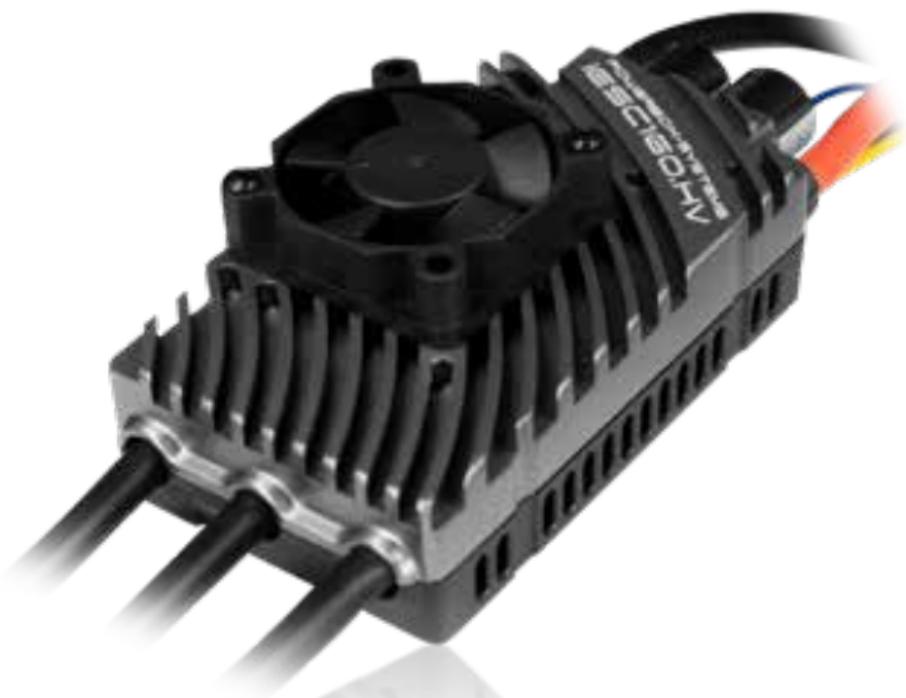




# PowerBox Systems®

World Leaders in RC  
Power Supply Systems



## iESC 160.HV

Intelligent 32-bit brushless speed controller  
with telemetry

Dear PowerBox customer,

Congratulations on your new **PowerBox iESC brushless speed controller**. The **iESC** is based on the latest generation of controllers for brushless motors, with a 32-bit processor and expanded functions such as telemetry and the ability to adjust settings directly from the transmitter. The high-performance micro-processor ensures smooth running for brushless motors with up to 40 poles.

Brake power, motor timing, direction of rotation, gearbox reduction ratio, freewheel, helicopter mode and much more can be adjusted directly from a **PowerBox** or Jeti transmitter. This means that set-up boxes and plug-in jumper cards are now a thing of the past.

The **iESC** provides a comprehensive set of telemetry data for **PowerBox**, Jeti and Futaba transmitters, including battery voltage, current, consumed capacity, rotational speed and controller temperature.

The abbreviation HV stands for High Voltage; the **iESC HV** can handle up to 14S batteries, and takes the form of an Opto version.

### Features:

- High-performance brushless speed controller with 32-bit technology
- Latest generation of MosFets for reduced power loss and maximum possible reliability
- Telemetry for **PowerBox**, Jeti and Futaba radio control systems
- Fixed-wing and Helicopter modes
- Adjustable direction of rotation, timing, battery type, freewheel, start-up current and other parameters
- Adjustable regulatory parameters in helicopter mode
- Parameters directly adjustable from **PowerBox** and Jeti transmitters
- Parameters adjustable using LCD programming device for all systems
- Integral Anti-Spark circuit
- HV Opto version
- Power-on self-test checks motor, throttle position and voltage
- Ingenious case design ensures optimum cooling

## Specification:

Type	Current load cont. / peak	LiPo cells	Dimensions (mm)	Weight (g)	Adjustable parameters
iESC 160.HV	160A/180A	6s - 14s	97 x 51 x 34 mm	199g	yes

## 1. CONNECTIONS

First connect the **iESC** to the motor. You can reverse the direction of rotation by swapping over any two wires. This is also simple to do using the Telemetry menu or the LCD programming box.

Connect the brown / yellow lead to the throttle channel of your receiver, and set the throttle channel at the transmitter to -100% to +100%. Telemetry is available for the following three systems; the telemetry system in use is automatically detected:

### PowerBox P<sup>2</sup>-BUS

Connect the blue / white patch lead (supplied) to the **P<sup>2</sup>-BUS** input at the receiver. You can adjust all the controller's parameters conveniently using the Telemetry menu.

### Jeti EX-BUS

Connect the blue / white patch lead (supplied) to one of the EX-BUS inputs at the receiver. You can adjust all the controller's parameters conveniently using the JetiBox menu.

### Futaba S.BUS2

Connect the blue / white patch lead (supplied) to the S.BUS2 input at the receiver. You can adjust all the controller's parameters using the separately available LCD programming box.

### All other systems

The blue / white patch lead is not connected.

You can adjust all the controller's parameters using the separately available LCD programming box.

### **Before you connect the flight battery:**

Please note that incorrect or negligent handling of an electric motor can result in serious personal injury. For this reason it is essential to observe the following safety instructions:

- **Always** remove the propeller from the motor before carrying out any adjustments to the **iESC**.
- Check that the flight battery is connected with correct polarity.
- Ensure that the throttle channel lead is connected to the correct receiver socket.
- Never attempt to exert any force on the motor using your hands.

Now connect the flight battery to the speed controller. There will be only a little spark when the pack is connected – the **iESC 160.HV** contains an integral electronic **Anti-Spark** circuit.

Wait until the beep sequence concludes.

If the controller continues to beep, this probably indicates that the throttle channel is reversed. If that is the case, simply reverse the throttle channel at the transmitter.

If the throttle channel is correctly set up, the **iESC** confirms this by emitting a series of beeps corresponding to the number of LiPo cells in the battery.

If the speed controller is set to an excessive throttle position at start-up, you need to calibrate the throttle channel. This is the procedure:

- Remove the propeller from the motor!
- Switch your transmitter on, and set the throttle stick to full-throttle.
- Connect the flight battery to the **iESC**, and wait 2 - 3 seconds.
- When you hear two short beeps "B-B", move the throttle stick to the Idle position.
- The **iESC** is now calibrated, and emits a series of short beeps corresponding to the number of cells in the battery, followed by one long beep.
- The **iESC** is now ready for use.

## 2. STANDARD OPERATION

In normal use it is important to check that the throttle stick is in the **OFF position** before you connect the flight battery. When you connect the battery, the **iESC** confirms readiness by emitting a series of brief beeps corresponding to the number of cells in the battery to which it is connected. This is followed by one long beep to indicate that the **iESC** is now ready for use.

### **Please note:**

- Adjustments you make to the settings of the **iESC** via the transmitter menu or the LCD programming box are only stored when the motor is stationary.
- The controller has no provision for use with a buffer battery.

## 3. TELEMETRY FUNCTION

The **iESC** provides a range of telemetry values which are passed directly to the screen of **PowerBox**, Jeti and Futaba radio control system transmitters. The following data are collected by the **iESC**, and sent to the transmitter:

- Battery voltage
- Current
- Consumed capacity
- Rotational speed (number of motor poles and gearbox ratio can be adjusted)
- Temperature of the **iESC**
- Status (**PowerBox** only)



If you are using a **PowerBox** or Jeti system the available telemetry values are displayed on the transmitter screen in your preferred arrangement.

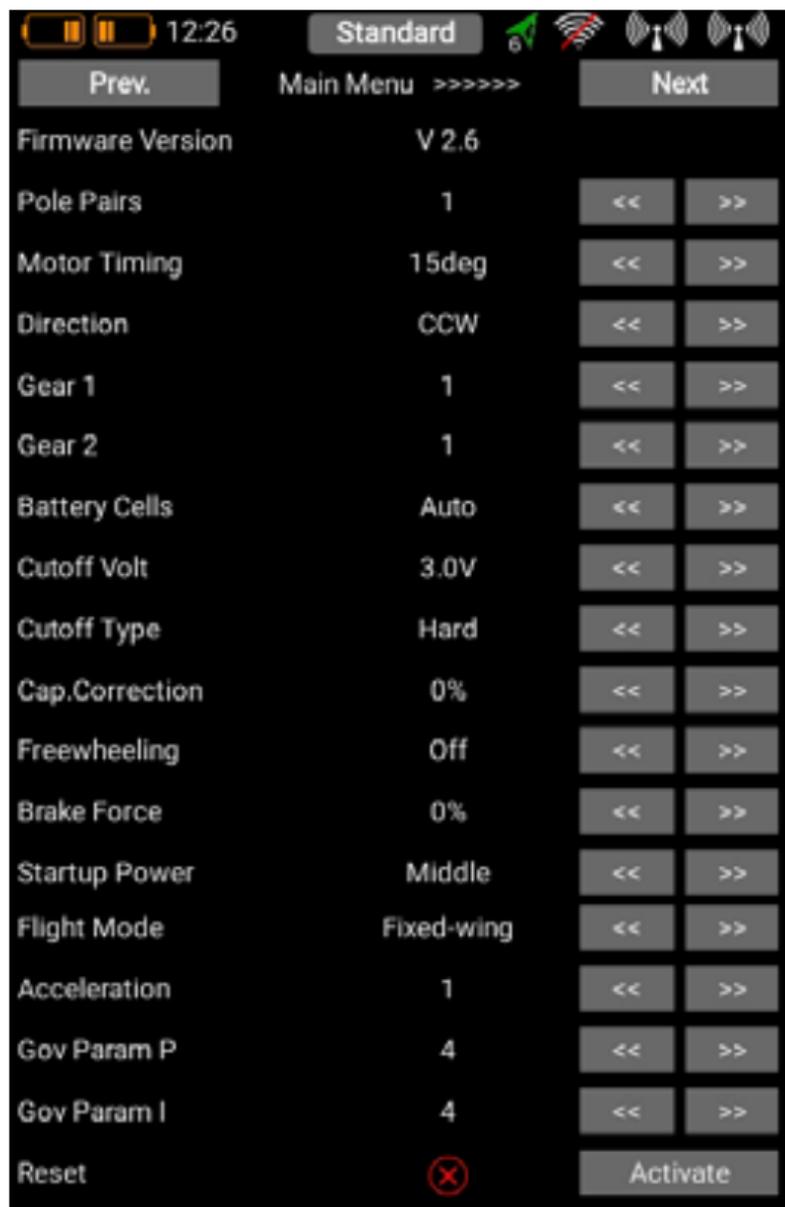
If you use a Futaba system: erase the Sensor List, and assign your sensors in the Sensor menu as follows:

Sensor		x1550 Hold	7.9V		1/3
	Sensor type	ID		Sensor type	ID
1	Curr-F1678	0	7	Voltage	
2	Curr-F1678		8	---	
3	Curr-F1678		9	---	
4	rpm sensor	0	10	---	
5	Temp-F1713	0	11	---	
6	Voltage	0	12	---	

#### 4.PARAMETER ADJUSTMENT

The **iESC** provides a range of adjustment facilities which enable you to match the **iESC** perfectly to your motor, battery and personal preferences.

**PowerBox** (Telemetry menu) and Jeti (JetiBox) pilots can make these adjustments directly from the transmitter. For all other systems a programming box with LCD screen is available separately.



Description of the adjustment parameters:

Parameter	Description	Adjustment range	Standard value
Brake Force	The higher the value, the faster the motor stops.	0% - 100%	0%
Motor Timing	Alters the control characteristics of the motor. Increasing this value can result in higher performance, but also leads to higher motor temperature. A lower value increases efficiency.	0° - 30°	15°
Direction	Reverses the direction of rotation of the motor.	CW / CCW	CW
Gear 1 Gear 2	At this point enter the number of gear teeth of your gearbox, in order to obtain the rotational speed of the rotor or propeller.	1 - 255	1
Freewheeling	Synchronises motor speed with the throttle stick. A positive effect is faster throttle response. It also increases efficiency.	OFF / ON	OFF
Battery cells	Number of cells in the battery connected to the system. The Auto function very reliably detects the cell count. If this is not the case, e.g. if LiFe cells are used, you can enter the cell count manually.	AUTO 6s - 14s	AUTO
Cutoff Volt	Defines the cut-off voltage per cell.	2.5V / 3.0V / 3.2V 3.4V / 3.6V / 3.8V	3.0V
Cutoff Type	If a discharged battery is detected, the <b>iESC</b> can either switch the motor off immediately, or initially reduce maximum power to 70%.	Reduce Soft Hard Switch off	Soft

Cap. Correction	At this point you can enter a percentage value for correcting the capacity measurement, if the displayed value is different from the capacity actually consumed.	-16% to +16%	0%
Acceleration	Defines how fast the motor's rotational speed increases.	0 / 1 / 2 / 3	1
Startup Power	Defines the current which is delivered to the motor when it starts up.	LOW / MIDDLE / HIGH	LOW
Flight Mode	Setting for fixed-wing model aircraft or helicopters. In fixed-wing mode the <b>iESC</b> starts at 5% and increases power in proportion to the throttle stick position. In Heli mode the <b>iESC</b> starts at 40%. From this point the motor speed rises slowly until it reaches the nominal point, after which rotational speed varies according to the throttle stick position.	Fixed Wing Heli	Fixed Wing
Gov Param P	<b>Heli mode only!</b> Adjusts the governor parameter P (linear input). The higher the value, the <b>faster</b> the speed controller approaches the target speed. Too high a value results in overshooting.	0 – 9	4
Gov Param I	<b>Heli mode only!</b> Adjusts the governor parameter I (integral input). The higher the value, the <b>more accurately</b> the speed controller approaches the target speed. Too high a value results in over-shooting.	0 – 9	4
Pole Pairs	This value is required in order to calculate the actual rotational speed of the propeller. The value is stated in the data sheet for your motor.	1-30	1

## 5. SPEED CALIBRATION (HELI MODE ONLY!)

- The throttle stick should be calibrated as described under point 1.  
If you have already done that, move to the next point.
- Ensure that Collective Pitch is set to 0°!
- Wait until the self-test has finished.
- Now move the throttle stick to 50%, and the rotor will slowly start to rotate.  
The helicopter will not lift off, as collective pitch is still at 0%.  
As soon as stable rotational speed is established, move the throttle stick back to Minimum: the rotor now slows down and stops.
- The calibration process is now complete.

## 6. GENERAL PROTECTIVE SYSTEMS

### • **Abnormal voltage input**

The LED flashes if the input voltage is not within the permissible range.

### • **Start-up guard**

If the motor fails to start within a period of two seconds, the **iESC** switches off. After this you must re-calibrate the throttle stick before the **iESC** can be operated again. Possible causes: incorrect motor connections, or a stalled motor.

### • **Overheating guard** (beep sequence, every two seconds: BB - BB -- )

If the temperature of the **iESC** rises above 110°C, the controller reduces power to 70%. The motor is not switched off completely to ensure that a safe landing can be carried out.

### • **Throttle signal lost** (beep sequence, every two seconds: B - B -- )

The **iESC** reduces power if the PWM signal is lost. After two seconds the motor is switched off completely. The motor runs again as soon as the signal is restored.

### • **Overload guard**

The **iESC** immediately switches the current off if a sudden overload situation occurs. One possible cause would be a stalled motor.

- **Low voltage** (beep sequence, every two seconds: BBB - BBB --)  
As soon as the set lower voltage threshold is reached, the **iESC** reduces power incrementally to 50%. This gives you sufficient time to land your model safely. The telemetry facilities can also be used to set earlier alarm thresholds at the transmitter.
- **Excess current guard**  
If the Peak Current is exceeded, the **iESC** switches the motor off, then restarts the motor. If the Peak Current is exceeded a second time, the **iESC** switches off the motor completely. Possible causes include a burned-out motor.

## 7. SET CONTENTS

- 1x **iESC 160.HV**
- Instruction manual in German and English

## 8. SERVICE NOTE

We make every effort to provide a good service to our customers, and have established a Support Forum which covers all queries relating to our products. It gives you the opportunity to obtain help quickly all round the clock - even at weekends. All the answers are provided by the **PowerBox Team**, guaranteeing that the information is correct.

Please use the Support Forum **before** you contact us by telephone:

**[www.forum.powerbox-systems.com](http://www.forum.powerbox-systems.com)**



## 9. GUARANTEE CONDITIONS

We are able to grant a **24 month guarantee** on our **PowerBox iESC** from the initial date of purchase. The guarantee covers proven material faults, which will be corrected by us at no charge to you. The guarantee does not cover damage caused by incorrect usage, e.g. reverse polarity, excessive vibration, excessive voltage, damp, fuel, and short-circuits. The same applies to defects due to severe wear.

### SERVICE ADDRESS

#### **PowerBox-Systems GmbH**

Ludwig-Auer-Straße 5  
86609 Donauwoerth  
Germany

## 10. LIABILITY EXCLUSION

We are not in a position to ensure that you observe our instructions regarding installation of the **PowerBox iESC**, fulfil the recommended conditions when using the unit, or maintain the entire radio control system competently.

For this reason we deny liability for loss, damage or costs which arise due to the use or operation of the **PowerBox iESC**, or which are connected with such use in any way. Regardless of the legal arguments employed, our obligation to pay damages is limited to the invoice total of our products which were involved in the event, insofar as this is deemed legally permissible.

We wish you loads of fun with your new **PowerBox iESC**!



Donauwörth, March 2024



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