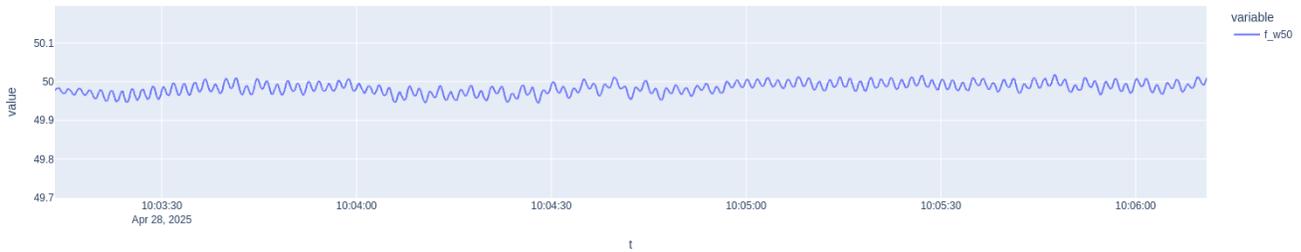


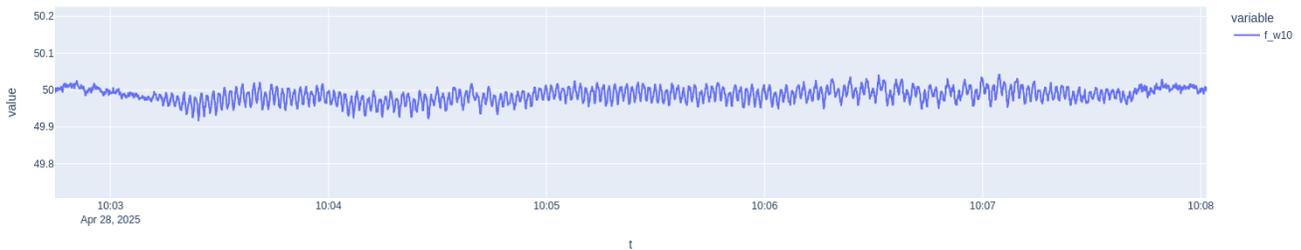
Low frequency oscillations 30 minutes before the blackout

Frequency

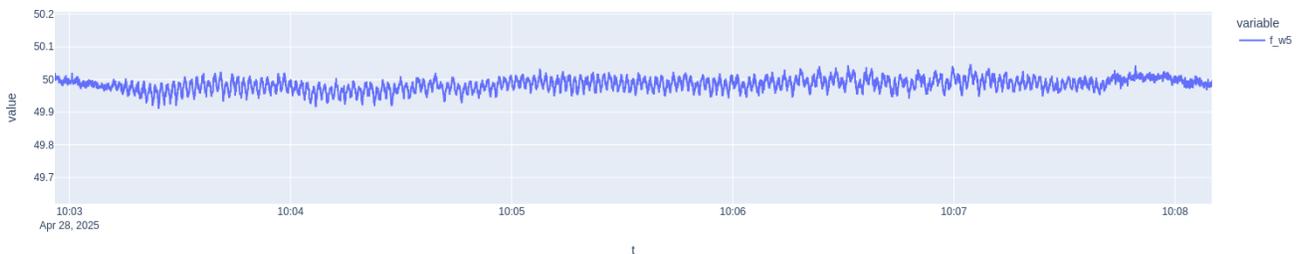
1 50-cycle windows



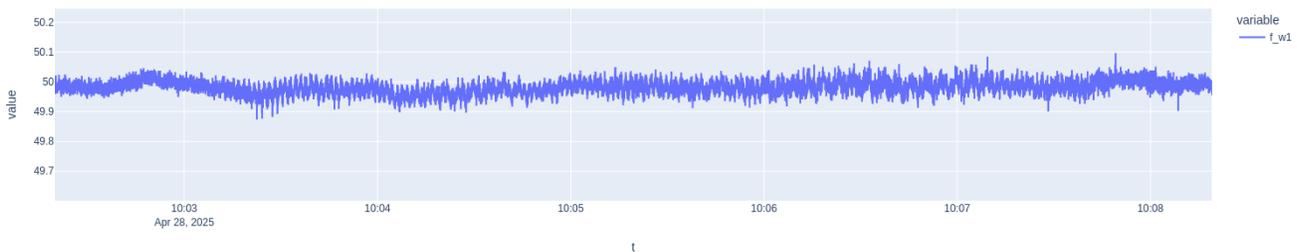
2 10-cycle windows



3 5-cycle windows



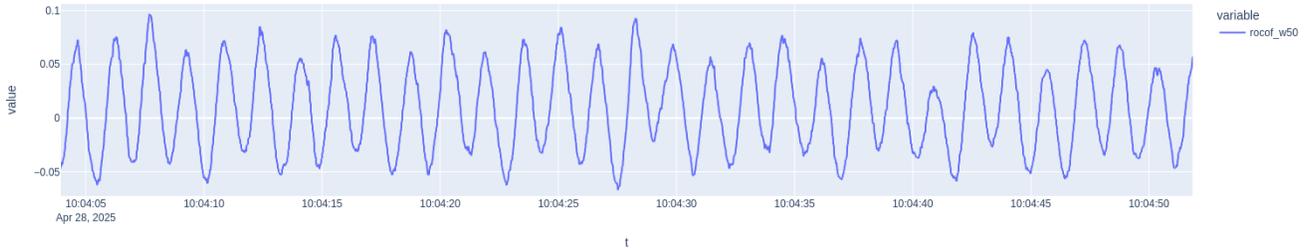
4 1-cycle windows



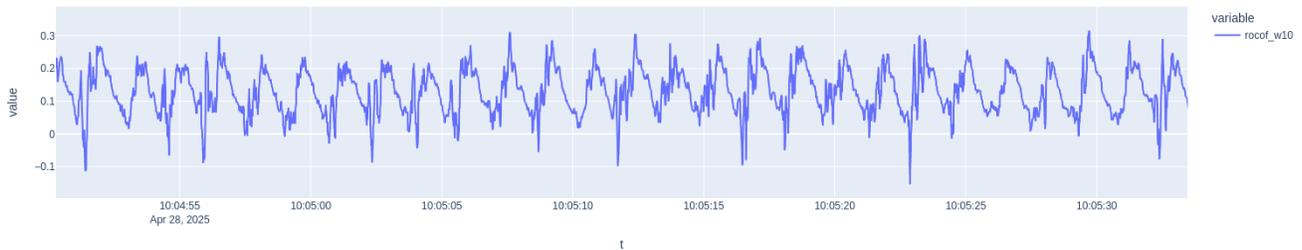
Low frequency oscillations 30 minutes before the blackout

ROCOF

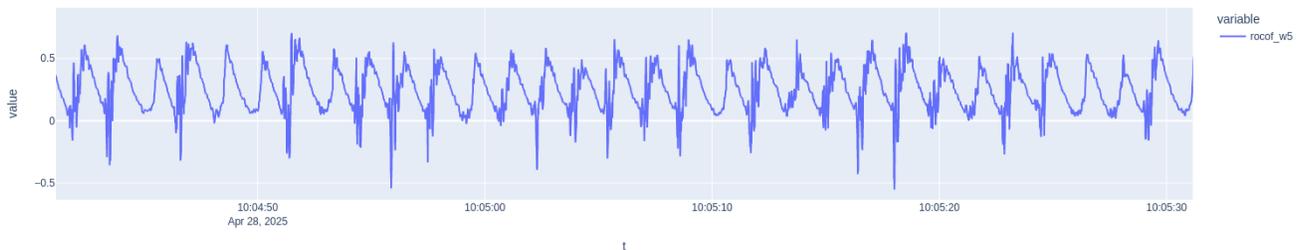
1 50-cycle windows



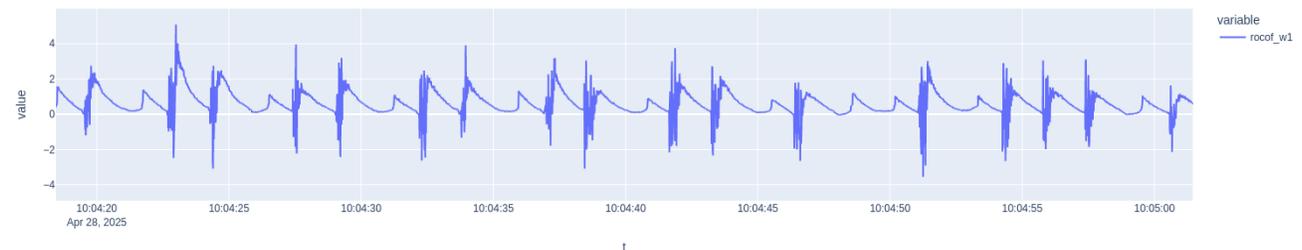
2 10-cycle windows



3 5-cycle windows



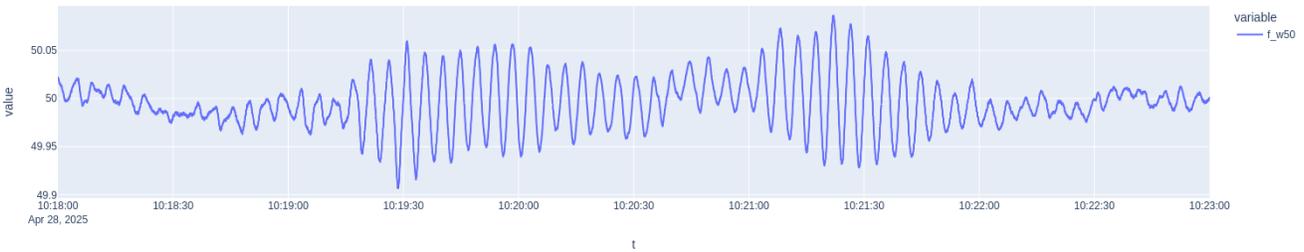
4 1-cycle windows



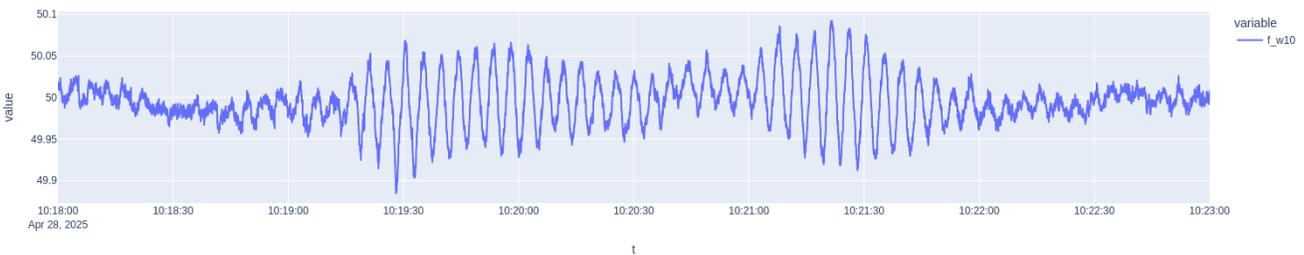
Large low frequency oscillations 10 minutes before the blackout

Frequency

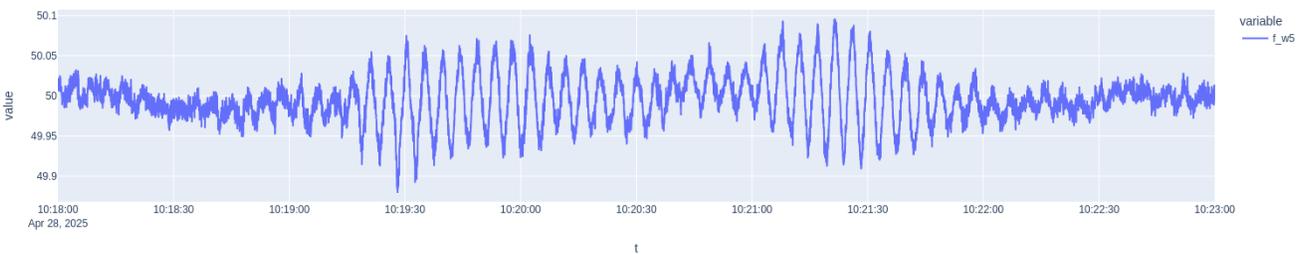
1 50-cycle windows



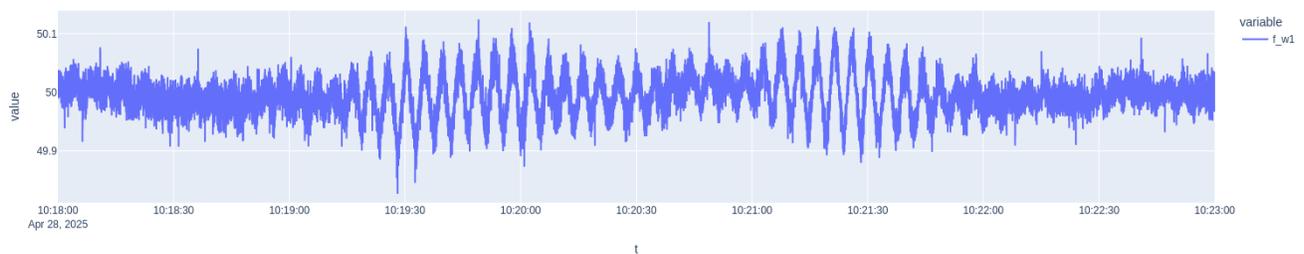
2 10-cycle windows



3 5-cycle windows



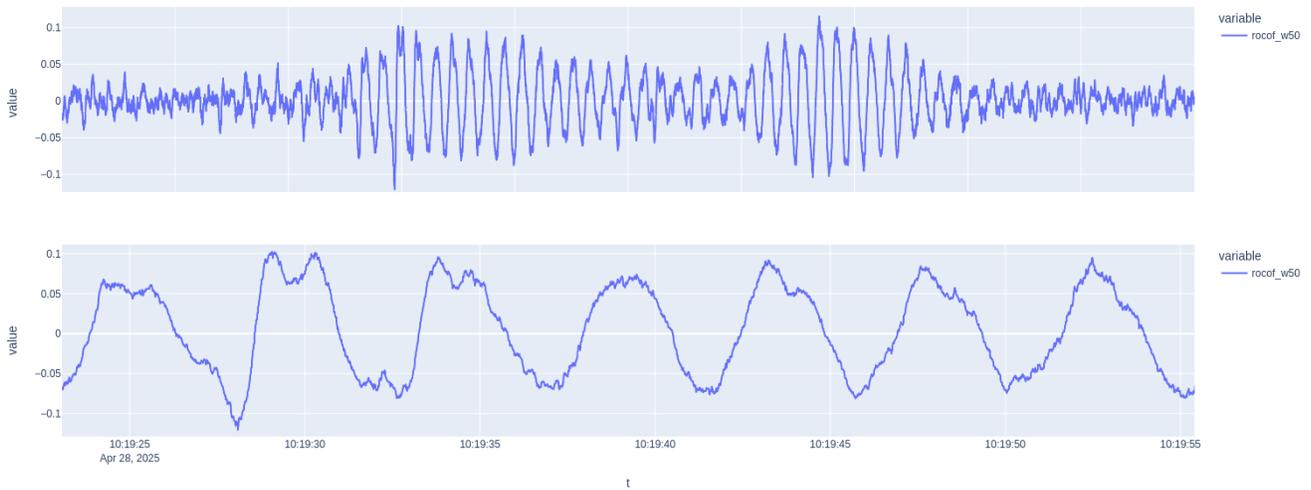
4 1-cycle windows



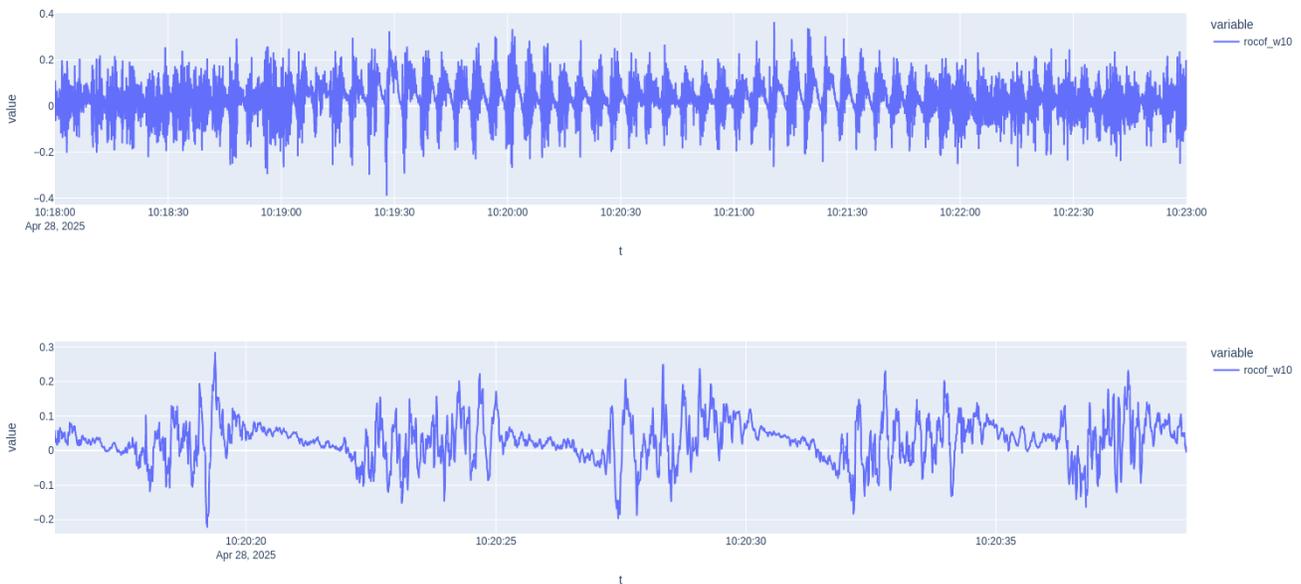
Large low frequency oscillations 10 minutes before the blackout

ROCOF

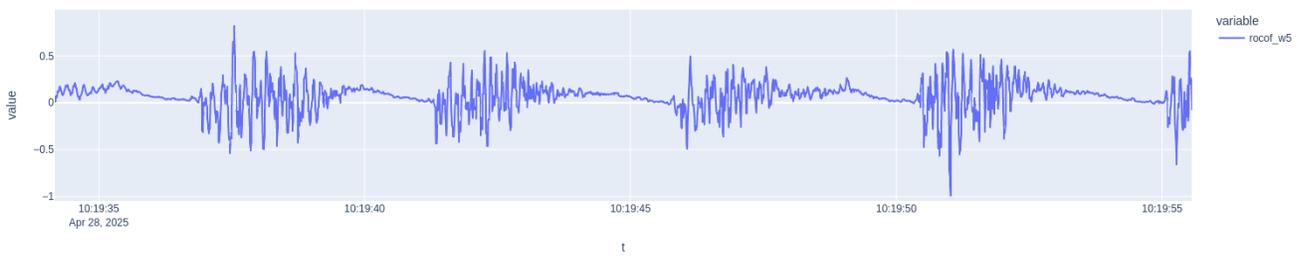
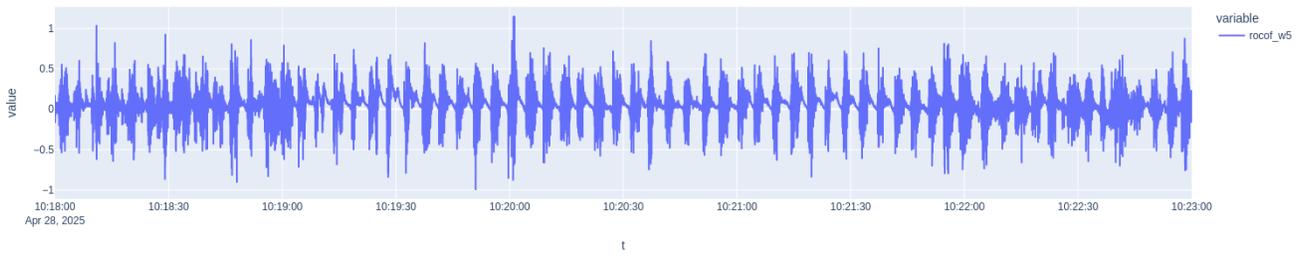
1 50-cycle windows



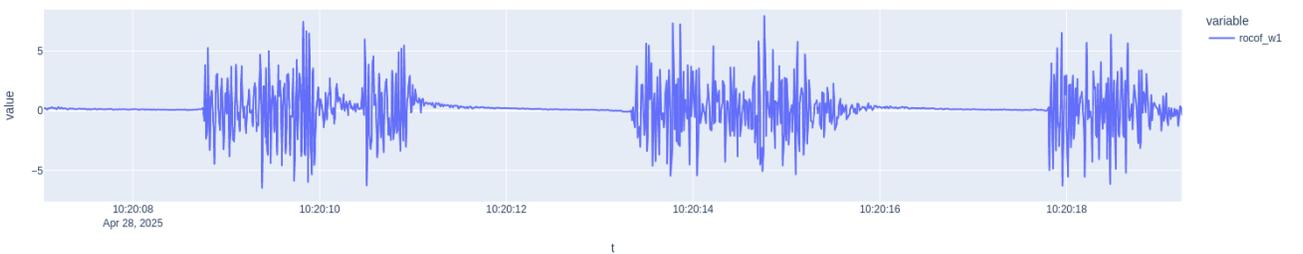
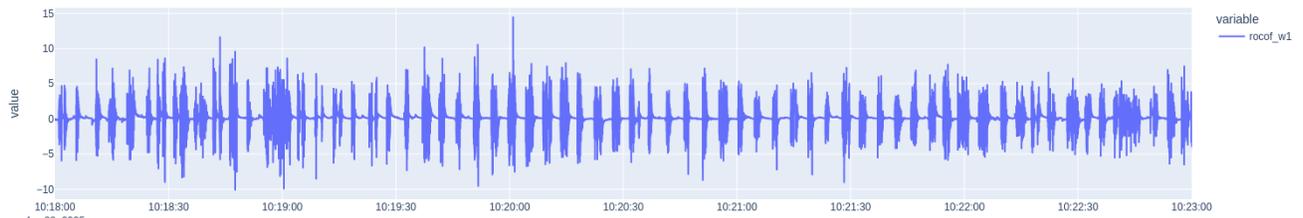
2 10-cycle windows



3 5-cycle windows

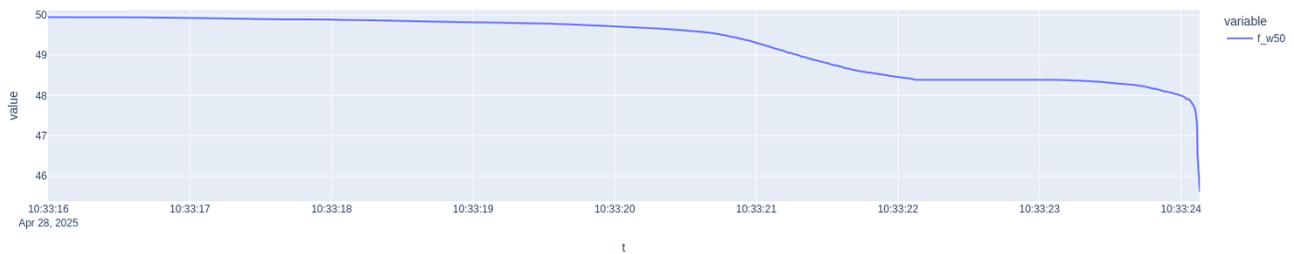
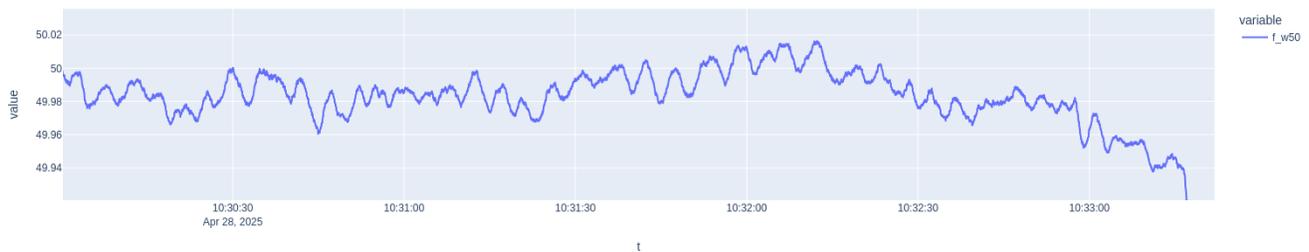


4 1-cycle windows

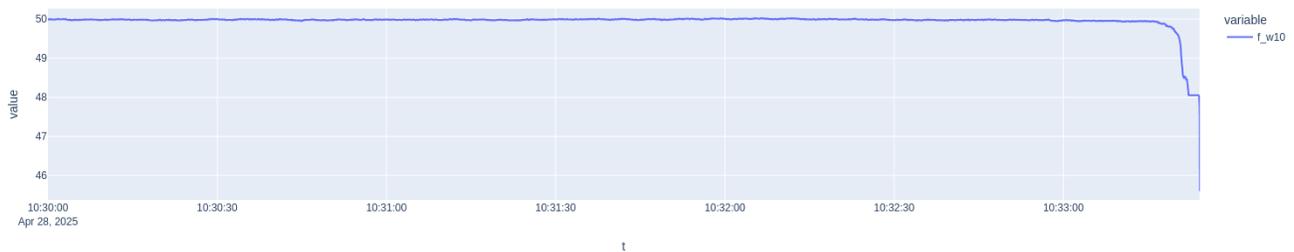


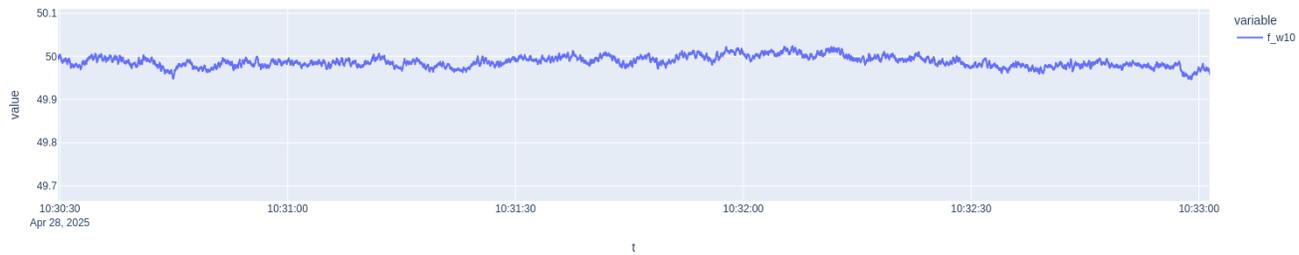
Blackout Frequency

1 50-cycle windows

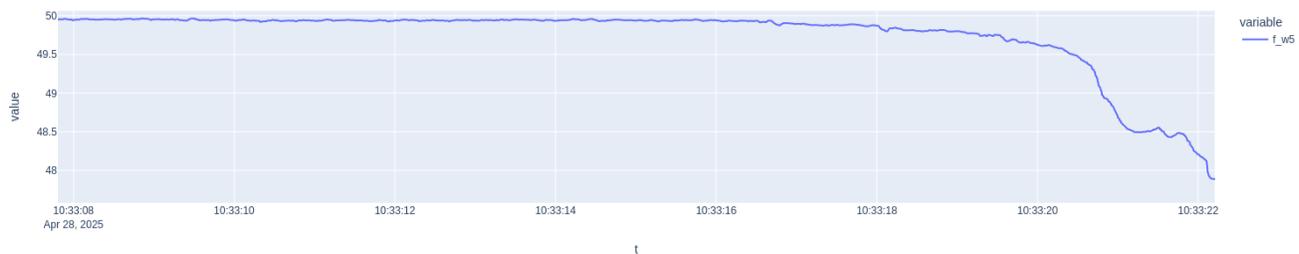


2 10-cycle windows

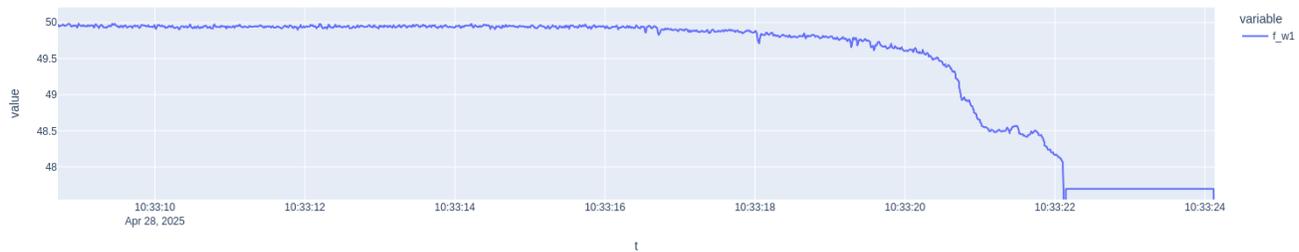




3 5-cycle windows



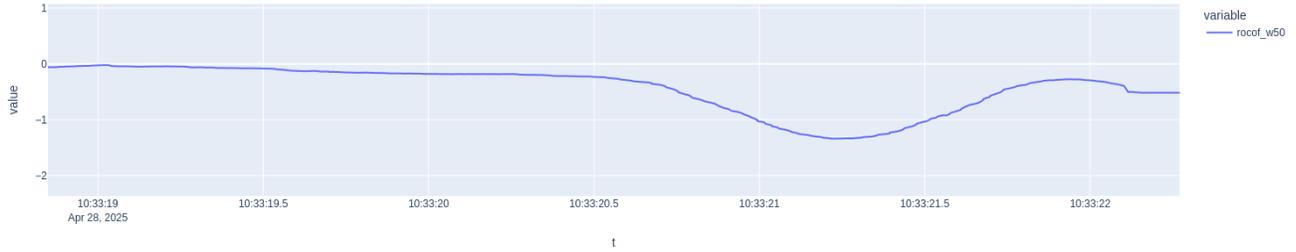
4 1-cycle windows



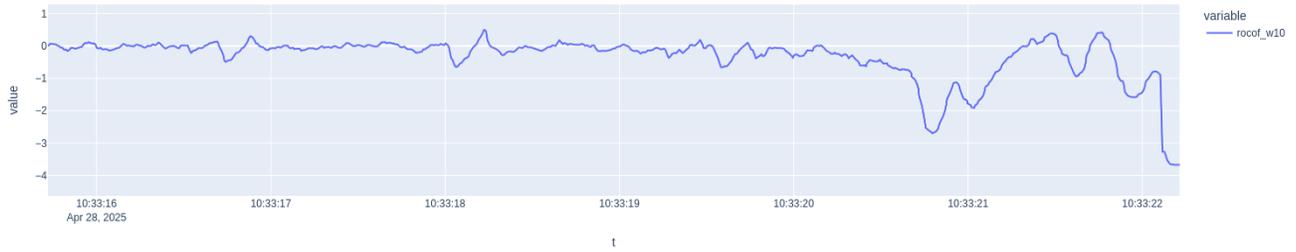
Blackout

ROCOF

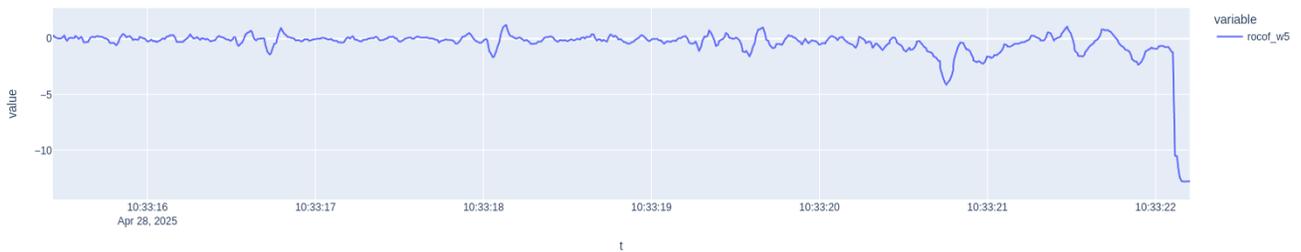
1 50-cycle windows



2 10-cycle windows



3 5-cycle windows



4 1-cycle windows

