battery 1st, 2nd, 3rd life, or remanufacturing?**

A 1st life battery usage in the vehicle

2nd life reusage in a vehicle, or as energy storage

Recycling batteries are recycled for their rare metals

Reman Rebuilding of a product as the original manufactured product using a mixture of reused, repaired and new parts. Remanufacturing requires the repair or replacement of worn out or outdated modules.

Q **What does a Battery Cycle mean?**

A One cycle of a battery is a discharge from full charge to full discharge, and a return to full charge again.