GB

HobbyStar™

Product Manual

120A ESC

WWW.HOBBYSTARLABS.COM

Brushless Speed Controllerfor 1:10 &1:12scale Car or Truck

Thank you for your purchasing the HOBBYSTAR Brushless Electronic Speed Controller (ESC). The HOBBYSTAR electronic speed controller is specifically designed for operating Sensored/Sensorless brushless motors. High power systems for RC models can be very dangerous and we strongly suggest that you read this manual carefully. HOBBYSTAR does not have control over the correct use, installation, application or maintenance of these products, thus no liability shall be assumed nor accepted for any damages or losses of costs resulting from the use of this item. Any claims arising from the operating, failure or malfunction etc. will be denied. We assume no liability for personal injury, property damage or consequential damages resulting from our product or our workmanship. As far as is legally permitted, the obligation for compensation is limited to the invoice amount of product in question.

Features:

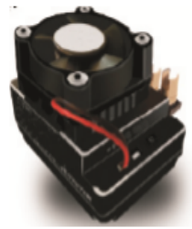
★ Enhanced throttle response, excellent acceleration, linearity and driveability
★ Use advanced PC interface to set up or update the firmware
★ Use LCD program card to make adjustments.
★ Throttle curve and punch rate adjustment
★ Dynamic boost timing and turbo timing adjustment
★ Brake curve and brake rate adjustment
★ Dynamic running data log
★ Multiple protection features: Low voltage cut-off protection, over-heat protection and throttle signal loss protection

Turbo Series Brushless System specification:

Model	Turbo SS120A	Turbo SS120A 1S
PN#Model	62012020	6212021
Cont.Current	120A	120A
Burst Current	760A	760A
Resistance	0.0003ohm	0.0003ohm
Suitable Car	1:10/1:12Car	1:10/1:12Car
Motor Type		
Suitable Brushless Motor	With 2s lipo or 5-6s Nixx 1/10 on-road≥3.5T,1/10 off-road≥7.5T With 3s lipo or 7-10s Nixx 1/10 on-road≥7.5T,1/10 off-road≥10.5T	With 1s Lipo or Nixx 1/12on-road≥3.5T, 1/10on-road≥5.5T
Battery call	2-2S lipos-10s NImh/NICd	1Slipos-3s NImh/NICd
BEC Output	6V/3A	
Dimension(without fan)	41.5*37+21mm	41.5*37+18mm
Weight(g)	102g	94g

ESC Installation

Ensure all connections are made correctly



Connection to the Receiver

Black wire RX-
Red wire RX+6.0V
White wire RX-Signal

Sensored Mode

When using a Sensored Brushless motor, the Blue motor wire A, Yellow motor wire B and Orange motor wire C of the ESC must be connected with the Sensored motor wire A,B,C respectively. It is necessary to connect the Sensor wire to the Sensor socket on the ESC. Do not alter wire sequence.

Sensorless Mode

When using a Sensorless Brushless motor, the Blue motor wire A , Yellow motor wire B and Orange motor wire C of the ESC can be connected in any order. If the motor runs in the opposite direction, please swap any two wire connections.

LEDs

When the Power wires on ESC are connected with the battery pack, the ESC can automatically identify the motor type (Sensored/ Sensorless) via indicated LEDs.
If the ESC works in Sensored Mode, remove the Sensor wire and the ESC will automatically change to Sensorless Mode.

Function	LED	LED Status
Low voltage of the battery	Red	Blinking
Over-heat of the ESC and motor (95?)	Blue	Blinking
Sensored Mode	Red and Blue LED	ON
Sensorless Mode	Blue LED	ON

Throttle Range Calibration

The ESC must be calibrated when used for the first time, and any time a new radio/receiver is used.

1. When all connections have been made and verified to be correct, connect ESC to battery power but do not switch on yet.
2. Switch on radio, and set throttle channel to "REV", and set the EPA/ATV of the throttle and brake to maximum (usually 150%). If your radio is equipped with ABS braking it must be disabled for calibration. **NOTE: Only set throttle to REV w/Futaba radios.**
3. Trims should be adjusted to 0.
4. With the radio on, press and HOLD the power switch on ESC. The light will be PURPLE at first, and will then change to a solid BLUE. Release power switch, ESC is now in calibration mode and Neutral Range has been set.
5. Move trigger to Full Throttle position and hold it there, LED will flash BLUE and then turn SOLID BLUE when Full Throttle has been set.
6. Immediately push throttle to Full Brake position. LED will begin to flash RED. Hold trigger at Full Brake until LED is on SOLID RED. Release trigger to Neutral.
7. LED will flash PURPLE, and then turn to SOLID PURPLE. This indicates ESC is calibrated.
8. ESC must be powered off and back on before use. Press power switch for at least 2 seconds to turn off ESC. Turn ESC back on and LED will turn to SOLID BLUE indicating it is ready to use.

Programmable items

Note: The settings of Boost timing and Turbo timing of Turbo SS120A are different from that of Turbo 120A 1S. Please see details in the following sheet.

Section	Programmable Item	Programmable Value
	Run Mode	Forward/Brake; Forward/Brake/Reverse; Forward/Reverse
	Cut-off voltage	Disable; Auto (3.0V/Cell); 3.0-11.1V(step 0.1V)
General Setting	ESC Overheat Protection	85℃; 105℃; 125℃; Disable
	Motor Overheat Protection	85℃; 105℃; 125℃; Disable
	Punch Rate1	1-30 (step 1)
	Punch Rate2	1-30 (step 1)
	Reverse Speed	25%; 50%; 75%; 100%
	Switch Point	1%-99% (step 1%)
Brake Control	Throttle Curve Initial Brake	Linear; Custom
	Drag Brake	=Drag brake; 0%; 20%; 30%; 40%
	Brake Strength	0%-100% (step 1%)
	Brake Rate1	0%; 12.5%; 25%; 37.5%; 50%; 62.5%; 75%; 87.5%; 100%
	Switch Point	1-20 (step 1)
	Brake Rate2	1%-99% (step 1%)
	Brake Curve	Linear; Custom; 1-20 (step 1)
Timing	Boost Timing of Turbo SS120A	0-64° (Step 1°)
	Boost Timing of Turbo SS 120A 1S	0-8° (Step 1°)
	Start RPM	1000-35000 RPM (step 500 RPM)
	End RPM	3000-60000 RPM (step 500 RPM)
	Stability	Yes; No
	Slope	Linear;Custom
	Turbo Timing of Turbo SS120A	0-64° (Step 1°)
	Turbo Timing of Turbo SS 120A 1S	0-21° (Step 1°)
	Activation Method	Full Throttle; RPM;Full Throttle + RPM
	Turbo Delay	Instant; 0.05; 0.1; 0.15; 0.2; 0.25; 0.3; 0.35; 0.4; 0.45; 0.5; 0.6; 0.7; 0.8; 0.9; 1.0
	Start RPM	8000-50000 RPM(step 1000 RPM)
	Turbo Slope "NO" (deg/0.1sec)	3; 6; 9; 12; 15; 18; 21; 24; 27; 30; Instant
	Turbo Slope "OFF" (deg/0.1sec)	6; 12; 18; 24; 30; Instant

HOBBYSTAR Turbo Series ESC information

Run Mode

Forward /Brake

This is a Race setting - Reverse is disabled.
Most tracks prohibit running with reverse enabled.

Forward /Brake/Reverse(Default)

If track permits reverse or for general bashing, the ESC requires at least 2 seconds of "Neutral" position before allowing reverse power

NOTE: Automatic protection is built into the HOBBYSTAR ESC. Only after the vehicle has stopped and throttle is at NEUTRAL for at least 2 seconds will reverse become available. To go forward while traveling in reverse apply forward throttle. This is to prevent damage to the vehicle drivetrain.

ESC reverse operation

Should you get into a situation that requires reverse, after you have applied any brakes you may have needed, return the throttle trigger to the neutral position. Wait a moment or two and then push the trigger forward for reverse.

Cut-off Voltage- Prevents the lipo batteries to over discharge. If the low voltage cutoff is activated, the ESC detects the Voltage of the battery anytime and the output power will be reduced to 20% in 3 seconds once the Voltage of the battery is lower than the preset Low Voltage Cutoff Threshold. After entering the voltage protection, Red LED blinks. When set to 'Auto' , the ESC will detect cell-count of batteries and set the Cut-off voltage to 3.0V/cell. E.g.: when using 2s lipo, the low voltage threshold is 6.0V.

ESC/motor overheat protection-If the function is activated, the output power will be gradually reduced to 20% and the blue LED will blink when the temperature of ESC or motor is up to the preset option.

Switch Point
Punch Rate 1 Punch Rate 2

These three items are used to control the speed of the throttle output of the ESC. Punch-rates are helpful for keeping tires from spinning under hard acceleration, and the HOBBYSTAR ESC gives you the option of setting multiple punch-rate levels. You can set the switch-point (the % throttle at which punch-rates are activated), and punch-levels for 2 different rates. The lower the number, the more restriction there is on power output and the higher the number the less restriction and more power.

Reverse Speed- For setting the maximum throttle setting to be applied to the motor in reverse mode when throttle is pulled to maximum reverse. (Note: a low setting is recommended to decrease likelihood of loss of vehicle control when in reverse.)

Throttle Curve-The function is used to define the input throttle curve in the ESC.

Option 1:'Linear'-This is where the forward throttle position of the transmitter directly relates to the forward throttle position of the ESC.

Option 2:'Custom'-This allows for a multi-step setting to the forward throttle. This differs from index on the transmitter because the forward throttle input into the ESC can be defined in multiple increasing steps.
Initial Brake-The function refers to the brake strength applied in the initial position of the brake. The default is 'drag brake', so the brake effect can be smooth.

Drag Brake - The function provides the driver a set percentage of brake when you have the transmitter resting in neutral. This will create the feel of a brushed motor.

Drag brake are used in racing to slow a vehicle as you let off approaching a corner versus the driver having to push the brake at every corner.
Try working with this to get a sense of how you might use this for your track.
If you are running on a high traction track with tight corners, a stronger setting should work best.
If you are running in an open area, you will find a smaller percentage will result in better control.
If you are running in dusty or slippery surfaces, you will more than likely want to use the lowest option.

Brake Strength- The function defines the overall brake level as a percentage of the backward throttle.

Switch Point
Brake Rate 1 Brake Rate 2

These three settings are used to control the speed of the brake function. Setting a suitable punch-rate is helpful to help keep tires from locking up under hard braking, and the HOBBYSTAR ESC gives you the option of setting multiple punch-rate levels. You can set the switch-point (the % brake at which punch-rates are activated), and punch-levels for 2 different rates. The lower the number, the more restriction there is on brake-power output, and the higher the number the less restriction and more braking-power.

Brake Curve-The function adjusts the brake strength relating to the throttle range. The default is linear, which is also can be set to non-linear by PC software.

Boost Timing- Boost timing is available in the entire throttle range. When boost timing is activated, the timing will change dynamically according to motor RPM.

Start RPM End RPM

Boost is dynamically applied through a pre-set RPM range, so any time the RPM is below the programmed start RPM, the start boost will be 0°. When the RPM is between the start RPM and the end RPM, boost timing will be applied dynamically according to motor RPM. If the 'boost slope' is set to 'linear', the boost is linearly defined in the given boost range.

RPM	<10000	10001-11000	11001-12000	12001-13000	13001-14000	>14000
Boost timing	0°	1°	2°	3°	4°	5°

Stability-If boost timing is activated, the timing is not only controlled by RPM but also by throttle range. When the throttle is at 25%, the most boost timing that is available is 16°. At 50% throttle, the most timing available is 32°. At 100% throttle the full 64° of boost timing is available. If Stability is selected (Yes), then initial power will be smoother and the motor will run cooler, but starting power will be decreased.

Slope

'Linear'- the boost per degree is consistent to corresponding RPM;

'Custom'- freely define the corresponding RPM of boost timing per degree. The setting is very flexible, proper adjustments can activate the start power and heat productivity of motor.

Turbo timing Turbo timing is generally used on tracks with long straightaways for extra speed on the top-end.

Activation Method-There are three different activation methods, and turbo timing will not be activated until the programmed conditions are met. Turbo timing can be turned off completely.

'Full Throttle'

FULL THROTTLE: Turbo timing will be activated when full throttle has been applied for the amount of time that is programmed.
RPM: Turbo timing will be activated when the RPM is higher than the RPM programmed as activation RPM.
FULL THROTTLE AND RPM: Turbo timing will be activated when full throttle has been held for the amount of time set AND motor is at RPM above activation RPM. If either of these conditions are not met, turbo timing will not be activated.

Turbo Delay- Turbo delay is the amount of full throttle time required to activate turbo timing. When in full throttle activation mode, turbo timing will be activated once full throttle has been held for the pre-set time.

Start RPM- When activation method is set to RPM, the RPM must above the pre-set RPM before it is activated.

Turbo Slope "ON" (TB Eng)- When turbo timing has been activated, this is the rate at which turbo timing is activated. E.g. '6 deg/0.1sec' means that 6 degrees of timing will be added every 0.1 sec. The more it releases for every 0.1 sec (higher number), the faster timing will be added and the faster the motor will build heat. For lead-finger drivers it is advisable to slow down the rate to keep heat from building in the motor every time you apply full throttle. Setting to instant applies full timing as soon as conditions are met.

Turbo Slope "OFF" (TB Deng)- When turbo timing has been activated and throttle is released, or RPM drops below pre-set RPM, this is the rate at which turbo timing is reduced. If set to instant, all turbo timing is removed immediately and vehicle stability may be affected. As with the "On" setting, the higher the number of degrees set per 0.1 sec of time the faster timing is removed.

"Blinky" Mode

•For racing in stock classes where no turbo or boost timing is allowed, the HOBBYSTAR ESC can be set to "blinky" mode. To enter blinky mode, simply set turbo and boost timing to "0". When in blinky mode, the power light will flash between blue and purple indicating that no ESC timing has been added.

Turbo LCD Program Card

The HOBBYSTAR LCD PROGRAM CARD can be used to program the HOBBYSTAR TURBO ESC as a stand-alone unit, or to program and update firmware when used as a USB link to your PC. NOTE: Application for use can be downloaded from HOBBYSTARLABS.COM.

Specification:
Dimension: 91mm*54mm*18mm (L*W*H)
Weight: 68g
Power supply: DC 5.0V~12.0V

How to connect the LCD program card:

1. Disconnect the battery from the ESC;
2. Disconnect the signal wire of the ESC from the receiver; then plug it into the socket marked with
3. Connect the battery to the ESC and turn on the ESC.
4. If the connection is correct, the following message (Turbo +Version+Date) will be displayed on the LCD screen. Press any button, the following message (Ready to connect ESC)will be showed

On the LCD Screen. It signifies that the data connection between LCD and ESC is establishing.

If the data connection between the program card and ESC has failed, the screen will only show "Ready t o connect to ESC". Please check whether the signal wire is connected correctly and repeat steps 1,2 and 3

5. If the connection is established successfully, the first programmable item will be displayed on LCD screen. It's ready to set the parameters now.
Note: It is important that the sequence is followed as indicated. The sequence of steps 2 and 3 cannot be reversed or else the program card will not work properly

Operation:

Working as an individual device to program the ESC, the function of button is as follows:
"Menu"Change the programmable item
"Value"Change the parameter
Note: Keeping the "Menu" or "Value" button held will scroll more quickly
"Reset"Return to the default settings
"OK": Save the current parameters into the ESC. If you don't press"OK" button, the customized settings will not be saved and updated into the ESC. If you just press"Menu"button, the customized settings are just saved into the program card, not into the ESC.

Example: Enter the value of a programmable item (e.g.: cut-off voltage 3.2/cell), then press "Value" button to select parameter. Finally, press "OK" button to save the parameters to the ESC.

Working as an USB adapter to link the ESC with PC to up date the firmware or set the parameters on PC.

Motor Specification

Motor	Touring Zero timing	Touring Turbo	1/10 Buggy
3.5T	8.0 - 8.5	not suggested	not suggested
4.5T	7.3 - 7.8	7.8 - 8.9	not suggested
5.5T	6.4 - 7.0	7.0 - 8.4	not suggested
6.5T	6.2 - 6.8	7.0 - 8.2	11.0 - 12.5
7.5T	6.0 - 6.6	7.0 - 8.0	10.5 - 12.0
8.5T	5.8 - 6.4	7.0 - 7.8	10.0 - 11.5
9.5T	5.5 - 6.5	6.8 - 7.6	9.0 - 10.5
10.5T	5.2 - 6.4	6.2 large track, 7.0 small track	8.0 - 9.5
11.5T	5.0 - 6.3	6.0 large track, 6.8 small track	8.0 - 9.0
13.5T	4.8 - 6.0	5.7 large track, 6.6 small track	not suggested
17.5T	4.5 - 5.8	5.4 large track, 6.0 small track	not suggested
21.5T	3.8 - 4.3	4.8 large track, 5.2 small track	not suggested

USB Link

The HOBYSTAR ESC can also be programmed on your PC via USB Star-Link. Application for use can be downloaded at HOBBYSTARLABS.COM.

1.With ESC switched off, remove ESC signal lead from receiver and plug into Star-Link. Connect other end of USB cable to PC.
2.Launch USB link application on your PC.
3.Switch on ESC, if data does not appear then press "Data" button to display current ESC settings.
4.Use "Apply" button after making changes to save them to ESC. "Restore" will reset ESC to default settings.