

Diagnosis and Handling of 12-Volt Lithium-Ion Battery (Vehicle Electrical System Battery) (31/20)

Change overview

Version	Date	Change
0	06/29/2020	• First publication
1	10/13/2021	• Update of Technical background and Procedure
2	01/06/2023	• TI setup adapted • Information on battery diagnosis supplemented
3	03/30/2023	• Checklist added in the "Battery diagnosis" section (prerequisite for invoicing with Porsche AG)
4	08/11/2023	• Information for Battery diagnosis updated
5	02/08/2024	• Information for fault status of the battery separator added

Vehicle Type: **Cayenne (9YA/9YB)**
911 Carrera (992)
Taycan (Y1A/Y1B/Y1C)

Model Year: **As of 2019**

Equipment: All lightweight batteries including Taycan (standard equipment) and Cayenne and 911 Carrera (I-no. J2A)

Concerns: **12-volt lithium-ion battery (12-volt vehicle on—board battery)**

Cause: **On vehicles in which a lithium-ion vehicle electrical system battery is installed, the battery is sometimes replaced even though it is not defective.**

This Technical Information is intended to help you to diagnose the battery in order to identify whether a battery is actually defective or whether only a temporary component protection function, which can be reset using appropriate measures, i.e. is reversible, was activated.



Information

Please also refer to the checklist in the section ⇒ *Technical Information 'Battery diagnosis'*.

For more information on the component protection functions of the 12-volt on—board battery and how they work, see the ⇒ *Technical Information 'Technical Background'* section.

- Content:
- Battery diagnosis ⇒ *Technical Information 'Battery diagnosis'*
 - Technical background ⇒ *Technical Information 'Technical background'*
 - Charging 12-volt vehicle electrical system battery ⇒ *Technical Information 'Charging the battery'*
 - Questions and Answers ⇒ *Technical Information 'Questions & Answers'*

Battery diagnosis



Information

If in doubt about the status of the lithium-ion battery (e.g. due to smoke, steam, heat development, odor or other abnormalities), first classify the lithium-ion battery according to the Workshop Manual ⇒ *Workshop Manual '2X00IN Classification of lithium-ion battery'*.

Otherwise, continue with the battery diagnosis as described below.



Information

There is no approved battery tester for the lithium-ion battery. The existing battery testers do not work for lithium-ion batteries because the algorithms for the acid/gel/AGM batteries are different.

By evaluating the actual values/measured values in the PIWIS Tester, it is possible that the status of the battery can be checked by evaluating the values that are actually present. The battery must already be installed in the vehicle at this time.

- Work Procedure: 1 Connect a battery charger suitable for lithium starter batteries with a rated current of at least 90 A (e.g. **VAS 5908 battery charger 90 A**) to the external power supply for jump-lead starting in the engine compartment and operate in automatic mode.
For instructions, see: ⇒ *Workshop Manual '2706IN External power connection, jump-lead starting'* and
⇒ *Workshop Manual '270689 Charging vehicle electrical system and battery'*
- 2 Connect **P90999 - PIWIS Tester 4** to the vehicle communication module (VCI) via the **USB cable**. Then connect the communication module to the vehicle and switch on the PIWIS Tester.
- 3 Switch on ignition.



Information

Please note that, **during the entire test** on the 12-volt vehicle electrical system battery, the **engine must not be started**.

- 4 Create vehicle analysis protocol (VAL) and mark it with the attribute 'Pre-VAL'.
- 5 Read out the fault memory of the Gateway control unit and check for the following fault memory entries.



Information

The 12-volt vehicle electrical system battery must be replaced **after the test** has been carried out under the following prerequisites:

- Test procedure was fully carried out **twice**
- Test procedure was completed **twice** with the **same result** (e.g. allow 12-volt vehicle electrical system battery to rest for 24 hours)
- Fault still persists

Assessment	Action
One of the following fault memory entries is stored in the gateway control unit: <ul style="list-style-type: none"> • P1B0200 – 12-volt battery monitoring, no function (8201CA) • P1D6C00 – 12-volt battery monitoring, no function (82000C) 	Check the fault status of the 12-volt vehicle electrical system battery. Continue with Step 6.
A fault memory entry is stored in the control unit gateway with reference to a faulty line connection.	Observe the guided troubleshooting for the respective specified fault memory entry.

- 6 Check the fault status of the 12-volt vehicle electrical system battery.
 - 6.1 Select the **gateway control unit** in the control unit selection.
 - 6.2 Select the **'Actual values / input signals'** menu.
 - 6.3 Check battery status.
 To do this, proceed as follows:
 - **Cayenne (9YA/9YB)**: Select the actual value group **'Battery (12 V)'** and press •F12" ("next") to confirm your selection. In the subsequent overview, select the value **'Battery (12 V): Select "Fault status"** and press •F12" ("next") to confirm.
 - **Taycan (Y1A/Y1B/Y1C)**: Select the actual value group **'Battery (12 V)'** and press •F12" ("next") to confirm your selection. In the subsequent overview, select the value **'Lithium-ion starter battery: Select "Battery, fault status"** and press •F12" ("next") to confirm.
 - **911 (992)**: Select the actual value group **'Battery/battery sensor'** and press •F12" ("next") to confirm your selection. In the subsequent overview, select the value **'Battery (12 V): Select Fault status** and press •F12" ("next") to confirm.

Then read off the respective status in the 'Value' field and evaluate it with the help of the following table.

**Information**

If the **fault status** of the **battery separator** ("Lithium-ion starter battery: battery separator, fault status" or "Battery (12 V): battery separator, fault status") **displays a fault**, the **12-volt lithium-ion battery (vehicle electrical system battery)** must be **replaced** regardless of the battery status ("Lithium-ion starter battery: battery, fault status" or "Battery (12 V): fault status").

Corresponding proof must be appended to any request.

Battery status	Action
<ul style="list-style-type: none"> This is not a fault Internal sensor fault Battery deep discharge 	12-volt vehicle electrical system battery can be reactivated. Continue with Step 7.
<ul style="list-style-type: none"> Restricted performance Battery sensor defective Fuse defective 	Replace 12-volt vehicle electrical system battery. For instructions, see: ⇒ <i>Workshop Manual '270655 Replacing battery'</i>

- Erase fault memory entries for all control units.
- Switch off ignition.
- Disconnect **P90999 - PIWIS Tester 4** from the vehicle.
- After waiting for approx. 1 minute, read off the charging current on the charger.

Assessment	Action
The charging current increased significantly (generally 60 A - 90 A).	Fully charge 12-volt vehicle electrical system battery. Then create another VAL and check the gateway control unit again for existing fault memory entries analogous to step 5.
The charging current is <5 A.	12-volt vehicle electrical system battery is over-charged. Continue with Step 11.
The charging current is <5 A and the " Battery deep discharge " battery status was read out beforehand.	Replace 12-volt vehicle electrical system battery. For instructions, see: ⇒ <i>Workshop Manual '270655 Replacing battery'</i>

- Switch off and disconnect the battery charger.
Then allow the 12-volt vehicle electrical system battery to rest for 24 hours.
- After 24 hours of rest, measure the voltage at the 12-volt vehicle electrical system battery with a suitable measuring device.

Assessment	Action
The voltage of the 12-volt vehicle electrical system battery is > 13 V.	Connect the battery charger and fully charge the 12-volt vehicle electrical system battery. Then create another VAL and check the gateway control unit again for existing fault memory entries analogous to step 5.
The voltage of the 12-volt vehicle electrical system battery is 0 V.	<p>For a few seconds, connect a voltage of 14.4 V directly to the 12-volt vehicle electrical system battery. If necessary, the separating element can be closed (in this case, a single clicking noise is audible).</p> <ul style="list-style-type: none"> • If the separating element closes, charge the 12-volt vehicle electrical system battery via the external starting points using a suitable charger. • If the isolation element does not close or opens again directly after removing the power source, the 12-volt vehicle electrical system battery must be replaced. For instructions, see: ⇒ <i>Workshop Manual '270655 Replacing battery'</i>



Information

In order to invoice Porsche AG for work for diagnosis and, if necessary, for replacing the 12-volt lithium-ion on-board battery, the checklist listed here must be completed and attached to the relevant PCSS line.

Otherwise, we reserve the right to reject or charge back the claim.

Checklist:

1 General data

Vehicle identification number: _____

Cause of discharge if known (e.g. closed-circuit current, vehicle idle time, etc.):

2 External charging influences on the battery

	Yes	No
Was the battery charged by a breakdown service?	<input type="checkbox"/>	<input type="checkbox"/>
Was a jump-lead attempt made by the customer or third parties?	<input type="checkbox"/>	<input type="checkbox"/>

3 Diagnostics

	Yes	No
Before the repair, a vehicle analysis log (VAL) was created and marked accordingly.	<input type="checkbox"/>	<input type="checkbox"/>
The vehicle electrical system battery was connected to the vehicle (+, - and Lin).	<input type="checkbox"/>	<input type="checkbox"/>
The gateway control unit was checked for relevant diagnostic entries.	<input type="checkbox"/>	<input type="checkbox"/>
According to the diagnosis, the battery was in the following condition (please check):		
This is not a fault		<input type="checkbox"/>
Internal sensor fault		<input type="checkbox"/>
Battery deep discharge		<input type="checkbox"/>
Restricted performance		<input type="checkbox"/>
Battery sensor defective		<input type="checkbox"/>
Fuse defective		<input type="checkbox"/>
The battery could not be reached via diagnosis		<input type="checkbox"/>
No relevant faults were stored		<input type="checkbox"/>
The fault case is not covered by the procedure described in the TI.		<input type="checkbox"/>
Explain the situation accordingly in the respective PCSS job.		
	Yes	No
After repairs, was a vehicle analysis log (VAL) created and marked accordingly?	<input type="checkbox"/>	<input type="checkbox"/>

Date: _____

Signature: _____

Technical background

Information: The battery control unit, the battery sensor and an isolating element (contactor) are integrated in the lithium-ion battery. This control unit monitors the charging and discharging of the battery and opens the disconnecting element in the event of overcharging, deep discharge or overheating, for example, by interrupting the power supply to the battery. As a result, there is no voltage present at the battery terminals. Therefore, no voltage can be measured at the battery terminals (value is between 0 V - 2 V).

If the separating element is open, the vehicle is de-energized. This may be perceived as a battery fault, for example.

Opening conditions for the separating element:



Information

The voltage values given below are internal battery voltage values that cannot be read or measured.

The status in the current VAL is always decisive for a battery diagnosis.

The overview is only intended to provide information about the behavior of the 12-volt on-board power supply battery and its separating element.

- The separating element opens when the charge state (SoC) drops below 15% or the battery voltage drops below 10 V.
- The separating element opens when the battery voltage exceeds 16 V.
- The separating element opens permanently if the voltage falls below 6.5 V or exceeds 18 V. This state is irreversible. The battery must be replaced.
- The separating element opens in the event of overheating or short circuit. A classification document for the 12 V lithium-ion battery is stored in the PCSS, see ⇒ *Workshop Manual '2X00IN Classification of lithium-ion battery'*.

Charging 12-volt vehicle electrical system battery

- Use a suitable battery charger
- Set the correct charge voltage and charging current
- Work procedure for a discharged battery
- Work procedure for an overcharged battery
- Work procedure for a totally discharged battery

NOTICE

Important!

- **Only use Deutronic charger VAS 5908.**
- ⇒ **Battery chargers that are not suitable for lithium-ion batteries cannot be used.**

To prevent damage to the battery and vehicle electrical system, a charger that is suitable for lithium-ion batteries must be used - **Battery charger 90A**. The charger must also be set correctly. To do this, change the charging values as shown below.



Information

If the battery charging current is lower than the power consumption of the vehicle, the contactor will open if the system voltage drops.

When the contactor opens, non-certified chargers can cause voltage peaks above 28 V at present. This can damage the battery.

**Information**

In most cases, the charging values must be changed.

Detailed information can be found under Special tools in the PPN or in the Workshop Manual/operating instructions for the charger.

Set charging values as follows:

Voltage:	14.4 V
Maximum charging current:	90 A
Trickle charge voltage:	13.5 V DC
Cut-in voltage:	5.0 V DC
Trickle current:	5.0 A
Capacitive charging current:	5.0 A

Work procedure for a discharged battery**Information**

If the battery is **discharged**, charge the battery as described and set the charging values specified above.

Questions & Answers**Is it possible to jump-start a vehicle with a lithium-ion battery?**

See relevant section in the Owner's Manual of the vehicle.

What happens if a standard AGM battery is installed in the vehicle instead of the specified lithium-ion battery?

The installation of a standard AGM battery in Cayenne (9YA/9YB) / Taycan (Y1A) / 911 Carrera (992) vehicles equipped with a lithium-ion battery is not permitted.

If a standard AGM battery is installed in the vehicle, a warning message will be displayed because there is no LIN communication. The power supply network switches to emergency operation.

Can customers charge the battery at home?

The 12-volt lithium-ion battery can be charged using the Porsche Charge-o-mat Pro. For further information, refer to the operating instructions for the charger or contact Porsche Tequipment.

**Information****Not relevant for the Taycan**

Taycan vehicles cannot be charged using the Charge-o-mat Pro charger.

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