



## Equipment Recognition Board

### Motor-speed limiting **Electronic Speed Controllers**

This BRCA standard allows all speed control manufacturers to develop and market a speed controller that limits the maximum rotational speed of a brushless motor, irrespective of the motor make or specification. The intent of this standard is to limit motor rotational speed with a zero tolerance on the upper limit. In this standard, if it doesn't say you can do it, you can't. We expect to work with manufacturers to update and improve this standard, to make provision for new technology and designs, and so we encourage you to contact us at [erb@brca.org](mailto:erb@brca.org).

The ability to control the maximum rotational speed of the motor is known as a rev-limiting speed controller (**ESC**). The **ESC** will not command, or allow, the motor to increase its rotational speed above a pre-set limit. At all times the speed controller will **also** comply with the "Zero Timing", or '**Blinky**' timing requirements.

The '**Blinky**' profile will ensure that the motor phase drive outputs (A,B,C) change state within 10uS of the relevant motor sensor signals changing. When in this profile, there is no alteration to the fixed mechanical timing of the motor. When the "Blinky" profile is activated, it will be identified by a blinking LED or LEDs while the ESC is armed and in neutral position. Functions that increase the timing such as "Boost" and "Turbo", or reduce the timing such as "Softening" are not compliant with "Blinky" profile and must not be used. The ESC must not continue to indicate 'blinky' mode when any of these functions (or similar) are enabled.

When an RPM limit is set the ESC must limit the Motor RPM to the specified setting with zero tolerance. It is the ESC manufacturers responsibility to ensure that the tolerance of timing circuitry is designed in such a way that this limit cannot be exceeded. That should include choice of timing circuit, eg resonator, RC oscillator, or Crystal, and must be considered over the expected operating temperature. Any checks/tests carried out at the track will fail a competitor who is found to exceed the limit.

To deliver a common range of speed limitations for universal use in competition, the range of speed limitations are as follows:

- 12500 RPM
- 15000 RPM
- 17500 RPM
- 21500 RPM
- Open – no motor-speed limitation.

Speed range selection must be easily checked in technical inspection during a race meeting. Speed range may only be selectable from a range in a table. User-selected motor speeds are not allowed. The range given above is the minimum standard required. The speed ranges must be at least 2000rpm apart. A unique sequence of blinking LED/s will be provided by the manufacturer to identify the rev-limit selected by the user.

For the open – no speed limitation setting, LED blinking will be as featured for zero-timing 'blinky' speedos where speed limiting is not fitted.

Each manufacturer may select their own way to show the speed range selected. This may be by colour of the LED/s, by the number of blinks for each speed selected, or another unique way of easy, quick visual identification of the rev-limit selected.

Speed controllers and software will be checked by the BRCA, in a controlled environment, for compliance with this standard. A list will be maintained and published by the BRCA, of those speed controllers, and their software designation, for use by organisers and competitors.

The BRCA reserves the right to retain a speed controller after the conclusion of a meeting to measure its performance against the above criteria in a controlled environment. The equipment, or identical new replacements, will be returned to the competitor. Sanctions may be taken against a competitor and/or manufacturer if a controller is found to be non-compliant.

## Current approved speed controllers

Manufacturer & Speedo	Part number	Firmware ID	Date added	Notes
ORCA Totem TTSS9001	ES22TOTEM2S	ORCA Totem 3.1 ORCA Totem v4.0	24/8/24 18/4/25	Adds 15k rpm. Use program box to adjust settings.
ORCA Blinky Pro	BP1001	17.5T V3.0	24/8/24	
Hobbywing Justock ETS	30112002	V1_17k5_NoTIMING	24/8/24	
Hobbywing Justock G3	30112003	XR-4.1.11	24/8/24	
Hobbywing Justock G3S	30112005	XR-4.4.03_G3 XR-4.4.04_G3	24/8/24 26/06/25	
Team Powers	TPR-XPS/Sport-V4BT-110EXT  TPR-XPS/Pro-V4BT-140EXT  TPR-Radon/Pro-V5BT-200A	V160A02203SL42020J	26/06/2025	

To apply for inclusion in this list, please send details of the speed controller and firmware as above to us at [erb@brca.org](mailto:erb@brca.org).

Where the software is an update to existing hardware, we will test the software on speed controllers we may already have, or can obtain. Where the software is for new hardware, we may ask you to provide a hardware sample for testing.

If you have questions, or suggestions for changes and updates to this standard, please email us ([erb@brca.org](mailto:erb@brca.org)) and we can discuss your suggestions with you prior to any changes.

V1.0 – Initial issue – PDW – 24Aug24

V1.1 – ORCA Totem v4.0 s'ware added; G3S f'ware ID corrected – PDW – 18Apr25

V1.2 – HW XR\_4.4.04\_G3 s'ware added. Team Powers ESC's added.