

CZ LIMITER RULES PROPOSAL

1) set the limit value:

- class mini - 20W/h or 1200W/minutes
- Eco, Mono 1, Hydro 1 - 53W/h or 3188W/min (comparable to 3S 4800 Lipo pack)
- Mono 2 and Hydro 2 - 106W/h or 6376W/min
- FSRE - 159W/h or 9564W/min

note: (MDLE-4 works in Watt/hours, E-lim and Wozniak KLW 202 works in Watt/ minutes)

If it should be comparable to batteries with weight limit (has been raised during last WC slightly) it has to be set based on capacity available for the weighted batteries next year (not 2 years old) and should respect the situation that more heavy batteries are used in case of limiter.

4800mAh = 53W/h => year predicted capacity 5200mAh => 56W/h

- class mini – 20 W/h
- Eco, Mono 1, Hydro 1 – 56 W/h
- Mono 2, Hydro 2 – 110 W/h
- FSRE – 170 W/h

2) update limit value - yes

The limit can be only changed according to valid section rulechange procedure.

3) check accuracy of limiter - no

1) limiter accuracy is guaranteed by producer

- for example +1% (5s)/ -1% (5s) – it means maximum 10s if 2 racers are compared - accuracy of limiter differs in each heat it means every racer can have at first time advantage and the second time disadvantage so we are not talking about continual advantage or disadvantage → when compared to batteries up to weight limit there is no accuracy (if you buy new batteries you cannot be sure if it will allow you to use stated capacity or bit less or bit more)
- its recommended to have limiter device calibrated once per 3 years at least

2) measurement device accuracy

- is any reliable device available? Yes but the reliable one is way to expensive (tenthousands of EUR). For future some device can be produced in lower price if this is the case than:
- How long accuracy test does take? Reliable test under full load will take several minutes.
- Limiter device can be checked randomly + the winner of final heat.

Conclusion: Normally do not check it at all (if limiter device is not accurate enough the advantage is not guaranteed for racer – ones its more the second time is less which is not reliable method for cheaters) so it is racer's responsibility to have his/her device calibrated (same as with batteries – its racer's responsibility what he bought and used). If measurement device is available the check of limiters accuracy can be done during championship as a service for competitors if organizer would like to deliver the championship on high level.

4) set min/max weight for limiter batteries - no

- when limiter is used no battery weight limit is applied

5) set slow down time before limiter cuts off the power – 5s

- 5s (its enough to realize the limit is reached, its not possible to finish another ECO lap)

6) set the time after which limit will be renewed (allows the boat go back to the platform) – 90s

- 90s (its not possible to set less than 60s because when the limit is reached just before the end of the race racer should not be able to finish last lap and there is 60s buffer to finish last lap)

7) check in - check out control:

- check in control:
 - o limiter has to be connected in the way that is not reseted after kill switch disconnection
 - o limiter has to be connected as a limiter not as a counter only (all wires has to be connected according to limiter device user manual)
 - o if correct limiter has been used (for example that has been used limiter set for Hydro 1 in Hydro 1 class and not for example limiter for hydro 2 in Hydro 1) – if correct limit no penalty, if wrong limit has been used, than DNF from heat
 - o if correct battery pack has been used (only allowed battery types can be used according to valid M section rules) for example its not possible to use 6S in ECO
 - o check voltage before the race it is according to current M section rules (may be the functionality can be delivered by limiter) – to prevent situation when racer will use batteries to the weight limit and to obey the voltage rules will discharge it under allowed voltage
- check out control:
 - o check voltage after the race it is according to current M section rules (may be the functionality can be delivered by limiter) – to prevent situation when racer will use batteries to the weight limit and to obey the voltage rules will discharge it under allowed voltage
- random check - limiter accuracy – no (see the point 3)
- championship checks (hat system) - no
 - o rather do the random checks if measurement device available and do check-in/check-out control
 - o why? Too complicated for organizer to be responsible for limiters. Limiter can be wet by a first use (even in case of waterproof one) the second user can be disadvantaged and than asked for repeated heat. Complication for judges to solve those situations if its racers or organizers fault. In case racer got the wrong limiter to for example to Hydro 1 but he race Hydro 2 so he do not finish the race and he will want to have an extra heat => if this option is voted yes than must be settled who is responsible for limiter organizer/racer and if there is possibility to redo a heat or not
 - o limiter is owned by racer (everybody is using different connectors, different length of cables), racer is responsible for his limiter

8) used limiter has to meet following requirements:

- its waterproof
- limit set for the class cannot be changed by racer himself
- accuracy of limiter is +/- 1%
- when limit is reached the boat will slow down at first than stop
- the limit must be renewed after some time (to give the possibility to go back to the platform)
- cannot be reseted after disconnecting kill switch (to prevent racer to restore limit during the race for example when cleaning the leaves from the propeler)
- limiter device is non-dismountable device (covered with some mass to prevent people to dismantle it)

note: it would be better to use only one type of limiter, if there is more limiters people will test all types to find out which one giving them the best conditions (costs for testing are high) – but how to choose the producer?

9) protest against the function of limiter is not possible (racer is responsible)

10) after renewal of limit racer should go directly to the platform and not finish the last lap – if he/she does so it means yellow card)

