

# UX5 SERIES EMERGENCY RESPONSE DETAILS

## « ERROR 235 »

## 1 Introduction

This document explain in details the design and implementation of the emergency response, called **error 235**, on UX5 product line.

## 2 Glossary

To facilitate exchanges in the frame of support activities, the **normalised battery voltage** can be named battery voltage.

## 3 Emergency response “error 235” causes and description

There are two reasons why this emergency response can occur :

- The first reason, and the **most frequent** one, is when **the normalised battery voltage** is under 14.5V for 5 seconds.
- The other reason, that can causes this emergency response, is a failure with the voltage sensor inside of the autopilot. In this case, the error 234 associated with the error 235 will be displayed together even during testing phases.

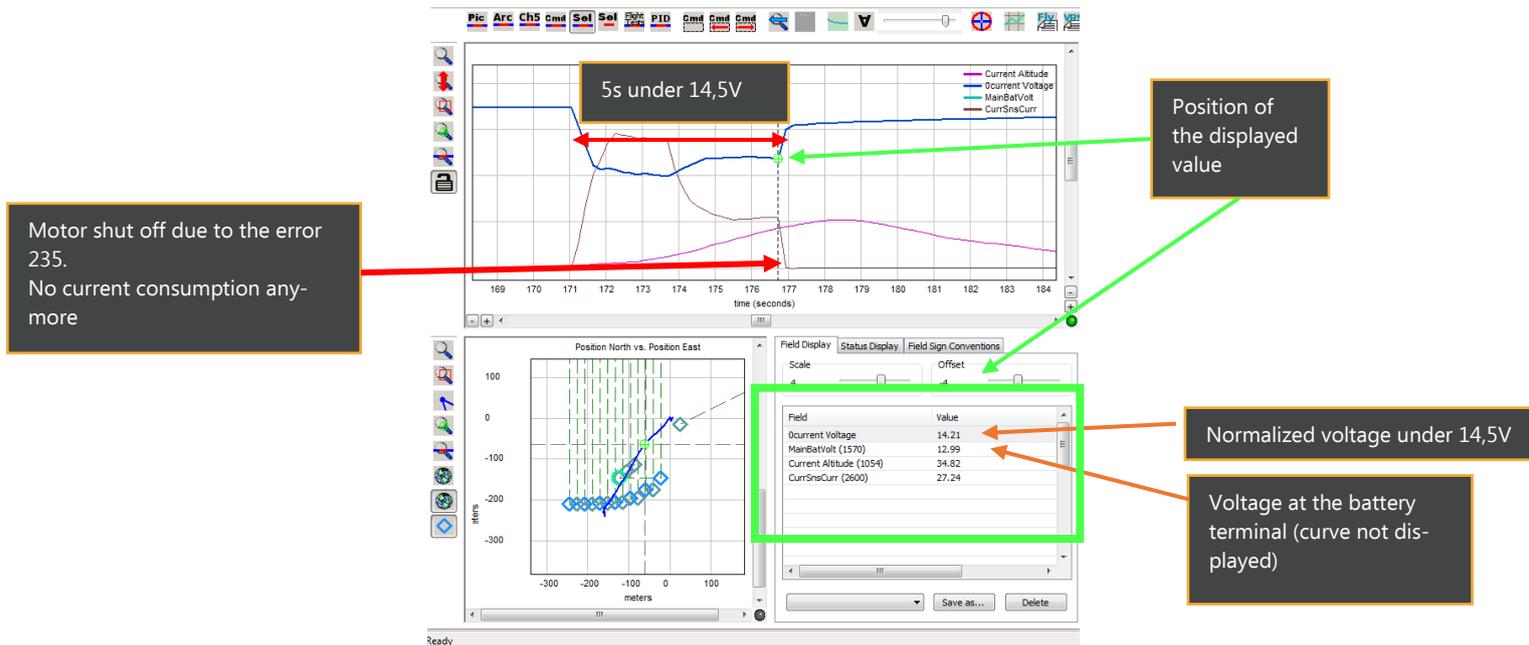
If the error 234 is not raised the autopilot monitor this voltage to measure the real capacity of the battery. This normalised battery voltage depends upon the internal resistance and the voltage at the battery terminal.

In case of high **internal resistance**, the normalised battery voltage will drop when the UX5 motor drains a significant power (most of the time during landing and take off).

The **internal resistance** is an indicator of the battery health. This internal resistance depends on the temperature, the age of the battery, past storage and finally the cells voltage balance.

To sum up, the battery health is reflected in the internal resistance. A high internal resistance during motor draining phases (Among other things at take off and landing) will drive to a drop of **the normalised battery voltage**.

Here is an example of the error 235 caused by deficient battery during a take off:



For this case, the battery was not stored at the storage voltage for a significant amount of time.

#### 4 Why this Emergency Response has been created

The emergency response "error 235" has been created to prevent **the autopilot from a lack of power.**

Thus, the motor is shut off to enable the autopilot to have enough power and keep control of the UAV. The UAV speed and altitude will decrease slowly while following the flight plan. With the autopilot still enabled, the operator will be able to take note where the UAV is heading even with a shut motor.

In the absence of such emergency response, the autopilot would not have enough power to remain turned on (and would therefore be turned off). In such case, the UAV would not be able to sustain its flight anymore and its behaviour will be unpredictable.

#### 5 Conclusion

This emergency response is a safety feature designed and implemented to improve security during operations.

The emergency response is mainly caused by the use of unhealthy batteries. It is critical to maintain batteries in the proper way (correct storage conditions, use of "Office Charger" the charger allowing to charge, discharge, run a full cycle balancing process and put the battery in storage voltage).

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