Electronic Speed Controller
Users' Manual *For Helicopter*
PULSO ™ *Master*

I. Features:

1. **Easy setting; easy operation. Specially designed for Helicopter.**
2. **Over-heat protection. The power will be cut-off as it is heated up to 110℃.**
3. **2A BEC, providing power to the receiver and the servos.**
4. **Three throttle curve in selection: Logarithmical/Linear/ Exponential.**
5. **Throttle acceleration selection: Slow/Medium/Hard.**
6. **Low-voltage cut-off:**
   - **By pro-box, the LiIo/LiPo battery single cell's cut-off voltage can be set during 2.0V-3.2V;**
   - **By pro-box, the Ni-MH/Ni-CD battery single cell's cut-off voltage can be set during 0.4V-1.0V.**
7. **Soft Start mode/Constant Speed Start mode.**
   - **Under Constant Fixed Speed mode, you can choose motors with different poles for ESC to control the rotation speed correctly.**
8. **Timing mode: Timing mode 1: 0-7° / Timing mode 2: 8-18° / Timing mode 3: 19-24° / Timing mode 2: 25-30°**

II. Factory Default Setting:

1. **Soft Start mode**
2. **Timing mode 1 (0-7°）**
3. **Cut-off voltage mode 1. (Intellectual cut-off for Ni-MH/Ni-CD battery)**

III. Operation—For DLH Series without Prog-Box

1. **Connection (Connect the motor & ESC / Connect the receiver & ESC)**
2. **Programming and Start-Up**:

1) Setting the Soft Start mode/Constant Speed Start mode: ***Note-Factory Default Setting: Soft Start mode***

How to change the Soft Start mode/Constant Speed Start mode:

- Switch "on" the transmitter and move the stick to "full throttle" (highest position)
- Connect the main power pack to ESC.
- Wait for 5 seconds, you will hear 4 beeps (··- ·)
- Move the throttle stick to position "close".
- After moving you will hear 1 "beep" that means: **Soft Start mode** ; or 2 "beeps" that means: **Constant Speed Start mode;**---------- **(Now the setting is saved);**
  *** Under Constant Speed Start mode, the throttle speed should be set in the range of 60% to 100% of the full speed.**
- Note: If you use the controller for the first time, Soft Start mode is recommended; If you want to change the mode again or set Timing mode, disconnect the motor battery pack and then repeat the procedure.

2) Setting the Timing mode: ***Note- Factory Default Setting: Timing mode 1 (0-7 °)***

How to change the Timing mode:

- Switch "on" the transmitter and move the stick to "full throttle" (highest position)
- Connect the main power pack to ESC.
- Wait 5 seconds, you will hear 4 beeps (··- ·), do not move the throttle stick.
- Wait 5 seconds, you will hear 5 "Single Beeps" (Timing mode 1, 0-7°); then 5 "double Beeps" (Timing mode 2, 8-18 °); then 5 "thrice Beeps" (Timing mode 3, 19-24 °); and then 5 "Quartet Beeps" (Timing mode 4, 25-30 °).
- Swiftly move the throttle stick to position "close" after the first 5 "Single beeps" (if choosing mode 1); or after the 5 "Double Beeps" (if choosing mode 2); or after the 5 "thrice Beeps" (if choosing mode 3); etc----------**(Now the Timing mode setting is saved);**
- Hear 1 "single beep" (Soft Start mode) or 2 "single beeps" (Constant Speed Start mode). No confirmation sound for timing

3) Setting the Cut-off Voltage mode and Motor Reverse Rotation Adjustment: ***Note-Factory Default Setting: Cut-off voltage mode 1 (Intellectual cut-off for Ni-MH/Ni-CD battery)***

How to change the Cut-off Voltage mode:

- Switch "on" the transmitter and move the stick to "full throttle" (Highest position)
- Connect the main power pack to ESC.
- Wait 5 seconds, you will hear 1 single beep, which means Soft Start mode; or hear 2 beeps, which means Constant Speed Start mode.
- Wait 5 seconds, you will hear 5 "Single Beeps" (Timing mode 1); then 5 double Beeps" (Timing mode 2); then 5 "thrice Beeps" (Timing mode 3); then 5 "Quartet Beeps" (Timing mode 4). Do not move the throttle stick.
- Wait another 5 seconds, you will hear 5 long "Dong" sounds: (Cut off mode 1: intellectual cut-off for Ni-MH/Ni-CD battery);
  and then 5 long "Dong-Beep" sounds: (Cut-off mode 2, cut-off voltage 5V for 2 cell LiPo battery);
  and then 5 long "double Beeps": (Cut-off mode 3, cut-off voltage 7.5V for 3 cell LiPo battery).
  and then 5 long "Dong-Beep Dong" sounds: (Motor Reverse Rotation Adjustment)
- Swiftly move the throttle stick to position "close" after the first 5 long "Dong" sounds if choosing Cut-off mode 1; or after 5 long "Dong Beep" sounds if choosing Cut-off mode 2; or after 5 long "double Beeps" if choosing Cut-off mode 3; or after 5 long "Dong-Beep-Dong" if choosing Motor Reverse Rotation Adjustment.----------**(Now the Frequency mode is saved).**

Note: 1. If you want to change the mode again, please disconnect the motor and battery pack, then repeat the procedure.
2. As DLH series is connected to main power pack and ready for starting, there will be five Single Beeps" (indicating Timing mode 1) or five "Double Beeps" (indicating Timing mode 2 or 5 "Thrice Beeps"(indicating Timing mode 3) or 5 "Quartet Beeps" (indicating Timing mode 4) as it memories the Timing mode.

IV. Operation with Prog-Box

1. **Operation Procedure:**
   1) **Connect the ESC with the motor;**
   2) **Connect the ESC with the Prog-box;**
   3) **Connect the ESC with the battery;**
   4) **Press lightly the four buttons on the Prog-box to choose the options showed on the LCD;**
   5) **As every programming is saved, you'll hear one confirmation beep;**
   6) **As the programming process is finished, disconnect the main power and the Prog-box with ESC.**
2. **Functions on the Prog-box:**

Functions	Parameter	Note
Reverse Mode	On / Off	Select Forward or Reverse
Timing Mode	2, 8, 15, 30 ° (Setting by Radio)	Select different Modes in terms of different motors
	0,1,2- - - - - - - - 30 ° (Setting by Prog-Box)	0-7 ° for 2 pole motors
		5-15 ° for 4 pole motors.
		10-20 ° for 8 pole motors.
		20-30 ° for 10 (or more) pole motors
Frequency (ONLY for Model Boat)	8, 16, 32 (Khz)	Select different Modes in terms of different motors 8Khz for Common setting (Lowest Efficiency Loss) 16Khz for low "Impedance" motor 32Khz for low "sensibility reciprocal" motor
Acceleration	Soft / Medium / Hard	Control the speed of motor acceleration by delay the act of Throttle
Accumulator (Battery) Type	Nicd / NiMh / Lilo / LiPo	Select battery type *Lilo=(Li-ion) *LiPo=(Li-polymer)
Nicd / NiMh cut-off voltage per cell	0.4/0.5/0.6/0.7…1.0V per cell	Setting cut-off voltage per cell for NI-CD / NI-MH
Lilo / LiPo Off voltage set	Automatic detection	ONLY available for 2-3 cells Lilo / LiPo battery
	2-5 Lilo or LiPo battery	Setting cell numbers of Lilo / LiPo battery by Prog-Box
Lilo / LiPo Cut-off Voltage per cell	2.0/2.1/2.2/2.3/2.4…3.2V per cell	Setting cut-off voltage/Cell for Lilo/LiPo * Recommended cut-off voltage: 3.0V-3.2V
Cut-off Mode	Slow Down / Hard	Slow Down--reduce the speed slowly; Hard—stop operation quickly
Throttle Curve	Logarithmical	Factory default—Linear
	Linear	
	Exponential	
ABS Brake (ONLY for Model Car)	On / Off	Select On / Off for ABS Brake
Power Limit (Forward)	Off / 75% / 50% / 25%	Total power limit
Power Limit (Reverse)	Off / 75% / 50% / 25%	Total power limit
Delay Time	0.25 / 0.5 / 0.75 / 1 / 1.5 / 2.5 (Seconds)	Select different delay time for Reverse
Forward Point	Auto Detection	
	Fixed: 1.7 / 1.8 / 1.9 / 2.0 (mS)	
Reverse/Brake Point	Auto Detection	
	Fixed: 1.0 / 1.1 / 1.2 / 1.3 (mS)	
Timing Monitor	On / Off	Timing Monitor for brushless ESC with no Sensor