

Repair Conditions

- Parts that can be repaired:
 - Internal electronic circuitry
(Damage caused by incorrect connection or operation is not covered by the warranty.)
- Note that the ESC will not be repaired in the following cases:
 - If the ESC housing has been opened
 - If a power supply other than the designated 6-cell Ni-Cd battery (7.2 V) is used
 - If wiring has been modified in order to use a different power supply
- KEYENCE assumes no responsibility for damage to the receiver or servo caused by incorrect connection of the ESC.
- Note that if the repair card is not properly filled out, repair and return of the ESC may be delayed.

Warranty			
Item	Sensor Controlled Brushless E.S.C. TACHYON	Purchase date	(M/D/Y) / /
Manufacture no.		Warranty term	3 months from purchase date
Address	Tel. no.		
Name			

Note that if the date and location of ESC purchase are not entered on the warranty card, you will be charged for repairs even within the warranty term.

If a failure occurs within three months of purchasing the ESC, write the symptoms of the problem and operating conditions on a separate sheet. Request a repair of the ESC from either the distributor where you purchased the product or directly from ACUVANCE (Technical Service Department).

Repair card

Symptoms

Write the symptoms of the problem, giving as much detail as possible.

ACUVANCE CORPORATION Technical Service Dept.

7F, Shin-Osaka Marubiru Annex 1-18-22
Higashinakajima Higashiyodogawa-ku
Osaka 533-0033 Japan.

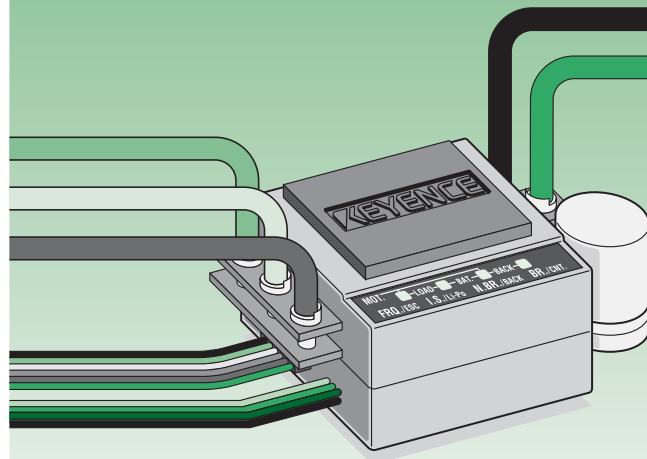
E-mail support@acuvance.co.jp

Distributor's name
(shop name, address, and tel. no.)

0413-4

Sensor Controlled Brushless E.S.C. TACHYON

INSTRUCTION MANUAL



ACUVANCE

PRECAUTION FOR USE



WARNING

•Before using this product, carefully read the important warnings described in this instruction manual to understand the instructions thoroughly.



DANGER

Instructions that the user must observe to prevent serious injury.



WARNING

Instructions that the user must observe to prevent accidents.



CAUTION

Useful information for handling this product.

•About batteries



DANGER

To prevent fumes, fire, or burns

Improper use of the battery is very dangerous. The battery must be handled carefully. Incorrect wiring or short-circuiting of wiring may cause fire or fumes. Before connecting or disconnecting the battery to or from the speed controller (ESC), be sure to turn off the power switch of the ESC. When the battery is not in use, disconnect it from the ESC or charger, and store it in a suitable location free of any loose wires or screws.

•About cable Connections



DANGER

To prevent fumes, fire, or burns

Incorrect wiring may cause fire or fumes that can damage both the ESC and battery beyond repair.

•About special ceramic board



DANGER

To prevent burns

The surface of the special ceramic board will be extremely hot after heavy load driving. Do not touch the special ceramic board directly.

•Handling precautions



WARNING

To avoid accidents or product failure

Do not modify the ESC in any way. Use it only for its intended purpose. Keep the ESC away from flames or heat. Avoid splashing any liquid, such as water, on the ESC.

FEATURES

- Features Keyence's original H.T.R.S* (patent pending), a hybrid design based on a special thermal conductive carbon sheet and special ceramic board that efficiently cools all FET components inside the ESC. In addition to the multilayered FET board, HTRS eliminates the need for aluminum heat sinks and cooling fans, resulting in a significantly smaller package.
- The small body packs 36 of the latest power MOS-FET components. This achieves low ON resistance that outrivals competition ESC models while supporting reverse braking.
- Push button controls on the ESC allow you to disengage reverse braking and change drive frequency, brake volume, and other settings. Users can add a separately sold a dedicated controller that expands the range of available settings and ranges for a personal driving experience.
- Uses a high-density 12-gauge power cable consisting of 1,530 wires for power transmission efficiency and flexibility.
- Motor rotation can be set in either direction.

*H.T.R.S.: Hybrid Thermal Radiation System

World's first Hybrid Thermal Radiation System* cools all FET components evenly and more efficiently than a cooling fan and heat sink.

Specifications

Power supply	4.8 V to 11.4 V (works with any battery)
Continuous and spontaneous maximum current	Max. current of battery
ON resistance	0.24 m (FET standard value)
Compatible motors	Any
Dimensions	W31 x D30 x H19 (excl. projections)
Weight (ESC unit)	35.0 g
Regulator for receiver/servo	6 V 3 A output

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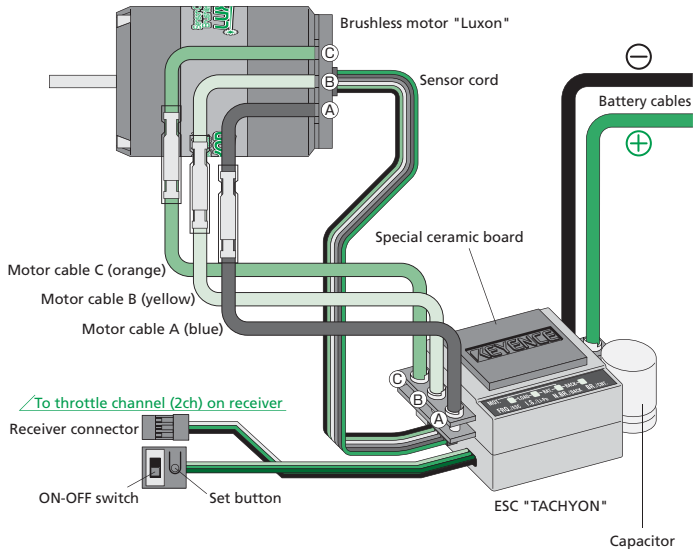
P.4	How to connect the TACHYON
P.6~P.9	Preparations Before Driving
P.10~P.15	Tuning the Driving Experience
P.14-15	Quick Reference of Functions
P.16~P.17	TACHYON ESC Mode Setting Flowchart

PART NAMES AND WIRING

⚠ DANGER To prevent fumes, fire, or burns

Be careful not to reverse the battery poles. Doing so can cause the ESC to fail.

Connect as illustrated below.



•Sensor cord

This cord transmits position signals to the ESC using a Hall element. The connector has the same shape on both the ESC side and the motor side, allowing it to be plugged in either direction. It should however be connected to the proper shape. This cord must be connected in order to initialize the ESC. (Leave this cord connected while driving). Be sure the connector fits snugly to prevent loose connections which can cause malfunctioning and product damage. Never modify the uncap sensor cord. Doing so may cause product failures.

•Motor cable (A, B, C)

These cables apply voltage to the motor coil following a timing based on the signals transmitted to the ESC via the sensor cord. The LUXON is pre-fitted with cables terminated with bullet type connectors allowing connection to our ESC TACHYON without soldering.

CAUTION

When soldering cables, use soldering iron with a high wattage rating (as high as 60 W) and complete the work in a short period of time. Prolonged soldering times using a low wattage soldering iron can damage the electrical components inside the ESC.

⚠ WARNING

Be sure to match the cables to the symbols A, B, and C on the ESC. Failure to follow this precaution can result in loss of control over the motor speed, or subject the ESC and motor to large currents. Unlike brushless motors without a sensor, swapping these cables does not change the rotating direction of the motor. If necessary, change the direction of rotation at the ESC*.

* To change the rotating direction, the ESC must be equipped with a feature for changing the rotating direction. The TACHYON is equipped with this feature (p.15)

⚠ WARNING

When replacing the motor cable, use a soldering iron with a broad tip and high output rating (as high as 60 W) and work swiftly. A soldering on with the low output rating will not melt enough of the solder resulting in a poor soldering connection which can cause cables to loosen under vibration or loose connections. Also, subjecting the internal parts to excessive heat over prolonged periods can damage them. (Be careful not to short-circuit the terminals with solder)

⚠ WARNING

Use only screws 8 mm or shorter to mount the motor to the motor mount.

PREPARATIONS BEFORE DRIVING

When using this product for the first time, the neutral position on your transmitter and the ESC do not match. If you attempt to drive your car before completing the initialization, the motor may start rotating as soon as the switch is turned on. This is extremely dangerous and can be prevented by following this procedure when turning the power on for the first time, "Initializing the transmitter throttle position". (The motor will not rotate during the initialization).

Initializing the transmitter throttle position

The ESC must be programmed with the transmitter's neutral position, forward MAX position, and reverse (brake) MAX position immediately after purchase, or if the transmitter has been replaced. Perform the steps.

Preparations Before performing this setting, set all transmitter throttle settings (EPA= end point adjustments, MAX brake volume, etc.) to their original state. Otherwise, the ESC will not detect the transmitter signals properly, preventing it from being initialized.

Preparations When performing the initial setting, be sure the sensor cord is connected to the motor and ESC. (Leave connected for driving). Otherwise, the initial setting cannot be completed. The three motor cables (A, B, C) may be left disconnected. In this case, prevent the cable connectors from touching one another.

Preparations If performing the initial settings with the motor cables connected, secure the motor in a motor mount or other device, and removed opinion gear to keep the car from moving unexpectedly

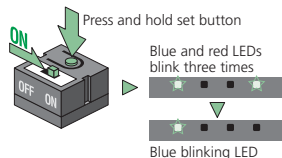
Initial setting procedure

1 <<Before making the initial setting>>

Be sure the ESC power is turned off, and make sure the ESC is properly connected to the battery, motor (only Sensor cord need be connected), and receiver. Then turn the transmitter power on.

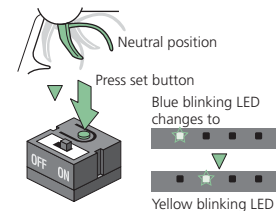
2 <<Initial setting mode>>

Press and hold down the set button while turning the ESC power on. The blue and red LEDs will blink three times, then the blue LED will start blinking indicating the ESC is in initial setting mode. Release the set button.



3 <<Setting the neutral point>>

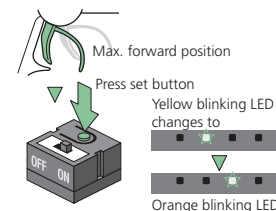
While the blue LED is blinking, set the throttle on the transmitter to its neutral position and press the set button on the ESC once. The yellow LED will start blinking.



4 <<Setting the high point>>

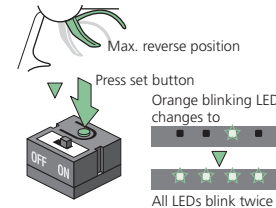
While the yellow LED is blinking, set the throttle on the transmitter to the maximum forward position and press the set button on the ESC once. The orange LED will start blinking.

* If the orange LED does not blink after pressing the set button with the throttle at the maximum forward position, set the throttle to the maximum reverse (brake) position and then press the set button once.



5 <<Setting the brake high point>>

While the orange LED is blinking, set the throttle on the transmitter to the maximum reverse position of Step 4, and press the set button on the ESC once. All LEDs will blink twice.



This completes the initial settings for the transmitter positions. The ESC automatically changes to the main mode (p. 8).

IMPORTANT If you performed the procedure described by the * under Step 4 above, <<Setting the high point>>, switch the throttle channel on the transmitter between normal and reverse after completing the initial setting for all transmitter positions.

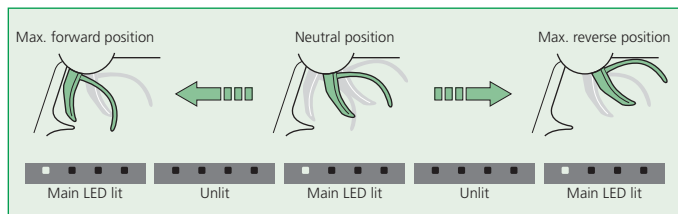
CAUTION If no operations are performed for 30 seconds during the initial setting, the ESC will automatically exit initial setting mode and change to the main mode.

PREPARATIONS BEFORE DRIVING

Verifying the transmitter positions have been correctly set to their initial settings

The main LED (see below) should be the only one illuminated when the throttle is in the neutral, maximum forward, and maximum reverse (brake) positions. If the main LED is unlit in all other positions, the initial setup has been completed properly.

(At time of shipment, the main LED is the only LED that alternately illuminates and goes out when adjusting the throttle.)

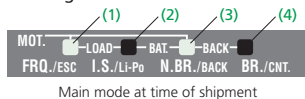


If the main LED does not follow this lighting pattern, the initial setting was not completed properly. Make sure the throttle related adjustments on the transmitter are initialized and the RX cable is properly connected to the receiver. Then, retry the initial setting procedure.

* In some cases, the drive circuit may cause the car to move in reverse when the throttle is operated in the forward direction. If your car displays this behavior, change the rotating direction of the motor (P. 15).

Checking main mode

At time of shipment, the main mode is as shown in the accompanying figure. Each LED has the following meaning.



(1) Main LED (blue): Factory shipped condition = lit

Main LED when setting mode (p. 10) is in ESC mode. Unlit during Program Card mode.

(2) Sub LED (yellow): Factory shipped condition = unlit

At time of shipment, the battery setting is Ni-cd/Ni-MH/Li-Fe and the LED is unlit. This LED is illuminated when the cutoff voltage (p. 14) is set to Li-Po2 cell, or Li-Po3 cell. (Set the cutoff voltage when using a Li-Po battery.)

IMPORTANT While driving, if the battery voltage drops to the cutoff voltage level, the motor will gradually stop rotating and the yellow LED will blink indicating you should replace the battery.

(3) Sub LED (orange): Factory shipped condition = lit

Illuminated when the reverse drive feature (p.14) is set to ON. Unlit when set to OFF.

(4) Main LED (red): Factory shipped condition = unlit

Main LED when setting mode (p. 10) is in Program Card mode. Unlit during ESC mode.

IMPORTANT If the ESC heats to a hazardous temperature while driving, the motor will gradually stop rotating and the red LED will blink. If this situation occurs, discontinue operation and let the ESC stand at room temperature. If the red LED starts blinking after driving for only a brief period, check to see if the gear ratio is overloading the motor.

[Important] Safety feature for driving in reverse

On radio-controlled cars, the same throttle controls are used for braking and driving in reverse. This can cause the car to move backwards when the intention is to apply the brakes. Suddenly trying to reverse the motor while it is rotating forward can place severe stress on the gears, motor, and ESC, sometimes resulting in internal damage. The TACHYON is equipped with the following feature to prevent this.

After applying the brakes, a vehicle starts to back up by the throttle being turned to the brake side one or more seconds after the throttle is returned to neutral once. Also, the motor, which is rotating in the forward direction, comes to a complete stop. (A vehicle does not back up unless one or more seconds pass.)

In this way, even if the reverse drive feature is set to ON, the ESC ensures that any throttle operation in the braking direction results in braking and no unintentional reversing. This feature prevents damage to the drive parts and collisions with other cars, as well as many other possible problems, and is essential to allow short braking action when turning corners.

* Note, this safety feature cannot be disabled.

This completes the preparation before driving. Connect the motor and enjoy driving.

* When using lithium polymer batteries, set the cutoff voltage before driving to Li-Po 2-cell or Li-Po 3-cell (p. 14).

TUNING THE DRIVING EXPERIENCE

Selecting setting modes

First, select either [ESC mode] or [Program Card mode]. Select ESC mode to adjust various features on the ESC, or Program Card mode to adjust using the Program Card. At time of shipment, the ESC is set to ESC mode.

Selecting setting modes

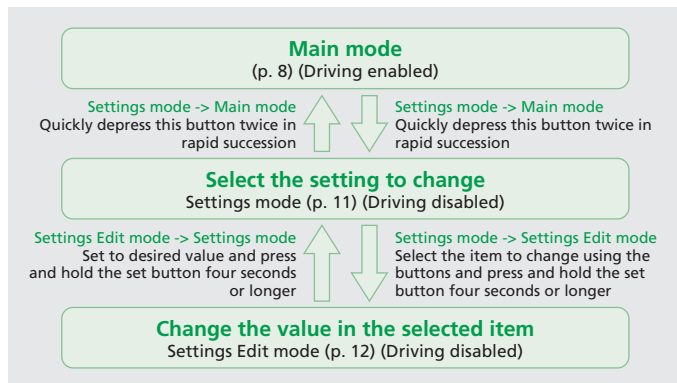
- 1 In the main mode, press and hold the set button four seconds or longer.
- 2 The main LEDs (blue and red) alternately blink indicating the setting mode is now active.

Repeating the same procedure alternates between [ESC mode] (blue) and [Program card mode] (red).

IMPORTANT The items, numerical setting ranges and units of adjustment differ depending on the mode selected (p. 14). Refer to the following section for setting procedures in ESC mode, or the instruction manual supplied with the Program Card for setting procedures in the Program Card mode.

IMPORTANT Unless otherwise specified, switching between setting modes does not alter any of the settings. However, when changing from Program Card mode to ESC mode, the settings for drive frequency, initial speed, neutral brake, and brake power (refer to p. 11), automatically assume the nearest value previously used in ESC mode.

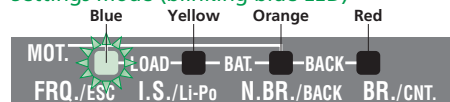
Flow for changing settings and ESC mode



Settings mode (when Setting mode = ESC mode)

In main mode (p. 8), quickly depress the set button once. The blue LED will start blinking indicating the ESC is in Settings mode. (While in Settings mode, the motor will not rotate even if the transmitter throttle is operated.)

Settings mode (blinking blue LED)



Neutral brake power adjustment is selected



Each short press of the set button causes a different LED to blink. If only one LED blinks, read the abbreviation written to the lower left of that LED. If two LEDs are blinking, read the abbreviation written on the line connecting those two LEDs. (There is no setting that corresponds to the state when all LEDs are blinking.)

Blinking LED pattern indicates the current setting item (Each setting is described in detail on the following pages).

[Blinking LED/abbreviation] - Setting

- [Blue/FRQ.] Drive frequency adjustment
- [Yellow/I. S.] Initial speed adjustment
- [Orange/N.BR.] Neutral brake power adjustment
- [Red/BR.] Brake power adjustment
- [Blue + yellow/LOAD] Load preset program
- [Yellow + orange/BAT] Cutoff voltage adjustment
- [Orange + red/BACK] Reverse drive feature ON/OFF selection
- [Blue + orange/MOT] Motor rotating direction selection
- [All LEDs/none] Save user program

[Verifying current settings]

To view the current setting, enter Settings mode, then toggle the blinking LED to the desired setting item. Wait three seconds. The LED indicating the setting item and the LED that indicates the value for that item will alternately blink or illuminate.

(Two blinks indicates the setting item <-> An illuminated LED indicates the setting value)

* Pressing the set button once returns to Settings mode.

TUNING THE DRIVING EXPERIENCE

Settings Edit mode (in ESC setting mode)

Changing to Settings Edit mode

While in Settings mode (p. 11), move the LED to the setting to be changed using the set button. Press and hold the set button four seconds or longer. This activates the Settings Edit mode. (While in Settings Edit mode, the motor will not rotate even if the transmitter throttle is operated.) Note, Settings Edit mode cannot be enabled from certain settings, such as the save function. (See last three items on p. 17.)

Changing the drive frequency (FRQ.)

Enter Settings Edit mode by making the blue LED blink in Settings mode. Each short press of the set button will illuminate each LED, thus changing the drive frequency as follows.

1 LED = 2 KHz, 2 LEDs = 4 KHz, 3 LEDs = 8 KHz, 4 LEDs = 16 KHz

Set the LED to the desired setting and press and hold the set button four seconds or longer. This confirms the settings and returns to Settings mode. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

Explanation A lower value provides more thrust, but a jerkier acceleration. A higher value provides less thrust, but smoother acceleration.

Changing the initial speed (I.S.)

Enter Settings Edit mode by making the yellow LED blink in Settings mode. Each short press of the set button will increase the number of illuminated LEDs, thus changing the initial speed as follows.

1 LED = standard, 2 LEDs = medium, 3 LEDs = fast, 4 LEDs = maximum

Illuminate the desired number of LEDs, and press and hold the set button four seconds or longer. This confirms the settings and returns to Settings mode. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

Explanation Initial Speed refers to the momentary speed applied when accelerating. The initial speed must be set appropriately, otherwise, if the initial speed is set too high, the tires may spin depending on their grip with the road.

Changing the neutral brake power (N.BR.)

Enter Settings Edit mode by making the orange LED blink in Settings mode. Each short press of the set button will increase the number of illuminated LEDs, thus changing the neutral brake power as follows.

1 LED = weak, 2 LEDs = standard, 3 LEDs = medium, 4 LEDs = strong

Illuminate the desired number of LEDs, and press and hold the set button four seconds or longer. This confirms the settings and returns to Settings mode. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

Explanation This adjustment affects the natural brake power applied when the throttle is returned to the neutral position.

Changing the brake power (BR.)

Enter Settings Edit mode by making the red LED blink in Settings mode. Each short press of the set button will increase the number of illuminated LEDs, thus changing the brake power as follows.

1 LED = standard, 2 LEDs = medium, 3 LEDs = fast, 4 LEDs = maximum

Illuminate the desired number of LEDs, and press and hold the set button four seconds or longer. This confirms the settings and returns to Settings mode. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

Explanation This adjustment affects the brake power applied when the throttle is move from the neutral position to the brake side.

Load preset program (LOAD)

Enter Settings Edit mode by making the blue and yellow LEDs blink in Settings mode. Each short press of the set button will illuminate each LED, thus changing the program to load as follows.

Blue = off-road, yellow = drifting, orange = touring, red = user program
(Refer to page 15 for the individual setting values for each program)

Illuminate the LED corresponding to the program to load, and press the set button four seconds or longer. This changes all settings at once and returns to Settings mode. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

Explanation This function is used to load a preset program optimized for each racing category. After loading a preset program, it is possible to change the individual settings as desired. The user program refers to the program settings saved using the Save feature.

TUNING THE DRIVING EXPERIENCE

Changing the cutoff voltage (BAT)

Enter Settings Edit mode by making the yellow and orange LEDs blink in Settings mode. Each short press of the set button will illuminate each LED, thus changing the cutoff voltage as follows.

Blue LED = Li-Po 2-cell, Yellow LED = Li-Po 3-cell, Orange LED = Ni-cd, Ni-MH 6-cell, Li-Fe Red LED = Ni-cd, Ni-MH 7-cell, Blue & Yellow LED = Ni-cd, Ni-MH 8-cell

Illuminate the LED corresponding to the cutoff voltage to use, and press the set button four seconds or longer. This changes the cutoff voltage setting and returns to Settings mode. To make the cutoff feature take effect, save the settings using the Save feature (explained later), and cycle the power.

Explanation This function stops the car to prevent it from going out of control when the battery runs low. When using a Li-Po battery, this function also prevents battery damage caused by over discharging.

Reverse drive feature ON/OFF selection (BACK)

Make the orange and red LEDs blink in Settings mode, and press the set button four seconds or longer. The LEDs will blink*, and the reverse drive feature will toggle between on or off after which the ESC will return to Settings mode. Repeating this operation toggles this setting between on or off. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

* Reverse drive is disabled when the blue and yellow LEDs blink, and enabled when the blue, yellow, and orange LEDs blink.

Changing the rotating direction of the motor (MOT)

Make the blue and orange LEDs blink in Settings mode, and press the set button four seconds or longer. The blue, yellow, and orange LEDs will blink twice simultaneously, indicating the rotating direction of the motor has changed. Then the ESC will return to Settings mode. Settings are reset when the power is turned off. To retain the settings, use the Save feature before turning the power off (p. 15).

Explanation In some cases, operating the throttle in the forward direction will cause the car to move in reverse, even though the wiring and initial settings are correct. This is due to the design of the car's drive train. If your car displays this behavior, use this feature to change the rotating direction of the motor.

Saving the user program (current settings) (SAVE)

Make all LEDs blink in Settings mode, then press and hold the reset button for 4 seconds or longer. All LEDs will blink three times, indicating the current settings have been saved as a user program. The ESC will return to main mode.

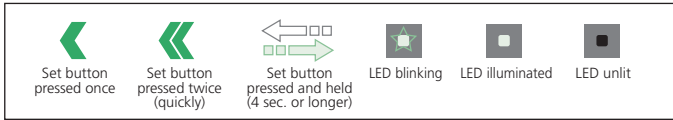
Explanation The saved user program can be recalled by using the LOAD function described earlier. Note, only one user program can be saved in ESC Settings mode.

Quick Reference of Functions

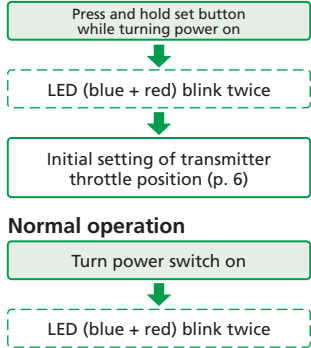
.....Adjustable items

Function	ESC Settings mode	Program card mode	Preset programs (* only in Program Card mode)				
			Off-road	Drifting	Touring	Technical*	High-speed*
Drive frequency	4 settings (2, 4, 8, 16 KHz)	4 settings (2, 4, 8, 16 KHz)	8KHz	8KHz	4KHz	4KHz	16KHz
Initial speed	4 levels (standard, medium, fast, maximum)	0 to 30% (5% increments)	Medium	Fast	Standard	15%	20%
Neutral brake power	4 levels (weak, standard, medium, strong)	0 to 30% (1% increments)	Standard	Medium	Standard	8%	3%
Brake power	4 levels (standard, medium, fast, maximum)	0 to 30% (1% increments)	Maximum	Medium	Standard	3%	3%
Max speed limit forward side	OFF	70% to OFF (100%) (5% increments)		100%		100%	100%
Max speed limit reverse side	25%	25% to OFF (100%) (25% increments)		25%		—	—
Reverse drive function	ON/OFF toggle (ON = enabled, OFF = disabled)		ON	ON	ON	OFF	OFF
Cutoff mode	Li-Po 2cell / Li-Po 3cell / Ni-cd-Ni-MH(under 6-cell)/ Li-Fe / Ni-cd-Ni-MH 7cell / Ni-cd-Ni-MH 8cell		Ni-cd-Ni-MH				
Timing advancement	2	2 to 16 (2 increments)	2			4	6
Preset program	Off-road / drifting / touring	Off-road / drifting / touring Technical / high-speed	(Note) Program Card mode is available when using the separately sold Program Card (tentative name). (Note) The range of adjustment and values for each setting in Program Card mode is subject to change.				
Number of user programs	1	4					

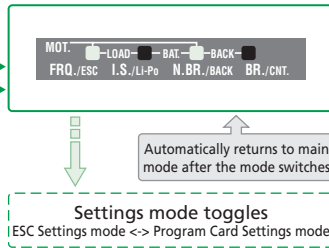
SETTINGS FLOWCHART FOR ESC MODE



To make initial settings (p. 6)

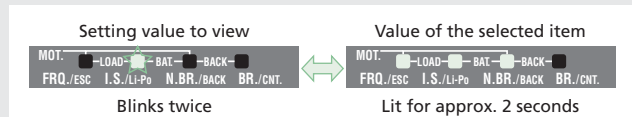


Main mode (Driving enabled) (p. 10)



Verifying current settings

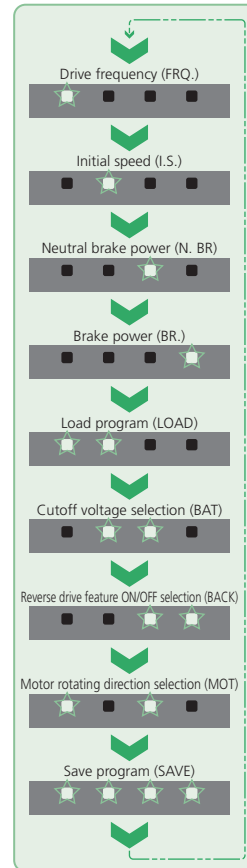
In Settings mode, set the LED to the value to view and wait approx. 2 seconds



In this example, the initial speed setting is set to medium.

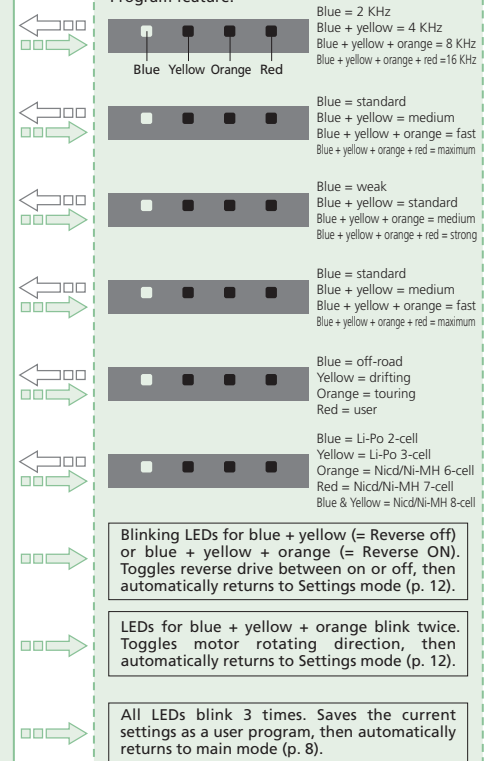
Pressing the button once returns to Settings mode

Settings mode (driving disabled) (p.11)



Settings Edit mode (Driving disabled) (p. 12)

(Note) Settings are reset when the power is turned off. To retain the settings use the Save Program feature.



* Pressing the reset button once in main mode changes to Settings mode (driving disabled). Two quick presses of the set button in Settings mode changes to main mode (driving enabled).

- (1) This controller is equipped with H.T.R.S., a heat control system that converts heat inside the ESC to infrared rays, and dissipates the heat by radiation. To allow this function to perform effectively, avoid covering the ceramic board with a powered fan or decals. Failure to obey this warning can significantly degrade the performance of the H.T.R.S. and damage the ESC.
- (2) If the capacitor supplied with this controller becomes damaged, the internal circuitry may also be damaged, requiring a full repair of the controller. Contact Keyence for repair work.
- (3) Users can experience improved acceleration, mileage, and other benefits by replacing the capacitor supplied with this controller with our separately sold Chevalier series.