Bad Elf Flex® Mini

Made for
iPhone | iPad | iPod

User Manual

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Introduction

Thank you for purchasing a Bad Elf Flex® Mini GNSS receiver. This manual describes the basic operation of your Bad Elf Flex Mini as well as specifications and warranty information. For the most recent information, visit bad-elf.com/flex-mini.

What's in the Box?

The following items are included in the standard Bad Elf Flex Mini configuration:

- Bad Elf Flex Mini
- Carrying case w/ carabiner
- Wrist lanyard
- USB-C charging cable
- Activation card

Product Overview

Charging and Charge Management

Charging your Bad Elf Flex Mini

Charge your Bad Elf Flex Mini fully before first use. Any standard USB compatible charging source can be used to charge your Bad Elf Flex Mini, including a PC or laptop.

- Connect the supplied USB-C charging cable into your Bad Elf Flex Mini.
- Insert the other end of the charging cable into any USB charging source.
- Charge your Bad Elf Flex Mini until the LCD screen indicates the unit is fully charged.
- The Flex Mini uses variable rate charging depending on the internal battery state and external charging source, but should always be fully charged within 4hrs.

Operation while charging

You can operate your Bad Elf Flex Mini while it is charging. A charge current of 500mA or greater can sustain unlimited operation regardless of the charge state.

Temperature limitations

To protect the internal battery, charging only occurs within the valid temperature range defined in the specifications of this manual.

Note: The battery temperature may differ from the ambient air temperature as internal temperatures vary during usage.

Low battery

The Bad Elf Flex Mini actively monitors the charge level of the internal battery. As the battery's charge approaches a low point, the LCD screen will display a warning and may automatically shut down to avoid over-discharge of the battery. Normal operation will resume when the Flex Mini is connected to a USB power source.

Battery Safety

Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage. To prevent injury or damage:

- Do not charge or use the product if it appears to be damaged or leaking.
- Charge the product only with an approved USB power source that can provide at least 500mA of charging current at 5VDC.

- Discontinue charging a battery that gives off extreme heat or a burning odor.
- Use the product only for its intended use and according to the instructions found in this document.

Basics of Operation

Powering On and Off

To turn the Bad Elf Flex Mini on, press and hold the power button for 3 seconds. It will take approximately 5 seconds to start up and to begin searching for satellites.

To turn the Bad Elf Flex Mini off, press and hold the power button for approximately 3 seconds until the display turns off.

If the unit is unresponsive, holding the power button for 15 seconds will force a hard reset.

Using Your Bad Elf Flex Mini

We've designed the Flex Mini to be as simple and intuitive as possible.

LEDs

The LEDs located directly below the display show the following status information:

Power LED (left)

The power status LED indicates the battery condition, charging source type, and operating status.

Color	Meaning
Solid Green	Fully charged
Pulsing Green	Charging, battery > 75% ~2.5 sec interval => high current charging source ~5 sec interval => low current charging source
Pulsing Red	Charging, battery < 75% ~2.5 sec interval => high current charging source ~5 sec interval => low current charging source
Fast Red	Indicates charging is needed, or the external power source is not usable.
Fast Yellow	Battery temperature out of range for charging

White	Indicate a transfer or firmware update is in progress, and the Flex Mini should not be disconnected from the USB cable
None	Not charging

GNSS LED (center)

Color	Meaning
Solid Green	GNSS has a satellite lock
Solid Red	GNSS does not have a satellite lock

Bluetooth LED (right)

Color	Meaning
Solid Blue	Bluetooth connection established
None	No Bluetooth connection found

Buttons

The buttons on the left and right side of the Bad Elf Flex Mini allow you to navigate the LCD screens and menus. Descriptions for each button are provided in the table below.

Button	Function
Power	Hold for 3 seconds to power on or power off the Bad Elf Flex Mini. Hold for 15 seconds to force a hard reset if the Flex Mini is unresponsive.
Escape/Back/Cancel	Used to exit a submenu or feature
Enter button	Used to accept an action or open a submenu within a feature. Short-cuts from any GNSS-related screen: ● Press twice to capture a Point of Interest (POI). ● Hold for 3 seconds to toggle logging ON or OFF.
Up / Down buttons	Used to navigate the menus, submenus, and selections found in the one of the Bad Elf Flex Mini features

Supported Platforms

You can connect a Bad Elf Flex Mini to a phone, tablet, or PC powered by the following operating systems:

- iOS version 11 or newer (see model list below)
- Android version 4.1x or newer
- Windows version 10.x or newer
- macOS version 10.4 or newer

The Bad Elf Flex Mini is made for:

- iPhone 14 Pro Max
- iPhone 14 Pro
- iPhone 14 Plus
- iPhone 14
- iPhone SE (3rd generation)
- IPhone 13 Pro Max
- iPhone 13 Pro
- iPhone 13
- iPhone 13 mini
- iPhone 12 Pro Max
- iPhone 12 Pro
- iPhone 12
- iPhone 12 mini
- iPhone SE (2nd generation)
- iPhone 11 Pro Max
- iPhone 11 Pro
- iPhone 11
- iPhone XS Max
- iPhone XS
- iPhone XR
- iPhone X
- iPhone 8 Plus
- iPhone 8
- iPhone 7 Plus
- iPhone 7
- iPhone SE
- iPhone 6s Plus
- iPhone 6s
- iPad Pro 12.9-inch (6th generation)
- iPad Pro 12.9-inch (5th generation)
- iPad Pro 12.9-inch (4th generation)
- iPad Pro 12.9-inch (3rd generation)
- iPad Pro 12.9-inch (2nd generation)
- iPad Pro 12.9-inch (1st generation)
- iPad Pro 11-inch (4th generation)
- iPad Pro 11-inch (3rd generation)
- iPad Pro 11-inch (2nd generation)
- iPad Pro 11-inch (1st generation)
- iPad Pro 10.5-inch
- iPad Pro 9.7-inch
- iPad Air (5th generation)
- iPad Air (4th generation)
- iPad Air (3rd generation)
- iPad Air 2
- iPad Air
- iPad mini (6th generation)
- iPad mini (5th generation)
- iPad mini 4
- iPad mini 3
- iPad mini 2
- iPad (10th generation)
- iPad (9th generation)
- iPad (8th generation)
- iPad (7th generation)
- iPad (6th generation)
- iPad (5th generation)
- iPod touch (7th generation)

Connecting Phones or Tablets via Bluetooth

Follow these steps to connect your phone or tablet to the Bad Elf Flex Mini via Bluetooth.

Start by making sure your Bad Elf Flex Mini is turned on and within range of your phone or tablet. Follow the instructions below for your phone or tablet's operating system.

For iPhone, iPad, or iPod touch

1. Open the Settings app and navigate to the Bluetooth screen.
2. Make sure Bluetooth is turned on.
3. If you have not previously paired with this Bad Elf Flex Mini, it will appear in the "Other Devices" section. Tap Bad Elf Flex Mini in the list to start the pairing process. If requested, confirm the pairing on your phone or tablet and on the Bad Elf Flex Mini.
4. Once you are paired, the Bad Elf Flex Mini will appear in the My Devices section. If the status shows as Disconnected, you can tap the Flex Mini name to connect.
5. Once the pairing succeeds, you should see it listed as Connected in the list of devices..

For Android phones and tablets

1. Go to Settings > Wireless & Networks.
2. Make sure Bluetooth is turned on.
3. Go to Settings > Wireless & Networks > Bluetooth Settings and tap Scan for devices.
4. After a few seconds, the Bad Elf Flex Mini should appear in the list of available Bluetooth devices.
5. Tap the name in the list to start the pairing process. If requested, confirm the pairing on your phone or tablet and on the Bad Elf Flex Mini.
6. Once paired, you will see the Bad Elf Flex Mini appear in the list as Connected for a few seconds then return to Disconnected. This is normal. The Bluetooth connection will be established whenever an app requests it.

For Windows

1. Select Bluetooth Devices from the icon list in the lower right portion of your desktop.
2. The Bluetooth option may not be displayed. If not, click the up arrow.

3. If your Bad Elf Flex Mini is turned on, you should see it appear in the list as something like Bad Elf Flex Mini #XXXXXX (with its serial number).
4. Select your Bad Elf Flex Mini from the list, and tap the Pair button.
5. Within 5-10 seconds, you should see a prompt from windows showing pairing is complete. Once this action is completed, the message “Ready to pair” will change to “Paired”.

At this point you have successfully paired your Bad Elf Flex Mini with your Windows computer. Next, you will need to determine the COM port assigned by the operating system.

1. Click on the icon to the left of Bad Elf Flex Mini #XXXXXX
2. Click on “More Bluetooth Options”
3. A Bluetooth settings dialog will open
4. Click on the “COM Ports” tab
5. The COM port with your device serial number labeled as “Outgoing” is the COM port you should use for your application.

Installing the Bad Elf Flex app

From your phone or tablet, visit http://bad-elf.com/flex/app to download the correct Bad Elf Flex companion app for your operating system. This app is used to check the health of your hardware, perform firmware upgrades, change settings, and stream correction data to your Bad Elf Flex Mini.

Using 3rd party apps

Any location-based app on iOS or Android can be used with the Bad Elf Flex Mini. You can visit http://bad-elf.com/apps for a list of compatible apps that we’ve either tested or have been recommended by other customers.

Specifications

Communications

USB	USB 2.0 device via USB-C receptacle Supports USB CDC profile for NMEA streaming
Bluetooth	Bluetooth V4.0 (HS) with integrated Class 1.5 PA, supports at least 3 simultaneous connections

Positioning Engine

GPS	L1 C/A, L5
GLONASS	L1
Galileo	E1, E5A
BeiDou	B1I, B2a
QZSS	L1

Note: constellations and frequencies are dependent on Flex Mini configuration and subscriptions.

Positioning Performance

Horizontal accuracy		CES (50%)	2DMRS (95%)
	RTK	Standard: N/A	TBD
		Extreme: 0.25cm	
	SBAS	Standard: 1-2m	TBD
		Extreme: ~1m	
	Autonomous	2.0-2.5m	TBD
Timing (1PPS) accuracy	20 ns		
Cold start time	< 60 s typical (no almanac or RTC)		
Warm start time	< 30 s typical (almanac and RTC)		
Hot start time	< 10 s (almanac, RTC, and position)		
Maximum speed	1,850 kph (999 kts)		
Maximum altitude	18,288 m (60,000 ft)		

Differential options	SBAS, Autonomous, External RTCM3
Correction I/O protocol	RTCMv3 (RTK)
Number of channels	135

Antenna

Antenna	Internal ceramic L1+L5 patch antenna

Battery and Power

Internal Battery	Non-replaceable 3.7VDC, 1600mAh, Lithium ion
Battery Life	24 hours
External Power	USB-C power input from any USB power source

Mechanical

User interface	Transflective LCD 5 buttons 3 multicolor LEDs Audible tones
Dimensions	3.5 x 1.8 x 1.3 inches / 90 x 45 x 32 mm
Weight	3.2oz / 90g

Environmental

Temperature	Operating: –20°C to +55°C (–4°F to +131°F) Storage: –40°C to +75°C (–40°F to +167°F)
Humidity	100% condensing
Waterproof	IPX7

Bluetooth RF Characteristics

Frequency band	2402MHz ~ 2480MHz

Number of channels	79 channels
Modulation	FHSS, GFSK, DPSK, DQPSK
Output Power (Class 1.5)	9 dBm (typical)
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-86 dBm (typical)
Sensitivity @ BER=0.01% for Ω/4-DQPSK (2Mbps)	-86 dBm (typical)
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-80 dBm (typical)
Maximum Input Level	GFSK (1Mbps):-20dBm Ω/4-DQPSK (2Mbps) :-20dBm 8DPSK (3Mbps) :-20dBm
Antenna	Internal antenna

Regulatory Information & RF Disclosures

Viewing Regulatory Information

The label for this device is provided electronically. The e-label may provide regulatory information, such as identification numbers provided by the FCC or regional compliance markings, as well as applicable product and licensing information

From the main screen (accessible by tapping **Esc/Back**), navigate to the **Settings > Regulatory** screen.

Class B Statement – Notice to Users:

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.

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 and Part 90. 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 communication. However, there is no guarantee that interference will not occur in a particular use. 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 the Bad Elf Flex Mini.
- Consult Bad Elf for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Human exposure to radio frequency energy

Like any other mobile device, the Bad Elf Flex Mini emits radio frequency energy (RF) during use. According to the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the critical effect of RF exposure relevant to human health and safety is heating of exposed tissue.

According to the Federal Communications Commission (FCC), “Some health and safety interest groups have interpreted certain reports to suggest that wireless device use may be linked to cancer and other illnesses, posing potentially greater risks for children than adults. While these assertions have gained increased public attention, currently no scientific evidence establishes a causal link between wireless device use and cancer or other illnesses.”

However, above a certain level (referred to as the threshold) depending on the duration of exposure, RF exposure and the accompanying temperature rise can provoke serious health effects, such as heat stroke and tissue damage (burns). To avoid hazards to health deriving from high RF exposure, limits are set in relation to the threshold known to show adverse effects, with an additional reduction factor to take care of scientific uncertainties. These limits are generally expressed in terms of the specific absorption rate (SAR). SAR is a measure of the rate of absorption of RF energy in the body. Tests for SAR are conducted with the device transmitting at its highest power level in all tested frequency bands. SAR-limits were first established in 1996 by the FCC in the USA and they were then adopted elsewhere.

You can find additional information about SAR at the following pages:

http://fcc.gov

http://icnirp.org

http://ec.europa.eu

Bad Elf Flex Mini has been tested and certified to not exceed SAR limits in the U.S., Canada, European Union, or Australia.

Limited Warranty Terms and Conditions

Warranty

Bad Elf products will substantially conform to publicly available specifications for the product and that the hardware and any storage media components of the product will be substantially free from defects in materials or workmanship for one year from the date of purchase. Within this period, Bad Elf will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor.

This warranty does not apply to: (i) cosmetic damage, such as scratches, nicks and dents; (ii) consumable parts, such as batteries, unless product damage has occurred due to a defect in materials or workmanship; (iii) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes; (iv) damage caused by service performed by anyone who is not an authorized service provider of Bad Elf; or (v) damage to a product that has been modified or altered without the written permission of Bad Elf. In addition, Bad Elf reserves the

right to refuse warranty claims against products or services that are obtained and/or used in contravention of the laws of any country.

Bad Elf makes no warranty as to the accuracy or completeness of third-party applications that use Bad Elf position data.

Repairs have a 90 day warranty. If the unit sent in is still under its original warranty, then the new warranty is 90 days or to the end of the original one year warranty, depending upon which is longer.

Limitations and Remedies

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS, IMPLIED, OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL BAD ELF BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Bad Elf retains the exclusive right to repair or replace (with a new or newly-overhauled replacement product) the device or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

How to Obtain Warranty Service

To obtain warranty service, contact Bad Elf Product Support for shipping instructions and an RMA tracking number. Securely pack the device and a copy of the original sales receipt, which is required as the proof of purchase for warranty repairs. Write the tracking number clearly on the outside of the package. Send the device to the Bad Elf warranty service station.

Online Auction Purchases: Products purchased through online auctions (that means purchases not made through bad-elf.com, on eBay from bad-elf-llc, on Amazon from Bad Elf, LLC, or an approved reseller) are not eligible for warranty coverage. Online auction confirmations are not accepted for warranty verification. To obtain warranty service, an original or copy of the sales receipt from the original retailer is required. Bad Elf will not replace missing components from any package purchased through any online auction.

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Document Version

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All specifications and usage information subject to change without notice at Bad Elf, LLC's discretion.

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Use of the Made for Apple badge means that an accessory has been designed to connect specifically to the Apple product(s) identified in the badge and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of

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