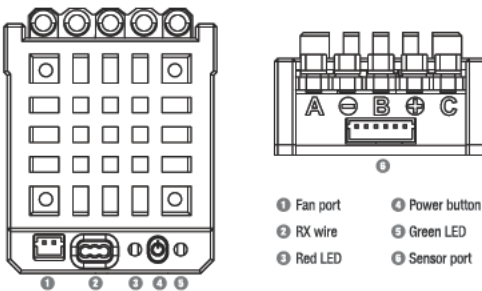


REEDY POWERED BLACKBOX 410R

#27000
#27001
#27020

OWNER'S MANUAL



POWERING THE ESC ON/OFF

- To turn the ESC ON, press the Power button.
- To turn the ESC OFF, press the Power button or unplug the battery.

ESC/RADIO CALIBRATION

- Plug the ESC into a charged battery and place your vehicle on a stand with the wheels off the ground.
- Turn on the transmitter and adjust the throttle/brake endpoints to 100% and the throttle trim to neutral.
- With the ESC off, engage full throttle on the transmitter.
- While maintaining full throttle, press and hold the ESC Power button until the red LED remains illuminated and the green LED blinks once. The full throttle position has been saved. This could take 2-3 seconds depending on how long the transmitter and receiver take to bind.
- Release the Power button and then return the throttle to neutral.
- Press and hold the Power button until the green LED blinks twice, then release the Power button. The neutral throttle position has been saved.
- Engage full brake, then press and hold the Power button until the green LED blinks three times. The full brake position has been saved.
- Release the Power button and then return the throttle to neutral. The red and green LEDs will illuminate and then the ESC will power off.
- The ESC calibration is now complete and the ESC is ready to use.

IMPORTANT ESC/Radio calibration must be completed with new ESCs, when changing transmitters, after repair service, and when updated firmware has been installed.

VIEWING AND SWITCHING PROFILES

Your ESC includes eight pre-installed profiles that can be selected using the Power button. Please see the chart located in this manual that shows the default settings for each of these profiles.

- To view the current profile, turn the ESC on and then press and hold the Power button until both LEDs stop flashing and remain illuminated. Release the Power button.
- The red LED will remain illuminated and the green LED will blink. The number of blinks corresponds with the profile number currently in use.
- If you would like to switch profiles, continue to step #4. If you would prefer to exit with no changes, press and hold the Power button until both LEDs go out and then begin to blink. Release the power button and the ESC is ready to use.
- To change the profile, press and release the power button until you reach the desired profile number as indicated by a the number of blinks of the green LED.
- When the desired profile number is reached, press and hold the Power button until both LEDs go out and then begin to blink. Release the power button and the ESC is ready to use

SPARE/OPTION PARTS

27000	Blackbox 410R 1S-2S Competition ESC
27001	Blackbox 410R 1S-2S Competition ESC w/Programmer
27020	Blackbox ESC Programmer
27021	Blackbox 410R Fan w/screws
27022	Blackbox 410R Heavy-Duty Capacitor Unit (standard)
27023	Blackbox 410R XL Capacitor Unit (4x4 SC)
27024	Blackbox 410R Pro Capacitor Unit (lightweight)
27025	Blackbox ESC Programmer Wire Extension

INTRODUCTION

Congratulations on your purchase of Reedy's Blackbox 410R Sensored Brushless Competition ESC. The latest electronics technology along with the design and engineering experience that is responsible for 29 World Championship titles has been incorporated into its design.

Extensive track testing by Reedy's engineers and racing team has resulted in a high performance, high quality, and reliable ESC suitable for all levels of competition. Excellent throttle and brake feel, precision adjustability, and robust hardware make the Blackbox 410R suitable for a variety of racing applications.

Please read the following instructions before installing and operating your ESC.

FEATURES

- CNC machined black aluminum case with integrated heat sink
- Fully adjustable brake, throttle, power, and safety functions
- Eight pre-programmed, customizable* profiles
- Blinky mode with ROAR approved software
- Precision throttle and brake control
- Speed sensitive drag brake function
- Ultra low resistance FET board
- 12-gauge power wires
- Heavy-duty external capacitor board
- Built-in voltage booster for 1S applications
- RPM data logging*
- Firmware updateable*

*Requires Blackbox PROgrammer #27020

SPECIFICATIONS

	Blackbox 410R
Voltage input	3.7-7.4 / 1-2 LiPo
On resistance (Ω)	0.00035 x2
Continuous current (A)	150
Dimensions (mm)	40.8 x 33.0 x 19.0
Weight w/o wires (g)	49
Motor limit (2-pole/4-pole)	3.5 / 4800kV
SBEC	5.5-7.0V/5A
Cooling fan	optional

SAFETY PRECAUTIONS

This product is a sophisticated hobby product and not a toy. 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 property. This product is not intended to be used by children without direct adult supervision. It is essential to read and follow all instructions and warnings found in this manual prior to installation, set up, and use, in order for the product to operate properly and to avoid damage or injury.

WARNINGS

- Never expose your ESC to water
- Never operate your ESC/motor under no load at high RPM
- Never apply reverse voltage
- Always unplug the battery from the ESC when not in use or while in storage
- Never let children use this product without the strict supervision of an adult
- Never leave the ESC unattended while powered ON
- Always use caution when handling your ESC as it may become extremely hot during use
- Always disconnect the battery and stop using the ESC if it begins to act abnormally
- Always power ON your transmitter before the ESC and power OFF the ESC before the transmitter

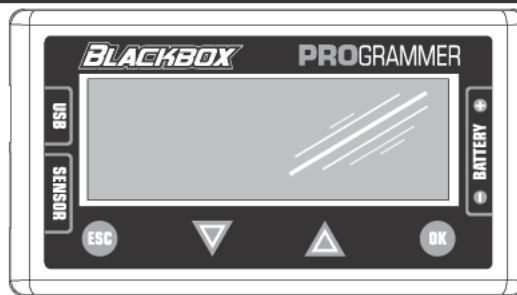
IMPORTANT ESCs that display evidence of contact with moisture, reverse voltage, or internal/external modifications to wiring are not covered under warranty.

IMPORTANT Optional Blackbox 410R Fan #27021 is highly recommended for TC, 1/10 4wd Buggy, and 4wd Short Course applications.

IMPORTANT Optional Blackbox 410R XL Capacitor Unit #27023 is REQUIRED for 4wd SC applications.

INSTALLATION

- Determine the most convenient location to mount your ESC, taking into consideration easy access to the battery connectors and Power button
- Determine the ideal sensor wire length and plug it into the ESC's sensor port
- Cut the battery and motor wires to the desired length
- Solder the appropriate battery connector(s) to the battery leads
- Mount your ESC/Capacitor unit securely using high quality double-sided tape.
- Plug the RX wire into the receiver (refer to radio manufacturer's manual)
- Solder the three ESC motor leads labeled A-B-C to the corresponding motor tabs labeled A-B-C.



USING THE BLACKBOX PROGRAMMER

The Blackbox Programmer #27020 connects to the ESC via the sensor port and allows you to modify each of the eight default profiles and save your new settings. It also operates as a Data Logger by displaying the maximum RPM attained. Lastly, the PROgrammer can be used as a stand-alone battery monitor to measure voltage, individual cell voltage (up to 6S), maximum and minimum cell voltage, and delta voltage.

ESC - Use to return to the previous menu and when prompted to EXIT by the PROgrammer

Up/Down Arrows - Use to scroll through menus and menu selections

OK - Use to verify settings selections and when prompted by the PROgrammer

Programmer Menu

Reedy Blackbox Programmer V0.0	ESC Programmer	ESC Settings	Change Settings	(enter settings menu)
			Select Profile	Select Profile #
Save Profile	Save Profile #			
RPM Log	Max Motor RPM XXXXX			
	ESC Update			
	Prog Update			
	Battery Statistics			
	Voltage - Cells 1-4			
	Voltage - Cells 5-6			

CHANGE SETTINGS

- With the ESC off, un-plug the sensor wire from the motor and plug it into the sensor port on the PROgrammer. The sensor wire extension included with your ESC makes working with shorter sensor wires more convenient.
- Turn the ESC ON
- Select ESC Programmer -> OK
- Select ESC Settings -> OK
- Verify the firmware version and ESC profile -> OK
- Choose Change Settings and you will now be able to view and/or modify your current selections. If you do not make any changes, you can unplug the PROgrammer at any time, reinstall the motor sensor wire, and use your ESC. If you have made changes, return to the previous menu and select Save Profile.
- Choose the profile number where the settings will be saved -> OK
- Once your settings have been saved, unplug the PROgrammer, reinstall the motor sensor wire, and your ESC is ready to use.

BRAKE

Brake Strength - Allows changes to the maximum brake strength of the ESC. A setting of 100% is typical when reductions in brake strength are made with the brake EPA adjustment on the transmitter. However, reducing the Brake Strength in the ESC will provide finer resolution in the brake EPA adjustment.

Brake Frequency - A lower frequency will provide a more aggressive feel while a higher frequency will provide a smoother, more precise braking feel but may result in higher ESC temperatures.

Brake Curve - Similar to radio exponential. A negative value is softer at the beginning of the brake engagement and becomes more aggressive as the brakes become fully engaged. The opposite is true for a positive value. A setting of 0% results in a linear feel throughout the braking range.

Drag Brake - Drag Brake is a percentage of the maximum brake available and provides automatic braking when the throttle trigger is returned to neutral. The Drag Brake value may require small adjustments when changes to the Brake Frequency are made.

Initial Brake - This is equal to the drag brake setting and not adjustable.

SPEED SENSITIVE DRAG BRAKE

The Speed Sensitive Drag Brake allows you to independently establish different high speed and low speed drag brake settings as well as determine the RPM at which a smooth transition between the two occurs.

Low Speed Strength - Determines the drag brake strength at low speeds (below the Switchover RPM). This setting mirrors the Drag Brake setting in the Brake menu.

High Speed Strength - Determines the drag brake strength at high speeds (above the Switchover Range RPM)

Switchover RPM - Selects the RPM at which the drag brake begins to smoothly transition between the high speed and low speed setting. You can deactivate this system by selecting disable.

Pro Tip: Using the RPM Data Logger to measure the maximum RPM is helpful in determining the appropriate Switchover RPM.

THROTTLE

Throttle Frequency - A lower frequency will provide a more aggressive throttle feel. A higher frequency will provide a smoother, more precise throttle feel but may also result in higher ESC temperatures.

Throttle Punch - By reducing the Throttle Punch, you will experience a slower throttle response which can be advantageous in low traction conditions. 100% is typical for most conditions.

Throttle Curve - Similar to radio exponential. A negative value is softer at the beginning of the throttle engagement and becomes more aggressive as the throttle reaches the maximum. The opposite is true for a positive value. A setting of 0% results in a linear feel throughout the throttle range.

Dead Band - Adjusts the amount of trigger movement available before the throttle/brake initially engages.

MOTOR POWER

The Blackbox 410R ESC features advanced settings that allow individual adjustment of acceleration and top speed timing. These are particularly useful on large tracks in applications such as 1/12 and 1/10 Touring Car and stock classes where ESC timing is permitted. Each setting can be used individually or together to achieve maximum speed. If you choose to leave these settings disabled, the ESC will be operating as if it is in blinky mode.

Acceleration Boost

Start RPM - Sets the RPM that at which acceleration boost timing begins.

Finish RPM - Sets the RPM that at which acceleration timing finishes.

Max Adv Timing - Sets the maximum advanced timing at the point that the motor reaches the Finish RPM.

Top Speed Timing

Slew Rate - Sets the rate at which the ESC adds the selected Top Speed Timing.

Max Adv Timing - Sets how much additional timing is fed to the motor after the Acceleration Boost has reached the Finish RPM.

Delay Time - Sets the delay period before top speed timing engages in order to create a smoother throttle feel.

IMPORTANT The sum of the Acceleration Boost timing and Top Speed Timing should be no higher than 60°. Overall timing is the sum of the ESC timing and motor timing.

IMPORTANT ESC timing settings increase acceleration and power but create heat which may result in permanent damage to your ESC and/or motor. If you find that you require high timing settings to obtain the desired speed, the use of a more powerful motor, when allowed, may be necessary.

Pro Tip: Use the RPM Data Logger to help determine the ideal Finish RPM.

MISC CONTROL

Run Mode - Choose between Race Open and Race Blinky mode depending upon which class you are competing in. In Race Open mode, all Motor Power options remain active. In Race Blinky mode, all Motor Power options are disabled. The green LED will flash to signify that the ESC is in Race Blinky mode. A third mode, Practice, enables reverse.

Motor Type - Choose between 2-pole and 4-pole depending upon the type of motor being used.

SBEC Voltage - Provides an adjustable range of between 5.5V and 7.0V. For most applications, 5.5V is recommended.

Forward Power - Provides the ability to limit forward power to suit different driver skill levels.

Reverse Power - Adjusts reverse power when utilizing Practice mode.

Note: In Practice Mode, the radio brake EPA setting must be set at 100%. To engage reverse, the throttle trigger must first be moved to full brake and then returned to neutral. Now the trigger can be moved in the braking direction to engage reverse.

PROTECTION

Battery Cutoff - Choose the voltage at which the ESC will cut power to the motor to protect the battery. For 1S operation no lower than 3.2V is recommended and for 2S operation no lower than 6.4V is recommended. For competition, this setting can be disabled but it is not recommended.

ESC Temp Cutoff - The temperature at which the ESC will cut power to the motor to prevent permanent damage to the ESC.

Setup sheets obtained from Reedy team drivers can be found at www.ReedyPower.com. These can be extremely helpful in determining good starting setups for your particular application. Blank editable setup sheets are also available which can be printed and saved for future reference.

SELECT PROFILE

- With the ESC off, un-plug the motor sensor wire from the motor and plug it into the sensor port on the PROgrammer. The sensor wire extension included with your ESC makes working with shorter sensor wires more convenient.
- Turn the ESC ON
- Select ESC Programmer ->OK
- Select ESC Settings ->OK
- Verify the firmware version and ESC profile ->OK
- Choose Select Profile ->OK
- Select the profile that you wish to load ->OK
- When the selected profile has been loaded "Load Successful!" will be displayed ->OK
- Unplug the PROgrammer, reinstall the motor sensor wire, and your ESC is ready to use.

RPM DATA LOGGER

The RPM Data Logger recalls the highest RPM attained since the ESC was last powered on. This feature can be used to determine Motor Power and Speed Sensitive Drag Brake RPM settings. It can also be used to estimate the maximum speed attained.

- When you are finished driving but before turning the ESC off, remove the sensor wire and plug it into the PROgrammer.
- Select RPM Log to view the maximum RPM attained.
- After viewing RPM data, unplug the sensor wire from the PROgrammer and plug it back into the motor
- Power off the ESC

IMPORTANT Once the ESC has been powered off, the data logger memory will be cleared.

Pro Tip: Wheel spin, jumps, and any instance where powered wheels leave the ground will affect the maximum RPM reading.

BATTERY MONITOR

Determine total voltage, individual cell voltage (up to 6S), maximum/minimum cell voltage, and delta voltage by plugging the battery balance connector into the PROgrammer and selecting the Battery Monitor option.

OPERATION AND WARNINGS

Operation	ESC Signal			
	Red		Green	
	Open	Blinky	Open	Blinky
Power ON ESC			solid	flash
Neutral throttle position			solid	flash
Full throttle position				solid
Full brake position		solid		
Programmer installed				solid

All LEDs should be off at any throttle/brake position other than neutral, full throttle or full brake.

Warning	ESC Signal				Motor Power
	Red		Green		
	Open	Blinky	Open	Blinky	
LVC engaged		solid		solid	reduced*
ESC temp cutoff		solid		blink	disabled*
No radio signal		blink		blink	
Sensor wire removed/failure				flash	

*Full operation resumes when the ESC is powered OFF and ON, and the problem that signaled the shutdown has been resolved.

FIRMWARE UPDATES

Firmware for both the Blackbox ESC and Blackbox PROgrammer can be updated after downloading the appropriate firmware and Blackbox Link installation program. These, along with installation and operating instructions, can be found at www.ReedyPower.com.

WARRANTY

Your Reedy Blackbox 410R is warranted to the original purchaser for 120 days from the date of purchase, verified by the sales receipt, against defects in material and workmanship. Product that has been mishandled, abused, used incorrectly, used for an application other than intended, or damaged by the user are not covered under warranty. Associated Electrics Inc. is not liable for any loss or damage, whether direct or indirect, incidental or consequential, or from any special situation, arising from the use, misuse, or abuse of this product.

Settings Menu			
Brake	Drag Brake	0% - 100% (1% increments)	
	Brake Freq	600Hz, 800Hz, 1000Hz, 1300Hz, 1600Hz, 2000Hz, 2500Hz, 3200Hz, 4000Hz, 5000Hz, 6400Hz, 8000Hz, 9600Hz, 12000Hz, 16000Hz	
	Brake Strength	0% - 100% (1% increments)	
	Brake Curve	-100% - 100% (10% increments)	
Speed Sens Brake	Low Speed Str	0% - 100% (1% increments)	
	High Speed Str	0% - 100% (1% increments)	
	Switchover RPM	Disable - 60000RPM (500RPM increments)	
Throttle	Throttle Freq	2000Hz, 2500Hz, 3200Hz, 4000Hz, 5000Hz, 6400Hz, 8000Hz, 9600Hz, 12000Hz, 16000Hz	
	Throttle Punch	0% - 100% (1% increments)	
	Throttle Curve	-100% - 100% (10% increments)	
	Dead Band	1% - 10% (1% increments)	
Motor Power	Accel Boost	Start RPM	Disable - 30000RPM (500RPM increments)
		Finish RPM	Disable - 50000RPM (500RPM increments)
	Top Speed Timing	Max Adv Timing	0° - 55° (1° increments)
		Slew Rate	5° - 30°/0.1sec (1° increments)
		Max Adv Timing	0° - 55° (1° increments)
Misc Control	Delay Time	0 - .95 sec (.05sec increments)	
	Run Mode	Race Open, Race Blinky, Practice	
	Motor Type	2-pole, 4-pole	
	SBEC Voltage	5.5V - 7.0V (.1V increments)	
	Forward Power	50% - 100% (1% increments)	
Protection	Reverse Power	25% - 100% (1% increments)	
	Battery Cutoff	Disable, 3.0V - 7.0V (.1V increments)	
	ESC Temp Cutoff	160°F - 230°F (10°F increments)	

Default Profiles		Profile #1	Profile #2	Profile #3	Profile #4	Profile #5	Profile #6	Profile #7	Profile #8	
Suggested Application		2S Off-Road Blinky Stock	2wd Mod	4wd Mod	2S On-Road Blinky Stock	1S On-Road Blinky Stock	Touring Car Mod Boosted	2S 4-Pole Short Course	Practice Mode with Reverse	
Brake	Drag Brake	30%	20%	10%	40%	30%	20%	10%	5%	
	Brake Freq	5000	8000	6400	3200	3200	3200	9600	7200	
	Brake Strength	100%	100%	100%	100%	100%	100%	100%	100%	
	Brake Curve	0%	0%	0%	0%	0%	0%	0%	0%	
Speed Sens Brake	Low Speed Str	30%	20%	10%	40%	30%	20%	10%	5%	
	High Speed Str	30%	20%	10%	40%	30%	20%	10%	5%	
	Switchover RPM	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable	
Throttle	Throttle Freq	6400	16000	12000	3200	2000	16000	16000	8000	
	Throttle Punch	100	100	100	100	100	100	100	100	
	Throttle Curve	0%	0%	0%	0%	0%	0%	0%	0%	
	Dead Band	1%	1%	1%	2%	2%	3%	1%	2%	
Motor Power	Accel Boost	Start RPM	Disable	Disable	Disable	Disable	13000	Disable	Disable	
		Finish RPM	Disable	Disable	Disable	Disable	43000	Disable	Disable	
	Top Speed Timing	Max Adv Timing	0	0	0	0	0	17	0	0
		Slew Rate	5°/0.1 sec	5°/0.1 sec	5°/0.1 sec	5°/0.1 sec	5°/0.1 sec	5°/0.1 sec	5°/0.1 sec	5°/0.1 sec
		Max Adv Timing	0	0	0	0	0	0	0	0
Delay Time	0	0	0	0	0	0	0	0		
Misc Control	Run Mode	Race Blinky	Race Blinky	Race Blinky	Race Blinky	Race Blinky	Race Open	Race Open	Practice Mode	
	Motor Type	2 pole	2 pole	2 pole	2 pole	2 pole	2 pole	4 pole	2 pole	
	SBEC Voltage	5.5v	5.5v	5.5v	5.5v	5.5v	5.5v	6.0v	5.5v	
	Forward Power	100%	100%	100%	100%	100%	100%	100%	100%	
	Reverse Power	25%	25%	25%	25%	25%	25%	25%	25%	
Protection	Battery Cutoff	6.5v	6.5v	6.5v	6.5v	3.3v	6.5v	6.5v	6.5v	
	ESC Temp Cutoff	230	230	230	230	230	230	230	230	

Troubleshooting		
Problem	Cause	Solution
ESC overheats	Motor over-gear	Change final drive ratio (FDR)
	No ESC fan or damaged ESC fan	Install new fan
	ESC Temp Cutoff set too low	Increase ESC temp cutoff value
	Lack of air flow	Reposition ESC
Motor overheats	Mechanical timing too high	Reduce motor timing
	Insufficient motor cooling	Add cooling fan and/or heatsink
	ESC timing settings too high	Reduce timing settings
	Weak rotor	Install new rotor
Poor speed/performance	Insufficient final drive ratio (FDR)	Change final drive ratio (FDR)
	Transmitter settings changed	Verify correct full throttle setting
	External capacitor unit damaged	Install new capacitor unit
	Incorrect ESC settings	Verify correct settings
	Motor damaged or defective	Inspect and repair necessary components
	Damaged ESC	Return ESC for repair
Motor stutters under acceleration	Damaged sensor wire	Replace sensor wire
	Damaged motor sensor board	Replace sensor board
	External capacitor unit damaged	Install new capacitor unit
	Damaged ESC	Return ESC for repair
No motor power, but servo functions	ESC plugged into RX incorrectly	Verify RX wire is plugged into Ch. 2
	ESC Temp or Battery Cutoff engaged	Wait for ESC to cool or re-charge battery
	Motor damaged or defective	Repair or install new motor
	Motor sensor wire missing or damaged	Install or replace motor sensor wire
	Damaged ESC	Return ESC for repair
	ESC RX wire plugged in backwards	Plug the RX wire in correctly
	Poor battery connection/defective battery	Improve connection or replace battery
	No radio signal	Check/re-blind TX/RX
No motor or servo power	Damaged ESC	Return ESC for repair
	Battery cutoff voltage set too low	Reduce battery cutoff voltage
	Dead or damaged battery	Charge or replace battery
	Bad battery connection	Improve connection or replace battery
	Damaged motor	Repair or replace motor
	Damaged ESC	Return ESC for repair
	Damaged ESC	Return ESC for repair
	Damaged ESC	Return ESC for repair