ELECTRONIC SPEED CONTROLLER

FLASH SERIES

ACUVANCE

Introduction

Thank you for purchasing the FLASH series. To get the best from your FLASH series, 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 of the super-small digital speed controller FLASH series

- Featuring 24 of the latest POWER MOS FET (SOP [note 1]) with reverse run faction, the FLASH series upgraded 21% as amplifter with reverse in compare with the other of our company and it has achived the world's top class ON-resistance of 0.97m(FET specification). It provides a powerful reverse function that does not require much heat protection as well as gereater torque for a forward function.
  (Although a reverse run equivalent to forward run is possible, at the time of the use of reverse run for emergency blame, We recommend you to move the throttle lever of transmitter slowly or to carry out stroke adjustment of throttle rigger by the side of transmitter.)
- With the three-layered internal board configuration and the high-density mounting of electronic components, the FLASH series occupies the smallest mounting area without compromising its performance.
- The innovative FET drive method was adopted to improve the efficiency for low to middle acceleration while preventing heat generation. (S.R.S. drive [Note 2], VZ type only) (Patent pending)
- The MPRS system [note3] which is proven is adapted to a large current circuit. Both super-small body and hight performance have been achived.
- All connectors are gold-plated to reduce contact resistance.

[Note 1] SOP: Surface-mount package. It has only a fraction of the weight of a conventional FET.
[Note 2] S.R.S. drive: Synchronous Reverse-voltage Suppression. This is an innovative driving system, which actively eliminates the loss, generated during the pulse drive.
[Note 3] MPRS: Metal Plate Heat Radiation Structure. This is a hybrid structure that feeds a current not only through a copper foil but also through a metal plate on the PC board. It allows the best configuration with the FETs.

⚠ CAUTION

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

⚠WARNING Instructions to prevent serious injury

⚠CAUTION Instructions to prevent accidents or product damage

NOTE Additional information on proper operation

Precautions

1. Ni-Cd battery

⚠ WARNING: To prevent fumes, fire, and burns

Improper use of the Ni-Cd 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. Mounting motor

⚠ WARNING: To prevent fumes, fire, burns, and explosion

NEVER attach a Shottky diode to the motor to be used. If a Shottky diode is attached, it may explode or the ESC may be damaged. To prevent noise, be sure to mount three noise-killer capacitors according to the illustration.

3. Connection of silicone cable and connector

⚠ WARNING: To prevent fumes, fire, and burns

Before using the ESC, check if dust has accumulated on the connector terminals (metallic part) of the battery and the motor, and check if the terminals are loose. Poor contact of the connectors may reduce the efficiency and may generate heat resulting in the deformation or fusion of the resin part.

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

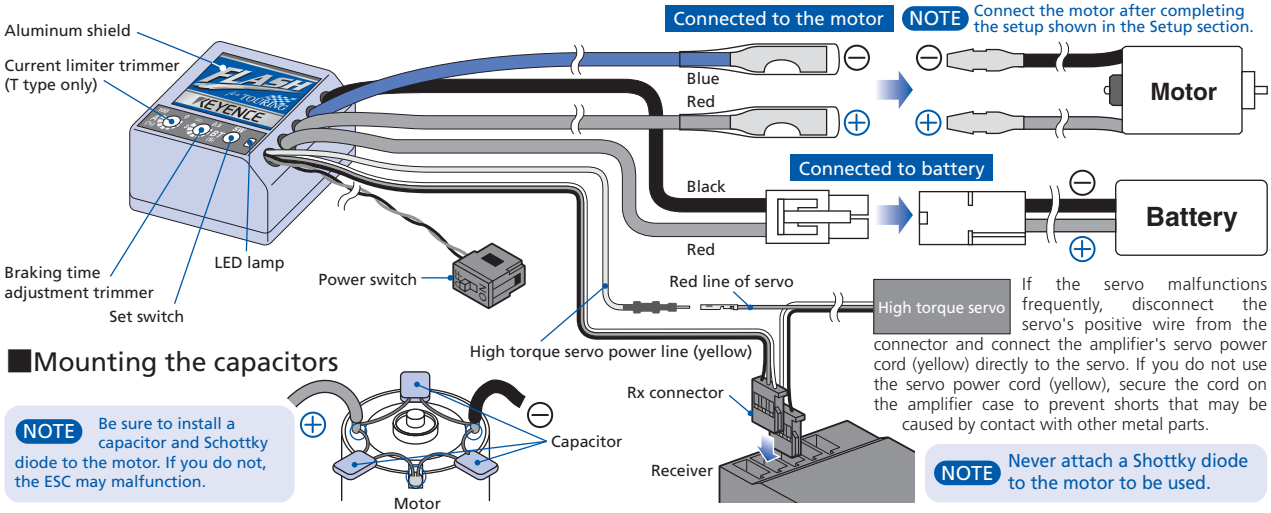
⚠ CAUTION: To prevent accidents and product damage

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.

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.



If the servo malfunctions frequently, disconnect the servo's positive wire from the connector and connect the amplifier's servo power cord (yellow) directly to the servo. If you do not use the servo power cord (yellow), secure the cord on the amplifier case to prevent shorts that may be caused by contact with other metal parts.

■Mounting the capacitors

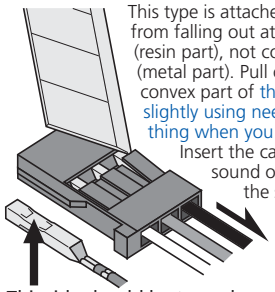
NOTE Be sure to install a capacitor and Schottky diode to the motor. If you do not, the ESC may malfunction.

NOTE Never attach a Shottky diode to the motor to be used.

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.



This type is attached stopper to prevent from falling out at the connector side (resin part), not connecter pin side (metal part). Pull out the cable while a convex part of the connector is raised slightly using needle, cutter or sharp thing when you pull out the cable.
Insert the cable untill there is a sound of crack while turning the side with connector pin (metal part) up when you insert the cable.

This side should be turned up.

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	Cut here		Cut here

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

SETUP Default Settings

NOTE For the default settings, store the neutral point, forward side high point, and reverse (brake) side high point of the transmitter in the amplifier.
Be sure to set the default settings when you use the amplifier for the first time after buying it or when the transmitter has been replaced.
Do not connect the motor until the set up is completed.

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

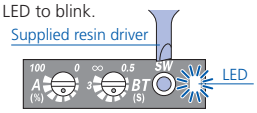
The amplifier may not be normally set depending on the settings of the transmitter. See "Notes about Setup" on the last page.

1 Check that the amplifier switch is OFF.

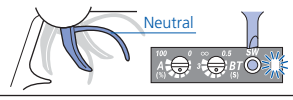
2 Turn ON the transmitter switch and set the following functions on the throttle side. Return all the settings for the neutral point, high point, and brake high point of the transmitter to Normal.

3 Turn ON the amplifier power switch.

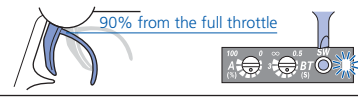
4 Press the SET switch for about five seconds to cause the white LED to blink.



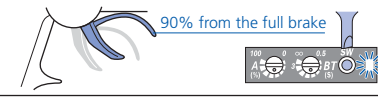
5 Put the transmitter throttle to Neutral and press the SET switch once. The blink speed of the white LED increases



6 Put the transmitter throttle to High Point and press the SET switch once (90% from the full throttle). The blink speed of the white LED decreases.



7 Put the transmitter throttle to Brake Point and press the SET switch once (90% from the full brake). The setup is completed.



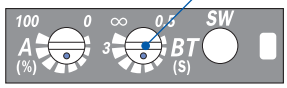
Setup confirmation ★Check the LED illumination status to confirm whether the ESC is properly set.

The proper setting can be confirmed with the LED. When the ESC is properly set, the LED indicator illuminates at "Neutral", then it goes off once and illuminates again at "High point" and at "Brake high point (Reverse high point)" as you turn the throttle. After checking that the setup has been completed successfully, connect the motor. The default setup of the amplifier is completed.

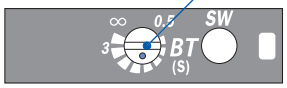
Braking time adjustment function

★The braking time can be adjusted to control the brake according to the application.

NOTE The braking time adjustment (BT) trimmer turns only within the range of 240°. Do not force it past this range.



■FLASH T type



■FLASH D type

Braking time adjustment trimmer (0.5~3sec,)
The "●" mark in the trimmer indicates the set value.

When moving the transmitter throttle from Forward to Reverse, brakes are applied to the motor once before it begins the reverse action to prevent motor breakage due to a sudden reversal. With the Braking Time Adjustment Trimmer (BT Trimmer), you can adjust the amount of time that the brakes are applied before the motor begins the reverse action within the range of 0.5 to 3 seconds.

ONE POINT

To begin the reverse action immediately irrespective of the setting time, put the transmitter throttle from Forward to Reverse to apply brakes, return it to Neutral, and put it to Reverse again.

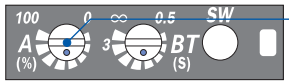
BACK CANCEL by setting , the braking time before going into the reverse action becomes infinite and the motor will never start the reverse action (= no back motion).

Current limiter (T type)

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

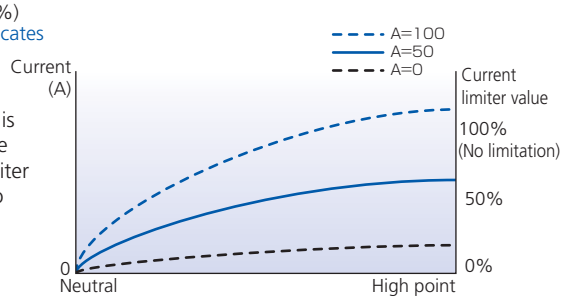
NOTE Current limiter (A) trimmer turns only within the range of 240°. Do not force it past this range.

The Ni-Cd battery of 7.2 V, 2000 mAh can produce instantaneous maximum current of 200 A;however, when it is used for a touring car, the available current is 20 to 50 A in the normal race run.



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 at full throttle. When the road surface is slippery, lower the limiter value. When you need high torque, raise the value. If you set the current limiter value to maximum, the current limiter function is disabled, allowing maximum torque. If you set the value to 0%, current is limited to the minimum value causing some motors to revolve at a slow speed. Set the value according to your needs.



ONE POINT

Setting current limitations may decrease the rotation speed of the motor. Set a proper value in consideration of both gas mileage and rotation speed.

Dash power mode (T type only)

★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.

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

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

Battery save mode (S.R.S. drive) (T type only, patent pending)

★The battery save mode reduces heat generation and fuel consumption for low- to middle-acceleration throttle operation. If you can't get the subtle throttle feel that you want, you can cancel this mode.

Setting Procedure

1. Turn OFF the amplifier power switch and turn ON the transmitter power switch.
2. Turn ON the amplifier power switch while pressing the SET switch of the amplifier.
   - ·Immediately after turning ON the power switch, the LED blinks quickly and then lights up. -> Energy Saving Mode is ON.
   - ·Immediately after turning ON the power switch, the LED lights up. -> Energy Saving Mode is OFF.

*By repeating steps 1 and 2, the Energy Saving Mode turns ON and OFF alternately.
*The ON/OFF state of the Energy Saving Mode is saved after the amplifier is turned OFF.

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:

How to Fit a Heat Sink

1. Remove the aluminum top sticker at the top of the amplifier case to expose the metal plate.
2. Use the double-sided tape supplied with the heat sink to fit the heat sink to the metal plate.

*Do not use thick double-sided tape or double-sided tape made of sponge because this weakens the heat radiation effect.

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.
The brake does not function. The car does not set into reverse.	Improper setting of ESC	Reset transmitter brake setting to normal before setting "Brake point" (reverse) . Set "Brake point" (reverse) 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.	Insufficient cooling	Attach radiating fin to improve air flow and heat radiation.
	Driving load is too high	Adjust driving system.
	A diode is attached to the motor.	Remove the Shottky diode from the motor.
Acceleration is decreased.	Improper ESC setting	Setup ESC again from the beginning.
	Current limiter value is too low	Increase current limiter value.
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.

Notes about Setup

Using a transmitter-receiver with a high response system

Our amplifier counts the frame rate of output signals from the receiver at the time of default setup in the neutral position and forcefully terminates the settings mode when the count reaches a given number of times. If you make setting changes in the high response system mode, this function may malfunction and severely shorten the time for setup due to the occurrence of the following phenomenon: The Setup Mode finishes immediately after it starts.

(Solution) If you have an FM or PCM receiver, use the receiver and set the transmitter to a mode other than the High Response Mode only during the amplifier setup. After completing the amplifier setup, return the transmitter to the High Response Mode and replace the receiver with a receiver that supports a high response function.

*If you have only high response receivers, contact the transmitter manufacturer for a solution.

Using a transmitter that has a throttle rudder adjustment function (*) and maximum brake rate adjustment function (*).

To use a transmitter that has these functions, change the amplifier settings after setting the throttle rudder angles for forward and reverse traveling to 100% of the maximum rudder position and the maximum brake rate to 100%. Depending on the settings of the transmitter, the amplifier may not detect signals correctly and the amplifier setup may not be successfully completed due to the occurrence of the following phenomena: Even if you put the throttle to the forward (reverse) side High Point and press the SET switch, the blink speed of the LED will not change. - After adjusting the brake (back) side High Point, the LED continues blinking and the setup cannot be completed.

(*) For details of the functions, see the instruction manual of the transmitter or contact the transmitter manufacturer.

Specifications

Power supply	6-cell or 8 cell Ni-Cd or Ni-MH battery	Dimensions	31.0 (W) x 26.5 (D) x 18.0 (H) mm
Maximum current	Max. current of Ni-Cd or Ni-MH battery	Weight (ESC unit)	24 g (44 g when cable included)
ON resistance	0.00097 ohm (FET specification)	Receiver/Servo regulator	7.2 V (input), 5.8 V (output), 1 A max.

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 Ni-Cd or Ni-MH 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 FLASH series	Date of purchase	. . .
Manufacture no.		Warranty term	1 year from the date of purchase
Costomer's address	—		
Telephone no.	TEL ( )		
Name			

Note that if the date and location of the FLASH series 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).

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

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.
Battery		Voltage: V Capacity: mAh	
Receiver			
Transmitter			
Servo			
R/C Car		☐ F-1 ☐ Touring Car	☐ Buggy ☐ Drift Car

3. Shop where you bought the ESC

Name :

Address :

Tel. No. :

0413-2