

FLUKE®

Biomedical

Fluke Biomedical

Beacon100

Users Guide

PN 2803836

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Warranty and Product Support

Fluke Biomedical warrants this instrument against defects in materials and workmanship for one full year from the date of original purchase. During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective, provided you return the product, shipping prepaid, to Fluke Biomedical. This warranty does not apply if the product has been damaged by accident or misuse or as the result of service or modification by other than Fluke Biomedical. **IN NO EVENT SHALL FLUKE BIOMEDICAL BE LIABLE FOR CONSEQUENTIAL DAMAGES.**

Only serialized products and their accessory items (those products and items bearing a distinct serial number tag) are covered under this one-year warranty. **PHYSICAL DAMAGE CAUSED BY MISUSE OR PHYSICAL ABUSE IS NOT COVERED UNDER THE WARRANTY.** Items such as cables and nonserialized modules are not covered under this warranty.

Recalibration of instruments is not covered under the warranty.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state, province to province, or country to country. This warranty is limited to repairing the instrument to Fluke Biomedical's specifications.

Warranty Disclaimer

Should you elect to have your instrument serviced and/or calibrated by someone other than Fluke Biomedical, please be advised that the original warranty covering your product becomes void when the tamper-resistant Quality Seal is removed or broken without proper factory authorization. We strongly recommend, therefore, that you send your instrument to Fluke Biomedical for factory service and calibration, especially during the original warranty period.

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Unpacking and Inspection

Follow standard receiving practices upon receipt of the instrument. Check the shipping carton for damage. If damage is found, stop unpacking the instrument. Notify the carrier and ask for an agent to be present while the instrument is unpacked. There are no special unpacking instructions, but be careful not to damage the instrument when unpacking it. Inspect the instrument for physical damage such as bent or broken parts, dents, or scratches.

Technical Support

For application support or answers to technical questions, either email techservices@flukebiomedical.com or call 1-800- 648-7952 or 1-425-446-6945.

Claims

Our routine method of shipment is via common carrier, FOB origin. Upon delivery, if physical damage is found, retain all packing materials in their original condition and contact the carrier immediately to file a claim. If the instrument is delivered in good physical condition but does not operate within specifications, or if there are any other problems not caused by shipping damage, please contact Fluke Biomedical or your local sales representative.

Standard Terms and Conditions

Refunds and Credits

Please note that only serialized products and their accessory items (i.e., products and items bearing a distinct serial number tag) are eligible for partial refund and/or credit. Nonserialized parts and accessory items (e.g., cables, carrying cases, auxiliary modules, etc.) are not eligible for return or refund. Only products returned within 90 days from the date of original purchase are eligible for refund/credit. In order to receive a partial refund/credit of a product purchase price on a serialized product, the product must not have been damaged by the customer or by the carrier chosen by the customer to return the goods, and the product must be returned complete (meaning with all manuals, cables, accessories, etc.) and in "as new" and resalable condition. Products not returned within 90 days of purchase, or products which are not in "as new" and resalable condition, are not eligible for credit return and will be returned to the customer. The Return Procedure (see below) must be followed to assure prompt refund/credit.

Restocking Charges

Products returned within 30 days of original purchase are subject to a minimum restocking fee of 15 %. Products returned in excess of 30 days after purchase, but prior to 90 days, are subject to a minimum restocking fee of 20 %. Additional charges for damage and/or missing parts and accessories will be applied to all returns.

Return Procedure

All items being returned (including all warranty-claim shipments) must be sent freight-prepaid to our factory location. When you return an instrument to Fluke Biomedical, we recommend using United Parcel Service, Federal Express, or Air Parcel Post. We also recommend that you insure your shipment for its actual replacement cost. Fluke Biomedical will not be responsible for lost shipments or instruments that are received in damaged condition due to improper packaging or handling.

Use the original carton and packaging material for shipment. If they are not available, we recommend the following guide for repackaging:

- Use a double-walled carton of sufficient strength for the weight being shipped.
- Use heavy paper or cardboard to protect all instrument surfaces. Use nonabrasive material around all projecting parts.
- Use at least four inches of tightly packed, industry-approved, shock-absorbent material around the instrument.

Returns for partial refund/credit:

Every product returned for refund/credit must be accompanied by a Return Material Authorization (RMA) number, obtained from our Order Entry Group at 1-800-648-7952 or 1-425-446-6945.

Repair and calibration:

To find the nearest service center, goto www.flukebiomedical.com/service or

In the U.S.A.:

Cleveland Calibration Lab

Tel: 1-800-850-4606

Email: globalcal@flukebiomedical.com

Everett Calibration Lab
Tel: 1-888-99 FLUKE (1-888-993-5853)
Email: service.status@fluke.com

In Europe, Middle East, and Africa:
Eindhoven Calibration Lab
Tel: +31-402-675300
Email: ServiceDesk@fluke.com

In Asia:
Everett Calibration Lab
Tel: +425-446-6945
Email: service.international@fluke.com

Certification

This instrument was thoroughly tested and inspected. It was found to meet Fluke Biomedical's manufacturing specifications when it was shipped from the factory. Calibration measurements are traceable to the National Institute of Standards and Technology (NIST). Devices for which there are no NIST calibration standards are measured against in-house performance standards using accepted test procedures.

WARNING

Unauthorized user modifications or application beyond the published specifications may result in electrical shock hazards or improper operation. Fluke Biomedical will not be responsible for any injuries sustained due to unauthorized equipment modifications.

Restrictions and Liabilities

Information in this document is subject to change and does not represent a commitment by Fluke Biomedical. Changes made to the information in this document will be incorporated in new editions of the publication. No responsibility is assumed by Fluke Biomedical for the use or reliability of software or equipment that is not supplied by Fluke Biomedical, or by its affiliated dealers.

Manufacturing Location

The BEACON100 is manufactured in Everett, WA, U.S.A.

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Beacon100

Introduction

The Fluke Biomedical Beacon100 Wi-Fi tag performs a critical role in Fluke Biomedical Asset Tracking System (ATS) that consists of the Beacon100 tag, Fluke Biomedical Positioning Engine software platform, and Compass end-user applications. The Beacon100 tags can be attached to any mobile object or asset, and can be carried by people, as well. The Positioning Engine software continuously reports the tag coordinates and logical areas within the Wi-Fi coverage area both indoors and outdoors.

Software Release Level

This guide documents the functionality available with software release level 1.0.

Beacon100 Features

The following features are included with this software release:

- Compatibility with standard 802.11b and 802.11g Wi-Fi networks
- Support for 40 or 104-bit WEP key authentication
- Static and dynamic IP addressing
- Two configurable buttons for switching the tag on and resetting the tag to its factory settings
- Location reporting triggered by button, motion, and periodic timer
- Two status indication light-emitting diodes (LEDs) for the tag status
- Configuration using Fluke Biomedical Activator, stand-alone tag configuration software

Tag Operation

User Interface

The Beacon100 tag user interface includes buttons and LEDs to indicate status, shown in Figure 1.



Figure 1. Beacon100 User Interface

esa001.bmp

Activating the Tag

The Beacon100 tag is delivered without any of the configuration settings needed to function. These environment specific settings must be applied before the tag can connect to the network and the Positioning Engine.

Tag activation is done using Beacon100 software that wirelessly configures the tags. See more information on the Activator software in the *Fluke Biomedical Activator Users Guide*.

After successful activation, the MAC address of the tag appears in the Positioning Engine tag list. After successful connection with Positioning Engine, you can directly manage the configuration from Positioning Engine using the Beacon100 tag configurations.

Status Indication LEDs

The Beacon100 tag is equipped with two multi-color LEDs that provide status indication.

The following Table 1 lists the different modes of the tag LEDs.

Table 1. Tag Mode LED Indications

Action	Right LED	Left LED	Status
Periodic or motion activated scan.	2x Green blink	-	Successful scan and send results to Positioning Engine.
Periodic or motion activated scan.	2x Red blink	-	Unsuccessful scan or unsuccessful results send.
Blue button press.	1x Orange + 2x Green blink or 2x Red blink	-	Success green. Unsuccessful scan or results send red.
Blue button press.	2x Green blink or 2x Red blink	1x Orange	Success green. Unsuccessful scan or results send red.
Activation. Blue button 3 seconds.	1x Orange	1x Orange + 6x Red blink + 2x Green blink or 2x Red blink	Both LEDs blink orange after button press. Left LED blinks during activation. Finally left LED blinks green or red. Green indicates successful activation.

Button Scan

Pressing the blue or green button sends a scan command to the tag. After the button press, the tag immediately scans and sends the results to Positioning Engine. The LEDs indicate the scan success or failure similarly as in the scan activated by the wakeup interval.

Resetting to Factory Settings

The Beacon100 can be reset to factory setting by either pressing a button sequence or by opening the back cover and removing the batteries.

To reset the Beacon100 using buttons with a button sequence, do the following:

1. Press the **blue** button until left LED flashes orange.
2. When the left LED flashes orange, press the **green** button immediately.
3. After approximately 2 seconds both LEDs flash orange.
4. The tag has now been reset to factory settings. The tag is in reset mode when it does not executing button scan as defined in the “Button Scan” section.

Firmware Update

The tag firmware can be updated wirelessly using Positioning Engine. The firmware is uploaded to the Beacon100 from the Tag Properties page in Positioning Engine. Follow instruction in the *Fluke Biomedical Positioning Engine Users Guide* for updating firmware.

Optimizing Battery Life

The Beacon100 Wi-Fi tag uses an ultra-low power system-on-chip architecture that minimizes the power consumption. This enables running tags with same batteries for several years. However, to get the maximum lifetime from your tags, you should take care that your network and tag configuration supports all possible power saving features.

The principle behind optimizing battery life is to minimize the amount of time the tag is active.

Recommendations for optimizing battery lifetime include the following:

- Scan only channels that are in use in your network. Typically, because of overlap of channels, there are only 3 or 4 channels in use from the 11 (or 13/14) available.
- Use single SSID whenever possible. Using multiple SSIDs requires additional network scans and decreases battery lifetime.
- When using dynamic IP addressing, tune the DHCP server to provide very long lease times for tag IP addresses.
- Beacon100 tags support roaming between sub networks. This feature renews a tag's IP address whenever the access point association changes. Since renewing IP addresses consumes large amounts of energy, it is strongly recommended to avoid using the network-wide dynamic addressing feature if it is not needed.
- Tune the wake-up settings to match your application needs. More frequent updates shorten the battery lifetime.

Tag Configuration

The tag can be adjusted for each application and network settings by adjusting a set of parameters. The parameters can be changed wirelessly using the Beacon100 laptop software or through Tag Configurations in Positioning Engine.

Activator is used for the initial configuration settings that allow connecting the tag to Positioning Engine over the network. After connection is established with Positioning Engine, all configurations can be managed through Positioning Engine.

Network Settings

Table 2 shows the list of available network settings.

Table 2. Network Settings Available for Beacon100

Setting	Description	Values	Available in Activator
SSID 1	Wireless network settings: SSID, Encryption, Key and Key Index Use exactly 5 or 13 characters (or hex bytes) for 40/104 bit encryption keys	SSID=max 32 digits, Encryption=no; WEP 40; 104bit Note that WPA is not supported with this firmware	Yes
SSID 2	Second wireless network settings: SSID, Encryption, Key and Key Index Use exactly 5 or 13 characters (or hex bytes) for 40/104 bit encryption keys	SSID=max 32 digits, Encryption=no; WEP 40; 104bit Note that WPA is not supported with this firmware	No
Scan Channels	Selection of channels that are scanned. To conserve battery, select only the channels in use	Check boxes for selecting scanned channels from 1 to 14 Note the channel restrictions depending on operating region	Yes
IP method	Defines the IP address assigning method	DHCP, static or network wide DHCP ¹	Yes (DHCP or static)
IP address	Beacon100 IP address if static addressing is used	Beacon100 IP address	Yes
IP netmask	Beacon100 netmask when static addressing is used	Beacon100 netmask	Yes
IP gateway	IP network gateway when static addressing is used	Network gateway	Yes
Positioning Engine IP address	IP Address of Positioning Engine	IP Address	Yes
Engine Port	Port number of Positioning Engine location protocol port	Port number. Default port is 8552	Yes
Positioning Management UDP port	Port number of Positioning Engine maintenance port	Port number Default port is 8553	Yes
<p>^[1] Network wide DHCP enables roaming between sub networks. With this setting, the Beacon100 tag refreshes its IP address whenever the tag associates with a new access point. It is not recommended to use the feature if it not required, due to higher power consumption.</p>			

Wake-up Settings

The list of other settings is shown in Table 3.

Table 3. Additional Beacon100 Settings

Setting	Description	Values	Available in Activator
Periodic Wakeup Interval	Interval between periodic wakeups and network scans.	Interval in seconds.	Yes
Maintenance Interval	Interval between periodic maintenance calls.	Interval in seconds.	Yes
Motion sensor enabled	If set, activates motion sensor.	Activated when checked.	Yes

Technical Specifications

General

Outside Dimensions: 1.8 in L x 2.2 in W x 0.7 in H (45 mm L x 55 mm W 19 mm H)

Weight: 1.8oz / 50 with batteries

Power: 2xCR2 3.0V Lithium (LiMnO₂) batteries

Two buttons with call button functionality

Two red/green/orange status indication LEDs

Operating Temperature: 32 to 122°F / 0 to 50 °C (shorter battery lifetime on the low and high end of the temperature range)

Storage Temperature: -40 to 140°F / -40 to 60 °C (shorter battery lifetime on the low and high end of the temperature range); storage at room temperature recommended

Humidity: From 20% to 95 % non-condensing, relative humidity

Environmental Protection: protected against dust and spraying water, IP-65

Wi-Fi

Supported IEEE Standards: 802.11b/g

Modulation Scheme: Direct Sequence Spread Spectrum (DSSS)

Media Access: CSMA/CA

Transmit Power: +11.5dBm at 2Mbps

Receiver Sensitivity: -89 dBm at 11Mbps

Frequency Ranges:

2.400 – 2.4835 GHz (USA, Canada, Europe)

2.400 – 2.497 GHz (Japan)

Supported Networking Protocols: UDP/IP, DHCP or static addressing

Security: WEP Encryption 40/104 Bit

Antenna Type: 2x internal omni-directional ceramic multilayer, antenna diversity

Maximum Antenna Gain: +1.5 dBi

Operating Ranges from Access Point

Open Space: 60m (180ft)

Typical Office: 30m (90ft)

Battery Replacement

Replace the batteries by opening the four screws on the backside of the tag. Remove old batteries from the device by pulling them gently upwards. Place each new battery between the battery clips.

Note

When replacing the batteries, take out one first and replace, and only after that replace the other second battery. This way the tag maintains its settings.

Check that the polarity of the batteries is correct. There are battery polarity indicators on the circuit board and inner surface of the front cover. The correct polarity is also shown in Figure 2. When replacing batteries, avoid touching the circuit board and the flex cable, which can be damaged by static electricity or mechanical impact.



fig_2.ernf

Figure 2. Battery Polarity and Replacement

Recommendations for choosing and replacing batteries include the following:

- Always use new batteries
- Replace the batteries together, removing and replacing first one, then the other
- Use only 3.0V, CR2 size batteries
- Fluke Biomedical recommends batteries from Durecell, Maxell, Sanyo or VARTA

After batteries have been replaced close the back cover, replace and tighten the screws.

Care and Maintenance

The Beacon100 tag is a product of superior design and craftsmanship and should be treated with care. The following suggestions will help you fulfill any warranty obligations and to use this product for many years.

- Keep the Beacon100 dry. Precipitation, humidity, liquids of any types, or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the Beacon100 in dusty or dirty areas, since moving parts can be damaged.
- Do not store the Beacon100 in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the Beacon100 in cold areas. When it warms up to its normal temperature, moisture can form inside, which may damage electronic circuit boards.
- Do not operate the Beacon100 outside its operating temperature range.
- Open the Beacon100 only for replacing batteries.
- Do not drop, knock or shake the Beacon100. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the Beacon100 tag.
- Use a soft, clean, and dry cloth to clean tags.
- Do not paint the Beacon100. Paint can clog the moving parts, affect the radio communication, and prevent proper operation.
- Use only the supplied antenna. Unauthorized antennas, modifications, or attachments could damage the Beacon100 and may violate regulations governing radio devices.

Certifications

FCC Rules

The Beacon100 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. The device may not cause harmful interference
2. The device must accept any interference received, including interference that may cause undesired operation.

FCC ID of the Fluke Beacon100 device is: T68-BEACON100

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.

FCC RF Radiation Exposure Statement

This equipment complies with FCC Radio Frequency Electromagnetic Signal (RF) exposure limits set forth for an uncontrolled environment of portable transmission. This product has been evaluated for RF exposure at a distance of 0.2 inches (0.5 cm). Operation at a separation distance less than 0.2 inches (0.5 cm) from the radiating element to nearby persons will expose nearby persons to RF levels that exceed the FCC rules for RF exposure.

CE Marking

This device has been tested to meet the Electromagnetic Compatibility (EMC) requirements of EN 50082-1 and EN 50022 for the CE Declaration of Conformity (DoC).

