

USER GUIDE

CARLSON BRX6 GNSS RECEIVER



ENVIRONMENTAL

Temperature – operating -30°C to +60°C

Temperature – storage -40°C to +80°C

Humidity MIL-STD-810F Method 5-7.4

Vibration MIL-STD-810FG Method 514.6E-1

Loose cargo MIL-STD-810F FIG. 514.5C-5

REGULATORY COMPLIANCE

CE COMPLIANCE

- IEC 60950-1: 2005
- EN 301 113-1 / EN 301 113-2
- EN 301 489-1 v1.9.2
- EN301 489-3 v1.6.1
- EN301 489-7 v1.3.1
- EN 301489-17v2.2.1
- EN301 489-24v1.5.1
- EN55022:2010
- EN55024:2010
- EN 300440-1 v1.6.1 / EN 300440-2 v1.4.1
- EN 300 328 V1.9.1
- EN 301 511 v9.0.2
- EN 301 908-1 v6.2.1 / EN 301 908-2 v6.2.1

FCC COMPLIANCE

- FCC Part 15, Subpart B
- FCC Part 15, Subpart C :2015
- FCC Part 15, Subpart C :2014
- FCC Part 2
- FCC Part 22H
- FCC Part 24E

IC COMPLIANCE

- ICES-003:2012 Issue 5
- RSS-247 Issue 1
- RSS-GEN Issue 4
- RSS 132 Issue 3
- RSS 133 Issue 6

CERTIFICATIONS

BRX6 UHF

- Model: S321 UHF
- FCC ID: ZC8S321UHF
- IC: 9586A-S321UHF

BRX6 NON-UHF

- Model: S321 Network
- FCC ID: ZC8S321Network
- IC: 9586A-S321Network

⚠ WARNING: If your BRx6 is equipped with a 400 MHz radio you may be required to obtain a valid radio license for your jurisdiction. Only set the radio to the frequency and power you are licensed to use at your location.

USA- FEDERAL COMMUNICATION COMMISSION (FCC)

Radio frequency radiation exposure information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

GSM Mode

- *When using the GSM to receive correction data, this equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.*

UHF Radio Mode

- *When using the 400 MHz radio, M3-TR4 from Satel™, this equipment should be installed and operated with a minimum distance of 24 cm.*

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Modifications not expressly approved by the manufacturer, Hemisphere GNSS, could void the user's authority to operate the equipment.

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to 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.

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

Caution: Exposure to Radio Frequency Radiation.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

CANADA - INDUSTRY CANADA (IC)

This device complies with RSS 210 of Industry Canada. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

L' utilisation de ce dispositif est autorisée seulement aux conditions suivantes: (1) il ne doit pas produire d'interférence et (2) l' utilisateur du dispositif doit être prêt à accepter toute interférence radioélectrique reçue, même si celle-ci est susceptible de compromettre le fonctionnement du dispositif.

Caution: Exposure to Radio Frequency Radiation.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website <http://www.hc-sc.gc.ca/rpb>.

EUROPE – DECLARATION OF CONFORMITY

This device is in compliance with the essential requirements of the R&TTE Directive 1999/5/EC.

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Hemisphere GNSS products may be covered by one or more of the following U.S. Patents:

6,111,549	6,397,147	6,469,663	6,501,346	6,539,303
6,549,091	6,631,916	6,711,501	6,744,404	6,865,465
6,876,920	7,142,956	7,162,348	7,277,792	7,292,185
7,292,186	7,373,231	7,400,956	7,400,294	7,388,539
7,429,952	7,437,230	7,460,942		

Other U.S. and foreign patents pending.

NOTICE TO CUSTOMERS

Contact your local dealer for technical assistance. To find the authorized dealer near you use the Carlson Software website dealer locator (<http://www.carlsonsw.com/where-to-purchase/dealers/>) or contact Carlson Software:

Carlson Software
33 East Second Street
Maysville, KY 41056
Phone: 606-564-5028
Fax: 606-564-6422
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Website: www.carlsonsw.com

TECHNICAL SUPPORT

If you need to contact Carlson Software Technical Support:

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CHAPTER 1: *INTRODUCTION*

Product Overview and Features

What's Included

OVERVIEW AND FEATURES

The BRx6 is an all-new multi-GNSS, multi-frequency smart antenna designed by and for surveyors. The BRx6 delivers robust performance and high precision in the field in a compact and rugged package. With multiple wireless communication ports and an open GNSS interface, surveyors can use the BRx6 in a variety of operating modes. The BRx6 can be configured as a precision base station sending RTK corrections via UHF radio or using the new Carlson Listen–Listen cloud-based low latency RTK correction delivery service. Configured as a lightweight and easy to use rover, the BRx6 connects to your base or virtual reference network via UHF radio, internal GSM cell modem, Carlson Listen-Listen or in Data Collector Internet mode. While the BRx6 is typically configured through SurvCE or SurvPC, it contains a built-in web UI used to control, manage, and upgrade the BRx6 with new firmware and activations. BRx6 uses the powerful Athena RTK engine and is Atlas (L-band satellite corrections) capable.



ATHENA RTK ENGINE

The BRx6 GNSS receiver uses Hemisphere’s Athena RTK (Real Time Kinematic) technology to deliver state of the art precise RTK positions. The localized corrections are processed on the rover to achieve superior accuracy and

repeatability. Performance testing has shown positioning accuracy at the centimeter level.

Athena RTK has the following benefits:

- Improved Initialization time - Performing initializations in less than 15 seconds at better than 99.9% of the time
- Robustness in difficult operating environments - Extremely high productivity under the most aggressive of geographic and landscape oriented environments
- Performance on long baselines - Industry-leading position stability for long baseline applications

ATLAS L-BAND

The BRx6 uses Atlas L-band, Hemisphere's industry leading correction service to achieve accurate positions anywhere in the world. With Atlas, the positioning accuracy does not degrade as a function of distance to a base station, as the data content is not composed of a single base station's information, but an entire network's information.

Atlas L-band can be added as a subscription. Atlas L-Band has the following benefits:

- Positioning accuracy - Competitive positioning accuracies down to 2 cm RMS in certain applications
- Positioning sustainability - Cutting edge position quality maintenance in the absence of correction signals, using Hemisphere's patented technology
- Scalable service levels - Capable of providing virtually any accuracy, precision and repeatability level in the 2 to 100 cm range
- Convergence time - Industry-leading convergence times of 10-40 minutes

Atlas L-band is not currently supported in SurvCE 5.04. It may be supported in subsequent releases of SurvCE.

⚠ WARNING: If your BRx6 is equipped with a 400 MHz radio you may be required to obtain a valid radio license for your jurisdiction.

aRTK POSITION AIDING

aRTK is an innovative feature available in the BRx6 GNSS receiver that mitigates the impact of land-based communication instability. Powered by Hemisphere's Atlas L-band correction service, aRTK provides an additional layer of communication redundancy to RTK users, assuring that productivity is not impacted by intermittent data connectivity.

BRx6 receives the aRTK augmentation correction data over satellite, while also simultaneously receiving the land-based RTK correction data. The BRx6 internally operates with two sources of RTK correction, creating an additional layer of correction redundancy compared to typical RTK systems. Once the satellite

correction data process is established (which takes as little as a few seconds), the BRx6 will continue to generate accurate RTK positions if the land-based RTK correction source becomes unavailable for a period of time.

SurvCE 5.04 does not currently support Atlas L-band or aRTK. These functions may be supported in future releases of SurvCE. When aRTK is supported, it will always be enabled in the BRx6 when using Carlson’s SurvCE and SurvPC data collection software.

SUREFIX RTK POSITION

In order to provide high fidelity quality indicators to users, the BRx6 contains an additional processor, the SureFix processor that runs in combination with the RTK engine. The SureFix processor takes several inputs, such as GNSS data, data preprocessing results and generated RTK solutions. The SureFix processor takes all available information including GNSS data, Athena pre-processing results and generated RTK solutions and by using functional and stochastic analysis methods determines the quality of the current RTK engine solution. Only those positions which have the highest quality are flagged as SureFix positions and are designed in SurvCE and SurvPC as FIXED+ positions.

WHAT’S INCLUDED

The BRx6 is available as a single unit or two units (base/rover setup). Figure 1-1 shows the parts included in the single unit kit and Table 1-1 lists the parts included in both kits.



Figure 1-1: BRx6 single unit kit

Table 1-1: BRx6 parts list

Item	Item	Qty	Part Number
1a*	BRx6 UHF Smart Antenna	1	8030.020.026
1b*	BRx6 Network Smart Antenna	1	8030.020.036
2	BRx6 3 Cell Smart Battery	2	8030.058.006
3	Battery Charger	1	8030.060.006
4	Battery Charger ACAdapter	1	8030.060.046
5	BRx6 Car Charger (12 v)	1	8030.060.026
5	BRx6 External Power Cable (5-pin LEMO)	1	8030.064.066
6	BRx6 External Power Cable with Clips	1	8030.064.036
7	BRx6 Serial Cable (USB and Serial, 7-pin LEMO)	1	8030.064.026
8	UHF External Antenna (SNA Connector)	1	8030.042.006
9	GSM External Antenna (SNA connector)	1	8030.043.006
10	Quick Release 5/8" Mounting Adapter	1	8030.085.002
11	Tape Measure (not shown)	1	8030.080.096
12	Carry Case (not shown)	1	8030.080.006
13	8 GB microSD Card (not shown)	1	8030.096.006

*= The BRx6 kit comes as either a UHF version or a network version. Only one device is included per kit.



CHAPTER 2: INSTALLATION

Ports and Connections

Installing Batteries

Installing UHF and GSM Antenna

Installing on a Tribrach

Installing on a Range Pole

Connecting to a Power Source

Connecting to an External Device

Turning BRx6 On/Off

Inserting and Removing the SD and SIMCard

PORTS AND CONNECTIONS

All ports and connections are located on the bottom of the unit, as shown in Figure 2-1. Table 2-1 provides additional information about each port/connection.



Figure 2-1: BRx6 ports and connectors

Table 2-1: BRx6 ports and connections

Port	What to connect
7-pin Data Port (LEMO)	Data cable for serial or USB (Item 7 in Table 1-1 on page 4)
5-pin Power/Radio Port (LEMO)	External Power and Radio devices (Item 5 and 6 in Table 1-1 on page 4)
GSM antenna connector	External GSM antenna (Item 9 in Table 1-1 on page 4)
UHF Antenna Connector	External antenna (Item 8 in Table 1-1 on page 4)
Mounting hole	Pole or tripod mount

INSTALLING BATTERIES

The BRx6 uses a single rechargeable Li-ion smart battery (11.1 V - 37.74 Wh). When installing the battery, ensure the contact points are facing up towards the “Carlson” logo. Slide the battery into the designated spot until the “battery tension bar” clicks and locks the battery into place. The typical run time of a BRx6 battery is 4 – 5+ hours depending on the operating mode. The BRx6 kit provides two batteries, as noted in the “What’s Included?” portion of this user guide.



Figure 2-2: Battery installation

To remove the battery, push the battery tension bar to the left. The battery should pop out of the battery compartment. When swapping batteries in the BRx6, it is recommended that the BRx6 be powered-down or turned off, the old battery removed and the new battery inserted in the battery compartment, then power up the BRx6.

The remaining charge level of a BRx6 battery can be tested by pressing the battery icon on the right side of the battery. The charge level is indicated by the number of LEDs lit on the back of the battery. Four LEDs indicate a charge level greater than 75% (4+ hours of battery life), two LEDs indicate a charge level of around 50% (approximately 2 hours of battery life). A depleted battery will display either one flashing LED or no LEDs will be lit.



Figure 2-3: Fully Charged Battery Indicator

INSTALLING UHF AND GSM ANTENNAS

To install the UHF portion of the BRx6 antenna, locate the UHF antenna (PN: 8030.042.006) from the kit list under “What’s Included”. Insert the connector end of the UHF antenna into the antenna connector labeled “UHF” and rotate clockwise to secure the antenna to the BRx6. To install the GSM portion of the BRx6 antenna, locate the GSM antenna (PN: 8030.043.006) from the kit list under “What’s Included”. Insert the connector end of the GSM antenna into the antenna connector labeled “UMTS” and rotate clockwise to secure the antenna to the BRx6.



Figure 2-4: Installing UHF and GSM Antennas

INSTALLING BRx6 ON A TRIBRACH

The BRx6 mounts flush to the tribrach, by securing the 5/8" metal mounting portion of the BRx6 to the standard 5/8" male portion of the tribrach. Using approximately 3-4 ft./lbs. of torque, secure the BRx6 onto the mount in a clockwise rotation.



Figure 2-5: Installing BRx6 on a Tribrach

QUICK RELEASE INSTALLATION AND OVERVIEW

The quick release attaches to the 5/8" bottom mounting portion of the BRx6. This adapter then connects to the top of a pole mount or the top of the tribrach mount. This design allows the BRx6 to be removed from either mounting point at the push of a button.



Figure 2-6: Quick Release Adapter

INSTALLING THE ANTENNA ARM

The antenna arm is typically used when the BRx6 is configured as a base using the internal UHF radio and mounted on a tripod. The antenna arm moves the UHF antenna away from the BRx6 and has the UHF antenna pointing up as shown in Figure 2.6.



Figure 2-7: BRx6 mounted on tribrach with UHF antenna arm

The BRx6 UHF antenna arm is found in each BRx6 receiver kit and consists of two pieces, the antenna arm and the UHF antenna as show in Figure 2-7.



Figure 2-8: Antenna Arm kit

To install the antenna arm, place the end of the arm with the 5/8" hole over the 5/8" mounting screw on the tripod/tribrach/survey pole, making sure the TNC connector on the end of the antenna arm is pointing up. Screw the BRx6 onto the tripod/tribrach/survey pole. The BRx6 holds the antenna arm in place. Attach the antenna arm's gold SMA connector to the UHF connector on the BRx6. Now attach the UHF antenna onto the TNC connector on the end of the antenna arm. The installation should appear as shown in Figure 2-6 above.

INSTALLING THE BRx6 ON A RANGE POLE

Using the standard 5/8" mount on the bottom of the BRx6, you can secure the unit to a field standard 5/8" range pole. The BRx6 should be placed carefully on the rangepole, to ensure cross-threading does not occur, while rotating the unit in a clockwise direction. Apply approximately 3-4 ft/lbs. of torque to the unit.



Figure 2-9: Range Pole Installation

CONNECTING TO AN EXTERNAL POWER SOURCE

The BRx6 has two main power sources. The first being an internal, removable battery which is described in the earlier portion of this chapter. The second source of power is the external power cable. The external power cable consists of two separate cables shown in Figure 2-9 that plug together using a two pin SAE connector. The shorter cable has a 5-pin (Lemo) connector on one end that plugs into the BRx6 and a 2-pin SAE connector on the other end. The longer cable has a 2-pin SAE connector that plugs into the shorter connector on one end and two alligator clips on the other end for connecting to any external 9 to 24 volt DC power source (for example, a sealed lead acid motorcycle battery). Connecting external power maybe a reasonable solution when setting up a permanent base or setting a long term base in a remote area.



Figure 2-10: External Power Connector

When connecting a BRx6 base to an external Satel or PacCrest UHF radio, the short BRx6 power cable (PN: 8030.064.66) can be replaced with an accessory cable that also connects to the external radio. When using a Satel radio, the BRx6 power cable to receiver and external Satel radio (PN: 8030.064.056) also has a connector to the radio's communication port. (Due to the design of the Satel radio, a separate power cable is required). When using a PacCrest radio, the BRx6 power cable to receiver and external Pac Crest radio (PN:8030.064.046) provides power to the radio and also connects to the radio's communication port.

CONNECTING TO AN EXTERNAL DEVICE

The BRx6 kit comes with an external data cable (PN: 8030.064.026). This cable (see Figure 2-10) has a 7-pin Lemo connector on one end, and both a DB-9 serial connector and a full-size client USB connector on the other end. The 7-pin Lemo connector plugs into the BRx6 and the USB or serial connector plugs into the external device being connected.



Figure 2-11: External Device Connector

When the USB connector is plugged into a PC or laptop, the BRx6 appears as an external memory device the same as if a thumb drive or USB memory stick was plugged into the computer. If raw log files are stored on the BRx6's internal memory, File Explorer can be used to drag and drop the files from the BRx6 to computer.

USING THE BRX6 FN AND KEYS

The BRx6 menu and display can be navigated using the FN and Power () keys on the BRx6. The FN key allows you to scroll through each item on the device menu display. The  key acts as an enter key for selecting menu options. The  key also acts as a power key to turn the BRx6 ON and OFF (see the section below).

TURNING THE BRX6 ON/OFF

Use the  key to power the BRx6 on and off the receiver.

Power on receiver: Press the  key for at least 1 second to power on the BRx6. The BRx6 will display *Carlson* on the display while powering on. The LEDs on the display will flash during the power on process. When power up is complete, the status menu will be shown on the display.

Power off receiver: Hold the  key for two seconds, then release. The Power icon on the display should be selected. If the power icon is not selected because the display was off, then hold the  key for another two seconds. If the power icon is not selected because another setting (Mode, RTK, Set, Shut) was selected, press the FN key to move to the next setting until the Power icon is selected. Press the  key to power down the receiver.

Self-Check: Self Check is found in the Set menu in the BRx6. Running self-check confirms that all parts of the BRx6 (GPS, Wi-Fi, Bluetooth, Radio, GSM cell modem and sensors) are all working properly.

Note: The frequency setting of the internal UHF module is set back to factory default on self-test. If you run a Self-Check, you will need to reconfigure the UHF radio settings using SurvCE.

REMOVING/INSERTING THE SD CARD / SIM CARD



Caution: Use electrostatic discharge (ESD) protection, such as by wearing an ESD strap that is attached to an earth ground, before inserting or removing the SIM card on the BRx6. If an ESD strap is not available then touch a metal object prior to accessing the SIM card holder.

The Micro SD card and the SIM card are only accessible by first opening the battery door, where the:

- The “SIM” card slot is positioned on the left side of the battery opening

- The “Micro SD” card slot is positioned on the right side of the battery opening.

To remove the SD card or SIM card:

- Open the battery door.
- Gently push the card in; it will then snap back and slightly out.
- Remove the card.

Note: When you insert either card make sure the contacts on the card are facing towards the top of the BRx6 and the side of the card with the notch goes in first.

To insert the MicroSD card or SIM card:

1. Place the card in its appropriate card slot.
2. Gently push the card in until it clicks.
3. Close and secure the battery door.

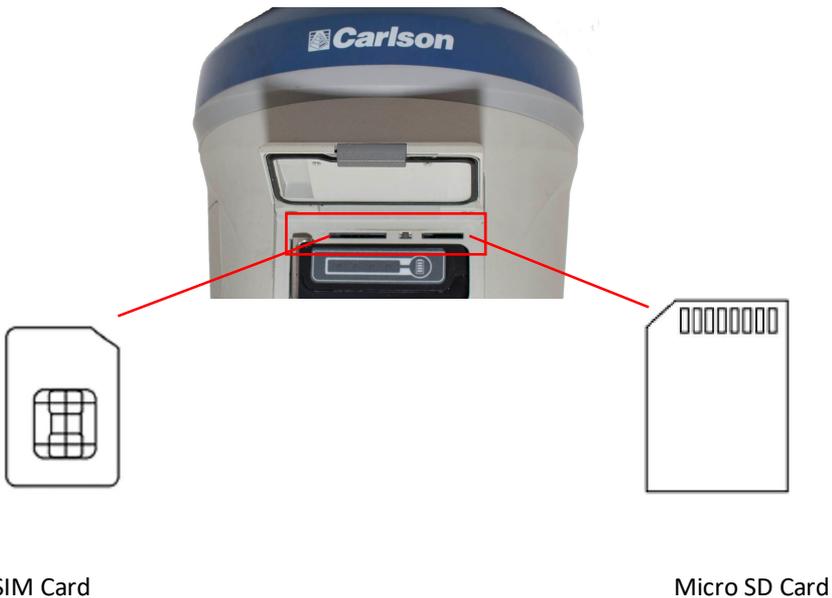


Figure 2-12: Inserting SIM or MicroSD cards

RESETTING THE BRx6

In order to do a hardware reset of the BRx6, lift the battery door and locate the “Reset” button between the SIM card and the Micro SD card slots. Pressing and releasing this button will turn the BRx6 off and automatically restart the BRx6.



Figure 2-13: Resetting BRx6



CHAPTER 3: SETUP AND CONFIGURATION

Control Panel Overview

Bluetooth Communication

BRx6 WebUI

How to Download Static Data

CONTROL PANELOVERVIEW

You operate the BRx6 using the control panel shown below.

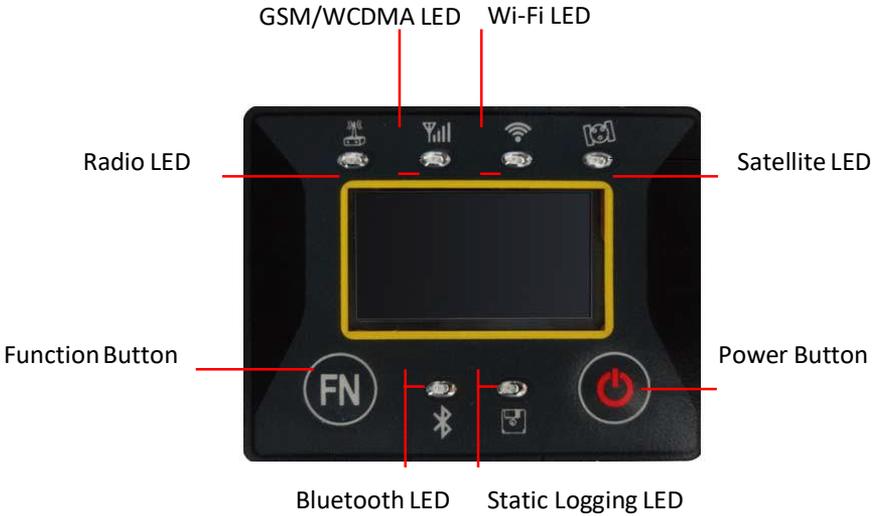


Figure 3-1: Control Panel and Display

SATELLITE LED (GREEN)

Approximately every 15 seconds, the satellite LED will blink the number of satellites being used in the current position. If 15 satellites are used for the current position, the satellite LED will blink 15 times, go OFF for approximately 15 seconds and then blink 15 times.



Figure 3-2: Satellite LED

STATIC LED (GREEN)

The LED is illuminated when Static mode is selected and the LED blinks at a 1 Hz rate when static data is being logged.



Figure 3-3: Static LED

BLUETOOTH LED (BLUE)

The Bluetooth LED illuminates when the BRx6 is connected to a data collector using Bluetooth. The Bluetooth LED will blink each time the BRx6 receives an RTK correction packet from the data collector. When using SurvCE in Data Collector Internet mode, if the Bluetooth LED is blinking, then you know that the BRx6 is receiving RTK corrections.



Figure 3-4: Bluetooth LED

WI-FI LED (GREEN)

When the Wi-Fi LED is illuminated, the WiFi access point in the BRx6 is active and you can connect your tablet or data collector to the BRx6 using WiFi and use the webUI to change BRx6 configurations. For more information on the WebUI is found later in this chapter. SurvCE or SurvPC will typically be used to configure the BRx6, not the WebUI. In most configurations the WiFi LED will always be ON.



Figure 3-5: Wi-Fi LED

Wi-Fi can be disabled from the BRx6 front panel using the following key-press sequence:

- Press the power button to turn the display on if OFF
- Hold the power button for 2 seconds to display the menu.
- Press the FN button to select the “Set” or wrench icon
- Press the Power button. This should select WiFi in the Settings menu.
- Press the Power button
- Press the FN button to select Enable or Disable
- Press the Power button

If Wi-Fi is disabled, you will not be able to use the WebUI.

INTERNAL UHF RADIO/EXTERNAL DATA LINK LED (GREEN)

The LED is green when the UHF radio for external data link is selected as the RTK data link. It begins blinking when the BRx6 is either transmitting data as a base, or receiving data as a rover.



Figure 3-6: Internal UHF Radio LED

NETWORK (INTERNAL GSM CELL MODEM) LED (GREEN)

The light is on when the Internal GSM or network module is selected as RTK data link. It starts to blink when receiving and transmitting data. (Download in rover mode and upload in base mode)



Figure 3-7: Network LED

POWER

When the BRx6 is powered on at least one (usually more) LED's will always be on. The status display will usually be illuminated. If the status display is not illuminated but a LED is on, the BRx6 is receiving full power.

When the BRx6 battery level is below 10% capacity, the BRx6 will beep three times every 60 seconds.

BLUETOOTH COMMUNICATION

If you have a Bluetooth-enabled device, such as a data collector, you can wirelessly communicate with the BRx6.

When you attempt to connect the BRx6 to a Bluetooth-enabled device, such as a handheld data collector, the BRx6 serial number (found on the identification label on the bottom of the BRx6) will appear on the data collector/device when querying for available Bluetooth devices.

The default BRx6 Bluetooth PIN/Pass Key is 0000.

Table 3-1 describes the Bluetooth status LED options.

Table 3-1: Bluetooth LED status

LED Colors	Meaning
	Bluetooth inactive
	Active Bluetooth connection
Blue blinking/pulsing	Active Bluetooth connection and receiving data

BRX6 WEB UI

The BRx6 contains a Wi-Fi access point with a web based user interface (web UI). The BRx6 web UI can be accessed using the web browser in any PC, Tablet, or Phone that has Wi-Fi capabilities.

Using the web UI, the BRx6 status can be checked, the BRx6 configuration can be changed, static log files can be downloaded and the BRx6 firmware can be updated. SurvCE users will typically use SurvCE to configure the BRx6. Most SurvCE users will primarily use the web UI to either a) update BRx6 firmware or b) download static log files from the BRx6.

INITIAL SETUP

In order to access the WebUI you will need to connect your device (PC, tablet, smartphone) to the BRx6 Wi-Fi. Using the Wi-Fi manager on your device, display the available Wi-Fi devices. The BRx6 serial number will be displayed at the device name in the list of available Wi-Fi access points. An example using the Windows Wireless Manager is shown below.



Select the BRx6 from the list and tap the “Connect” button.



Once your device is connected to the BRx6, open the web browser on your device and type or copy the following IP address into your URL bar: **http://192.168.10.1/**

The web UI will prompt you for a user name and password. The default BRx6 user name and password are:

User Name: admin

Password: s321

Depending on the operating system installed on your computer, the screens and process may be different than shown above.

WEB UI STARTUP

After logging into the web UI, the following status page will be displayed on your device browser. The “**Status**” tab contains general GNSS information including System mode, Latitude, Longitude, Height, Satellites, etc.

The screenshot shows the 'Status' tab of the BRX6 Web UI. The page header includes the Carlson logo and the device name 'BRX6'. In the top right corner, the following information is displayed: S/N: S321341500024, FW: 1.8.160805, IP: 192.168.10.1, and 1980-01-06 08:00:00. Below the header, there are tabs for 'Status', 'Information', 'Download', and 'Management', with 'Status' being the active tab. A 'Settings' button is located in the top right. The main content area contains two columns of system information:

- System Mode:** Rover
- Longitude:** 0.000000000 °
- Height:** 0.000 m
- Satellites:** 0
- HDP0P:** 0.000
- HRMS:** 0.000 m
- GNSS Time:** 1980-01-06 08:00:00
- Current Datalink:** Bluetooth
- Latitude:** 0.000000000 °
- Status:** Idle
- PDP0P:** 0.000
- TDOP:** 0.000
- VRMS:** 0.000 m

At the bottom left, there is a support email address 'support@carlsonsw.com' and a copyright notice: '© Copyright 2013 Carlson Software. All Rights Reserved.'

The “**Information**” tab contains device and module information, in addition to current software and firmware versions.

The screenshot shows the 'Information' tab of the BRX6 Web UI. The page header is identical to the 'Status' tab. The 'Information' tab is active, and the main content area displays detailed device and module information in two columns:

- Device Model:** BRX6
- Hardware Version:** S321-V1.0
- Firmware Version:** 1.8.160805
- MCU Version:** 1.08
- Battery Power:** 88%
- Used Memory:** Internal Storage
- Manufacture Date:** 2015-8-24
- Device Serial:** S321341500024
- BOOT Version:** 4.02
- OS Version:** 4.10
- Sensor Version:** 1.0
- Power Source:** battery
- Data Memory:** Total 3.16 GB; Free 2.85 GB
- GNSS Mode:** P306
- GNSS Hardware Version:** 1
- GNSS Serial:** 18803052
- GNSS Firmware Version:** 5.3Aa13
- Baud Rate:** 38400

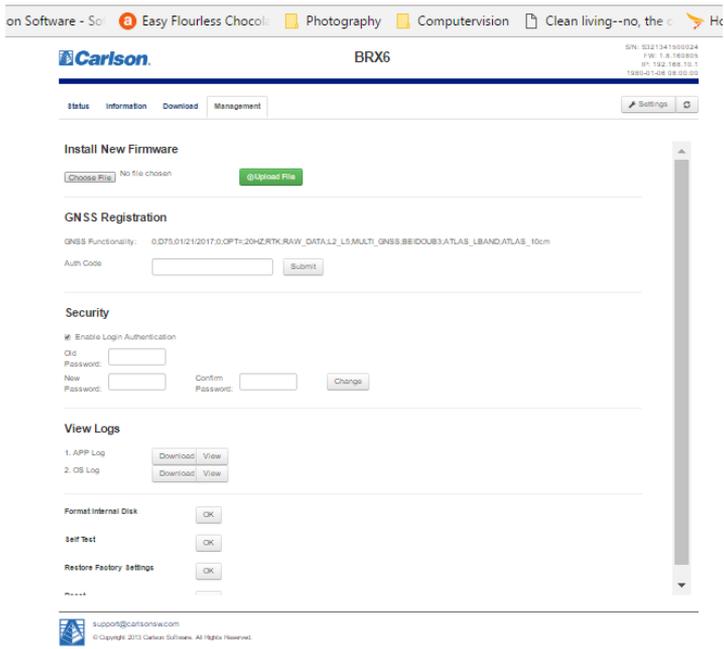
The bottom of the page includes the same support email and copyright notice as the 'Status' tab.

The “**Download**” tab allows you to review, download or delete any of the data files stored in the BRX6’s memory.

The screenshot shows the BRX6 Web UI interface. At the top, the browser address bar displays '192.168.10.1'. The page header includes the 'Carlson' logo and the device model 'BRX6'. On the right side, device information is provided: SN: S321341500024, FW: 1.8.160805, IP: 192.168.10.1, and a timestamp of 1980-01-06 08:00:00. Below the header, there are navigation tabs for 'Status', 'Information', 'Download', and 'Management', with 'Management' being the active tab. A 'Settings' button is also visible. The main content area features a table with the following data:

Select	Name	Size	Modification Time	Operation
<input type="checkbox"/>	13Jul.bin	317.585K	2016-07-13 17:47:50	Download Delete
<input type="checkbox"/>	13Jul_2.bin	22.538M	2016-07-13 21:06:20	Download Delete
<input type="checkbox"/>	14JUL_BRX6.bin	7.133M	2016-07-14 19:46:40	Download Delete
<input type="checkbox"/>	14JUL_BRX6_2.bin	12.123M	2016-07-14 21:34:00	Download Delete
<input type="checkbox"/>	17JUL_24.bin	12.182M	2016-07-17 20:33:28	Download Delete
<input type="checkbox"/>	20MAY_M1_BRX6_bin	19.438M	2016-05-20 15:19:34	Download Delete
<input type="checkbox"/>	20MAY_M1_BRX6_2.bin	193.787K	2016-05-20 15:25:22	Download Delete
<input type="checkbox"/>	20MAY_M1_BRX6_3.bin	4.365M	2016-05-20 21:08:28	Download Delete
<input type="checkbox"/>	21MAY_M1_BRX6.bin	33.898M	2016-05-21 12:53:00	Download Delete
<input type="checkbox"/>	22JUL_BRX6_24_UH.bin	18.853M	2016-07-22 09:59:30	Download Delete
<input type="checkbox"/>	192.168.10.1/fib-down	509.765K	2016-07-24 15:59:10	Download Delete

The “**Management**” tab provides access to the firmware update tools, a terminal to register authorization codes, and password customization in order to properly secure your device moving forward.



INSTALL NEW FIRMWARE

This feature allows you to update the menu application software. Once the correct software is selected under the “choose file” button, the “Upload” button initiates the firmware update procedure and restarts the BRx6 device. Detailed instructions for upgrading BRx6 firmware are included when you download firmware updates from the Carlson Knowledge Base.

GNSS REGISTRATION

The GNSS registration field displays the GNSS features activated on the BRx6 and the expiration date of the features for which the BRx6 is subscribed. In addition, the ability to update the BRx6 with new subscriptions is available under the “AuthCode” field. Enter the new authorization code, tap the submit button and the device will automatically update. Detailed instructions are provided from Carlson Technical Support when a new subscription code is provided.

SECURITY

The security field allows the user to enable or disable login WebUI requirements. The user is able to reset or customize a new password for their device by filling in the required fields to change the password, Old Password, New Password and Confirm Password. The default WebUI password is *admin* and the default password is *s321*.

VIEW LOGS

The view logs field allows you to track any activity at the application and OS level. This feature is typically not used, but may be required by the technical support staff troubleshooting any issues.

FORMATTING / SELF TEST / RESET

The Format internal disk button allow you to reformat the internal hard drive in the BRx6. Self test, provides an application review to ensure the device functioning properly (See self-check for more information). Reset, initiates a complete device shut down. Creating a hard reset to the device and stopping any application activity. (See resetting the BRx6 for more information).

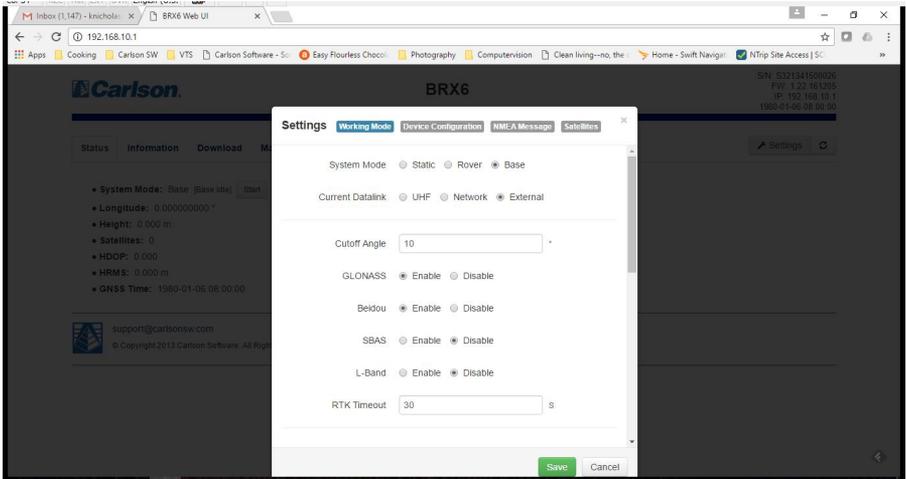
WEB UI SETTINGS

SurvCE users will typically configure the BRx6 from SurvCE and will rarely if ever need to change the BRx6 settings using the web UI. This section provides a brief overview of the different BRx6 settings which can be changed from the web UI.

There are two things to remember when changing BRx6 settings using the web UI:

1. Going into Equip/Rover or Base in SurvCE and then tapping the green check, will change the BRx6 settings. SurvCE changes BRx6 settings based on the configuration defined in SurvCE, not on the configuration defined in the web UI.
2. Be sure to tap the **“Save”** button if you want to changes made in the web UI to be saved.

To change BRx6 settings using the WebUI, tap the **“Settings”** button and the Settings windows will be displayed as shown here:

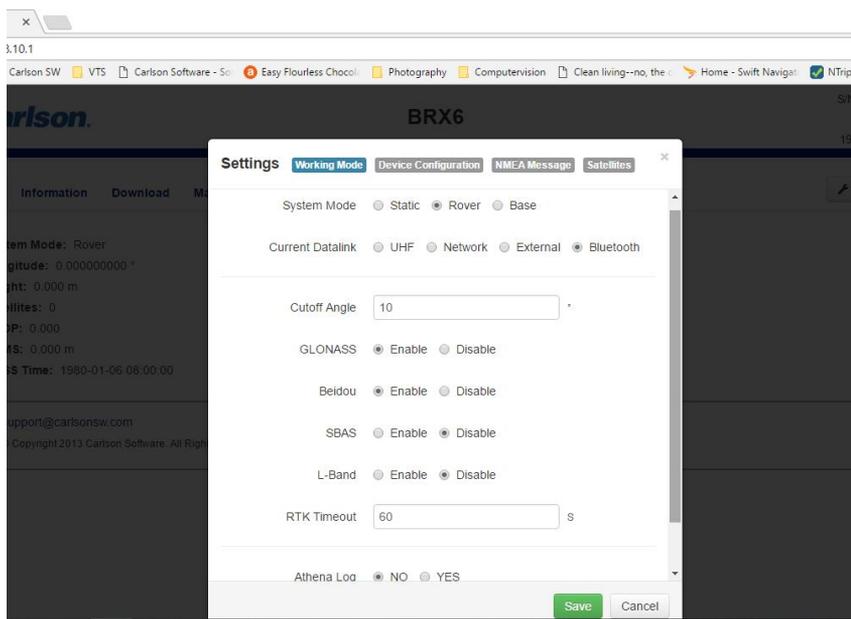


WORKING MODES

The working mode tab can be used to change the following BRx6 settings. The options displayed in the working mode tab are dependent on the system mode and current datalink selected. Since SurvCE will usually be used to configure the BRx6 only the working mode options when the system mode is “Rover” and the Current Datalink is “UHF” will be presented below.

- System Mode: Static, Rover or Base
- Current Datalink: UHF radio, Network (internal GSM), External (in Base mode only) or Bluetooth (Rover mode only)
- Cutoff Angle: called “Elevation Mask” in SurvCE
- Enable or Disable the following:
 - GLONASS
 - Beidou

- SBAS
 - L-Band (Atlas)
- RTK Timeout
 - Athena Log – leave as No unless instructed by Technical Support
 - Radio Channel – selects one of the 16 available UHF radio channels
 - Radio Mode – select the available UHF radio modes from the drop down
 - FEC (UHF Forward Error Correction) – select ON or OFF
 - Advanced UHF Settings – This feature is not supported by Carlson Software on the BRx6.
 - Radio Configuration File – Organizations will a large number of BRx6 units may want to create a Radio Configuration File so each receiver’s UHF settings can be configured the same. Contact Technical Support for additional to find out more information.



DEVICE CONFIGURATION

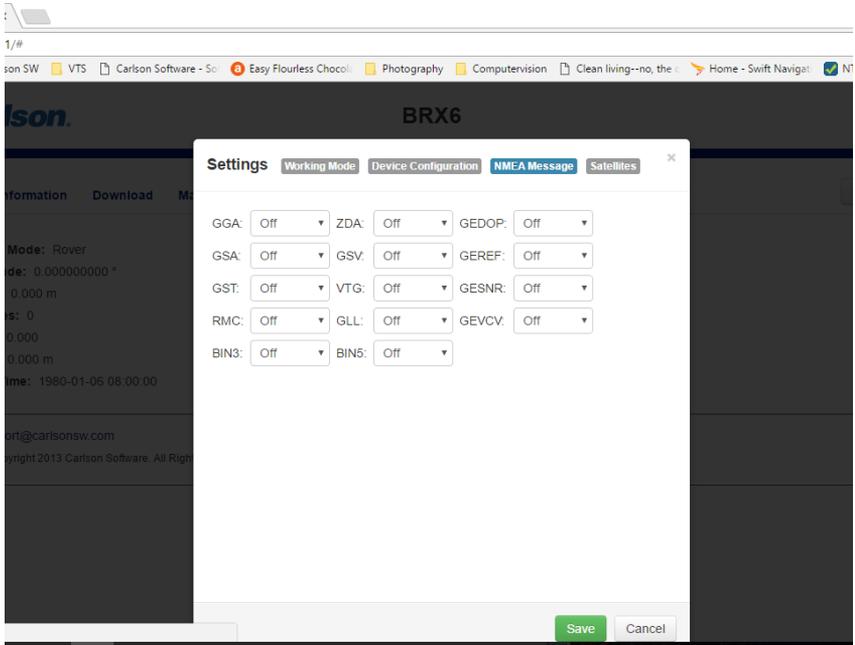
The device configuration tab can be used to change the following BRx6 settings:

- BRx6 Language – the language text displayed on the BRx6 display. Currently the options are English and Chinese.
- Time Zone – The time zone used to display the time on the BRx6 display.
- Direct Link Mode – the mode used for direct, hard wire communications with the BRx6. Unless instructed by Technical Support, this should be Disable.

- Sensor – Enable or disable the internal tilt, accelerometer and compass settings. SurvCE automatically enables the sensors when using the IMU sensors.
- Speaker – Enable or disable the speaker. SurvCE has the same capability.
- First Storage – store log data first on either internal storage of the micro SD card.
- Tracker – leave set to Disable.

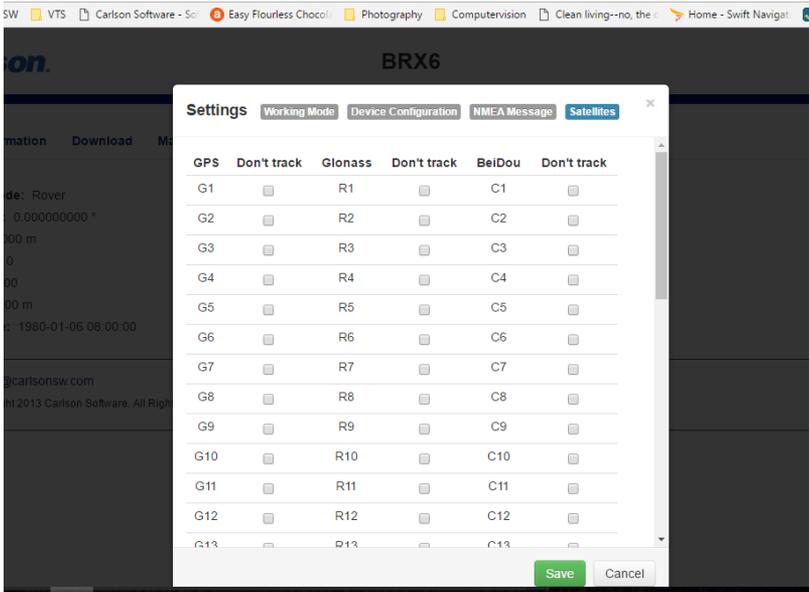
NMEA MESSAGES

The NMEA message tab is used to select the NMEA messages to transmit to the data collector. SurvCE automatically configures the NMEA messages.



SATELLITES

The Satellites tab selects which satellites are to be used in calculating the position. The default is all satellites are enabled. SurvCE provides this same functionality.



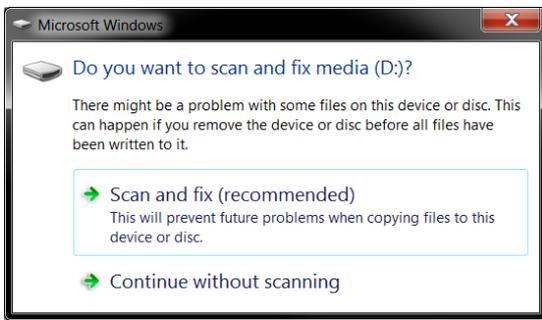
HOW TO DOWNLOAD STATIC DATA

You can download static data from the BRx6 using either the WebUI “Download” tab and by a direct USB connection to your PC. Using the USB connection is typically faster than using the WebUI, especially for large static log files.

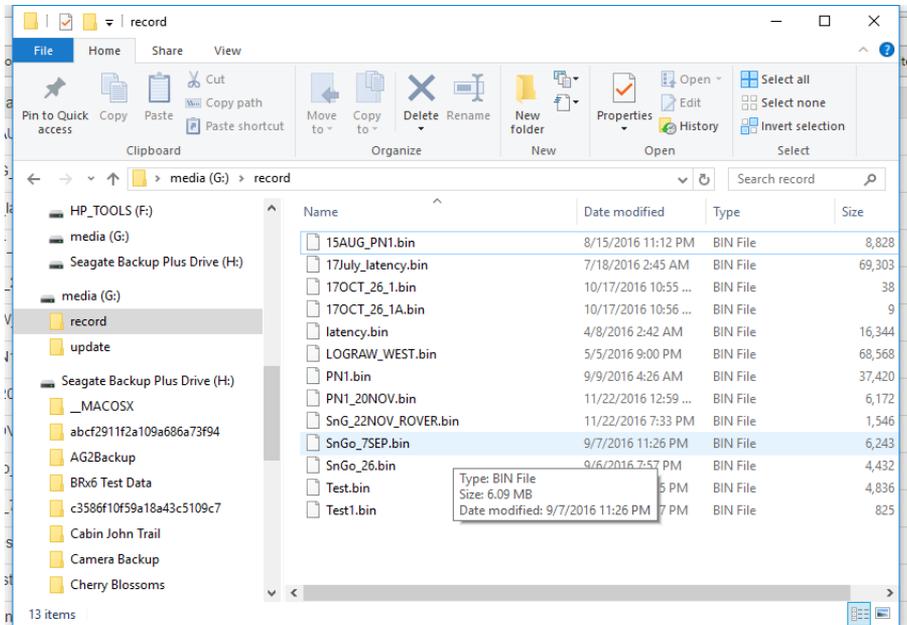
When using the WebUI, tap the green “Download” button next to each file to download one by one, or select multiple files and tap the green “Package” button to package the selected files in the compressed “tar” format and download.

To download files using a USB connection to your PC, follow the procedure described below.

1. Turn off the receiver, then connect the cable with the USB connector to the communication interface of the receiver (7-pin Lemo) port, and finally insert the client USB connector into USB port on the PC. Turn the BRx6 back on and a new removable drive will appear in on your PC. The drive will be named “media”. The drive number will depend on your PC configuration and other prompts as show below, may appear:



The PC considers the BRx6 memory as a “media disk”, so open the “media disk”, the open the “record” folder to find all the log files stored on the BRx6. Here is a screen shot from PC where the BRx6 appears as drive “media (G)” and contains 13 static log files. The files can be copied, moved or “drag and dropped” to the desired folder on the PC.





APPENDIX A: TROUBLESHOOTING

Table A-1 provides troubleshooting tips for the BRx6.

Table A-1: BRx6 troubleshooting

Issue	Possible Resolution
Receiver fails to power on	Make sure to hold the power button down for a minimum of one full second to turn on Internal battery is not charged Check charge on internal battery External power is low Check charge on external battery and the fuse on the power cable, if applicable Check all power cables and pins Try other batteries or cables
No data logged No communication No valid data	(1) Check receiver power status (2) Verify it is locked to a valid DGPS signal (2) Verify that it is locked to 4 or more GPS satellites (2) Check integrity and connectivity of power and data cable connections Verify that the baud rate settings match in external device mode If trying to connect over Bluetooth, ensure Bluetooth module is powered ON and device is paired prior to opening the port
Random data from web UI or BRx6 Direct Link mode	Verify the messages selected in the output messages in the web UI match what you desire. Verify the baud rate settings match Potentially, the volume of data requested to be output could be higher than the current baud rate supports. Try using a higher baud rate for communications.
No GNSS position	Verify the antenna's view of the sky, especially toward SBAS satellites, south in the northern hemisphere Ensure there is SBAS coverage in your area
No DGPS position in external RTCM mode	Verify the baud rate of the RTCM input port matches the baud rate of the external source Verify the pin-out between the RTCM source and the RTCM input port (the "ground" pin and pin-out must be connected, and the "transmit" from the source must connect to the "receiver" of the RTCM input port)



APPENDIX B: TECHNICAL SPECIFICATIONS

Appendix B: Technical Specifications

The following tables provide information on the technical specifications of the BRx6.

Table B-1: GNSS receiver specifications

Item	Specification
Receiver type	Multi Frequency GNSS
Channels	372
Positioning modes	RTK, L-band DGNSS, SBAS, External RTCM, Autonomous
RTK formats	RTCM3.0, RTCM 2.3, CMR+, ROX
L-band formats	Atlas H100, Atlas H30, and Atlas H10
Update rate / recording interval	Selectable from 1, 2, 4, 5, 10, 20 Hz

Table B-2: Performance Specifications

Mode	Specification	
	Horizontal	Vertical
RTK Performance	8 mm + 1 ppm	15 mm + 1 ppm
Static Performance (long occupation)	3mm + 0.1 ppm	3.5mm + 0.4 ppm
Static Performance (rapid occupation)	3mm + 0.5 ppm	5mm + 0.5 ppm
L-band Performance ³	0.08 m	0.16m
SBAS Performance ¹	0.3 m	0.6 m
Autonomous, no SA	1.2 m	2.4 m

Table B-3: Satellite Tracking

Satellites	
GPS	L1C/A, L1P, L2P, L2C
GLONASS	L1C/A, L2C/A
BeiDou	B1, B2
QZSS	With future firmware upgrade

Galileo	With future firmware upgrade
SBAS	MSAS, WAAS, EGNOS, GAGAN

Table B-4: Communication and port specifications

Item	Description
Connectors I/O	5-pin Lemo connector for external power supply and external radio devices 7-pin Lemo connector for USB OTG connection and a serial port interface 1 antenna connector for internal radio 1 antenna connector for modem module
Web UI	To upgrade the software, manage the status and settings, data download, via smart phone, tablet or other electronic device
TTS	Smart voice broadcast system. "Speaking" receiver
Reference Outputs	RTCM2.1, RTCM2.3, RTCM3.0, RTCM3.1, RTCM3.2 including MSM

Table B-5: Radio specifications

Item	Specification
Frequency Range	410 - 470 MHz
Channel Spacing	12.5 KHz / 25 KHz
Emitting Power	0.5 / 1w

Table B-6: Wireless specifications

Item	Specification
Wi-Fi	Integrated module with internal Wi-Fi antenna
Bluetooth	Bluetooth 2.1 + EDR Integrated Bluetooth (BT) communication module with internal BT antenna

Table B-7: Cellular specifications

Item	Description
Type	UMTS/HSPA+/GSM/GPRS/EDGE
Supported Frequencies	GSM/GPRS/EDGE (850, 900, 1800, and 1900MHz) WCDMA/HSDPA (850/800, 900, 1800, and 1900MHz)

Table B-8: Power specifications

Item	Specification
Battery	Rechargeable 11.1 V - 37.74 Wh
Battery Life	4-5+ hours with one battery and UHF radio in Rx mode
Voltage	9 to 22V DC external power input with over-voltage protection
Charge Time	Typically 7 hours

Table B-9: Memory specifications

item	Specification
SIM Card	Accessible SIM card slot
Memory	Internal 4GB. Accessible through USB and Wi-Fi External Micro SD card slot supports up to 64 GB.

Table B-10: Environmental specifications

Item	Specification
Operating Temperature	-30°C to 60°C (-22°F to 140°F)
Storage Temperature	-40°C to 80°C (-22°F to 176°F)
Water / Dust Proof	IP67
Shock Resistance	MIL-STD-810G, method 516.6
Vibration	MIL-STD-810G, method 514.6E-1
Humidity	Up to 100%

Table B-11: Mechanical specifications

Item	Specification
Size	14.1 D x 14.0 H (cm) 5.5 D x 5.5 H (in)
Weight	<1.38 kg (<3.05 lbs)
Mounting	5/8"x11, 55 ° thread angle, stainless steel insert
Phase Center Offset	GPS L1 and L2 offset below 2.5mm

¹ Receive only, does not transmit this format.

² Depends on multi-path environment, number of satellites in view, satellite geometry, and ionospheric activity.

³ Depends also on baseline length.

⁴ Requires an L-band subscription.

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The warranty for the BRx6 GNSS receiver is provided by the manufacturer of the BRx6, Hemisphere GNSS

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Maysville, KY 41056
Phone: 606-564-5028 Fax: 606-564-6422
Support@carlsonsw.com
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