An approach for a fault-tolerant power electronic system for drag power kites is proposed. The key idea is to use a high number of electrical cables in the tether and leave rotor drivetrains in groups isolated on the kite, in the tether, and on the ground. The power flow is paralleled behind an uninterruptible power supply of each drivetrain group on the ground. It is shown that this approach hardly affects the overall system performance, for example, due to the anyways high optimal number of electrical cables in the tether. With this approach, a fault in one drivetrain group does only affect the same drivetrain group and a fault between two drivetrain groups affects only the same two drivetrain groups. A fuse system and a fault shut-off control for the power converters are proposed, with which also faults between two drivetrain groups lead at most to unavailability of only one drivetrain group. In particular also open circuit faults and short circuit faults in the tether are mitigated and are overall not harmful for the system and a usual multicopter-like landing is still possible. Therefore, the proposed power electronic system design has no single point of failure. A generalization and a number of variants are discussed. In detail, a number of power electronic topologies
and both tether power transmission types, DC and AC, are possible. The proposed approach was verified by a high number of circuit simulations and by a proof-of-principle demonstrator. In all cases it was confirmed that any open circuit fault and any short circuit fault lead at the most to unavailability of only one rotor drivetrain group.