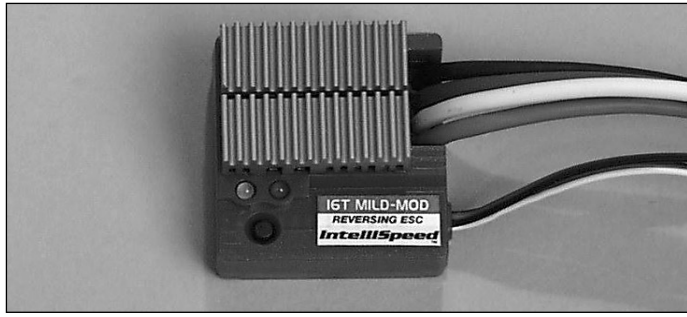




IntelliSpeed™ 16T Mild-Modified Electronic Speed Control with ABS Brakes & Reverse OPERATING INSTRUCTIONS



INTRODUCTION TO INTELLISPEED 16T MILD-MODIFIED ESC

The following instructions will help you get trouble-free operation from your electronic speed control (ESC). These simple steps will allow your ESC to achieve maximum performance and minimize the chance of problems due to incorrect installation. Consult the specifications listed below for limitations for this ESC. You should always ask your hobby dealer or call our service department before using the ESC for an application other than what is listed in these instructions. **PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY!**

FEATURES & SPECIFICATIONS

- The IntelliSpeed 16T Mild-Modified ESC is designed to be used with any 16-27 turn motors – great for sport or intermediate racing applications.
- Customize the model's traction control with three different built-in acceleration speed settings.
- Anti-Lock Brake System (ABS) enables greater control while cornering.
- A built-in reverse delay function aids in protecting model gear-trains when shifting from forward to reverse.
- Reverse lockout function meets racing purposes.
- Motor, battery, and radio connectors are pre-installed.
- High frequency operation provides very smooth control, maximizes battery run time, and reduces operating temperatures.
- High temperature control automatically shuts down the ESC to prevent damage from occurring during excessive current situations.

Input Power:	7.2 to 8.4 volts DC (6-7 cells)
Operating Frequency:	1.0 kHz
BEC:	5.0 volts / 1.0 amp
On-Resistance:	0.0046 ohms
Max. Constant Current:	192 amps
Max. Peak Current:	660 amps
Motor Turns Limit:	no fewer than 16 turns
Acceleration Time Delays:	0.0, 0.1, and 0.2 seconds
Case Size (with heat sink):	1.48 x 1.34 x 0.57" (42 x 38 x 16mm)
Weight (with heat sink):	2.19 oz (62g)

IMPORTANT INSTRUCTIONS (ESC=ELECTRONIC SPEED CONTROL)

- Do not run the car near water! Never allow water, moisture, or any foreign material inside the case of the ESC.
- Never use more than 7 cells (8.4 volts total) in the battery pack.
- Do not attempt to connect the battery pack to the ESC in reverse, as permanent damage could result.
- Do not mix instructions. If you are building a vehicle that has a mechanical speed control, do not use the wiring diagram included with the vehicle.
- Never cut or splice the ESC input wires. Do not connect a battery to the receiver's "battery" slot. The Rx receives power *through* the ESC itself, which plugs into the Rx's throttle channel slot.
- Three 0.1µF, 50V monolithic capacitors (included) should be properly installed on any motor that does not have built-in capacitors to reduce interference from electronic noise. (See step 2)
- Always disconnect the battery pack from the ESC when not in use.
- Never turn on the ESC before plugging it into the Rx and switching on the transmitter (Tx).
- Be careful not to touch the heat sink during use as it can become very hot.
- For the best performance, use an FM radio system.

STEP 1: MOUNTING THE ESC & RECEIVER

The following information can help the ESC perform at maximum efficiency and minimize the chance of overheating and radio interference problems.

MOUNTING THE ESC (Figure 1)

1. Locate the ESC in a position to allow for good airflow, with as little obstruction from the model's outer body or exterior dirt and debris as possible. Maintaining a clean ESC and achieving good airflow through the

heat sink fins is very important for keeping the ESC cool and maximizing performance.

2. Mount the ESC using double-sided mounting tape.
3. Mount the ON/OFF switch in a convenient place. Ensure that it is securely mounted, using mounting tape or screws in a location where it cannot be easily turned off by objects on the track or rough terrain.

MOUNTING THE RECEIVER

1. Radio interference can cause the ESC to rapidly switch between forward and brake, overheating the transistors and possibly damaging the ESC. The Rx and its antenna should be mounted as far away from the ESC as possible. Also, try to keep the Rx away from the motor, battery, power wires, servos, or any large piece of metal – such as a metal chassis.
2. Make sure the Rx antenna can be fully extended through a mast and not completely enclosed inside the model. Do NOT cut or coil the Rx antenna.
3. Mounting the Rx deep within the tub of the chassis can greatly increase the chance for radio interference. Try to mount the Rx away from the bottom of the chassis tub.
4. Graphite and metal chassis transmit radio noise generated by the motor. To mount the Rx on a graphite chassis (if necessary), place it on edge with the crystal and antenna as far away from the chassis as possible to reduce the chance of radio interference.

Mount the speed control to obtain maximum parallel airflow THROUGH the heat sink. For off-road cars, or cars with a metal or graphite chassis, mount the ESC on the chassis, and the Rx and antenna on the rear shock tower to reduce radio interference.

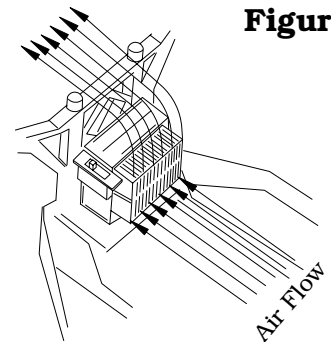
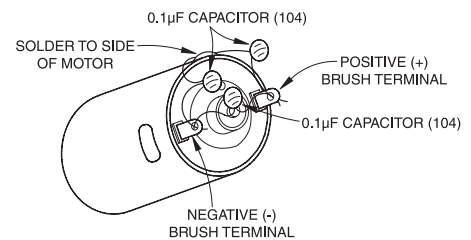


Figure 1

STEP 2: MOTOR & CAPACITOR CONNECTIONS

Figure 2



Motors generate electrical noise which can interfere with radio reception. Properly installed capacitors can help reduce the chance of such interference. Some motors come from the factory with capacitors pre-installed. Check the motor's instructions to see if capacitors are in place. Otherwise, installation of the three included 0.1µF 50V non-polarized ceramic capacitors onto the motor is highly recommended.

- Solder one capacitor between the motor's POSITIVE (+) brush tab and GROUND tab†.
- Solder one capacitor between the motor's NEGATIVE (-) brush tab and GROUND tab†.
- Solder one capacitor between the motor's POSITIVE (+) and NEGATIVE (-) tabs.

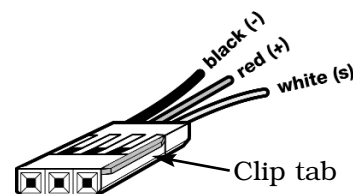
† Solder to the can of the motor if your motor doesn't have a ground tab.

STEP 3: TRANSMITTER ADJUSTMENTS

Adjusting your transmitter (Tx) is critical for proper speed control operation. The Tx throttle adjustments are described below:

- ATV, EPA, or ATL - set all to maximum.
- Throttle Trims and Sub Trims – set all at neutral or zero.

STEP 4: RADIO CONNECTOR POLARITIES

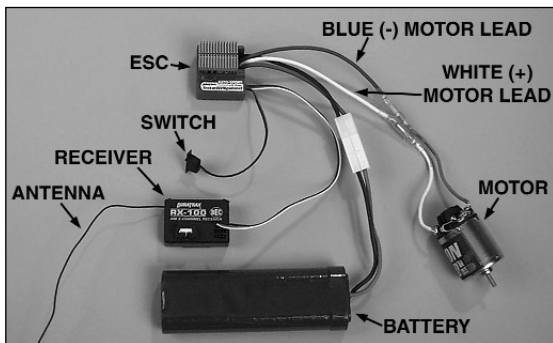


By simply clipping off the tab on the side of the connector using wire cutters, it can be directly connected to any Futaba® J, Airtronics "Z," Hitec "S," or JR receiver. For proper connection refer to your radio's manual. **WARNING:** This connector is NOT directly compatible with the old Airtronics connector style. For old Airtronics radios, it is highly recommended to use an Airtronics Servo Adapter to connect this ESC to the older style Airtronics radios. **NEVER ALLOW THE RED (+) AND BLACK (-) WIRES TO CROSS ON ANY RECEIVER OR ESC AS PERMANENT DAMAGE WILL RESULT TO BOTH ITEMS.**

STEP 5: SPEED CONTROL SET-UP

Before you begin this step, the ESC should be connected to the throttle channel on the Rx, the Tx should already be adjusted, and the ESC switch should be in the off position (refer to Step 3 for Tx adjustment).

- 1) Connect the battery pack to the ESC, turn on the Tx, then the ESC.
- 2) **NEUTRAL POINT:** Leave the throttle trigger in the neutral position. Press and hold the ESC's pushbutton until the green LED begins to flash, then release the button.
- 3) **FULL THROTTLE:** Move the throttle trigger to full throttle and hold until the red LED illuminates (motor will not operate in set up mode).
- 4) **FULL REVERSE:** Move the throttle trigger to full brake/reverse and hold until both the red and green LEDs illuminate.
- 5) **ABS BRAKES:** Return the throttle trigger to neutral. The green LED will flash briefly, followed by both the red and green LEDs oscillating after about 3 seconds.
 - a. To **activate** ABS brakes: Move the throttle trigger to either full throttle or full reverse (while LEDs are oscillating), then return to neutral. The red LED will flash to confirm ABS brakes are active.
 - b. To **de-activate** ABS brakes: Do NOT move the throttle trigger (leave in neutral position) when the LEDs oscillate in this step.
- 6) The ESC is now set for operation, confirmed by the green LED remaining on.
- 7) If the motor operates in reverse when applying forward throttle, the throttle reversing switch on the Tx must be moved to the opposite position.



STEP 6: ACCELERATION/TRACTION CONTROL

The acceleration, or traction control function provides 3 optional time delays which control how quickly full forward speed is delivered to the motor after full deflection is given to the throttle trigger. This allows the ESC to be customized to personal preferences or certain track and model conditions.

To set the acceleration / traction control:

- 1) With the Tx throttle in the neutral position, press and hold the ESC's pushbutton for 3 seconds. The green LED will flash, followed by a flashing red LED.
- 2) Release the pushbutton, and choose from one of three acceleration time delays as follows:
 - a. After one second the red LED will blink ONCE. Press and release the pushbutton at this time to set a delay of **0.0 seconds**. This is often the desirable delay for normal race tracks.
 - b. After two seconds the red LED will blink TWICE. Press and release the pushbutton at this time to set a delay of **0.1 seconds**.
 - c. After three seconds the red LED will blink THREE times. Press and release the pushbutton at this time to set a time delay of **0.2 seconds**. This is often the desirable delay for slick tracks.

STEP 7: REVERSE DELAY & REVERSE LOCKOUT SETTINGS

A time delay can be set for changing the direction of motor travel from forward to reverse. This delay helps to prevent damage to gear assemblies that can result from slamming the motor from high speed forward movement directly to reverse. The reverse direction control for this ESC can also be completely disabled or "locked-out." Many races require ESCs be used which do not have reverse function.

Follow these steps to set reverse delay or reverse lockout:

- 1) With the Tx throttle in the neutral position, press and hold the ESC's pushbutton for 5 seconds. The green and red LEDs will flash.
- 2) Release the pushbutton, and choose from one of two reverse time delays or reverse lockout as follows:
 - a. After one second the green and red LED will blink ONCE. Press and release the pushbutton at this time to set a delay of **0.3 seconds**. This is often the desirable delay for normal race tracks.
 - b. After two seconds, the green and red LED will blink TWICE. Press and release the pushbutton at this time to set a delay of **0.8 seconds**.
 - c. After three seconds the green and red LED will blink THREE times. Press and release the pushbutton at this time to **completely lockout or shut off reverse**.

THERMAL CUTOFF PROTECTION

This ESC has built-in circuitry to sense an excessive heating condition caused by current overload. If the operating temperature exceeds 100° Celsius (212° F), the unit will automatically shut down, as indicated by flashing red and green LEDs. This is to protect all on-board components and prevent permanent damage from occurring. The ESC can again be used once the internal temperature returns to an acceptable level, as indicated by a change in the setup LEDs.

TROUBLESHOOTING GUIDE

ESC DOES NOT WORK

Problem: Motor and/or steering servo are dead.

- 1) Recharge dead batteries.
- 2) Check for faulty power connections.
- 3) Check for a damaged connection between ESC and Rx.
- 4) Reverse polarity at battery. Allow ESC to rest at least 1 minute to reset the circuit protection system.
- 5) Internal damage. Unit may require service. See "Service Procedures."

Problem: No reverse.

- 1) Tx adjusted incorrectly. Repeat Step 5 above.
- 2) Reverse transistors might be damaged, and unit may require service. See "Service Procedures."

Problem: Case is melted.

Internal damage and unit requires service. See "Service Procedures."

Problem: ESC runs with switch off.

Drive transistor may be blown and unit may require service. See "Service Procedures."

ESC WORKS BUT OTHER PROBLEMS EXIST

Problem: Rx glitches or stutters during acceleration.

- 1) The three required motor capacitors are not installed or have broken. Re-check all capacitors.
- 2) The Rx signal is intermittent due to a large voltage drop during acceleration. Use an external battery and a **non-BEC** Rx designed to be used with ESCs. Pay special attention to remove the red lead from the Rx to ESC harness prior to powering up the ESC or Rx.
- 3) Rx mounted too close to ESC causing interference. Relocate Rx away from ESC.
- 4) Check for faulty power connections.
- 5) Use of an AM radio system might be resulting in erratic signals. Use of an FM radio system might be necessary.

Problem: Model runs slowly or has no acceleration.

- 1) The ESC is not set up properly. Repeat Step 5 above.
- 2) Check for faulty battery and/or motor connections.
- 3) Tx is improperly adjusted. Repeat Step 3 above.

Problem: Steering servo works but motor is dead.

- 1) Motor brushes are hanging up, worn out, or motor is bad. Clean or replace brushes and check motor.
- 2) Check for faulty motor connections.

Problem: Overheated motor or hot power plugs.

- 1) Motor is geared too high. Change to a lower gear setup.
- 2) Binding in the vehicle's drivetrain. Check to make sure nothing is interfering with the models' drivetrain.
- 3) The motor is shorted electrically. Check the motor for shorts and replace if necessary.
- 4) Check for faulty motor connections.

Problem: Motor runs backwards while forward LEDs are on.

- 1) Motor is wired backwards. Re-check Step 5 above.
- 2) A "reverse rotation" motor is being used. Replace with a forward rotation motor.

Problem: Motor runs backwards when forward command is given, even though LEDs match the motor direction.

Move the Tx throttle reversing switch to the opposite position.

Problem: Model runs properly, then motor goes dead.

The built-in thermal protection may be automatically shutting down power to the ESC due to overheating conditions. Check for binding drivetrain, bad motor or incorrect gear ratio for track conditions. Adjust gear mesh, replace motor or change gear ratio. The ESC should reset in a few minutes and operation can again be attempted.

SERVICE PROCEDURES

Note: ESCs that operate normally when received will be charged a minimum service fee and return shipping charges. Before sending your ESC in for service, it is important that you review the Troubleshooting Guide in this instruction sheet. The ESC may appear to have failed when other problems exist in the system, such as a defective Tx, Rx or servo, or incorrect adjustments/installation.

- Hobby dealers are not authorized to replace ESCs thought to be defective.
- Do not cut the input harness, switch harness, or power wires of the ESC before sending it for service. A fee will be charged for cut wires which must be replaced for testing.

120-DAY LIMITED WARRANTY

U.S. AND CANADA ONLY

DuraTrax warrants this product to be free from defects in materials and workmanship for a period of 120 days from the date of purchase. During that period, we will repair or replace, at our option, any product that does not meet these standards. You will be required to provide proof of purchase date (receipt or invoice).

If, during the 120-day period, your DuraTrax product shows defects caused by abuse, misuse, or accident, it will be repaired or replaced at our option, at a service charge not greater than 50% of the current retail list price. Be sure to include your daytime telephone number in case we need to contact you about your repair.

This warranty does not cover components worn by use, application of reverse voltage, cross connections, poor installation, subjection of components to foreign materials, any alterations to wires, or tampering. In no case shall our liability exceed the original cost of the product.

Your warranty is voided if...

- A. Reverse voltage is applied to the ESC by connecting the battery pack backwards, or plugging the motor connectors into the battery pack.
- B. Any wires are allowed to become frayed which could cause a short.
- C. The ESC is subjected to improper voltage on the inputs.
- D. Tampering of any electronic components or circuitry is attempted.
- E. Water, moisture, or any other foreign material is allowed inside the ESC.
- F. The red wire in the input harness is not removed when using an external battery pack.
- G. Too much pressure is applied when installing the heat sink.

Under no circumstances will the purchaser be entitled to consequential or incidental damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. If you attempt to disassemble or repair this unit yourself it may void the warranty.

For service to your DuraTrax product, either in or out of warranty, send it post paid and insured to:

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