SMART®
TECHNOLOGY

FIRMA™ MARINE

Spektrum FIRMA Smart ESC Series

Spektrum FIRMA Smart Geschwindigkeitsreglerserie

Série de variateurs ESC Spektrum FIRMA Smart

Smart ESC SPEKTRUM FIRMA

HORIZON® HOBBY

SPEKTRUM®

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.

Waterproof Component

Your new Horizon Hobby® Spektrum™ ESC has been designed and built to allow you to operate the product in many “wet conditions,” including puddles, creeks, wet grass, snow and even rain.

While waterproof, this component has not been designed to be immersed in water for long periods of time and should NOT be treated like a submarine. In addition, most metal parts, including any screws and nuts, as well as the contacts in the electrical cables, will be susceptible to corrosion if additional maintenance is not performed after running in wet conditions.

To maximize the long-term performance of your ESC and to keep the warranty intact, it should only be used as described in the “Usage Conditions” section of this manual. Additionally, the procedures described in the “Wet Conditions Maintenance” section must be performed regularly if you choose to run in wet conditions. If you are not willing to perform the additional care and maintenance required, then you should not operate your vehicle in those conditions.

CAUTION: Failure to exercise caution while using this product and comply with the following precautions could result in product malfunction and/or void the warranty.

General Precautions

- Read through the wet conditions maintenance procedures and make sure that you have all the tools you will need to properly maintain your ESC.
- Do not operate your ESC where it could come in contact with salt water (ocean water or water on salt-covered roads), contaminated or polluted water.

Salt water is very conductive and highly corrosive, so use caution.

Usage Conditions

Your ESC will operate successfully in any of the following, individual-usage scenarios:

- 2 hours continuous operation in damp grass or vegetation.
- 2 hours continuous operation in heavy fog (95% humidity, saturated air, condensing water).
- 1 hour continuous operation in light rain (<0.10 in/2.5mm per hour).
- 15 minutes continuous operation in heavy rain (>0.30 in/7.6mm per hour).
- 1 hour continuous operation in light sleet (<0.10 in/2.5mm per hour).
- 1 hour continuous operation in light snow (<0.25 in/6.35mm per hour).
- 45 minutes continuous operation in standing or running fresh water (the water level should always remain below the vehicle frame), or constant splashing water, without any immersion of waterproof component(s).
- 5 minutes continuous operation in standing or running fresh water (the water level should never rise higher than 0.5 in (about 10mm) above the vehicle frame), constant splashing water, or frequent, intermittent immersion of waterproof component(s).
- 1 hour continuous operation in damp sand, dirt, mud or snow (the material level should always be below the vehicle frame), constant splatter without any immersion or coverage of waterproof component(s).

Furthermore, when appropriate maintenance procedures (as described below) are performed promptly following exposure, the ESC will remain best protected from corrosion or other long-term, water-related damage.

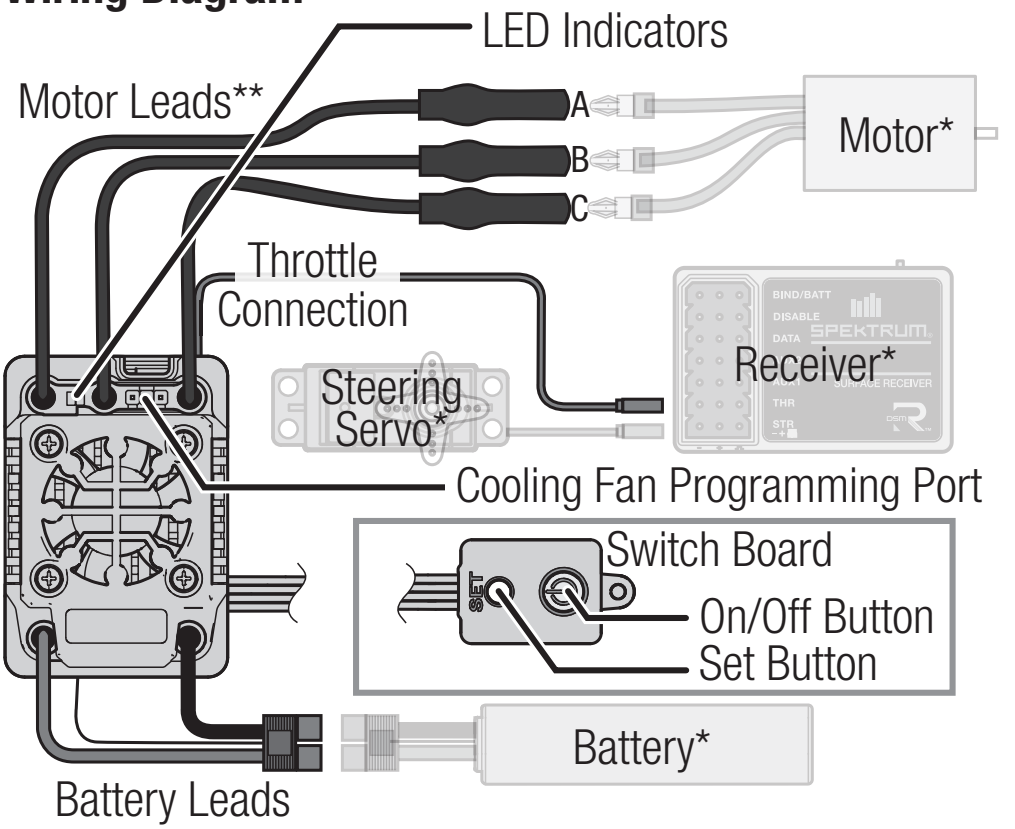
Wet Conditions Maintenance

- Gently rinse the mud and dirt off the ESC with a garden hose.
- Remove the battery pack(s) and dry the contacts.
- If you have an air compressor or a can of compressed air available, blow off the ESC to help remove any water that may have gotten into small crevices or corners. Dry any water that may be inside a recessed connector housing.
- Let the ESC air dry before you store it. Water may continue to seep or evaporate out of tight areas for a few hours.

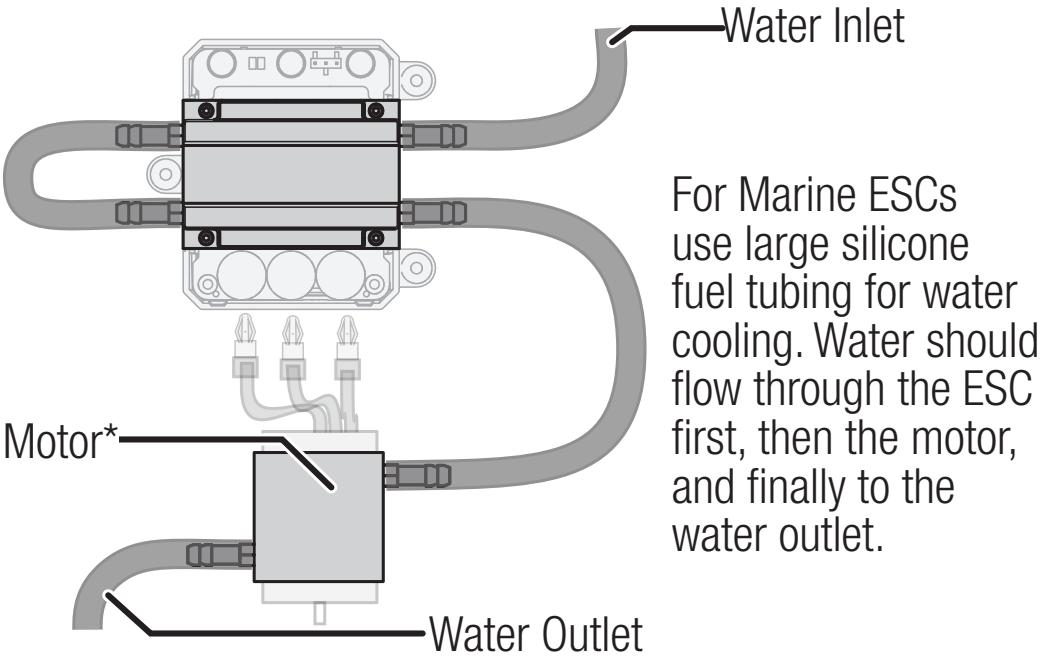
NOTICE: Never use a pressure washer to clean your vehicle.

Spektrum Firma ESCs

Wiring Diagram



Water Cooling For Marine Versions



*Not Included
**Some Firma ESCs feature female bullet connectors directly on the ESC case

Throttle Signal

Smart Throttle

The Spektrum Firma™ ESC is compatible with Smart Throttle. Smart Throttle combines throttle signals with telemetry data from the ESC on one normal three wire servo connector. Smart Throttle compatible receivers will detect a Smart Throttle ESC and automatically begin to send telemetry information to your transmitter.

Using the Smart Throttle connection this ESC can send voltage, current, and other telemetry data. It can also pass along battery data from compatible Spektrum Smart batteries. A Spektrum Smart battery with IC3™ or IC5™ connector is required for battery data. EC3™ connectors are compatible for basic operation, but will not provide Smart battery data.

Only certain Spektrum telemetry receivers include Smart Throttle, check your receiver manual for more information. If the ESC is not connected to a Smart Throttle compatible receiver no telemetry data from the ESC will be available, but the ESC will operate normally with a common servo signal (PWM).

Normal Servo Signal (PWM)

The Firma ESCs are fully compatible with common RC receivers and will use a conventional PWM signal for basic operation.

Installation and Wiring

1. Mount the ESC and power button with the included mounting tabs, double sided tape or hook and loop material. Select a location to mount the ESC with good ventilation for cooling. The ESC mounting tabs can also be used to secure the ESC to the vehicle‘s chassis.
2. Connect the three motor wires from the ESC to the motor wires. Connect A on the ESC to A on the motor (B to B and C to C). In the event the motor spins the wrong direction, reverse any two wires.
3. Connect the throttle servo lead to the throttle port on your receiver.
4. Secure all wiring so it is protected from damage or being caught by moving parts.

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.

ESC and Transmitter Calibration

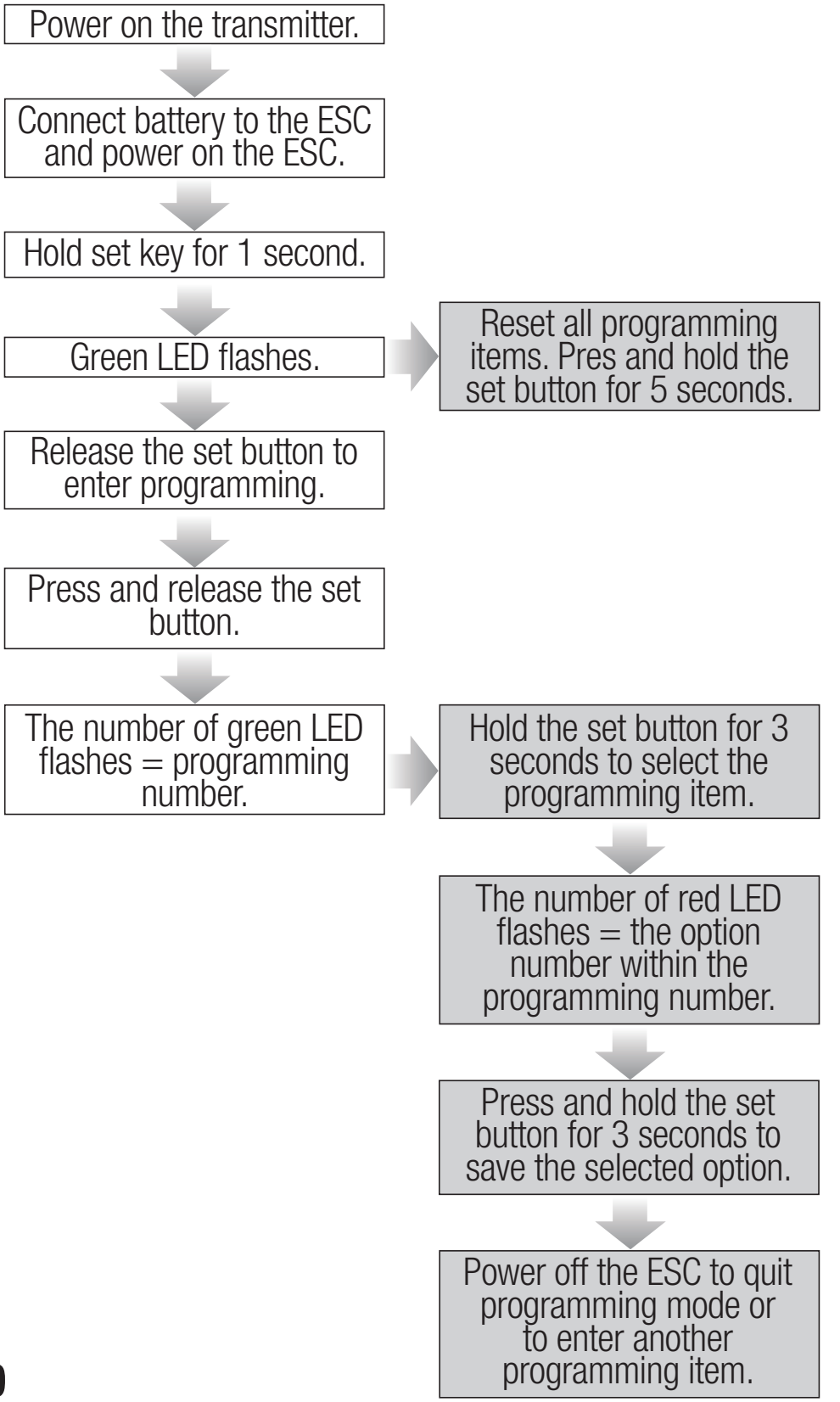
1. Begin with the transmitter and receiver binding complete.
2. Set your transmitter's throttle channel to 100% travel and trim to neutral.
3. Turn on your transmitter and connect a battery to the ESC but don't power it on.
4. Press and hold the Set button while turning on the ESC. When the red LED begins to flash, release the Set button. The ESC will enter programming mode if the button is pressed for more than three seconds.

TIP: The red LED should be flashing when the ESC enters calibration mode. If the green LED is flashing the ESC is in programming mode.

5. Leave the throttle trigger at the neutral position, then press and release the Set button. The red LED will stop flashing, the green LED will flash one time and the motor will make a tone to indicate the neutral position has been accepted.
6. Hold the throttle trigger at the full throttle position then press and release the Set button. The green LED will flash twice and the motor will make two tones to indicate the full throttle position has been accepted.
7. Hold the throttle trigger at the full brake position then press and release the Set button. The green LED will flash three times and the motor will make three tones to indicate the full brake position has been accepted.

The motor will operate normally after calibration is completed.

Button Programming



More Programming Options

The programmable items and their options can be found on the included programming card. Use the button programming, Smart ESC programming box (SPMXCA200) or the SmartLink USB updating and programmer application to make settings changes. Programming can also be done through Firma programming on specific computer transmitters. See **SpektrumRC.com** for more details about your Firma ESC.

Programming with the SPMXCA200 Smart Programmer Box

1. Unplug the fan and connect the programming lead to the fan port.
2. Connect a battery to the ESC.
3. Power on the ESC and select the parameter with the SELECT button.
4. Change the values of the selected parameter with the EDIT button
5. Press the SAVE button to save the changes. The ESC requires a power cycle to implement the saved changes.

Firma Programming

Advanced features for your ESC may be accessed directly through your Spektrum compatible transmitter (DX5C, DX5 Rugged, DX5R, DX5 Pro AND DX6R) when using a compatible Spektrum™ Firma™ Smart speed control with a Smart compatible telemetry receiver.

More Programming Options

1. Power ON your Transmitter.
2. Power ON your Smart equipped vehicle.

3. When the Smart logo is visible on the Main Screen of your transmitter, scroll to the Firma Programming page.
4. Follow the on-screen prompts as directed. (Turn wheel all the way to the Right and hold for 5 seconds, then all the way to the Left and hold for 5 seconds.)
5. The menu will change to ESC programing options, at which time throttle is disabled. The vehicle will not respond to throttle commands while in the ESC programming menu. Normal throttle control will resume when you select one of Exit options on the Smart ESC page.
6. The functions listed in the transmitter menu are same as the Spektrum ESC Program box.
    - Use the throttle trigger to move the menu; Pull the trigger (forward throttle)to move the menu down. Push the trigger (reverse throttle) to move the menu up.
    - Cursors next to the line show which function is available to select.
    - Turning the wheel to the left or right will let you access the parameters within each function. An asterisk "*" next to the parameter shows the ESC's default setting.
    - Select the Exit option you want by moving the cursor to the chosen position. Then turn the wheel to the Left or Right to exit the Menu.

Save w/Exit : will save any parameter settings changed.

Default w/Exit : will return all parameters to ESC default settings.

Exit : will leave the Smart ESC menu, and not save any changes.

7. Once you choose an exit option you will hear the normal startup tones as the ESC reconnects with the 5Pro. Normal throttle control will only be restored after selecting one of the Exit options.

IMPORTANT: You can access other transmitter menu functions away from the Firma Programming screen, but you cannot drive your until you Exit the Firma Programming screen. While the Firma Programming screen is active, the throttle is disabled on the vehicle. Steering control remains active during ESC programming.

Operation

1. Connect a battery to the ESC.
2. Leave the transmitter throttle at neutral and press the On/Off button on the ESC to turn it on. The ESC will cause the motor to make several tones.
   The number of tones indicates (1) the ESC is in operation (2) the LiPo cell count detected and (3) the ESC is in a ready-to-use state.
3. Press the On/Off button or unplug the battery to turn off the ESC.

NOTICE: Do not leave a battery connected with the ESC turned off for extended periods of time. Always unplug the battery for storage or the battery may be damaged.

LED Indicator	LED Code
ESC turned On, LED indicator is Off	Throttle trigger is in the neutral zone
Red LED illuminated	ESC is operating in forward, reverse or brake
Red and Green LED illuminated	ESC is at full throttle, full brake, or full reverese
LED flashes red once and one signal pulse per second	LVC protection activated. (detected by entire voltage of battery)
LED flashes red twice and two signal pulses per second	LVC protection activation has detected a weak cell within a Smart battery (a cell has reached as low as 2.8V). This is a warning that the pack's health is at a level of low output capabilities.
LED flashes green with short single pulses	The ESC is in thermal shutoff mode
LED flashes green with two short pulses repeating	Battery under voltage (cell count too low)
LED flashes green with three short pulses repeating	The ESC has exceeded the continuous current limit
LED flashes green with four short pulses repeating	The ESC has failed the self test
LED flashes green with five short pulses repeating	Capacitor temp has been exceeded

Troubleshooting Guide

Problem and LED Indicator	Error Mode	Possible Causes	Solution
Motor won't operate. LED flashes red once with a single short pulse.	LVC has been activated for non smart battery.	Battery voltage is below the LVC setting.	Verify the battery is charged.
		ESC settings are incorrect for the battery.	Verify the ESC settings are correct for the battery.
Motor won't operate. LED flashes red twice with two short single pulses.	LVC has been activated for smart battery.	Battery voltage is below the LVC setting.	Verify the battery is charged.
		ESC settings are incorrect for the battery.	Verify the ESC settings are correct for the battery.
Motor won't operate. LED flashes green with short single pulses.	The ESC is in thermal shutoff mode.	The ESC is not getting adequate airflow.	Turn off the ESC and allow it to cool before resuming operation. Consider making changes to improve airflow to the ESC.
		There is too much load on the drive system for the ESC to support.	Consider changing the battery, motor, gearing, or tires to reduce ESC load or change your driving habits to reduce the load.

Motor won't operate. LED flashes green with two short pulses repeating.	N/A	Battery under voltage (cell count too low)	Verify that the cell count for the battery being used is within the input spec for the ESC
Motor won't operate. LED flashes green with three short pulses repeating.	The ESC has exceeded the continuous current limit.	ESC is not getting adequate airflow.	Verify the motor is not damaged; If a motor is damaged it may still function but draw excessive current, resulting in over current protection.
		There is too much load on the drive system for the ESC to support.	Reduce the load on the motor
			Change to an ESC with higher current capabilities if the chosen ESC cannot handle the load demands for your model.
Motor won't operate. LED flashes green with four short pulses repeating.	The ESC has failed the self test.	The ESC is damaged.	Send the ESC to a Horizon Hobby service center for service.

Motor won't operate. LED flashes green with five short pulses repeating.	Capacitor temp has been exceeded	The ESC is not getting adequate airflow.	Turn off the ESC. Allow it to cool before resuming operation. Consider making changes to improve airflow to the ESC.
		There is too much load on the drive system for the ESC to support.	Consider changing the battery, motor, gearing, or tires to reduce the load on the ESC, or change your driving habits to reduce the load.
Motor stutters at start-up.	N/A	Poor wiring connection between the ESC and motor.	Verify all wiring connections are solid and well insulated, re-flow any cold solder joints.
		Excessive drag on drive system.	Check for parts rubbing, bent shafts, rusted bearings, tight gears, or anything that could cause extra drag on the drive system.

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 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 carton. 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.

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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	

FCC Information

Supplier's Declaration of Conformity

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.

Horizon Hobby, LLC
2904 Research Rd.,
Champaign, IL 61822
Email: compliance@horizonhobby.com
Web: HorizonHobby.com

Compliance Information for Canada

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

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

1. this device may not cause interference,
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Compliance Information for the European Union

EU Compliance Statement:

Horizon Hobby, LLC hereby declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive, RoHS 2 Directive 2011/65/EU, RoHS 3 Directive - Amending 2011/65/EU Annex II 2015/863

A copy of the EU Declaration of Conformity is available online at: http://www.horizonhobby.com/content/support-render-compliance.

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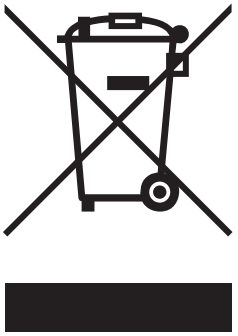
Instructions for disposal of WEEE by users in the European Union



This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collections point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and make sure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

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