OWNER'S MANUAL

FX /FX Pro
Forward / Brake

FX-R/FX-R Pro
Forward /
Brake / Reverse

10th SCALE BRUSHED SPEED CONTROL

- **Adjustable Drag Brake/Reverse Type**
- **Voltage Cutoff for LiPo Cells**
- **Realtime Temp Monitor (RTM)**
- **Push Control (Anti-Drag)**
- **QuickTune™ Digital Setup**

INTRODUCTION

Congratulations and thank you for your purchase of the ***FX***, Tekin's High- Performance 10th Scale Brushed Motor Electronic Speed Control. Just connect the speed control as described below, perform a quick radio calibrate, and you are ready to race! The QuickTune™ feature allows you to quickly and accurately adjust all critical operating parameters

QUICKSTART

By far, the fastest and easiest way to get up and running is to watch Tekin's online instructional videos at www.teamtekin.com. Watching these short and informative videos will simplify installation and help you to avoid most common problems.

FX/FX Pro Connection Diagram—Figure 5.
FX-R/FX-R Pro Connection Diagram—Figure 6.

CAUTION: The following statements need to be understood before using the *FX / FX Pro / FX-R/ FX-R Pro*:

1) Do not operate speed control in or around water.
2) Do not hook-up the battery backwards! No reverse voltage protection.
3) Turn on the transmitter first THEN turn on the speed control.
4) Disconnect battery from speed control when not in use.
5) Insulate exposed wire with heat shrink tubing to avoid shorts.
6) The *FX* series is intended for 10th scale or smaller vehicles.

BEFORE YOU BEGIN

Plan Speed Control Placement

1) Choose a location for the speed control that is protected from debris. To prevent radio interference place the speed control as far away from the radio receiver as possible and keep the power wires as short as possible. If possible plan on routing power and motor wires away from the radio receiver and radio wires. Twist the motor wires together to minimize glitching.
2) For best results clean the bottom of the speed control and chassis. Peel off the cover on one side of the doubled-sided tape, (included) and stick to the bottom of the speed control. DO NOT peel off the other side yet.
3) Use a small piece of double-sided tape on the ON/OFF switch.
4) Determine how you would prefer to connect the motor and battery pack to the speed control. For the motor, using connector pairs such as Tekin 4.0 mm Banana Connectors #TT3052, is preferable for most applications as it allows you to easily change motors (Fig.1). For the battery, consider where your pack sits and how much wire will be needed to attach to the speed control.

4.0 mm Banana Connector Part # TT3052 (3 Pairs)

POWER CAPACITOR

CAUTION: A power capacitor is supplied with the FX Series (TT3520) and MUST BE MOUNTED on the speed control for proper operation (Fig. 2). Failure to use the power capacitor can cause irreparable damage to the speed control.

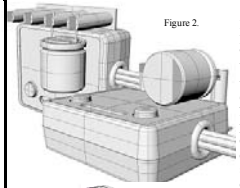


Figure 2.

INSTALLING THE POWER CAP:
The capacitor should be mounted directly to the Battery Positive (+BATT) and Battery Negative (–BATT) posts on the speed control, with the capacitor wires cut as short as possible. The capacitor polarity is indicated on the top of the capacitor by a colored half-circle which is the -BATT connection (Fig. 3).

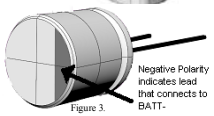


Figure 3.

SOLDERING

TIPS & TRICKS: Place the speed control on its side and use servo tape to secure it to the bench. Doing so provides a stable work area and allows easy access to the solder posts (Fig. 4). A good rule of thumb is that if a wire is to hot to hold at about 2 inches out in the wire, then the soldering iron has been on the joint to long—stop, let everything cool, then try again.

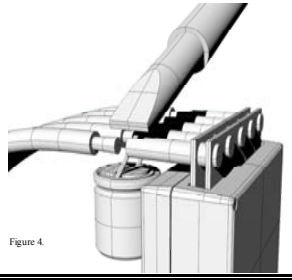


Figure 4.

SOLDERING CONT...

ATTACHING WIRES TO THE SPEED CONTROL:

1) Red wires are usually used to connect the speed control to the positive battery terminal and the positive motor terminal. Black wire is typically used for the battery negative terminal, and blue is used for the negative motor connection. Inspect the sticker on the speed control or refer to the diagrams to determine which color wire to attach to each post.

1) Strip back the insulation of the wire by about 3/32" to 1/8" and "pre-tin" the wire by heating the end and applying solder until it is thoroughly covered. **CAUTION:** Be very careful not to splash yourself with hot solder.

1) Place the tip of the iron in the notch on top of the post and apply a small amount of solder to the post. When the solder has flowed, remove the soldering iron, wipe the tip clean and apply a small amount of fresh solder to it.

1) Hold the wire so the tinned end is in contact with the notch of the post. Now touch the iron tip to the wire and the post. Wait about 2 seconds for the solder to flow, and then remove the iron while still holding the wire. You may let go of the wire after a second or two when the solder sets.

HOOKUP INSTRUCTION

DO NOT CONNECT BATTERY INCORRECTLY TO SPEED CONTROL, VERIFY THAT THE BATTERY POSITIVE WIRE WILL CONNECT TO THE SPEED CONTROL POSITIVE WIRE BEFORE CONNECTING!

1) CONNECT SPEED CONTROL TO RECEIVER
Plug the speed control into the throttle channel of the receiver.
- Channel 1: Servo
- Channel 2: Speed Control
"REMEMBER: 1 to Turn, 2 to Burn"

2) CONNECT SPEED CONTROL TO BATTERY
Visually verify that the connector on the battery pack and the speed control match the chart below, then connect.
DANGER: If the battery wires touch during the plug installation it will cause an electrical short circuit resulting in damage to the pack and possibly a fire hazard. Tekin recommends the use of high quality battery connectors to improve power transfer and minimize the risk of short-circuits.

ESC	*BATTERY*
(B-) Black Wire	(-) Negative
(B +) Red Wire	(+) Positive

3) CONNECT SPEED CONTROL TO MOTOR
Visually verify that the connector on the motor and the speed control match the chart below, then connect.

HOOKUP INSTRUCTIONS CONT...

NOTE: FXR /FXR Pro are reversing-type ESCs and wiring to motor is different from forward-only FX/FX Pro models.

ESC	*MOTOR*
(M -) Blue Wire (All Models)	(-) Negative
(M +) Red Wire (FXR/FXR Pro)	(+) Positive
(B +) Red Wire (FX/FX Pro)	(+) Positive

SELF TEST / FACTORY RESET

The *FX series* has a built-in self-test mode that checks all major systems on the speed control. Before using the self-test mode, be sure the rear wheels are free to spin (off the ground). To activate the self-test, turn the speed control on, then press/hold INC button and then press/hold MODE button simultaneously for 3 seconds. After 3 seconds, the LEDs will ramp up in sets of three. Circuits inside the speed control are tested to see if any problems have occurred. If the unit passes self-test the unit will return to run mode. If problems occur turn the power off to the unit and verify all other connections are clean/tight/correct (motor, receiver, battery, plugs, etc). After verification, power the unit back on.
NOTE: Activating the self-test mode also resets all the user-programmable settings and radio calibration settings to their default values.

SOLDERING CONT...

ATTACHING WIRES TO THE MOTOR:
The same techniques described in section 5 and 6 may be used to solder the wires to the motor.

IMPORTANT: Take precautions if removing factory battery connectors. Connecting the battery backwards will cause damage, and will void warranty. When soldering connectors to a battery pack, cut only one wire of the battery pack at a time to ensure that the exposed wires cannot short together.

HINT: If you are using connectors for both the battery and the motor, make sure that they are not the same or that you have a male and a female attached to the speed control wires. That way, you cannot accidentally connect the battery to the motor wires or vice versa.

1) Make sure that the connector ends will be mated together correctly, male to female, and that the wire colors match—red to red and black to black.
2) Solder the wires from the speed control to each of the connectors, then solder wires from the battery to each connector's mate.

RADIO CALIBRATION

NOTE: Before Radio Calibrating, ensure speed control is hooked up to the receiver, a charged battery is properly connected, and the transmitter is turned on. On your radio, set all trim adjustments to the middle, and set throttle/brake EPAs to 100%. Ensure that your throttle direction is set to "normal". Calibration is really very simple, you just press and hold the MODE button for 3 seconds to enter radio calibrate, let the speed control "find" your neutral, then let it "find" your full throttle and full brake. If you are unsure how to perform this procedure, follow the detailed steps outlined below.

Startup Sequence
After calibrating to your radio, when the speed control power switch is turned ON the unit will begin looking for the neutral signal. If a neutral signal is found the Arming Sequence (flashes LEDs/chime) will occur followed by LED4 on, then flashing to LED1. **NOTE:** If Arming Sequence does not occur see Trouble Shooting section of this manual before proceeding.

NOTE: If any problems occur, repeat radio calibration.

HINT: Once calibrated, the LEDs on the speed control will advance as the throttle or brake is applied.

RADIO CALIBRATION, CONT...

One Touch Radio Calibration

1) Turn on transmitter.
2) Turn on speed control.
3) Press and hold the MODE button on the speed control for 3 seconds. All LEDs will blink red 3 times with 3 chimes. The speed control will make a pulsing chime as it looks for a neutral signal—you do not need to do anything yet.
4) When NEUTRAL position is found and recorded, LED4 will flash and a confirmation chime will sound.
5) The pulsing chime will begin again and LED6 will flash; pull transmitter trigger to the full throttle position and hold until the confirmation chime sounds.
6) The pulsing chime will begin again and LED1 will flash; push transmitter trigger to the full brake position and hold until the confirmation chime sounds.
7) Release trigger to return to the neutral position. LEDs will flash and the Arming Sequence chime will sound.
8) LED4 is now on, flashing to LED1. Calibration is complete and you are ready to drive!

SPECIFICATIONS

Controls, FX/FX Pro	Fwd/Brk
Controls, FX-R/FXR Pro	Fwd/Brk/Rev
Input Power (Cells) FX/FX-R	4-7 NiCd/NiMh (2S LiPo)
Input Power FX Pro/FX-R Pro	4-9 NiCd/NiMh (3S LiPo)
Motor Limit	(Rated At 6 Cell/2S)
FX	10 Turn
FX-R	12 Turn
FX Pro	None
FX-R Pro	10 Turn
On Resistance	
FX	0.00015 Ohms
FX-R	0.0006 Ohms
FX Pro	0.000075 Ohms
FX-R Pro	0.0003 Ohms
Max Current	
FX	208 Amps
FX-R	104 Amps
FX Pro	416 Amps
FX-R Pro	208 Amps
BEC	6 Volt, 3 Amp
Dimensions, FX/FXR	1.15 x 0.75 x 0.4" (29 x 19 x 10 mm)
Dimensions, FX Pro/FXR Pro	1.15 x 0.75 x 0.65" (29 x 19 x 15.25 mm)

QuickTune™

Tekin's QuickTune™ electronic setup feature allows users to change every critical operating parameter in a quick, easy, and accurate fashion. The basic operation is described as:

- Use "MODE" button to scroll to a Program Feature.
- Use "INC" (increment) button to view/adjust the Feature

QuickTune™ :

1) **Press the "MODE" button to access a Program Feature.** The LED starts blinking to indicate that Feature programming is under way. Each time the MODE button is pressed and released, the LED advances. For example, to get to the Voltage Cutoff adjustment, simply press and release the MODE button 6 times. **NOTE:** Do not wait longer than 5 seconds to adjust the selected MODE or the speed control will return to normal operation. Once the MODE is selected, move on to step 2 within 5 seconds.
2) **Press the "INCR" button to adjust the value of the Feature.** The first time INCR button is pressed, the LED (s) will display the existing setting. Each time the INCR button is pushed the value will advance, then after maximum, start over again at the low end of the scale. If two LEDs are on at once, it indicates a value mid-way between the LEDs.

QuickTune Example: Let's say you want to use a 2 cell LiPo battery. To change the Voltage Cutoff from the default setting (1 = None) to setting 2 (2 = 6.0 Volt Cutoff), first follow step 1 above by pressing and releasing the MODE button 6 times. Now press and release the INC button, the LED should show the current setting of 1. Press and release the INC button again and the LED will move to position 2, indicating that Voltage Cutoff is now set to 6.0 Volts. Wait 5 seconds and the ESC returns to normal operation.
HINT: If you wish to set another Program Feature, press the "MODE" button again. After 5 seconds pause, the values you selected will be saved in memory and the speed control will resume normal operation.

PIT TUNE MODE

PIT TUNING: If you are in the pit area and cannot use your transmitter you may use pit tuning mode to adjust settings by following this procedure: Unplug the steering servo from the receiver to avoid servo damage. Hold down either MODE or INCR button while turning the power switch on. An LED sequence will occur indicating you are in pit tune mode. The user settings will be active, but the motor will not run and the speed control will not respond to receiver signals. Turn the speed control power off and back on to resume normal operation.

QuickTune™ MODES

MODE	*RANGE*	*DEFAULT*
DRAG BRAKE (DRG B)	1-11	1 (NONE)
NEUTRAL WIDTH—FX/FX Pro (NW)	1-11	7
REVERSE STRENGTH-FXR/FXR Pro (RS)	1-11	7
CURRENT LIMITER (LIM)	1-11	11 (NONE)
PUSH CONTROL / ANTI DRAG (PC)	1-11	1 (NONE)
REVERSE TYPE—FX-R/FX-R Pro (RT)	1-3	3
THROTTLE PROFILES—FX/FX Pro (TP)	1-6	3 (LINEAR)
VOLTAGE CUTOFF (VC)	1-4	1 (NONE)

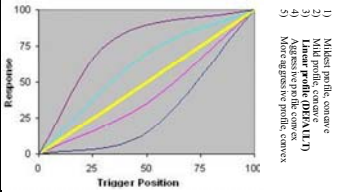
LED1: DRAG BRAKE control provides immediate braking action in the neutral zone. This gently slows the car down when you let off the trigger. Drag Brake can provide a better cornering approach. Higher values increase the degree of drag braking.

ADJUSTMENT MODES CONT...

LED2: REVERSE STRENGTH (FXR/FXR PRO ONLY) adjusts your maximum reverse strength. Higher values increase reverse strength. Use radio EPAs to reduce reverse AND brake.
LED2: NEUTRAL WIDTH (FX/FX PRO ONLY) adjusts your dead band around the neutral point. A low neutral width value provides more sensitive trigger response around neutral. A higher value allows you to move the trigger slightly before throttle or brake is engaged.
LED3: CURRENT LIMITER adjusts the throttle response during acceleration. Low values allow low amounts of current to pass to the motor, higher values allow higher amounts of current the top value turns off current limit.
LED4: PUSH CONTROL or ANTI-DRAG overcomes the natural drag of the motor when you return to neutral. Racers refer to this as "creep" , this setting eliminates the need to trim the throttle forward to create a coasting (pushing) effect. Low values give you a short duration push, higher values a longer duration push.
LED5: BRAKE/REVERSE TYPE (FXR/FXR PRO ONLY)

1) Proportional Brake with Reverse Lockout (LED1 ON). Proportional brake will be applied during reverse throttle.
2) Forward to Immediate Reverse (LED1-2 ON). The car will operate freely in forward and reverse and will change direction IMMEDIATELY.

THROTTLE/BRAKE PROFILES



OPERATING TIPS

BRAKE STRENGTH: Reducing your brake strength helps control excess skidding during heavy braking and on loose surfaces. This is a very useful setting to have, spend some time experimenting to find the right setting for your car/style/track.
DRAG BRAKE: Increased drag brake settings help by allowing you to concentrate less on braking, more on driving a good line.
NEUTRAL WIDTH: A tight neutral width can interfere with correct operation of Drag Brake and Push Control if your radio trigger does not return precisely to the same neutral position.

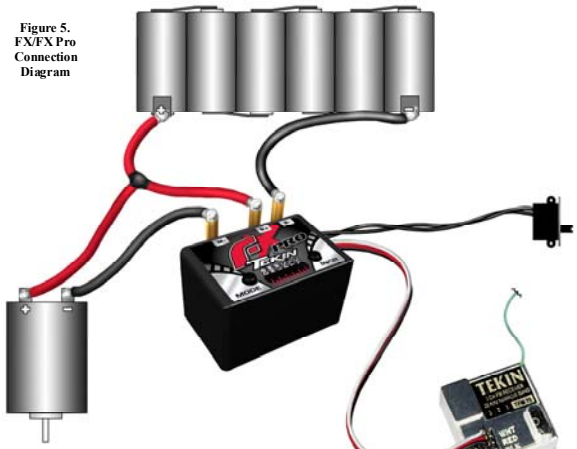


Figure 5. FX/FX Pro Connection Diagram

ADJUSTMENT MODES CONT...

3) Proportional Brake with Reverse Delay (LED1-3 ON). The car will only go in reverse if the trigger has been in neutral for 1 second, otherwise it operates like proportional brake with no reverse.

LED5: THROTTLE PROFILES (FX/FX PRO ONLY)

1) Mildest profile, concave (LED1 ON)
2) Mild profile, concave (LED1-LED2 ON)
3) Linear profile (LED1-LED3 ON)
4) Aggressive profile convex (LED1-LED4 ON)
5) More aggressive profile, convex (LED1-LED5 ON)
6) Custom— User Selectable Using Tekin HotWire PC Connection (LED1-LED6 ON)

LED6: VOLTAGE CUTOFF

1) NONE (LED1 ON)
NiCd/NiMh Cells.
2) 6 Volts (LED1&LED2 ON)
2 Cell LiPo (2S)
3) 9 Volts (LED1-LED3 ON)
3 Cell LiPo (3S)
4) Custom (LED1-LED4 ON)
User Selectable Using Tekin HotWire PC Connection

IMPORTANT: If using Lithium Polymer (LiPo) batteries, DO NOT operate your vehicle with the factory default Cutoff Voltage setting (None).

TROUBLESHOOTING

HINT: When powered on, the ESC emits an all-systems-go chime if it is connected correctly to the motor and radio.

NO LIGHTS COME ON
Check for dead batteries or reverse battery connection. Check the connections between the batteries and the speed controller and that the switch is in the "ON" position. Verify that there are no bad connections at the speed controller.

ALL LEDs FLASHING
No radio signal can be found. Check receiver connection and verify that ESC is plugged into correct channel. Verify transmitter and receiver are functioning properly.

BOTTOM OR TOP 3 LEDs FLASHING
Radio signal found, but neutral point from transmitter is out of expected range. Speed control not calibrated properly or radio settings have been changed. Adjust trim and recalibrate speed control as described in the Radio Calibration section.

SERVO AND THROTTLE DEAD
Check for dead batteries, bad battery connections to speed control, bad receiver plug connection, broken power switch, broken wires, bad or mismatched crystals, or bad radio equipment. Check that servo plug is not shorting to the speed control plug and that speed control is plugged into THR (CH2).

ERROR CODES

LED INDICATOR (S)	ERROR DESCRIPTION
All LEDs Flashing	No Radio Signal, check radio system
LEDs 1,2,3 Flashing	Radio signal found but lower than expected, See Radio Calibration Section
LEDs 5,6,7 Flashing	Radio signal found but higher than expected, See Radio Calibration Section
LEDs 1,3,5 Flashing	Voltage Cutoff set below battery voltage or in hi-temperature thermal shutdown
LEDs ramp up then down	ESC is in Pit Tune Mode
LED 4 on briefly, then flashes to one or more other LEDs	Normal operation, see Temperature Monitor Section.

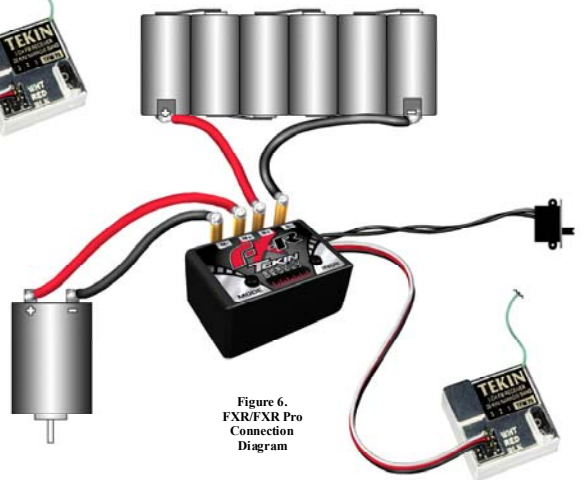


Figure 6. FXR/FXR Pro Connection Diagram

REALTIME TEMPERATURE MONITOR

The On-Board RealtimeTemperature Monitor (RTM) works to provide you with important feedback on speed control temperature, helping you to adjust gearing and avoid long term heat damage.

This is how it works;

⇒ The speed control must be calibrated to your radio and the radio must be in the neutral position.

⇒ The middle LED will be on steady, and should blink out every 2 seconds.

⇒ At the moment that the center LED blinks out, one or more of the other LEDs will light up.

⇒ LEDs 1-3 lit is typical of light loads or a stock motor.

⇒ LEDs 1-5 lit indicates heavy loads and is typical when running mod motors. LEDs 1-6 lit indicates high internal temperatures approaching thermal shutdown. Discontinue using until the speed control returns to normal operating temperature.

⇒ The FX series ESCs are equipped with a thermal shutdown feature to help protect against heat damage. If the unit shuts down, let it cool and adjust your gearing with a smaller pinion or try adding a fan directed at the solder posts.

TROUBLESHOOTING CONT...

SERVO WORKS, THROTTLE DEAD
If LEDs 1,3 and 5 are flickering, it indicates that Voltage Cutoff may be set above battery pack voltage, or that unit is in thermal shutdown. Check that cutoff is correctly set and that battery is fully charged. Motor or connections to motor are bad. Speed control not plugged into throttle channel on receiver, or receiver plug connection is bad. May be in Pit Tune mode.

STUTTERING UNDER HEAVY ACCELERATION
Receiver bad or getting magnetic field interference, try mounting receiver on its side and/or spacing it 3/16 inch up from the chassis. Try adding an electrolytic cap on the power supply (BATT socket) of receiver. Move power wires away from receiver. Remove any zip ties securing wires and check for kinked, broken, or damaged motor wires. Twist motor wires around each other to help suppress noise. Check that you are not over geared by trying a smaller pinion.

MOTOR RUNS BACKWARDS
First check that your radio trigger setting is set to NORMAL, not REVERSE, then perform a radio calibration. Check that the motor is wired correctly and that endbell is on correctly.

THROTTLE WORKS, SERVO DEAD
Broken servo. Servo plug wiring is bad or incorrectly wired.

TROUBLESHOOTING CONT...

NO REVERSE
QuickTune mode, Brake/Reverse Type is set to option 1.
QuickTune mode, Brake/Reverse Type is set to option 3 (transmitter trigger must be in neutral position for 1 second before reverse is enabled). Speed control is an FX/FX Pro, not an FXR/FXR Pro (not a reversing type).

MOTOR WILL NOT SHUT OFF OR RUNS SLOWLY
Incorrect radio calibration or throttle trim setting on transmitter. Check transmitter settings and recalibrate speed control. Moisture in speed control: Unhook batteries and let the speed control dry.

MOTOR CUTOUT/RADIO INTERFERENCE/POOR RANGE
Transmitter batteries are low or damaged. Mismatched crystals. The three-wire cable from speed control to receiver may also be too long; 6 inches is the maximum. This speed control radiates very low noise and you should have no trouble with interference. If you do have interference, mount the speed control in the pan, and mount the receiver and antenna at the top of the shock tower. Try to keep the receiver away from the batteries, power wires, metal or graphite.

BRAKES DO NOT WORK OR ARE WEAK
Speed control or radio transmitter improperly adjusted. Check that Push Control is not set to high. Adjust EPAs on transmitter all the way out and recalibrate speed control to radio.

HotWire™ PC INTERFACE

The HotWire PC Interface (TT1450) unlocks the full potential of your Tekin Speed Control, much more than just a pretty interface to your user–adjustable settings.
When you connect the HotWire to your speed control you can download and install the latest software revisions as improvements and features are added to the speed control design.
Further, because Tekin continually seeks to push performance levels, we occasionally releases Beta Version Software. With the HotWire you can, if you so choose, elect to join the team and become part of our Product Research and Development at Team Tekin.
The HotWire also allows you to adjust several hidden features not accessible through the on-board programming, such as user-defined Custom Throttle Profiles and Custom Voltage Cutoffs. Another feature is the ability to save and reload settings. If you want to recall the settings that helped put you in the A-Main last time, you can save your settings, then later instantly tweak your speed control to revert to that particular track and specific driving conditions. If you feel like leveling the playing field, you can share your custom settings with a friend.
Even better, downloadable speed control configurations from our top-level drivers give you access to the exact speed control settings that they have used in specific setups and for particular races! Check it out at www.teamtekin.com/HotWire

WARRANTY / REPAIR

TEKIN, INC. guarantees speed controllers to be free from factory defects in materials and workmanship for a period of 120 days from date of purchase, when verified by sales receipt. This warranty does not cover: suitability for specific application, components worn by use or improper voltage, tampering, misuse, or shipping. Our warranty liability shall be limited to repairing unit to our original specifications. Because we have no control over the installation or use of this product, in no case shall we be liable for damages.
Additionally, these items void the warranty:

1) Using the same polarity connectors on the battery and motor wires from the speed controller.
2) Allowing water or moisture into the speed controller.
3) Failure to attach the supplied capacitor.
4) Incorrect wiring or use inconsistent with the instructions.

WARRANTY SERVICE: For warranty work, you MUST CLAIM WARRANTY on A COMPLETELY FILLED OUT PRODUCT SERVICE FORM and include a VALID CASH REGISTER RECEIPT with purchase date, dealer name & phone# on it, or an invoice from previous service. If warranty provisions have been voided, there will be service charges.

REPAIR: Before sending your FX/FX Pro in for service, please review the Instructions and Troubleshooting sections. After reviewing these instructions, if your speed control still requires service, please contact our customer service department for additional assistance.

NOTE: Hobby dealers or distributors are not authorized to replace TEKIN products thought to be defective.

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