

SPEKTRUM 30A Firma™ Brushless ESC + 2800Kv 2-in-1

Instruction Manual

NOTICE

All instructions, warranties and other collateral documents are subject to change at the sole discretion of Horizon Hobby, LLC. For up-to-date product literature, visit horizonhobby.com or towerhobbies.com and click on the support or resources tab for this product.

Meaning of Special Language

The following terms are used throughout the product literature to indicate various levels of potential harm when operating this product:

WARNING: Procedures, which if not properly followed, create the probability of property damage, collateral damage, and serious injury OR create a high probability of superficial injury.

CAUTION: Procedures, which if not properly followed, create the probability of physical property damage AND a possibility of serious injury.

NOTICE: Procedures, which if not properly followed, create a possibility of physical property damage AND a little or no possibility of injury.

WARNING: Read the ENTIRE instruction manual to become familiar with the features of the product before operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.

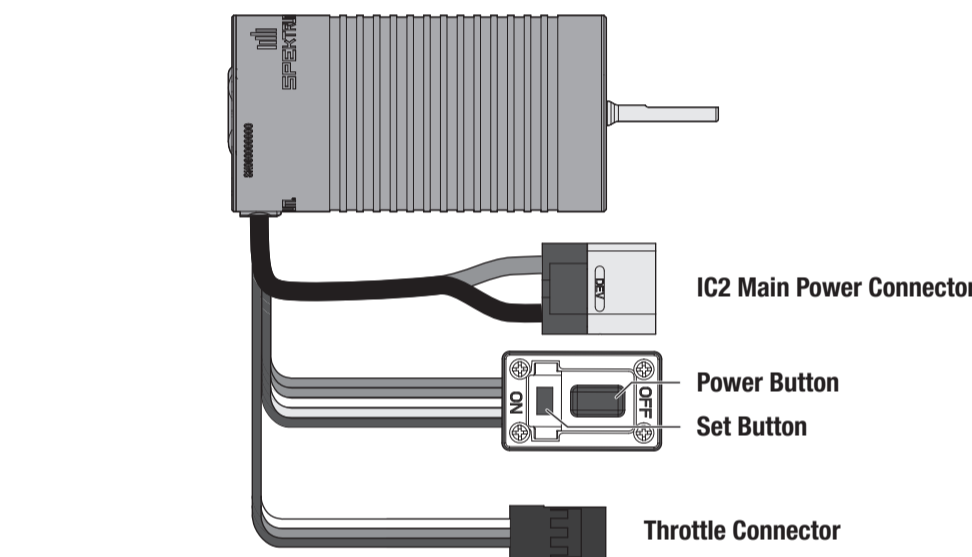
This is a sophisticated hobby product. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children without direct adult supervision. Do not attempt disassembly, use with incompatible components or augment product in any way without the approval of Horizon Hobby, LLC. This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or serious injury.

Age Recommendation: Not for children under 14 years. This is not a toy.

NOTICE: This product is only intended for use with unmanned, hobby-grade, remote-controlled vehicles and aircraft. Horizon Hobby disclaims all liability outside of the intended purpose and will not provide warranty service related thereto.

Specifications

	SPMXSEM0502
Continuous peak current	30A
Main applications	1/16 and 1/18 rock crawler
LiPo/NiMH Cells	2-3S LiPo, 6-9 Cells NiMH
BEC output	6V/7.4V adjustable, continuous current 4A (Switch mode)
Input plug	IC2
Weight	2.7oz (76.5g)
Parameter setting	Set button
Motor KV	2800Kv
Diameter/length of Motor	24mm / 45.8mm
Shaft diameter / exposed shaft length	2.3mm / 13.7mm
Motor Poles	4 poles



Gearing

Improper gearing will cause excessive heat buildup in the motor and speed control. Use your vehicle's kit manual in order to find the manufacturer's recommended pinion size. It is best to monitor the system's operating temperature when you are operating on new and different tracks or racing surfaces. Your system's operating temperature should never exceed 160° F (71° C). The best place to

monitor the system's temperature is at the center of the end bell. If the temperature is higher than 160° F (71° C) after a 5 minute run, the gearing should be lowered (change to a smaller pinion gear).

CAUTION: Once the battery is connected to the system, stay clear of the rotating shaft and pinion gear. Failure to do so could result in personal injury.

Installing the System

Always ensure the mounting screws are long enough to properly seat into the motor. However, ensure the screws do not enter into the motor too far, which could cause damage.

The maximum depth that the mounting screws can enter into the motor is approximately 1/8th in (3mm). We suggest using the mounting hardware included with your vehicle. The use of screws that are too long will damage the system and void any warranty. When installing the motor into your vehicle, it is very important that the gear mesh is correct and smooth with no binding. The vehicle's motor mounts usually feature adjustable slotted mounting holes so that you can adjust the gear mesh properly.

Proper gear mesh (how gear teeth meet) is important to the performance of the vehicle. When the gear mesh is too loose, the spur gear could be damaged by the pinion gear of the motor. If the mesh is too tight, speed could be limited and the system will overheat. Insert a small piece of paper in between the pinion and spur gears as you are installing them. Push the gears together while tightening the screws that mount the system. When the mesh is at the correct distance, remove the small piece of paper by rotating the spur gear until the paper comes out. Check the mesh at multiple points around the larger spur gear before finalizing the motor mounting position.

Connecting the System

- Connect the receiver; Insert the servo connector coming from the motor into the throttle channel of receiver.
- Connect the battery; The Firma 2-in-1 ESC motor has an IC2 battery connector. Connect a 2S LiPo Battery with an IC2 connector when you are ready to operate your vehicle.

NOTICE: Do not connect a dedicated receiver battery to the receiver along with the ESC. When the ESC is turned On it will provide the receiver with 6V regulated power from the main battery through the throttle connection. The ESC may be damaged if the receiver is also connected to a dedicated receiver battery.

NOTICE: Always disconnect the battery from the system when you have finished operating your vehicle. The system's switch only controls power to the receiver and servos. The system will continue to draw current when connected to the battery, resulting in possible damage to the battery through over-discharge.

ESC Calibration

When using a new ESC it is important to calibrate it so the ESC matches the throttle range on your transmitter. If you install a new radio system, or make changes to your throttle/brake values in your transmitter, you must redo the ESC Calibration Process. Failure to calibrate the ESC to your radio system will result in the ESC not working correctly. Set the Fail Safe on your radio to a neutral position to ensure the motor stops in the event of a signal loss.

- Power ON your transmitter, and begin with throttle values at 100% for dual rates and travel, and at neutral for trim and sub-trim. Verify there are no ABS braking functions activated before proceeding with calibration. For transmitters without an LCD, turn the D/R knob to the max setting, and center the throttle trim.
- Connect a battery to the ESC.
- Hold the Set button and power ON the ESC. The motor will beep, release the power button.
- With the throttle trigger and trim in the neutral position, press and release the set button. The motor will emit one tone.
- Pull the throttle trigger to full throttle, and press and release the set button. The motor will emit two tones.
- Push the throttle trigger to full reverse, and press and release the set button. The motor will emit three tones.
- Power OFF the system by pressing the ON/OFF button.
- Power ON the system by pressing the ON/OFF button. The system is ready for operation.

Operation

- Power ON your transmitter.
 - Connect a battery to the power connector coming from the motor.
 - Press and release the ON/OFF button to Power ON the ESC.
 - The Motor will emit two tones to indicate 2S LiPo, and three tones to indicate 3S LiPo.
 - After operation, press and release the ON/OFF button to power OFF the vehicle, or unplug the battery.
- IMPORTANT:** Always unplug the battery after operation. If you leave the battery connected for an extended period of time, it will slowly drain the battery to zero volts and cause permanent damage to your battery.

ESC Programming

- Power ON your transmitter, leave throttle and throttle trim at neutral.
- Connect a battery to the ESC and power ON the ESC.
- Press and hold the set button for two seconds.
- Press and release the set button to navigate and select options from the programming table. The motor will emit tones that correspond to the table.
- Press and quickly release the set button to move to the next parameter. At the desired parameter, press and hold the set button for three seconds to make the selection.
- Press and quickly release the set button to move to the next value under the selected parameter. At the desired value, press and hold the set button for three seconds to make the selection. The motor will emit a long tone to indicate the selection is saved.
- Power OFF the system.
- Repeat steps 2-7 to make further programming changes.

Programming Options

Programmable Item	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
1. Running Mode	Forward/ Brake	Forward/ Brake/ Reverse	Forward/ Reverse						
2. RPM/Throttle Matching	Disabled	Enabled							
3. LiPo Cells	Auto	2S	3S						
4. Cutoff Voltage	Disabled	Low	Medium	High					
5. Thermal Protection	221F/105C	257F/125C	Disabled						
6. Motor Rotation	CCW	CW							
7. BEC Voltage	6.0V	7.4V							
8. Drag Brake Force	Disabled	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
9. Drag Brake Rate	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9
10. Max Brake Force	12.5%	25%	37.5%	50%	62.5%	75%	87.5%	100%	Disabled
11. Max Reverse Force	25%	50%	75%	100%					
12. Punch	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9

1. Running Mode

Determines if the motor will operate with or without brake and reverse.

2. RPM / Throttle Matching

The motor RPM will change when the vehicle encounters obstacles or terrain changes (RPM is based on the loads on the vehicle). This setting manages how aggressively the ESC will change the RPM under load.

When the throttle input remains unchanged, setting this item to "Low" provides the feeling of a brushed motor. Setting it to "High" provides a strong sense of speed-governing, making the vehicle maintain speed at a given throttle setting regardless of the resistance.

The default setting is enable.

3. LiPo Cells

When Auto is selected the ESC will determine the number of LiPo cells at every power up by the initial voltage. If you want to set it for a specific value you can choose 2s or 3S.

4. Cutoff Voltage

Low Voltage Cutoff (LVC) for LiPo Protection. This item is mainly for preventing LiPo packs from being over-discharged. If the LVC is enabled, the ESC will reduce the output to 50% and cut power 10 seconds later when the voltage goes below the cutoff threshold. The red LED will begin a repeating single flash when the ESC enters LVC.

If the LVC is disabled, the ESC will not cut off the power when the voltage is low. We don't recommend setting the LVC to "Disabled" when using a LiPo pack, Without LVC it is easy for a LiPo battery to be damaged due to over-discharge.

- NiMH - For a NiMH pack, we recommend setting this item to "Disabled."
- Cutoff Voltage - The ESC will set the cutoff for the pack based on the voltage the battery is at when the battery is connected.

5. Thermal Protection

Select the temperature cutoff you wish to use, or disable the thermal protection at your own risk. We recommend the default setting of 221F/105C.

6. Motor Rotation

Change this setting to reverse the motor rotation. Do not change wiring with this 2-in-1 motor/ESC system.

7. BEC Voltage

- Option 1: 6.0V Appropriate for most standard servos. Not recommended for High Voltage (HV) servos.
- Option 2: 7.4V Appropriate for high voltage servos. Do not use this option with standard servos; it's possible a standard 5 – 6 Volt rated servo will be damaged at this voltage setting.

8. Drag Brake

Braking power when the throttle is at the neutral position. Higher drag brake values are used to provide a stronger hold or hill brakes.

IMPORTANT: Drag brakes will consume more power and heat will be increased, start with small values and use with caution. Improve ventilation to ESC if heat is excessive.

9. Drag Brake Rate

This feature manages how rapidly the ESC applies drag brakes. Choose the drag brake rate from level 1 (very soft) to level 9 (very aggressive); lower values ramp the brakes slower and prevent sudden stops or jerky stopping movements.

10. Max Brake Force

Determines how much braking power can be applied when the throttle trigger is in the full reverse position.

11. Max. Reverse Force

The power applied to the motor when the throttle trigger is at the full reverse position. We recommend using a low value for most drivers.

12. Punch

Determines how quickly power is applied when the throttle trigger is quickly moved to the full throttle position.

Problem	Possible Cause	Possible Solution
The ESC is not starting, and there are no motor beeps.	1. No power getting to ESC. 2. ESC switch was damaged.	1. Check all ESC and battery connections and check the status of the battery. 2. Contact the Horizon Hobby Service center
After the ESC is powered on and finished LiPo detection, the motor beeps but does not respond to throttle input.	1. The ESC didn't detect a throttle signal. 2. The neutral throttle value stored on your ESC is different from the one stored on the transmitter.	1. Check if the throttle wire is plugged in backward or in the wrong channel, and verify the transmitter has good batteries and is powered ON. 2. Re-calibrate the throttle range after you release the throttle trigger to the neutral position.
The vehicle runs backward when you pull the throttle trigger for forward.	The default motor direction doesn't match your chassis.	Reverse the motor using the programming button on switch.
The motor suddenly stopped or significantly reduced the output in operation.	1. The control link receiver was influenced by radio interference. 2. The ESC entered the LVC protection. 3. The ESC entered the ESC thermal protection.	1. See your transmitter manual for more information on troubleshooting the radio link. 2. Replace or recharge the battery. 3. Allow the ESC to cool before further use.
The throttle response is bad close to neutral and the vehicle wants to crawl.	1. Worn potentiometer on throttle mechanism of the transmitter. 2. The ESC calibration was not proper.	1. Repair or replace your transmitter. 2. Re-calibrate the throttle range or fine tune the neutral position on the transmitter.
When pressing the SET button to set the throttle neutral position, you were unable to set the full throttle endpoint and the full brake endpoint after the neutral position was accepted.	1. The ESC throttle cable wasn't plugged into the correct channel on the receiver. 2. The ESC throttle cable was plugged in backward. 3. The throttle range set on your ESC is different from what your transmitter has set.	1. Plug the throttle cable into the throttle (TH) channel on your receiver. 2. Refer to your receiver manual to verify proper connection. 3. Re-calibrate your transmitter to the ESC.

1-Year Limited Warranty

What this Warranty Covers

Horizon Hobby, LLC. (Horizon) warrants to the original purchaser that the product purchased (the "Product") will be free from defects in materials and workmanship for a period of 1 year from the date of purchase.

What is Not Covered

This warranty is not transferable and does not cover (i) cosmetic damage, (ii) damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or due to improper use, installation, operation or maintenance, (iii) modification of or to any part of the Product, (iv) attempted service by anyone other than a Horizon Hobby authorized service center, (v) Product not purchased from an authorized Horizon dealer, (vi) Product not compliant with applicable technical regulations, or (vii) use that violates any applicable laws, rules, or regulations. OTHER THAN THE EXPRESS WARRANTY ABOVE, HORIZON MAKES NO OTHER WARRANTY OR REPRESENTATION, AND HEREBY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

Purchaser's Remedy

Horizon's sole obligation and purchaser's sole and exclusive remedy shall be that Horizon will, at its option, either (i) service, or (ii) replace, any Product determined by Horizon to be defective. Horizon reserves the right to inspect any and all Product(s) involved in a warranty claim. Service or replacement decisions are at the sole discretion of Horizon. Proof of purchase is required for all warranty claims. SERVICE OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY.

Limitation of Liability

HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY, REGARDLESS OF WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR ANY OTHER THEORY OF LIABILITY, EVEN IF HORIZON HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability. If you as the purchaser or user are not prepared to accept the liability associated with the use of the Product, purchaser is advised to return the Product immediately in new and unused condition to the place of purchase.

Law

These terms are governed by Illinois law (without regard to conflict of law principals). This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Horizon reserves the right to change or modify this warranty at any time without notice.

WARRANTY SERVICES

Questions, Assistance, and Services

Your local hobby store and/or place of purchase cannot provide warranty support or service. Once assembly, setup or use of the Product has been started, you must contact your local distributor or Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please visit

Warranty and Service Contact Information

Country of Purchase	Horizon Hobby	Contact Information	Address
United States of America	Horizon Service Center (Repairs and Repair Requests)	servicecenter.horizonhobby.com/RequestForm/	2904 Research Rd. Champaign, Illinois 61822 USA
	Horizon Product Support (Product Technical Assistance)	productsupport@horizonhobby.com 877-504-0233	
	Sales	websales@horizonhobby.com 800-338-4639	
European Union	Horizon Technischer Service Sales: Horizon Hobby GmbH	service@horizonhobby.de +49 (0) 4121 2655 100	Hanskampring 9 D 22885 Barsbüttel, Germany

FCC Information

Supplier's Declaration of Conformity

30A Firma 2-in-1 Brushless ESC/2800Kv Motor (SPMXSEM0502)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. Consult the dealer or an experienced radio/TV technician for help.

IC Information

CAN ICES-3 (B)/NMB-3(B)

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science, and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following 2 conditions:

Compliance Information for the European Union

EU Compliance Statement:
30A Firma 2-in-1 Brushless ESC/2800Kv Motor (SPMXSEM0502); Hereby, Horizon Hobby, LLC declares that the device is in compliance with the following: 2014/30/EU EMC Directive; RoHS 2 Directive 2011/65/EU; RoHS 3 Directive - Amending 2011/65/EU Annex II 2015/863.

The full text of the EU declaration of conformity is available at the following internet address: <https://www.horizonhobby.com/content/support-render-compliance>.



our website at www.horizonhobby.com, submit a Product Support Inquiry, or call the toll free telephone number referenced in the Warranty and Service Contact Information section to speak with a Product Support representative.

Inspection or Services

If this Product needs to be inspected or serviced and is compliant in the country you live and use the Product in, please use the Horizon Online Service Request submission process found on our website or call Horizon to obtain a Return Merchandise Authorization (RMA) number. Pack the Product securely using a shipping cart. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon is not responsible for merchandise until it arrives and is accepted at our facility. An Online Service Request is available at http://www.horizonhobby.com/content/service-center_render-service-center. If you do not have internet access, please contact Horizon Product Support to obtain a RMA number along with instructions for submitting your product for service. When calling Horizon, you will be asked to provide your complete name, street address, email address and phone number where you can be reached during business hours. When sending product into Horizon, please include your RMA number, a list of the included items, and a brief summary of the problem. A copy of your original sales receipt must be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

NOTICE: Do not ship LiPo batteries to Horizon. If you have any issue with a LiPo battery, please contact the appropriate Horizon Product Support office.

Warranty Requirements

For Warranty consideration, you must include your original sales receipt verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be serviced or replaced free of charge. Service or replacement decisions are at the sole discretion of Horizon.

Non-Warranty Service

Should your service not be covered by warranty, service will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for service you are agreeing to payment of the service without notification. Service estimates are available upon request. You must include this request with your item submitted for service. Non-warranty service estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Horizon accepts money orders and cashier's checks, as well as Visa, MasterCard, American Express, and Discover cards. By submitting any item to Horizon for service, you are agreeing to Horizon's Terms and Conditions found on our website http://www.horizonhobby.com/content/service-center_render-service-center.

ATTENTION: Horizon service is limited to Product compliant in the country of use and ownership. If received, a non-compliant Product will not be serviced. Further, the sender will be responsible for arranging return shipment of the un-serviced Product, through a carrier of the sender's choice and at the sender's expense. Horizon will hold non-compliant Product for a period of 60 days from notification, after which it will be discarded.

10/15