

# Report: High Voltage Error on Tata Nexon EV

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# Introduction

Tata Nexon EV is an electric car manufactured by Tata motors in India. The USP of this car is that it is the cheapest electric car in India and is loaded with many premium features, and also the best-selling one. Currently there are 4000+ Nexon EV's sold by the company which is the highest when compared with other competitors in the space.

Apart from its successful business the Tata Nexon EV has its users concerned about abrupt occurrences of a High Voltage error (HV Error), that causes the vehicle to stall and stop working.

#### <u>Goal</u>

Explore data collected from users to see if Fast charging has any connection with occurrence of HV error. The basic theory is that the Fast charging equipment's send current in high voltages than the vehicle can accommodate thus going into an error-state. Just like a computer system hanging up when its memory is overloaded.

#### **Approach**

There are 4000 Nexon EV's sold till date in India. By the time of preparation of this report the number would be more by a few hundreds. Assuming a population of 4000. I calculated that its easier to gather data from a sample population that would represent the entire population of 4000 EV owners.

A survey was designed to gather data for analysis and sent to only owners of Nexon EV's through various channels. Initially I wanted to have a confidence level of 90 percent on my report with a 5 percent margin of error but due to privacy concerns a few people were reluctant to take the survey. I managed to get 180 responses which would give this report an 80 percent confidence that the results published below is what the EV owners all over India have experienced with a margin of error of 5 percent.

#### **Findings of the Analysis**

The survey questionnaire can be viewed at <a href="https://forms.gle/qQ8vvKCcPuLTdEmR7">https://forms.gle/qQ8vvKCcPuLTdEmR7</a>, where all the responses were moved to a spreadsheet and using pivot tables and basic data cleaning techniques the following visualizations were created :



#### 1. Distribution of various variants of Nexon Ev

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There are three variants of the nexon ev: XM, XZ+, XZ+Lux. XZ+ is the most owned variant followed by the XZ+Lux.

#### 2. How many owners experienced an HV error?

The survey shows that around 33 percent of the total owners have had an HV error atleast once in their time of ownership of the vehicle.



This made me think if this problem occurred in all variants or only specific to any one variant? When analyzed according to the survey I got:



Since XZ+ variant dominates the market followed by XZ+Lux we need more study to confirm if the error is seen more in XZ+ variant or not. For now I assume there is a 33% chance of HV error in any variant which is something Tata Motors should work on.



While most of the owners faced this error after 1 year of owning the vehicle, new owners are reporting this error within a month of purchase of the car :



The possible reason maybe: Since its launch in January 2020, the initial buyers were mostly charging from their homes more rather than rely on a fast charge, with more charging infrastructure coming in recently the frequency of causation of Hv error has also increased.

#### 3. When do owners get an HV error?

Of all the owners who had a high voltage error in their vehicle, 50% percent of them had charged from a fast-charging station right before this error, while about 37% used slow charging options right before this error. This doesn't mean these people used only slow chargers Tata motors provided them for home charging it also includes DC slow chargers.



A 13% of the population had HV error randomly, ie, not right after a Fast/Slow charging session. These users couldn't confirm if they had done a fast/slow charge or what equipment



they charged from. They received this error mostly while driving the vehicle, probably indicating battery issues.

## 4. HV Error Vs Fast charging

Looking for relations between fast charging and the occurrence of HV error in the vehicle I was able to find that a majority of the affected owners (73% of the total owners who had faced HV error not to be confused with total population) had faced the error after charging from a specific equipment.



Further investigating on which equipments the user charged from and received a HV error revealed various equipments but a few ones were the major contributors:



While 26.7% of the total users faced an HV error randomly. Masstech and Tata power Equipments are the main contributers. This result resembles real life scenario also most of the users complain about masstech equipments not working properly. Further study on the output of the masstech equipment while charging might be needed to pinpoint the exact reason.

## 5. <u>Resolutions for HV error</u>

Not all HV errors are problematic. Majority of these errors were cleared by a simple restart of the car after a few minutes. While adverse cases have had the service centers to change the motor and battery of the vehicle completely. The following graph shows different resolutions that solved the problem of participants of the survey who faced an HV error:



# **Conclusion**

Though the HV error is caused by Fast charging, it is probably due to voltage fluctuations. Which is why a few slow chargers also have given the same issue. It is also seen from this analysis that the vehicle software has some bugs which gives this error and disappears with a meagre restart, or a reset by a service personnel.

