

Introduction

Thank you for purchasing the EXTRAIGHT. To get the best from your EXTRAIGHT, please read this manual carefully. After reading it, be sure to keep it in a convenient location.

Ultra-small digital speed controller Instruction Manual

Features

- The state-of-the-art, ultra-compact power MOSFET <SOP*1> is employed, achieving a power-on resistance value (FET standard) of 0.25mΩ.
- The MPRS system*2 is adapted to a large current circuit. The ultra-small controller minimizes heat generation and significantly reduces loss of battery energy.
- The current limiter setting enables smooth start-up and improves run-time.
- The brake rate adjustment enables faster braking.

*1 SOP : Today's mainstream system developed by KEYENCE for the first time as a surface-mount package and speed controller.

*2 MPRS (Metal Plate Radiation of heat Structure) : Hybrid structure which conducts current not through a copper foil but through a metal plate on the PC board. It allows the best configuration with the FET.

⚠ CAUTION

The following symbols alert you to important messages. Be sure to read these messages carefully.

⚠ WARNING

⚠ CAUTION

NOTE

Instructions to prevent serious injury

Instructions to prevent accidents or product damage

Additional information on proper operation

Precautions

1. Ni-Cd or Ni-MH battery

⚠ WARNING: To prevent fumes, fire, and burns

Improper use of the battery is very dangerous. The battery must be handled carefully. Incorrect wiring or short-circuiting of the cables may cause fire or fumes. Before connecting or disconnecting the battery to or from the ESC, be sure to turn off the ESC's power switch. Do not charge the battery while it is connected to the ESC. When the battery is not in use, disconnect it from the ESC or charger, and store it in a location with no wires or screws.

2. Connection of silicone cables

⚠ WARNING: To prevent fumes, fire, and burns

A faulty wiring or electrical contact (short-circuit) will damage the amplifier and may generate fire or smoke. In addition, both the amplifier and battery may become irreparable. Refer to the electrical wiring diagram (note the colors and positions) and arrange the wiring properly. Also, make sure to remove the battery before starting the wiring operation in order to prevent ignition or other accidents.

3. Mounting motor

⚠ WARNING: To prevent fumes, fire, and burns

Make sure to attach the provided shottkey diode and condenser to the motor. When the motor revolves, excessive voltage (surge over-voltage) is generated, which may damage the amplifier under some circumstances. Mounting the shottkey diode and condenser will control the voltage (surge voltage) applied to the amplifier. In addition, it will enhance the efficiency of the motor revolution. Refer to the section of "Wiring and names of each part" on the following page and perform the mounting procedure properly. Note that the shottkey diode has polar characteristics. Be sure to mount the shottkey diode in proper orientation.

4. Heat sink (Radiating fin)

⚠ WARNING: To prevent fumes, fire, and burns

Electricity flows through the metallic part at the top of the ESC. Therefore, do not allow wiring cables, other metallic parts and the carbon chassis to make contact with the ESC. When a heat sink is attached, electricity flows through the heat sink. Exercise the same precautions.

5. Proper operation

⚠ CAUTION: To prevent accidents and product damage

Do not modify the ESC. 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.

6. ESC mounting orientation

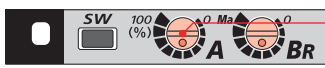
NOTE : To prevent accidents and product damage

Except for at the outer side of the car, mount the ESC with its terminal side oriented to prevent the cable connector (terminal) side and PC board from any damage caused by car bodies contacting, collision, or turnover.

Current limiter

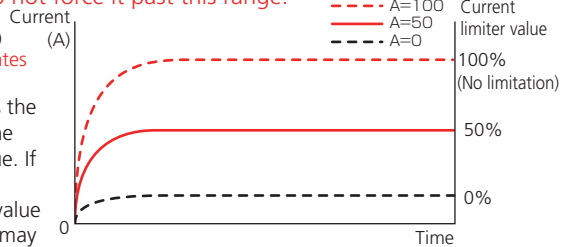
★ Limiting the maximum current to the motor prevents a skid and improves battery efficiency.

NOTE The trimmer turns within a range of 240 degrees. Do not force it past this range.



Current limiter trimmer (0 to 100%)
The "●" mark in the trimmer indicates the set value.

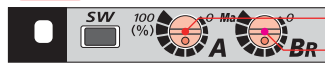
As illustrated on the right, changing the current limiter value changes the maximum current capacity. When the road surface is slippery, lower the limiter value (close to 0%). When you need high torque, raise the value. If you set the current limiter value to 100%, the current limiter function does not work and maximum torque can be produced. If you set the value to 0%, the current is limited to the minimum value and some motors may revolve at a slow speed. Set the value according to your needs.



Brake adjustment function

★ Adjusting the brake to match the road surface enables smooth running

NOTE The trimmer turns within a range of 240 degrees. Do not force it past this range.

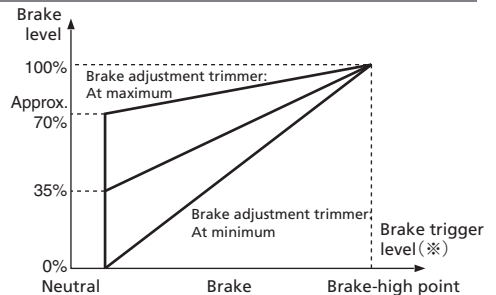


Current limiter trimmer (0 to 100%)
Brake adjustment trimmer (0 to 70% max)
The "●" mark in the trimmer indicates the set value.

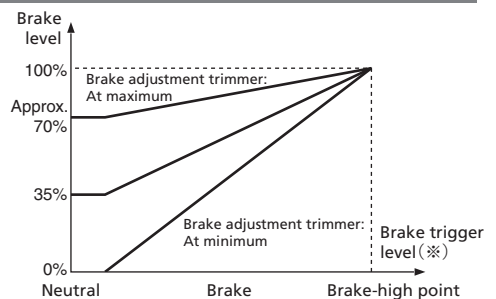
In normal mode, the minimum brake level can be changed by setting the brake adjustment trimmer. When the trimmer is set to minimum, the brake level changes linearly with the trigger level. When the trimmer is set to maximum, the minimum brake level is 70% of the maximum brake level. If you need strong brakes, gradually increase the setting value until you find a suitable level. Turning on the power switch while holding down the SET switch and then releasing the SET switch activates the neutral brake mode. The neutral brake level is the value specified with the brake adjustment trimmer. (The neutral brake mode is reset when you turn the A-01B off and on again without holding the SET switch. The operation mode setting is not retained.)

※ Brake trigger level : The level of the throttle opening between the neutral and brake-high point.

Normal mode



Neutral brake mode



Dash power mode

★ When a car is started, the current limiter can be canceled only with the first throttle operation if you want to make a quick start.

1. Turn the transmitter on and hold down the SET switch for approximately 5 seconds. The LED flashes. (Same as in setup mode.)
2. Wait until the LED stops flashing. (Approximately 10 seconds) The dash power mode is set.

NOTE If any noise interferes with the above setting procedure, the ESC may mistake the noise for throttle operation and may not set the dash power mode.

Mounting heat sink (Radiating fin)

⚠ WARNING: To prevent fumes, fire, and burns

Electricity flows through the radiating plates. If you mount a radiating fin, the electricity might flow through it. Do not allow other cables and metallic parts to make contact with the radiating fin.

★ If you run a car under normal conditions, the radiating fin is not necessary. When running a car under a blazing sun or if you are using a high-torque motor, mounting the radiating fin enables a more stable run. Mount the radiating fin as described below:

1. Remove an aluminum top sticker at the top of the ESC housing.
2. A metallic plate is exposed.
3. Remove dust from the plate surface.
4. Attach the double-sided tape (included) to a radiating fin. (Be sure to always use thin double-sided tape.)
5. Securely attach the heat sink to the metallic plate of the ESC.

(To improve radiation, apply 2-gel type epoxy resin adhesive instead of the double-sided tape. Knead the gels well and apply a light coat of it to the heat sink. Attach the heat sink to the metallic plate and fix them until the adhesive dries. Note that you cannot remove the heat sink once you attach it.)

Tips

(1) About the setting of the braking point:

When the braking point is set to a value that is too low, the brake feels weak.

- For a ProPO radio control with ABS, turn off the ABS first, set the braking point, and then turn on the ABS again.
- When you have problems with the setting, reverse the current setting of the reverse switch on the throttle side of the transmitter, and then adjust the amplifier settings again.

(2) About the setting for the braking rate:

Adjusting the braking rate will enable smoother travel motion. Use this feature when faster braking performance is required with a heavy car body, etc. First, turn the braking adjustment trimmer to the leftmost position, and then gradually turn it to the right to increase the initial strength of the brake actuation. Adjust the braking rate to the optimal point while checking the travel motion. (Note that the maximum braking power will not change.) When the neutral braking setting is selected, the setting is adjusted so that the braking is always set to ON when the car is put in neutral. This feature displays its force when traveling on a course requiring high cornering abilities. Use this feature as required.

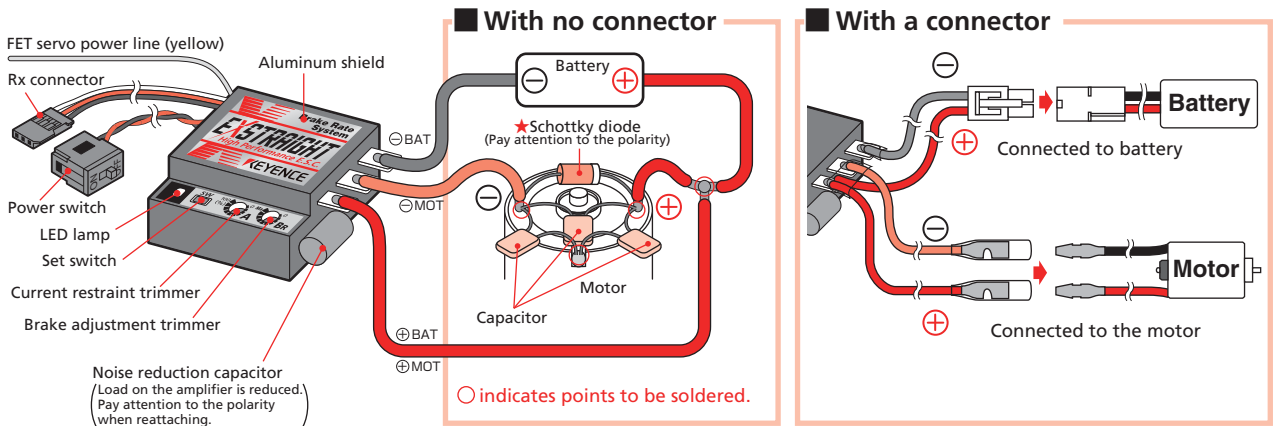
(3) About the setting of the high point:

The setting of the throttle high point can be adjusted normally at full throttle. However, the setting can also be adjusted short of full throttle (60 to 80%) to change the sensation of operation (acceleration feel). Adjust the setting at the point with optimal operational feeling.

Part names and wiring

⚠ WARNING: Precautions to prevent smoke, fire, or an explosion

Be extremely careful to observe the correct polarity for the wiring of the battery and Schottky diode. Be sure to install a capacitor and Schottky diode to the motor. If you do not, the ESC may malfunction.



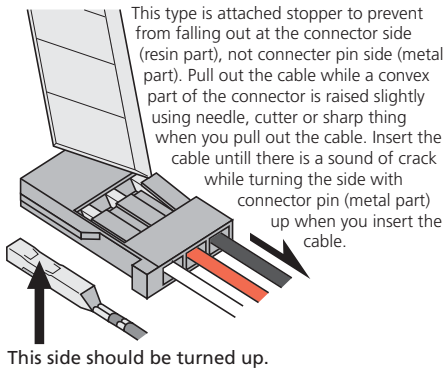
NOTE Solder the terminals with care so as not to damage the internal circuitry. Insulate points where the conductor is exposed, where wires have been stripped or soldered, using tape or heat shrink tubing. Otherwise, a short may occur.

NOTE If you use a motor with less than 13 turns, you should attach a schottky diode to the left side of motor. (It reduces heat generated from the amplifier, and improves efficiency.)

Receiver connector

⚠ WARNING: Precautions to prevent smoke, fire, or an explosion

Be sure to remove the batteries before modifying the wiring. Be extremely careful that the wires' polarity is correct. Note that we do not repair servos and receivers.



Manufacturer of your receiver	Former SANWA, Former KO	FUTABA, New KO	New SANWA (Z connector), JR
Shape of connector insert port (receiver side)	Avoid reverse insertion. 	The connector can be used without change. 	Avoid reverse insertion.
Wiring			

NOTE Be careful of treatment at the time of using a cutter.

Usage

● **Setup** ★ Perform each setup procedure within 10 seconds after the LED begins flashing. (This is because the unit is automatically reset after 10 seconds.)

1. Ensure that the ESC's power switch is turned off.
2. To lock a car, eliminate any driving force on the tires by disconnecting the motor cable, etc.
3. Turn the transmitter on. Reset each throttle function (throttle curb, ABS, trimmer point, etc.) to the normal position.
4. Turn the ESC on.
5. Hold down the SET switch for approximately 5 seconds.
6. The LED indicator flashes. (The ESC enters setup mode.)
7. Set the transmitter throttle to "Neutral", and then press the SET switch once.
8. The LED indicator flashes faster.
9. Set the transmitter throttle to "High point" (at 90% of full throttle), and then press the SET switch once.
10. Setup is completed.

● Setup confirmation

With a correct setting, the LED will light at neutral, turns off as the throttle is gradually opened, and light again at high point and brake point. If the setting of the transmitter interferes the correct setting, repeat the procedure after setting the reverse switch of the transmitter's throttle to the opposite side. See also the separate sheet "Key to setting".

When using a high-torque servo

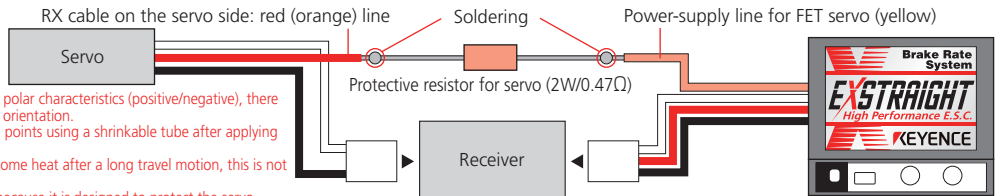
⚠ WARNING: To prevent fumes, fire, and burns

Be sure to remove the battery and external power supply before changing the wiring. Ensure that the polarity of the wiring is correct. Incorrect polarity may cause a malfunction in the ESC, receiver, and servo.

★ When using a high-torque servo, the capacity of the BEC power supply may become insufficient. Install the provided resistor for the high-torque servo as shown in the wiring diagram below.

NOTE

- (1) Since the resistor element has no polar characteristics (positive/negative), there is no need to consider the wiring orientation.
- (2) Make sure to isolate the soldered points using a shrinkable tube after applying solder.
- (3) Although the resistor generates some heat after a long travel motion, this is not an abnormal phenomenon.
- (4) Make sure to install the resistor, because it is designed to protect the servo.



Troubleshooting

Symptom	Cause	Remedy
Cannot set "High point"	Improper setting of ESC	Reset transmitter throttle setting to normal before setting "High point". Set "High point" position at 90% of full throttle.
	Improper transmitter setting	Correct transmitter throttle setting.
Brake fails.	Improper setting of ESC	Reset transmitter brake setting to normal before setting "Brake point". Set "Brake point" position at 90% of full throttle.
	Improper transmitter setting	Correct transmitter brake setting.
Motor and servo both do not work.	Bad contact with battery	Check that contact with battery is good.
	Improper wiring of receiver	Check that wiring of receiver and servo is correct.
	Receiver failure	Replace crystal or request repair.
	Transmitter failure	Replace crystal or request repair.
	ESC failure	Request repair.
Motor does not work, but servo works.	Improper setting of ESC	Setup ESC again from the beginning.
	Motor failure	Replace motor.
	Bad contact with battery	Check that battery and cables are properly connected.
	Bad contact with receiver connector	Confirm whether the Rx connector pin is broken or loose.
	ESC failure	Request repair.
ESC gets too hot.	Input voltage is too high	Use 6-cell power supply.
	Insufficient cooling	Attach radiating fin to improve air flow and heat radiation.
	Driving load is too high	Adjust driving system.
	Schottky diode failure	Confirm whether the schottky diode connected between the body and the motor is loose or damaged. If the diode appears to be damaged, exchange it.
Acceleration is decreased.	Improper ESC setting	Setup ESC again from the beginning.
	Current limiter value is too low	Increase current limiter value.
	Schottky diode failure	Confirm whether the schottky diode connected between the body and the motor is loose or damaged. If the diode appears to be damaged, exchange it.
Car behaves incorrectly.	Failure in motor capacitor	Replace motor capacitor.
	Bad position of receiver	Keep receiver as far from battery or ESC as possible.
	Transmitter/receiver failure	Request repair.
	Incorrect wiring	Make silicone cables as short as possible.

Specifications

Power supply	6-cell or 8-cell, Ni-Cd or Ni-MH battery	Weight (ESC unit)	17 g
Maximum current	Max. current of battery	Regulator for receiver/servo	5.8 V output, 1 A max. (when 7.2 V is input)
ON resistance	0.00025 ohm (FET Data)	PWM frequency	2930 Hz
Dimensions	30.6 (W) x 26.1 (D) x 13.1 (H) (except for terminal)		

<Perforated line>

Repair regulations

1. The part that can be repaired is as follows. Internal electronic circuit
(Damage caused by incorrect connection or running operation is not covered by the warranty.)
2. Note that repairing the ESC is impossible in the following cases.
When opening the ESC housing.
When using a power supply other than the specified 6-cell or 8-cell battery.
When modifying the wiring in order to use a separate power supply.
3. KEYENCE assumes no responsibility for damage of the receiver or servo caused by incorrect connection of the ESC.
4. Note that if the repair card is not filled out, repair and return of the ESC may be delayed.

Warranty

Item	Ultra-small digital speed controller EXSTRAIGHT	Date of purchase
Manufacture no.		Warranty term	3 months from the date of purchase
Customer's address	—		
Telephone no.	TEL ()		
Name			

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

If a failure should occur within three months of the date of purchasing the ESC, write the symptoms of the problem and the working condition on a separate sheet. Request a repair of the ESC from either the distributor where you purchased the ESC or from ACUVANCE (Technical Service Department).

Request card for repair

1. Symptom (Condition)

Please describe condition of the ESC as detailed as possible.

2. Your equipment

Please fill in the blanks below.

Description	Maker	Model No.	Others
Motor			Turn No. <input type="text"/>
Battery		Voltage: <input type="text"/> V	
		Capacity: <input type="text"/> mAh	
Receiver			
Transmitter			
Servo			
R/C Car	<input type="checkbox"/> F-1	<input type="checkbox"/> Buggy (4WD)	
	<input type="checkbox"/> Touring Car	<input type="checkbox"/> Buggy (2WD)	

3. Shop where you bought the ESC

Name :

Address :

Tel. No. :

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