Hyperion TITAN PSW Brushless ESC with COOL SBEC and TiWarn

Transmitter Stick Programmable Functions * indicates default

Brake Modes:	On / Off*
Battery Type:	NiMH-NiCd / 2S-6S Li-Po
Soft Start:	On* / Off
Warning Voltage:	LCV +0.2V* / LCV +0.3V
Timing Modes:	Auto* / 7 deg / 30 deg
Motor Rotation:	Reverse Off */ Reverse On
LVC Cutoff Modes:	Hard - Stop / Soft - Reduce Power*
Governor Mode:	Off* / Range 1 / Range 2 / Range 3

Hyperion Emeter or PC Software for TITAN can also program the settings below

NiCd/NiMH per cell cutoff voltage:	0.6V* / 0.7V / 0.8V / 0.9V	
Lithium per cell cutoff voltage:	2.0V to 3.2V, in 0.1V steps	(3.1V per cell, Lithium Battery Type are default)

Hardware Specs:
*5.3V nom, 5.0V min, 4.0A SWITCH-MODE BEC Circuit
 (6A max peak, 3.5A Cont. - 7 analog or 6 digital servos **max**, see cautions)
*Over-Temp Protection: Soft Cutoff@80C
*Max Commutations: 345,240
*Voltage Ranges: 5~18 cells Ni~, 2~6 Cells Lithium

Amperage rated at 25 degrees Celsius (77f) ambient, with cooling airflow to ESC. Reduce continuous rating 10% if ambient exceeds 35 degrees Celsius (95f); reduce a further 20% if cooling airflow is poor.
Amperage Peak 10 sec: Rated, + 20%

Dimensions:

Controller	Board Size L x W x H mm	Weight *
TITAN 35 PSW31	58 x 28 x 7.5	42g
TITAN 50 PSW31	58 x 28 x 7.5	47g
TITAN 80 PSW31	58 x 28 x 11.4	58g

* Figures include 2.8g BEC switch (on/off for Rx and Servos) and 4g Ferrite Noise suppressor which may be removed after appropriate range check.

TITAN WARNING LED SYSTEM

TITAN WARN is an extremely useful addition to your ESC, due to the nature of high-performance batteries and aircraft models today. The newest 16C~30C lithium Polymer batteries provide tremendous performance but, compared to older low-rate lithium, they are easily damaged if discharged too deeply. High-rate lithium polymer and A123 cell types also have very steep voltage drops as capacity becomes depleted. That means that when your battery reaches auto-cut voltage, there may be little or nothing remaining in the flight pack to allow safe landing. Finally, for electric helicopters, 3D aerobatic models, EDF Jets - and many other models - it can be dangerous to have a sudden cut of motor power - even if it is a 'soft' cut. But pilots still need to know when to land, to avoid over-discharge damage to their expensive batteries.

The TI-WARN is a bright RED LED attached to the TITAN ESC by cable. Mount it on your model so the LED is visible during flight. The TITAN WARNING LED system works by reference to the setting for Battery per Cell Cutoff Voltage. For example, with the default setting of 3.1V/cell Li, and LED Warning Voltage at default of +0.2V /cell, then the Warning LED will begin flashing whenever the flight pack voltage reaches 3.3V/cell, and LED will become solid red when flight pack reaches 3.2V/cell. In this case the pilot may choose to set LVC Type to NO CUT (if helicopter or 3D model, for example), and when the LED goes solid red, plan on landing soon. Start with conservative settings and experiment to see which leaves the desired capacity remaining at end of flight. (see A123 and Hyperion Lithium datasheets for more info)

Note: When Flight Pack is first connected to TITAN ESC, LED will flash to indicate the current Lithium BATTERY TYPE setting. That is, two flashes if ESC is set to Lithium 2S, three flashes if set to 3S. You MUST be sure that the ESC BATTERY TYPE setting matches your flight pack!

Note: The LED warnings only occur when motor is running (i.e. throttle stick is above 'zero' setting).

Programming the Titan ESC via Transmitter Stick

- For Tx stick programming, the motor serves as the speaker - so connect your brushless motor to the Titan ESC first.
- Remove the propeller from the motor before starting programming!
- Futaba Transmitters should have the throttle set to servo REVERSE before using the Titan ESC.
- Switch on the transmitter and set **the throttle stick to full throttle.**
- Connect the flight battery pack to TITAN ESC
- Wait for 5 seconds; you'll hear these tones __ -- when setup mode is entered.
- Follow the tones listed below for each programming function.
- When you hear the tones for your desired function, pull the throttle down, then you'll hear confirmation tone. The setting is now memorized. You can only change one setting at a time, if you need to change more settings, disconnect the motor battery pack and wait 5 seconds, and repeat the procedure for next setting. It is really very easy to program the Titan. To familiarize yourself with the ESC, let it go through all the tones once, as you follow the text below.

Brake Mode On/Off

To change brake mode, pull the throttle stick within 5 seconds of first setup mode tones __ --

After changing the brake mode, the ESC responds with these confirmations:

Brake mode changed to OFF _ -   (double tone)

Brake mode changed to ON _   (single tone)

Battery type

NiMH/NiCd:	. . . . .
2S Lithium:	.. ..
3S Lithium:	... ... **(this is the normal default setting, but see also tech note on back page)**
4S Lithium:	....
5S Lithium:	....
6S Lithium:	....

Low Voltage Cutoff Behavior

If the motor battery pack drops to the programmed cut-off voltage, the controller will **reduce the motor speed** or **stop the motor**, depending on the setting below, to ensure that there is enough power for the receiver and servos. You can resume full power by setting throttle to full stop for a moment and return to full throttle, but remember that it's time to land!

Soft Auto-Cut (reduce rpm)**: - _ - _ - _ - _ - _**   (normal for sport models)

Hard Auto-Cut (full stop)**:   _ - _ - _ - _ - _ -**   (normal for gliders)

NO CUT (no cutoff occurs)**:   __ - __ - __ - __ - __ -**   (preferred by some for EDF, LMR Glider, Heli, 3D, etc)

Soft start (Acceleration)

When gearbox drive system is used it is highly recommended to enable the Soft start.

Enable: **V V V V V**

Disable: VV VV VV VV VV

Timing (advance timing)

The controller has three timing modes; Automatic works for **ALL** types of brushless motors. But for some high-pole-count or homemade brushless motors, you may want to try hard timing for optimal efficiency and power.

Auto   7~30 degrees**:   - - - - -**

Soft   7 degrees**:   -- -- -- -- --**

Hard   22 ~ 30 degrees**:   --- --- --- --- ---**

Warning Voltage

LCV +0.2V/cell: *   **\ \ \ \ **   (LED flashes at AUTOCUT v/cell setting +0.2V, Solid Red at v/cell +0.1V)

LCV +0.3V/cell: **/ / / / /**   (LED flashes at AUTOCUT v/cell setting +0.3V, Solid Red at v/cell +0.2V)

Rotation Reverse   Reverse Motor Rotation: **W W W W W**

Active RPM Control (Helicopter Governor Mode)   **Max Potential Motor RPM = [commutations / #of magnets]**
NOTE: Titan ESC can drive motors at rpm beyond the motor and motor bearing's physical max rpm. Be careful!

OFF: *	_-_ _-_ _-_ _-_ _-_	345,240 commutations max (esc limit of commutations)
range 1:	_·-_ _·-_ _·-_ _·-_ _·-_	153,800 commutations max
range 2:	_··-_ _··-_ _··-_ _··-_ _··-_	213,000 commutations max
range 3:	_···-_ _···-_ _···-_ _···-_ _···-_	310,000 commutations max
GasMode:	_····-_ _····-_ _····-_ _····-_ _····-_	**RPM Control is OFF in GasMode, but Heli Super-soft start is ENABLED.**

Note: When RPM Control is turned ON, some other settings are also automatically changed, as below:
1) LVC Mode changes to SOFT if currently set HARD; if LVC is currently set to SOFT or NO CUT, LVC is unchanged.
2) If SOFT START is currently disabled, it is turned ON. With RpmControl or GasMode ON, Soft Start is a very soft 15-second spool up of motor

CAUTIONS!   [Note: We strongly suggest Hyperion Atlas Digital Servos due to their low current consumption]
THE SERVO LOAD RATINGS FOR THE SWITCH MODE BEC CIRCUIT ASSUME SERVOS WHICH ARE AVERAGE IN CURRENT DRAWN AT IDLE AND UNDER LOAD, WHICH ARE IN GOOD CONDITION, AND WHICH ARE OPERATING NON-BINDING CONTROL SURFACES. IF YOU HAVE REASON TO BELIEVE ANY OF THESE ARE NOT TRUE, REPLACE SERVOS or REPAIR CONTROL LINKAGES BEFORE FLIGHT

- **NEVER reverse the polarity from battery to Titan ESC!** **Be careful, please.**
- **Never exceed total wire length of 25cm from Battery to TITAN ESC. Shorter is better whenever possible.**
- Futaba transmitters should have throttle channel set to "reverse".
  Always test the Titan ESC with your transmitter and receiver before actual use.
- When testing, be sure the motor is properly mounted, **without propeller attached**.
- Be sure to check that no one is using your frequency before flight.
- Always position yourself behind a spinning propeller, not in front.
- Switch off the Titan ESC AND disconnect the battery pack immediately after your flight has ended.
- RC aircraft power systems are dangerous. Please act accordingly.
- To avoid inadvertent damage to your expensive lithium pack, the default setting for battery type is "3S Lithium". **If you are using anything other than 3S - you MUST program the battery type before using the Titan ESC.**

TROUBLESHOOTING and TIPS:
* If OPTO ESC type, receiver must be powered by a separate 4.8~6.0V battery before flight pack is connected to ESC
* Check condition of Motor/ESC/Battery Wires and Connectors carefully. Re-solder connectors if startup is rough
* Default BATTERY TYPE setting is LI 3S. If your pack is not LITHIUM 3S, program Battery Type first
* For high-rate lithium (16C or higher) 3.1V LCV setting is best to avoid pack damage and reserve some power for landing
* LCV settings start at 2.0V, allowing v3 TITAN ESC to work with any cell chemistry, including A123 brand packs
Warranty
Hyperion Titan brushless speed controllers are fully guaranteed against defects in material or workmanship for 12 months from date of purchase. The warranty does NOT cover damage to reverse-polarity connection of the battery, over-spec use, water or crash damage, nor any other claim not arising from a defect in materials or assembly. **You must contact your selling dealer with details of the problem before making a return.** In most cases, the problem is an issue with radio or controller setup, and can easily be resolved at no expense to you. Controllers returned without notice in which defects are not found will only be returned to the sender at his expense.

Crash, water, or reverse-polarity damaged Hyperion Titan ESC may be exchanged with your seller for a 40% discount on new replacement, from manufacturers suggested retail.

Many Happy Flights!

 The Hyperion Team