

BEV - Reasons For No/Slow DC Charging Complaint

The purpose of this Service Bulletin (SIB) is informational regarding DC charging complaints on Gen 5 Battery Electric Vehicles (BEV). It serves as a supporting argument and is intended to help distinguish between a standard designed function or component operation from an actual system fault in a DC charging customer complaint (i.e., “DC Not charging or “DC charging too slow”.

Helpful “Tips and Tricks” have been included on each topic within the document that can be used as reference to aid in the diagnosis or in understanding the system.

The situation involves several possible causes:

1. Limitation of charging power by the charging station or charging app configuration
2. Decreasing charging power at a very high state of charge (SOC)
3. Too frequent DC charging attempts within a short period of time
4. The high-voltage battery is not at the ideal temperature.
5. Ageing of high-voltage battery

1. Limitation of charging power by the charging station or charging app configuration

Possible cause for the situation #1 may be associated with the charging station/provider/installation:

- The maximum charging power of the vehicle is higher than that of the charging station.
- Quality state or internal fault of the charging station
- Charging station (installation/grid/post) current limitation with effect on the charging power
- Delayed increase in charging power at the charging station (installation/grid/post)
- Charging power of the charger is limited, as the power is divided amongst various chargers at that location.
- As DC charging is currently only available at public charging stations located in shopping malls, convenience/service stations and highway rest areas. The customer interacts with these charging stations via charging apps in their mobile phone.
 - Mobile charging apps require configuration and signing up with a valid email and a form of payment entered (even if the service is free, with the account).
 - Inconsistencies in the customer’s account information may result in the vehicle not charging at that facility/charger.

Tip:

Signing up to the Electrify America charging plan, is easy, just follow the prompts within the My BMW App. Various free charging programs are offered and coverage differs depending on the vehicle.

Trick:

In cases where the charging app configuration is suspected, the customer can verify the vehicle will charge by connecting to a “known good” DC charger (outside that app network in question) or by simply bringing the vehicle to the dealer for charging verification.

Tip:

The customer can access the last charging events stored in their My BMW app. This information can be shared with their BMW Service Center to help aid in the charging complaint diagnosis.

BMW CHARGING HISTORY												
October 2023												
I4 EDRIVE40 (*****1580)												
Total charged ~ 179 kWh (*)			Charging sessions 8				Total cost -- (*)					
Plug-in date	Total mileage	State of charge when plugged in	Unplug date	State of charge when unplugged	Charging location	Location address	Cost*	Energy charged*	Energy rate 1	Energy rate 2	Charged time	Precondition for departure
10/16/2023 11:47AM	10,970 mi	71%	10/16/2023 5:17PM	100%	Charging location	Charging location address	-- USD	~ 25 kWh	--	--	2h 52min	On
10/14/2023 11:15AM	10,894 mi	82%	10/14/2023 5:19PM	100%	Charging location	Charging location address	-- USD	~ 15 kWh	--	--	1h 47min	On
10/13/2023 10:19AM	10,845 mi	30%	10/13/2023 7:16PM	100%	Charging location	Charging location address	-- USD	~ 61 kWh	--	--	6h 59min	On
10/3/2023 7:43PM	10,661 mi	88%	10/4/2023 7:27AM	100%	Charging location	Charging location address	-- USD	~ 10 kWh	--	--	1h 12min	On
10/2/2023 6:01PM	10,631 mi	79%	10/3/2023 7:38AM	100%	Charging location	Charging location address	-- USD	~ 19 kWh	--	--	2h 11min	On
10/1/2023 10:21PM	10,570 mi	74%	10/2/2023 7:34AM	100%	Charging location	Charging location address	-- USD	~ 24 kWh	--	--	2h 42min	On
10/1/2023 4:29PM	10,546 mi	71%	10/1/2023 5:31PM	81%	Charging location	Charging location address	-- USD	~ 9 kWh	--	--	1h 02min	On
10/1/2023 12:44PM	10,527 mi	60%	10/1/2023 2:33PM	78%	Charging location	Charging location address	-- USD	~ 16 kWh	--	--	1h 48min	On

The My BMW App stores the most recent charging history including the most important information about the last charging events. The information may be pertinent in many charging complaints that involve a specific charging station or charger location or even the charging power that was delivered. The data extracted can be helpful in identifying the root of the problem or the faulty charger that was used. However, it is up to the customer if they would like to share this with the BMW service center.

To access this the My BMW app charging history, follow the path below:

Open My BMW app > Charging > Charging history >Share > Select how you would like to share.

Tip:

The BMW Service Center can print and provide the customer a detailed “Charging Check report” of the vehicle’s High-voltage AC and DC charging system directly from the ISTA charging system test plan.

To verify the customer charging complaint, use ISTA charging history test plan as a diagnostic option in service. The charging history can be read out via a service function in the following path:

Service functions > Electric drive > Charging > Read the history of the last charging processes.

Note: Only the last 5 charging processes are stored and available to review.

Trick:

Do not to attempt to plug in a charger before the charging history is read out or the events that the customer has experienced and is complaining about will be erased.



HV charging plug blue LED indicating charging

Tip:

The charging indicator LED display at the HV charging plug should not be used as a diagnostic tool in service. This is designed as a quick indicator of charging state to the user (customer).

Instead:

- perform ISTA diagnosis,
- check fault codes,
- run the charging history test plan to verify the customer concerns and
- then the fault relevant charging test plans to verify why the car is not charging.

Instrument cluster charging indicator display (DC charger limitation).



Instrument cluster charging indicator display (DC charger limitation)

If a shaded area (//////) is displayed to the right of the charging bar in the instrument cluster charge indicator during the charging process, this indicates a restriction imposed by the charger or the infrastructure the charger is connected to. In this example, the vehicle is charging at a rate of 106 kW out of a possible 200 kW.

In the second example only 48 kW are being charged. Notice the shaded area (//////) displayed is larger.

2. Decreasing charging power at a very high state of charge (SOC)

During a typical charging session, the charging power decreases as the state of charge of the HV battery increases; this is designed as a protective function of the high-voltage battery.

Instrument cluster charging indicator display (vehicle charging rate limitation).



Instrument cluster charging rate indicator display

The blue shaded area displayed on the left of the charging bar, in the instrument cluster charge indicator during charging, indicates the charging rate “currently allowed” by the vehicle at this moment.

This value will be displayed in Kilowatts (kW) directly above the charge bar and will vary:

- depending on the charger used,
- the charge settings in the vehicle and
- will display a lower rate at the beginning and near the end of the charging session, especially due to battery temperature.

3. Too frequent DC charging attempts within a short period of time

When driving for a long time without stationary period with four DC charging processes in quick succession, there is a power reduction in the vehicle after the fifth charging process.

This is a standard protective function designed to prevent the high-voltage battery from ageing too quickly under repeated DC charging events without sufficient stationary time to balance the HV cells in the HV battery.

- The full charging power will be available again no later than 48 hours after the last DC charging process.
- The car may be driven to deplete the state of charge (SOC) further before charging again.

Tip:

In this case to restore the frequent DC charging limitation, it is recommended to drive the vehicle normally to deplete the state of charge further than usual (for example to 40% SOC) and perform the next charging session with an AC charger (if possible).

A Check Control message (CCM) is generated to alert the customer of when this protective function has triggered in the vehicle corresponding to “too frequent DC charging events without stationary period”.

The CCM is available from I level 23-07-5xx onwards with the information below.



Charging power temporarily reduced Check Control Message

Charging power reduced. Extended charging time.

DC charging power temporarily reduced to conserve the high-voltage battery. Full DC charging power available again after DC charging pause of up to 2 days.

4. The high-voltage battery is not at the ideal temperature.

This is a normal function when the high-voltage battery temperature limits are exceeded.

- The high-voltage battery is too **cold** to charge (due to excessively low outside temperature) and it has not yet had time to “precondition “to warm up the cells before the charging process started.
- The high-voltage battery is too **hot** to charge (due to excessively high outside temperature or spirited summer driving without cool down period.
- Inadequate cooling of the high-voltage battery due to faults in the HV battery cooling system, insufficient coolant quantity and/or refrigerant in air-conditioning (A/C) the system.

Tip:

It is a good practice to set preconditioning of the HV battery before charging in extreme (high or low) temperatures to avoid slow charging or having to wait at the charger while the battery ready's itself to charge.

From July 2022 vehicle production onwards, when the outside temperature is below 15 °C / 59 °F, a blue car with temperature symbol appears in the instrument cluster during charging to indicate to the driver a temperature related charging limitation has been enabled.



Instrument cluster charging indicator display (temperature limitation)

The “cell temperature too high / cell temperature too low” is specified in the Charging History test plan and available for up to 5 previous charging events stored.

ISTA Path:

Service functions > Electric drive > Charging > Read the history of the last charging processes.

Trick:

Setting the charging station location as a navigation destination or an intermediate destination (route optimized for charging), is also good practice so the high-voltage battery is automatically preconditioned to the ideal temperature to charge, if there is sufficient time to do so on the way to the destination.

Note:

Preconditioning preparation can also be activated manually as from vehicle production in November 2022 onwards.

5. Ageing of high-voltage battery

High-voltage battery state of health (SOH)

As with any battery and because of use, over time, the capacity of the high-voltage battery is reduced (therefore "SOH = battery condition" decreases).

The maximum current depends on the battery condition and is reduced if necessary.

The values are relatively proportional, so that, for example, at 90% battery condition, about 90% of the maximum charge current is still available.

Determination of battery condition (SOH) is assessed by testing the battery capacity via ISTA service function.

The path is as follows:

Vehicle management > Troubleshooting > Function structure > Electric drive > High-voltage battery unit > High-voltage battery: Evaluate battery condition.

The following sources of information about "charging".

- The vehicle's owner's manual,
- Technipedia
- Charging the high-voltage battery unit FUB
- DC charging FUB
- Target values / procedure in case of customer complaint involving charging of the high-voltage battery in Aftersales Information Research (AIR).

For more information regarding AC and DC charging please download the "Gen 5 Vehicle Quick Reference Guide for the Service Drive" SIB 61 25 23 attachment, also available on TIS.

Following Subjects are discussed in this guide:

- What is AC vs. DC Charging
- Charging Socket
- BMW Flexible Fast Charger 2.0
- Vehicle Charging and what to expect (times, speeds)
- Battery Preconditioning
- Main factors affecting range
- Quick Links to BMW's YouTube Tutorials