ONYX

®

ONYX® Programmable Brushless Air ESC

ONXM2140 40 amp

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.

SKU	Current (Continuous/ Burst)	Voltage	BEC
0NXM4020	40A/60A	3 – 6S LiPo	8A 5.2V/6V/7.4V

Specs	Size	Weight
	47mm x 28mm x 14mm	44g

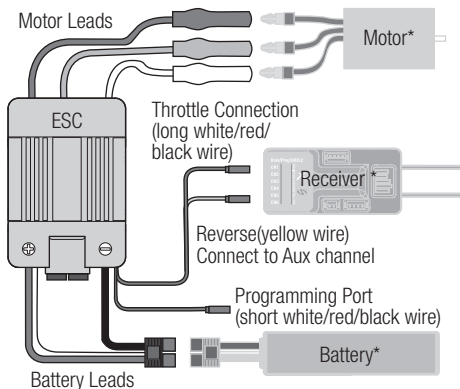| ESC Features |
|---|
| Start-Up Protection |
| Thermal Protection: If the internal temperature of the ESC reaches 230°F/110°C, the ESC will reduce output power |
| Lost Signal Protection: The ESC will stop the motor if throttle signal is lost |
| Three brake modes: Normal/ Proportional/ Reverse Brake |
| Designed for use with Lithium battery types |
| Adjustable cutoff type |
| Adjustable BEC output Voltage (5.2V/6V/7.4V) |
| |

NOTICE: Always disconnect the battery from the ESC when you have finished operating your vehicle. If you leave the battery connected, the ESC will continue to draw current, resulting in possible damage to the battery through over-discharge.

NOTICE: Do not connect a dedicated receiver battery or external BEC to the receiver along with the ESC. When the ESC/Receiver is powered ON, it will provide the servo ports with regulated power from the main battery. If an external power source is connected to the receiver in addition to the ESC, the ESC and/or receiver may be damaged.

Connection and Installation

Mount the ESC so it cannot move around inside the aircraft and in a location where it can receive free-flowing air during operation. It is normal for the ESC to get warm while in operation.

Motor Leads

Motor*

ESC

Throttle Connection
(long white/red/
black wire)

Receiver *

Reverse(yellow wire)
Connect to Aux channel

Programming Port
(short white/red/black wire)

Battery*

Battery Leads

* Not Included

Motor Direction

If the motor turns the wrong direction you can reverse the direction by swapping any two of the three wires between the motor and ESC.

Throttle Range Calibration

When you first install the ESC, you will need to calibrate the throttle range.

⚠️ **WARNING:** Remove the propeller from the aircraft for safety during setup. Removing the propeller from the motor enables the operation to be tested safely.

⚠️ **WARNING:** For some radio control systems (Futaba and Tactic in particular), you will need to reverse the throttle channel for normal operation where OFF is with the stick at the low position. If you do not verify correct operation before installing the propeller, the motor could power ON in a manner you don't expect.

1. Power on the transmitter then move the throttle stick to full. (prevents throttle high warning).
2. Connect a battery pack to the ESC.
3. Wait for 2 seconds. The motor will emit a double tone which indicates the high throttle point has been set.
4. Move the throttle stick to zero throttle. The motor will emit a series of short tones and then a long tone.
5. Disconnect the battery, the ESC is calibrated and ready for operation.

Operating Your ESC

⚠️ **CAUTION:** For safety, always assume the propeller could spin any time the battery is plugged in.

1. Move the throttle stick to zero throttle and power ON your the transmitter.
2. Connect the battery pack to the ESC.
3. A series of tones ending in one long tone indicates the ESC is ready for flight.

If the motor fails to start within 2 seconds, then the ESC will stop trying to power the motor. If this happens, the throttle stick must be moved to zero throttle to reset and start again.

The ESC will stop the motor if the throttle signal is lost. If the signal is regained, throttle control will be restored immediately.

Motor Reversing (Optional)

⚠️ **CAUTION:** For safety, always assume the propeller could spin any time the battery is plugged in.

If you wish to use the motor reverse function, connect the Aux input cable from the ESC to an open channel on your receiver. You will need to select Reverse in the Brake Type settings to use this function, it is disabled by default.

The motor reverse function is most helpful when used at low throttle speeds when on the ground to give you the ability to quickly slow or even reverse when taxiing. It can be especially helpful for seaplanes.

This feature can be used in flight in some limited aerobatic applications, but should not be used in place of flaps or to slow an aircraft during normal flight. For most users we recommend using a momentary button or switch to activate reverse to prevent accidental reversal during flight.

If you intend to test the aerobatic opportunities this feature may open, be sure to reinforce your airframe in the motor mounting area, and expect the airframe will be subjected to more varying torque loads than under most aerobatic flight.

On the Aux channel;

- The signal must be at -100 for the ESC to arm.
- When the signal is from -100 to 0 the ESC will operate in the normal direction
- If the signal is changed between 0 and 100, the motor will stop and reverse.

The throttle speed response to your throttle stick (throttle channel) will continue to operate in the same manner regardless of motor direction.

Stick Programming

⚠️ **CAUTION:** For safety, always assume the propeller could spin any time the battery is plugged in.

IMPORTANT: Complete throttle calibration before attempting stick programming.

Power on your transmitter with the throttle at the full position.

TIP: If a selection is not made the ESC will return to the beginning of the list and cycle through the options again.

TIP: There are twelve programming parameters. See the table below for full details.

Connect the battery to the ESC.

The motor will emit short two tones, then another series of tones to indicate the first programming parameter.

The ESC will indicate the parameter option with a series of tones.

To select a programming parameter, move the throttle stick to the bottom position within three seconds.

The motor will emit of series of tones for the selected parameter. See the Parameters Options table for details.

8

After making a selection the ESC will continue down the list of parameters.

To make a selection, move the throttle stick to the full throttle position.

Select the last parameter (#13) to save the settings and exit programming.

After exiting programing and with the throttle at the low position, the ESC will arm and operate normally.

Programming Parameters

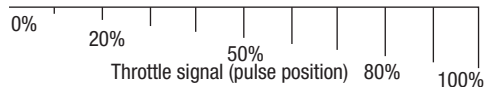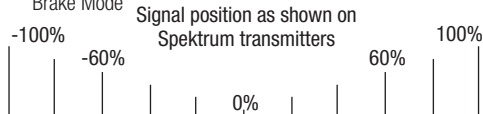| Number of Tones	Programming Parameter
One short tone	1. Brake Type
Two short tones	2. Brake Force
Three short tones	3. Voltage Cutoff Type
Four short tones	4. Number of LiPo Cells
One long tone	5. Cutoff Voltage
One long tone and one short tone	6. BEC Voltage
One long tone and two short tones	7. Start-Up Mode
One long tone and three short tones	8. Timing
One long tone and four short tones	9. Motor Rotation
Two long tones	10. Freewheel Mode
Two long tones and one short tone	11. Factory Reset
Two long tones and two short tones	12. Exit

Parameter Options

Programming Parameter	One short tone	Two short tones	Three short tones	Four short tones	One long tone	One long and one short tone	One long and two short tones	One long and three short tones
1. Brake type	Disabled	Normal	Proportional	Reverse				
2. Brake force	Disabled	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
3. Voltage Cutoff Type	Soft	Hard						
4. Number of LiPo cells	Auto Calc.	3S	4S	5S	6S			
5. Cutoff Voltage	Disabled	2.8V	3.0V	3.2V	3.4V	3.6V	3.8V	
7. BEC Voltage	5.2V	6.2V	7.4V					
8. Start-up Mode	Normal	Soft						
9. Timing	Low	Med	High					
10. Motor Direction	CW	CCW						
11. Freewheel	Enabled	Disabled						
12. Factory Reset								
13. Exit	Exit							

The blacked out cells with white text are the default settings.

10

Programming Options Descriptions

1. Brake Type: The throttle range changes depending on the Brake Mode

Signal position as shown on Spektrum transmitters

-100% -60% 0% 60% 100%

0% 20% 50% 80% 100%

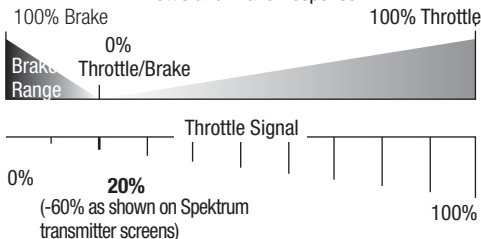Throttle signal (pulse position)

Normal Brake

The motor brake will activate when the throttle stick is moved to the low position. In this mode the strength of the braking is set with the Brake Force selection.

Throttle Signal

0% 100%

Throttle and Brake Response

Brake activates at low throttle

0% 100%
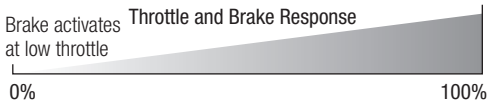
Proportional Brake

With this option selected, the throttle range changes so the ESC will not start below 20%. The throttle will operate as normal above 20%, but moving the throttle below 20% will apply the brakes, increasing in strength as the signal drops to 0%.

Throttle and Brake Response

100% Brake   100% Throttle

0%
Brake   Throttle/Brake
Range

Throttle Signal

0%

20%
(-60% as shown on Spektrum
transmitter screens)   100%

Reverse Brake

Select this option if you want to enable reverse. Connect the reverse lead to an Aux channel to be able to reverse the motor direction.

2. Brake Force

This option is adjustable from level 1 to level 7. The higher the level, the stronger the braking effect. Brake Force is only effective in the "Normal brake" mode.

3. Voltage Cutoff Type

Soft Cutoff: Selecting this option will gradually reduce the ESC output to 50% of the full power within 3 seconds after the low-voltage cutoff protection is activated.

Hard Cutoff: Selecting this option will immediately cut off the ESC output when the low-voltage cutoff protection is activated.

12

4. LiPo Cells

Select Auto Calc to cause the ESC to automatically calculate the number of LiPo cells based on a 3.7V/cell default. Alternatively, you can select a specific sell count to set the ESC to a fixed battery configuration.

5. Cutoff Voltage

Use this option to adjust the cutoff voltage from 2.8V to 3.8V/cell or disable the cutoff voltage completely.

⚠️ **WARNING:** Discharging a LiPo battery below 2.8V/cell may damage the battery. Attempting to charge or discharge a damaged battery will cause a fire.

6. BEC Voltage

Select the BEC output voltage.

7. Start-up Mode

Normal Start-up: If this mode is selected, the motor will immediately increase in RPM to correspond to the throttle stick input.

Soft Start-up: If this mode is selected, the motor will gradually increase in RPM to correspond to the throttle stick input.

TIP: We recommend using this soft start-up mode when using large diameter motors or gear drives.

8. Timing

Select Low, Medium, or High motor timing.

9. Motor Rotation

Adjust the rotation direction of the motor without changing wires.

10. Freewheeling

This option can be set to Enabled or Disabled. Freewheeling can help provide better throttle linearity or smoother throttle response.

Programming with the DYNS3005 Programmer Box

1. Begin with the ESC powered off.
2. Connect the programming lead to the programming port on the programming box.
3. Connect a battery to the ESC.
4. Power on the box and select the parameter with the SELECT button.
5. Change the values of the selected parameter with the EDIT button.
6. Press the SAVE button to save the changes.

Failsafe Protections

Start-up Protection:

The ESC will monitor the motor speed during the start-up process. If the RPM of the motor is not responding as expected, the ESC will detect a start-up failure.

In the event of a start-up failure;

- If the throttle is less than 15%, the ESC will try to restart automatically.
- If the throttle is more than 20%, the throttle stick must be moved back to the bottom position before the ESC will allow a restart.

ESC Thermal Protection:

1. The motor will not start if the temperature exceeds 70℃ when the ESC is powered on.
2. If the ESC temperature goes above 110℃ during operation, the ESC will reduce the output power to 60%. This automatic power reduction helps protect the ESC from failure while still providing some power to the motor to prevent a crash. The ESC will gradually resume normal operation when the temperature drops back within the operating specifications.

Throttle Signal Loss Protection:
When the ESC detects loss of signal for over 0.25 second, it will cut off power to the motor immediately. The ESC will resume normal operation when throttle signals are received.

Overload Protection:
The ESC will cut off power to the motor if there is a sudden load that exceeds predetermined limits.

Over-current Protection:
The ESC will cut off power to the motor if the peak current goes above the rated value.

Low-voltage Cutoff Protection:
The ESC will limit the output to 60% when the input voltage drops below the LVC value.

Warning Tones

The ESC begins to check the voltage when the battery pack is connected.

1. If the ESC does not arm normally the motor will emit a series of tones.

TONES	SCENARIO
Repeating double tone	Voltage outside of acceptable range when the power is connected
Repeating single tone	The ESC cannot detect a normal throttle signal
Repeating rapid single tone	The throttle is not at its lowest position
A double tone followed by a pattern of tones	The ESC has entered the programming mode. If the throttle is at the low position when this happens, disconnect the power, reverse the throttle channel and try again

2. If nothing happens, verify the battery pack is charged and inspect all wiring connections.

Troubleshooting Guide

Problem	ESC Tones	Possible Causes	Solution
Motor won't operate and continues to emit tones	Two short tones repeating	Input voltage is beyond the operating range of the ESC	Ensure the operating voltage is within the specs for the ESC
	One long tone repeating	The ESC is not receiving a throttle signal from the receiver	Verify the transmitter and receiver are connected, check the throttle lead is in the correct servo port, and check channel assignments
	One short tone repeating	The throttle input is not at the low position	Move the throttle control to the low position
		Throttle range is set too narrow	Re-calibrate the throttle range

Motor stutters during operation above 60% throttle and continues to emit tones at low throttle	Two short tones repeating after operation	The ESC has gone over the temperature limit and activated the thermal protection feature	Reduce the load on the motor
			Improve heat dissipation for the ESC with better airflow (fresh air intake and hot air exhaust)
Motor output is suddenly limited to 60% power during operation and continues to emit tones at low throttle	Three short tones repeating after operation	The voltage of the battery has dropped too low and the LVC feature has been activated.	Verify the battery is charged
			Change to a larger battery or a higher C rated battery to increase the load the battery can handle
			Verify the motor is not damaged; If a motor is damaged it may still function but draw excessive current, resulting in early LVC activation
			Reduce the load on the motor

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.

10/15

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
0NXM2140

FC 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.

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