

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent of:

U.S. Patent No.:

Attorney Docket No.: 50095-0024IP2

Issue Date:

Appl. Serial No.:

Filing Date:

Title:

**Mail Stop Patent Board**

Patent Trial and Appeal Board

U.S. Patent and Trademark Office

P.O. Box 1450

Alexandria, VA 22313-1450

**DECLARATION OF JACOB ROBERT MUNFORD**

1. My name is Jacob Robert Munford. I am over the age of 18, have personal knowledge of the facts set forth herein, and am competent to testify to the same.
  
2. I earned a Master of Library and Information Science (MLIS) from the University of Wisconsin-Milwaukee in 2009. I have over ten years of experience in the library/information science field. Beginning in 2004, I have served in various positions in the public library sector including Assistant Librarian, Youth Services Librarian and Library Director. I have attached my Curriculum Vitae as Appendix A.
  
3. During my career in the library profession, I have been responsible for materials acquisition for multiple libraries. In that position, I have cataloged, purchased and processed incoming library works. That includes purchasing materials directly from vendors, recording publishing data from the material in question, creating detailed material records for library catalogs and physically preparing that material for circulation. In addition to my experience in acquisitions, I was also responsible for analyzing large collections of library materials, tailoring library records for optimal catalog

search performance and creating lending agreements between libraries during my time as a Library Director.

4. I am fully familiar with the catalog record creation process in the library sector. In preparing a material for public availability, a library catalog record describing that material would be created. These records are typically written in Machine Readable Catalog (herein referred to as “MARC”) code and contain information such as a physical description of the material, metadata from the material’s publisher, and date of library acquisition. In particular, the 008 field of the MARC record is reserved for denoting the date of creation of the library record itself. As this typically occurs during the process of preparing materials for public access, it is my experience that an item’s MARC record indicates the date of an item’s public availability.
  
5. Typically, in creating a MARC record, a librarian would gather various bits of metadata such as book title, publisher and subject headings among others and assign each value to a relevant numerical field. For example, a book’s physical description is tracked in field 300 while title/attribution is tracked in field 245. The 008 field of the MARC record is reserved for denoting the creation of the library record itself. As this is the only date reflecting the inclusion of said materials within the library’s collection, it is my experience

that an item's 008 field accurately indicates the date of an item's public availability.

6. This declaration is being drafted as of September 2020. Public and university libraries in my area have been closed for months due to the COVID-19 pandemic. My state, Pennsylvania, has a travel advisory, which has affected my ability to travel. In my experience, library catalog records are accurate descriptions of a library's collection and my lack of physical access to libraries at this time creates no doubt in my determinations of authenticity or availability of the exhibits noted below.
  
7. I have reviewed Exhibit 1010, a copy of an article entitled "A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring" by Y. Mendelson, R. J. Duckworth, and G. Comtois, as published in the *Proceedings of the 28<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, August 30 – September 3, 2006* (hereinafter referred to as "2006 IEEE conference publication").
  
8. Attached hereto as Appendix MENDELSON01 is a true and correct copy of the MARC record for the 2006 IEEE conference publication, as held by

Cornell University's library. I secured this record myself from the library's public catalog.

9. The MARC record contained within Appendix MENDELSON01 accurately describes the title, author, publisher, and ISSN number of the 2006 IEEE conference publication. In comparing the information listed in Appendix MENDELSON01 to Exhibit 1010, it is my determination that the copy of the 2006 IEEE conference publication in Cornell University's library is the same as the copy of the 2006 IEEE conference publication in Exhibit 1010.

10. The 008 field of the MARC record noted on page 1 of Appendix MENDELSON01 indicates that the 2006 IEEE conference publication was first cataloged by Cornell University's library as of December 26, 2007. Based on this information and considering the dates of the conference, it is my determination that the 2006 IEEE conference publication, which included the article published as Exhibit 1010, was made available to the public by Cornell University at least as of December 26, 2007.

11. I have reviewed Exhibit 1013, a copy of a technical document entitled *QuickSpecs: HP iPAQ Pocket PC hd150 Series, Version 3, November 20, 2003* (hereinafter referred to as "2003 iPAQ Spec.")

12. Attached hereto as Appendix QUICKSPECS01 is a true and correct copy of the 2003 iPAQ Spec. as a PDF file entitled 'iPaq\_4150\_quick-specs.pdf'. I secured this copy myself from [ftp://ftp.abcddata.com.pl/HP/Ipaq/Retired%20Products/h4150/iPaq\\_4150\\_quick\\_specs.pdf](ftp://ftp.abcddata.com.pl/HP/Ipaq/Retired%20Products/h4150/iPaq_4150_quick_specs.pdf). In comparing Appendix QUICKSPECS01 to Exhibit 1013, it is my determination that Exhibit 1013 is a true and correct copy of the 2003 iPAQ Spec.

13. Attached hereto as Appendix QUICKSPECS02 is a true and correct copy of the FTP file tree for the website hosting the 2003 iPAQ Spec. I secured this record myself from <ftp://ftp.abcddata.com.pl/HP/Ipaq/Retired%20Products/h4150/>. FTP is a web technology that allows the transfer of files without the need for a formal webpage. FTP software autogenerates a file tree for each file offered and logs the date of creation within that file tree. The entry for 'iPaq\_4150\_quick-specs.pdf' indicates this file was uploaded to this FTP server as of November 20, 2003. As such, it is my determination that the 2003 iPAQ Spec. in Exhibit 1013 was available to the public on the Internet via this FTP server at least as of November 20, 2003.

14. I have reviewed Exhibit 1007, a copy of a manual entitled *Mio Alpha Complete User* (hereinafter referred to as “Mio”)

15. Attached hereto as Appendix MIO01 is a true and correct copy of Mio as a PDF file entitled ‘iPaq\_4150\_quick-specs’. I secured this copy myself from [https://web.archive.org/web/20150505102733/http://help.mioglobal.com/hc/en-us/article\\_attachments/202124850/Mio\\_ALPHA\\_User\\_Guide\\_EN.pdf](https://web.archive.org/web/20150505102733/http://help.mioglobal.com/hc/en-us/article_attachments/202124850/Mio_ALPHA_User_Guide_EN.pdf). In comparing Appendix MIO01 to Exhibit 1007, it is my determination that Exhibit 1007 is a true and correct copy of the Mio.

16. Attached hereto as Appendix MIO02 is a true and correct copy of the Internet Archive entry for Mio. I secured this record myself from [https://web.archive.org/web/2015\\*/http://help.mioglobal.com/hc/en-us/article\\_attachments/202124850/Mio\\_ALPHA\\_User\\_Guide\\_EN.pdf](https://web.archive.org/web/2015*/http://help.mioglobal.com/hc/en-us/article_attachments/202124850/Mio_ALPHA_User_Guide_EN.pdf). The entry for ‘iPaq\_4150\_quick-specs.pdf’ indicates this file was indexed by the Internet Archive as of May 5, 2015. As such, it is my determination that the Mio in Exhibit 1007 was available to the public on the Internet via the Internet Archive at least as of May 5, 2015.

17. I have reviewed Exhibit 1008, a webpage entitled “Mio Alpha Optical Heart Rate Monitor In-Depth Review (Bluetooth Smart/ANT+” from the website DC Rainmaker (hereinafter referred to as “DC”).

18. Attached hereto as Appendix DC01 is a true and correct copy of DC as a PDF file as well as the Internet Archive record for this webpage. I secured this copy myself from [https://web.archive.org/web/20130701000000\\*/https://www.dcrainmaker.com/2013/02/monitor-bluetooth-smartant.html](https://web.archive.org/web/20130701000000*/https://www.dcrainmaker.com/2013/02/monitor-bluetooth-smartant.html). In comparing Appendix DC01 to Exhibit 1008, it is my determination that Exhibit 1008 is a true and correct copy of the DC.

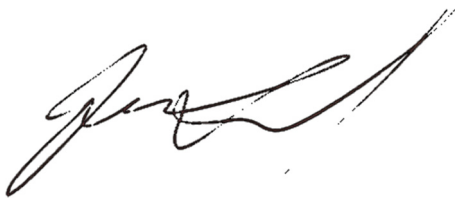
19. Pages 1 – 2 of DC01 represent the Internet Archive record for DC. I secured this record from [https://web.archive.org/web/20130701000000\\*/https://www.dcrainmaker.com/2013/02/monitor-bluetooth-smartant.html](https://web.archive.org/web/20130701000000*/https://www.dcrainmaker.com/2013/02/monitor-bluetooth-smartant.html). The entry for DC indicates this page was indexed by the Internet Archive as of February 15, 2013. As such, it is my determination that the DC in Exhibit 1008 was available to the public on the Internet via the Internet Archive at least as of February 15, 2013.



20. I have been retained on behalf of the Petitioner to provide assistance in the above-illustrated matter in establishing the authenticity and public availability of the documents discussed in this declaration. I am being compensated for my services in this matter at the rate of \$100.00 per hour plus reasonable expenses. My statements are objective, and my compensation does not depend on the outcome of this matter.

21. I declare under penalty of perjury that the foregoing is true and correct. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: 9/29/20

A handwritten signature in black ink, appearing to read 'Jacob Robert Munford', written in a cursive style.

Jacob Robert Munford

# **APPENDIX A**

## Appendix A - Curriculum Vitae

### Education

University of Wisconsin-Milwaukee - MS, Library & Information Science, 2009  
Milwaukee, WI

- Coursework included cataloging, metadata, data analysis, library systems, management strategies and collection development.
- Specialized in library advocacy and management.

Grand Valley State University - BA, English Language & Literature, 2008  
Allendale, MI

- Coursework included linguistics, documentation and literary analysis.
- Minor in political science with a focus in local-level economics and government.

### Professional Experience

Researcher / Expert Witness, October 2017 – present

Freelance

Pittsburgh, Pennsylvania

- Material authentication and public accessibility determination. Declarations of authenticity and/or public accessibility provided upon research completion. Depositions provided on request.
- Research provided on topics of public library operations, material publication history, digital database services and legacy web resources.
- Past clients include Apple, Fish & Richardson, Erise IP, Baker Botts and other firms working in patent law.

Library Director, February 2013 - March 2015

Dowagiac District Library

Dowagiac, Michigan

- Executive administrator of the Dowagiac District Library. Located in Southwest Michigan, this library has a service area of 13,000, an annual

operating budget of over \$400,000 and total assets of approximately \$1,300,000.

- Developed careful budgeting guidelines to produce a 15% surplus during the 2013-2014 & 2014-2015 fiscal years.
- Using this budget surplus, oversaw significant library investments including the purchase of property for a future building site, demolition of existing buildings and building renovation projects on the current facility.
- Led the organization and digitization of the library's archival records.
- Served as the public representative for the library, developing business relationships with local school, museum and tribal government entities.
- Developed an objective-based analysis system for measuring library services - including a full collection analysis of the library's 50,000+ circulating items and their records.

November 2010 - January 2013

Librarian & Branch Manager, Anchorage Public Library

Anchorage, Alaska

- Headed the 2013 Anchorage Reads community reading campaign including event planning, staging public performances and creating marketing materials for mass distribution.
- Co-led the social media department of the library's marketing team, drafting social media guidelines, creating original content and instituting long-term planning via content calendars.
- Developed business relationships with The Boys & Girls Club, Anchorage School District and the US Army to establish summer reading programs for children.

June 2004 - September 2005, September 2006 - October 2013

Library Assistant, Hart Area Public Library

Hart, MI

- Responsible for verifying imported MARC records and original MARC cataloging for the local-level collection as well as the Michigan Electronic Library.
- Handled OCLC Worldcat interlibrary loan requests & fulfillment via ongoing communication with lending libraries.

## Professional Involvement

### Alaska Library Association - Anchorage Chapter

- Treasurer, 2012

### Library Of Michigan

- Level VII Certification, 2008
- Level II Certification, 2013

### Michigan Library Association Annual Conference 2014

- New Directors Conference Panel Member

### Southwest Michigan Library Cooperative

- Represented the Dowagiac District Library, 2013-2015

## Professional Development

### Library Of Michigan Beginning Workshop, May 2008

#### Petoskey, MI

- Received training in cataloging, local history, collection management, children's literacy and reference service.

### Public Library Association Intensive Library Management Training, October 2011

#### Nashville, TN

- Attended a five-day workshop focused on strategic planning, staff management, statistical analysis, collections and cataloging theory.

### Alaska Library Association Annual Conference 2012 - Fairbanks, February 2012

#### Fairbanks, AK

- Attended seminars on EBSCO advanced search methods, budgeting, cataloging, database usage and marketing.

# **APPENDIX MENDELSON01**

Enhanced online resources and other COVID-19 updates »



# LIBRARY CATALOG

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[ADVANCED SEARCH](#) | [ASK A LIBRARIAN](#) | [MY ACCOUNT](#)

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## Librarian View

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LEADER 02149cam a22004574a 4500
001 9874630
005 20180515124517.0
006 m o d
007 cr n
008 071226s2006 nyua ob 101 0 eng d
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035 #a (OCoLC)275723396
035 #a 9874630
040 #a DLC #c DLC #d DLC #d WaSeSS
050 0 0 #a R856.A2 #b I344 2006
110 2 #a IEEE Engineering in Medicine and Biology Society. #b Annual Conference #n (28th : #d 2006 : #c New
York, N.Y.)
245 1 0 #a 2006 28th Annual International Conference of the IEEE Engineering in Medicine and Biology Society : #b
New York, NY, 30 August - 3 September 2006.
260 #a [New York?] : #b IEEE ; #a Piscataway, NJ : #b IEEE Service Center [distributor], #c c2006.
300 #a 1 online resource.
336 #a text #2 rdacontent
337 #a computer #2 rdamedia
338 #a online resource #2 rdacarrier
504 #a Includes bibliographical references and author index.
506 #a License restrictions may limit access.
650 0 #a Biomedical engineering #v Congresses.
650 0 #a Biomedical materials #v Congresses.
650 0 #a Biosensors #v Congresses.
650 7 #a Biomedical engineering. #2 fast #0 (OCoLC)fst00832568
650 7 #a Biomedical materials. #2 fast #0 (OCoLC)fst00832586
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655 7 #a Conference papers and proceedings. #2 fast #0 (OCoLC)fst01423772
710 2 #a Institute of Electrical and Electronics Engineers.
856 4 0 #3 Full text available from IEEE/IET Electronic Library (IEL) #i ssid=ssj0000394402; dbcode=RIE;
providercode=PRVIEE #u http://proxy.library.cornell.edu/login?
url=https://ieeexplore.ieee.org/servlet/opac?punumber=4028925 #z Connect to text.
899 2 #a PRVIEE_RIE
948 2 #a 20180515 #b m #d batch #e lts
948 3 #a 20180515 #h SerialSolutions #i COO_360MARC_Update_20180514_monographs_changed.mrc.uc
948 0 #a 20170411 #b i #d batch #e lts
948 1 #a 20170411 #b s #d batch #e lts #f ebk
948 3 #a 20170411 #h SerialSolutions #i COO_360MARC_Update_20170410_monographs_new.mrc.uc
948 2 #a 20170703 #b m #d batch #e lts #x WorldShare
```

### CONTACT US

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[Feedback](#)

[Release Notes](#)

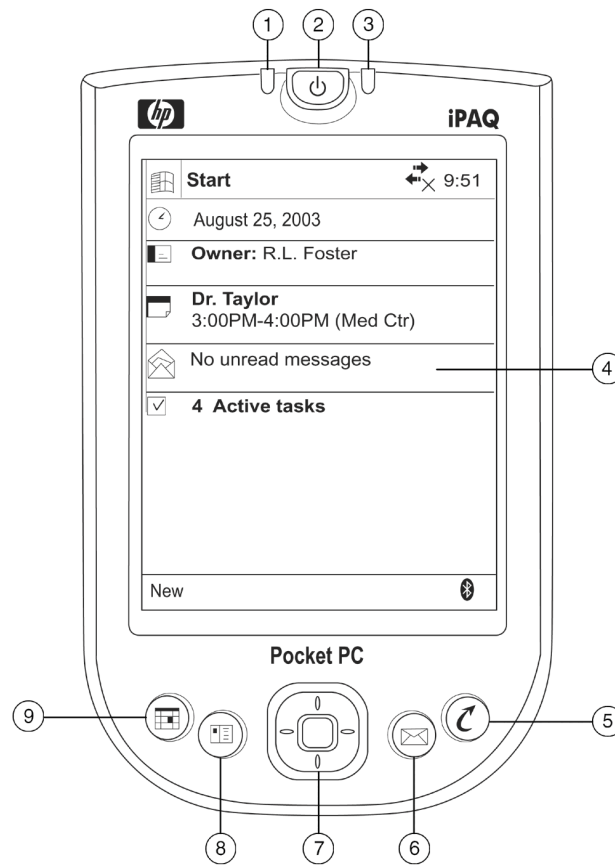
### RESOURCES

[Library Website](#) | [Search](#) | [Catalog](#) | [Articles & Full Text](#) | [Databases](#) | [E-journal Titles](#) | [Images](#)

# **APPENDIX QUICKSPECS01**



### Overview



- |                                     |                            |
|-------------------------------------|----------------------------|
| 1. Active Bluetooth/WLAN Indicator  | 6. Inbox Button            |
| 2. Power Button                     | 7. 5-Way Navigation Button |
| 3. LED Power/Notification Indicator | 8. Contacts Button         |
| 4. Color Display                    | 9. Calendar Button         |
| 5. iTask Button                     |                            |

### At A Glance

- Integrated WLAN 802.11b<sup>1</sup>
- Integrated Bluetooth™<sup>1</sup>
- Integrated SD expansion slot
- Microsoft® Windows® Mobile™ 2003 software for Pocket PC
- Dazzling Transflective TFT color with LED backlight display
- Removable/rechargeable battery
- Stay productive with Pocket versions of familiar applications like Microsoft Outlook , Word and Excel

**NOTE** <sup>1</sup>: A standard WLAN infrastructure, other devices enabled with Bluetooth, and a service contract with a wireless airtime provider may be required for applicable wireless communication. Wireless Internet use requires a separately purchased service contract. Check with a service provider for availability and coverage in your area. Not all web content available.

### Standard Features

#### Models

##### iPAQ Pocket PC h4150 – 64-MB SDRAM

FA174A#ABA – US Commercial, English  
 FA174A#ABC – French Canadian  
 FA174A#ABG – Australia, New Zealand  
 FA174A#ABU – UK, English  
 FA174A#ABB – Euro English  
 FA174A#ABD – German  
 FA174A#ABF – French  
 FA174A#ABZ – Italian  
 FA174A#ABE – Spanish  
 FA174A#B16 – Latin America, Spanish  
 FA174A#AC4 – Brazilian Portuguese  
 FA174A#ABJ – Japanese  
 FA174A#UUF – APD, English  
 FA174A#AB2 – S-Chinese  
 FA174A#AB0 – Taiwan, T-Chinese  
 FA174A#AB5 – Hong Kong, T-Chinese  
 FA174A#AB1 – Korean  
 FA174A#ARE – Malaysia

##### iPAQ Pocket PC h4155 – 64-MB SDRAM

FA175A#ABA – US Retail, English

<b>Processor</b>	400 MHz Intel® Xscale™ technology-based processor	
<b>Memory</b>	<b>SDRAM</b>	64-MB (55-MB user accessible) Up to 2.8-MB iPAQ File Store (varies by SKU)
	<b>ROM</b>	32-MB
<b>Display</b>	<b>Type</b>	Transflective type TFT color with LED backlight
	<b>Number of Colors</b>	64K color (65,536 colors) 16-bit
	<b>Touch Screen</b>	Yes
	<b>Resolution (W x H)</b>	240 x 320
	<b>Viewable Image Size</b>	3.5 in (89 mm)
<b>Hardware Buttons/ Reset Buttons</b>	One power button, one recording button, one soft reset switch, four software programmable application buttons, one 5-way navigation button	
<b>Stylus</b>	One (extra stylus included in the box)	
<b>Audio</b>	Integrated microphone, speaker and one 3.5 mm headphone jack, MP3 stereo (through audio jack)	
<b>Notification Systems</b>	<b>Alarms</b>	Solid amber LED (right) - battery in unit fully charged Flashing amber LED (right) - battery in unit is charging Flashing green LED (right) - event alarm/notification Flashing green LED (left) - WLAN active Flashing blue LED (left) - Bluetooth active
	<b>Notification</b>	Sound and message on the display



### Standard Features

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<b>Cradle Interfaces</b>	<b>Connector</b>	1
	<b>Cable</b>	1 USB cable connects to PC
	<b>DC Jack connector for AC Adapter</b>	1
	<b>Additional battery charger</b>	Charge additional slim or extended batter

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<b>SD Slot</b>	Support SDIO and SD/MMC type standard
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<b>Power Supply</b>	<b>Battery</b>	Removable/Rechargeable 1000 mAh Lithium-Ion user swappable battery. Estimated usage time of fully charged battery up to 12 hours (no wireless, no backlight). Optional extended 1800 mAh Lithium-Ion battery available for purchase.
	<b>AC Power</b>	AC Input: 100~240 Vac, 50/60 Hz, AC Input current: 0.2 Aac max Output Voltage: 5Vdc (typical), Output Current: 2A (typical)

**NOTE:** Battery run time varies based on the usage pattern of an individual user and the configuration of the handheld. Use of internal wireless capabilities and backlight will significantly decrease battery run time.

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<b>Ergonomic Design Features</b>	Instant-on/off and Backlight
	5-way Navigation button
	Touch-sensitive display for stylus
	4 programmable application launch buttons - defaults configured for Calendar, Contacts, Inbox, and iTask buttons
	Record button
	2 alarm settings
Built-in speaker	

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<b>HP Exclusive Applications</b>	Bluetooth Manager
	iPAQ File Store: non-volatile storage in flash ROM (not available in Japanese, Simplified Chinese, Traditional Chinese and Korean versions)
	iPAQ Backup: utility for Backup/Restore to Main Memory, Memory Card or iPAQ File Store
	iPAQ iTask Manager: access and launch programs easily
	iPAQ Image Zone: view images and create slide shows
	Utilities: Self Test, iPAQ Audio, Power Status

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### Standard Features

Companion CD from HP

#### APPLICATIONS

##### Full Versions

HP Web registration  
HP Mobile Print Center  
Westtek ClearVue Suite  
F-Secure FileCrypto Data Encryption  
Colligo Personal Edition  
Adobe PDF Viewer  
RealOne Player for Pocket PC  
iPresenter PowerPoint converter  
MobiMate WorldMate  
Resco File Explorer 2003 - U.S. Retail only

##### Trial Versions

Xcellenet Afaria Device Management Agent  
Margi Presenter-to-Go (requires purchase of additional hardware)  
Illium ListPro  
CommonTime Cadenza mNotes  
Resco Picture Viewer - U.S. Retail only

##### CD LINKS

NetMotion  
Avaya IP Softphone  
IP Blue VTGO!  
Cisco CallManager  
Pocket Presence Running Voice IP  
Vindigo  
Audible Manager and Audible Player (Service plan required to download and play Audible content - link)  
SingleTap  
Handango  
Pocket Backup Plus

##### Additional Documentation

Safety and Comfort Guide on PDF, and User Guide on PDF

**NOTE:** Programs may vary based on SKU. Some programs are accessed through CD links to download web sites.

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#### Operating System

Microsoft Windows Mobile 2003 software for Pocket PC - Premium edition  
Pocket versions of Microsoft software are included (Outlook, Word, Excel and Internet Explorer for Pocket PC)

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#### Operating System Applications

Powered by Microsoft Windows Mobile 2003 for Pocket PC  
Calendar, Contacts, Tasks, Voice Recorder, Notes, Pocket Word (with Spellchecker), Pocket Excel, Pocket Internet Explorer, Windows Media Player 9 (MP3, audio and video streaming), Calculator, Solitaire, Jawbreaker, Inbox (with Spell Checker for email), Microsoft Reader (eBooks), File Explorer, Pictures, Terminal Services Client, VPN Client, Infrared Beaming, Clock, Align Screen, Memory, Volume control, ClearType Tuner (except for Asian languages)

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#### Additional Software and links

Outlook 2002, Microsoft ActiveSync 3.7 (Desktop device synchronization), Microsoft Reader eBooks, Links to Microsoft websites for additional downloadable applications (some programs may require purchase of additional desktop software to utilize Pocket PC versions)

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#### Service and Support

One-year parts and labor in most regions; two-year warranty in Europe (one-year warranty for rechargeable battery pack) 90 days technical support for software in all regions. Optional HP Care Pack available in North America for Next Business Day replacement (at additional charge)

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### Standard Features

<b>WLAN Specifications<sup>1</sup> Radio Specifications</b>	<b>RF Network Standard</b>	IEEE 802 Part 11b (802.11b)
	<b>Frequency Band</b>	2.4000 to 2.4835 GHz 2.4465 to 2.4835 GHz (France) 2.4000 to 2.497 GHz (Japan)
	<b>Antenna type</b>	Embedded Inverted F Antenna
	<b>WEP Security</b>	64/128-bit compliant to IEEE 802.11 Compliant to 802.1X
	<b>Network Architecture Models</b>	Ad-hoc (Peer to Peer) Infrastructure (Access Points Required)
	<b>Modulation Technique</b>	Direct Sequence Spread Spectrum
	<b>Modulation Schemes</b>	DBPSK, DQPSK, CCK
	<b>Receiver Sensitivity - Packet Error Rate (8E-2)</b>	11 Mbps: <-80 dBm 5.5 Mbps: <-82 dBm 2 Mbps: <-86 dBm 1 Mbps: <-89 dBm
	<b>Maximum Receive Level</b>	-10dBm (1/2/5.5/11 Mbps)
	<b>Output Power (maximum)</b>	15 dBm (limited due to FCC SARS requirements)
	<b>Power Management</b>	Radio On/Off control through Microsoft Connection icon, Power Save mode available in Power Settings
	<b>Power Consumption</b>	Transfer mode: < 380 mA, average Receive mode: < 280 mA, average
	<b>Power Saving Option</b>	802.11 Compliant Power Saving, idle mode 25 mA
	<b>Media Access Protocol</b>	CSMA/CA (Collision Avoidance) with ACK
	<b>Protocols Supported</b>	TCP/IP IPX/SPX UDP
	<b>SAR</b>	1.0 mW/g
	<b>Throughput</b>	>4.5 Mbps
	<b>Operating Distance</b>	Up to 1000 feet - open sight
	<b>Certifications</b>	All necessary regulatory approvals for countries we support including: WECA Wi-Fi approval FCC (47 CFR) Part 15C, Section 15.247&15.249 ETS 300 328, ETS 301 489-1 Low Voltage Directive IEC950 UL, CSA, and CE Mark

**NOTE:** <sup>1</sup> A standard WLAN infrastructure, other devices enabled with Bluetooth, and a service contract with a wireless airtime provider may be required for applicable wireless communication. Wireless Internet use requires a separately purchased service contract. Check with a service provider for availability and coverage in your area. Not all web content available.

### Standard Features

<b>Bluetooth Specifications<sup>1</sup></b>	<p><b>Technology</b> High-speed, low-power, short-range</p> <p><b>Bluetooth specification</b> 1.1 compliant (2.4-GHz Industrial Scientific Medical Band)</p> <p><b>System interface</b> High-speed UART processor interface</p> <p><b>User Interface</b> Bluetooth Manager</p> <p><b>Device type</b> Class II device; up to 4 dBm transmit, typical 10 meter range</p> <p><b>Power</b> 3.3V 5% Peak current - typical TX current at approximately 30mA - typical RX current at approximately 50 mA</p> <p><b>Receiver sensitivity</b> -78 dBm</p> <p><b>Regulatory standards</b> R&amp;T#-EN 300 328 and EN 300 826, UL 1950, CB Safety Scheme inclusive of EN 60950 and IEC 950, FCC Part 15 subpart C, Canadian, CE</p> <p><b>Profile Support</b> General Access Profile Service Discovery Application Profile Serial Port Profile Generic Object Exchange Profile File Transfer Profile Dial-Up Networking Profile LAN Access Profile Object Push Profile Personal Area Networking Profile Basic Printing Profile Hard Copy Replacement Profile (printing)</p>
<b>Usage Models <sup>1</sup></b>	<p><b>Service Discovery</b> Determine what Bluetooth devices are within range and support authorization</p> <p><b>File Transfer</b> File and directory browsing and navigation on another Bluetooth device. File copying Object manipulation - including add, delete, create new folders etc.</p> <p><b>Serial Port</b> Synchronization between PDAs and PCs</p> <p><b>Dial Up Networking</b> Wireless link to WAN thru Bluetooth enabled cell phone<sup>1</sup> Agnostic to WAN technology Send/receive SMS messages</p> <p><b>LAN Access</b> Wireless link to Corporate LAN using Bluetooth and appropriate Bluetooth access point<sup>1</sup> Corporate email, network neighborhood, access to LAN applications, file transfer, ftp, Internet browsing, etc, using TCP/IP<sup>1</sup> Access the Internet by connecting to your desktop or notebook over Bluetooth and using its network connection<sup>1</sup></p> <p><b>Generic Object Exchange and Object Push</b> Exchange business cards, tasks, documents, appointments and more<sup>1</sup></p> <p><b>Personal Area Networking</b> Collaborate, chat, play games, exchange data<sup>1</sup> Adhoc peer to peer networking<sup>1</sup></p> <p><b>Basic Printing and Hard Copy Replacement Profiles</b> Print to any HP Bluetooth enabled printer without the need for cables or specific print drivers</p>
<b>Certifications</b>	<p>All necessary regulatory approvals for countries we support including: Bluetooth logo, FCC (47 CFR) Part 15C, Section 15.247&amp;15.249 ETS 300 328, ETS 301 489-1/17 Low Voltage Directive IEC950 UL and CE Mark</p>

**NOTE:** <sup>1</sup> A standard WLAN infrastructure, other devices enabled with Bluetooth, and a service contract with a wireless airtime provider may be required for applicable wireless communication. Wireless Internet use requires a separately purchased service contract. Check with a service provider for availability and coverage in your area. Not all web content available.

# QuickSpecs

## TechSpecs

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<b>System Unit</b>	<b>Dimensions (H x W x D)</b>	4.47 in x 2.78 in x 0.5 in (113.6 mm x 70.6 mm x 13.5 mm)	
	<b>Weight</b>	4.67oz (132 g)	
	<b>Operating Temperature</b>	32° to 104° F (0° to 40° C)	
	<b>Storage Temperature</b>	-4° to 140° F (-20° to 60° C)	
	<b>Operating Humidity</b>	90% RH	
	<b>Regulatory Marks</b>	Electrical	FCC Class B, UL or CSA NRTL
	Safety	C-UL, NOM	

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<b>TFT Color Display</b>	<b>Number of Colors</b>	65,536 (64K 16-bit)	
	<b>Resolution (W x H)</b>	240 x 320	
	<b>Dot Pitch</b>	0.24 mm	
	<b>Viewable Image (W x H)</b>	3.5 in (89 mm)	
	<b>Display Type</b>	64K color (16-bit) transreflective type TFT color with LED	

---

<b>AC Adapter</b>	<b>Dimensions (H x W x D)</b>	3 x 1.9 x 1.8 in (76 x 48 x 44 mm) (including prongs)		
	<b>Cord Length (approximate)</b>	6 ft (1.83 m)		
	<b>Power Supply Ratings</b>	<b>Voltage Range</b>	100 to 240 V Switching	
		<b>Input Current</b>	0.3 A	
		<b>Input Frequency</b>	50 to 60 Hz	
		<b>Output Voltage</b>	5 VDC	
<b>Output Current</b>		2 Amp		

### Options

**NOTE:** Optional accessories are available at additional cost.

<b>Memory/Storage</b>	64-MB SD Memory Card	253478-B21	FA134A#AC3
	128 MB SD Memory Card	253479-B21	FA135A#AC3
	256 MB SD Memory Card	287464-B21	FA136A#AC3
	512-MB SD Memory Card	344310-B21	FA184A#AC3
<b>Power</b>	1800 mAh Lithium Ion Extended Battery	343110-001	FA192A#AC3
	1000 mAh Lithium Ion Slim Battery	343111-001	FA191A#AC3
	Auto Adapter	253508-B21	FA125A#AC3
	Charger Adapter	274707-B21	FA133A#AC3
	AC Adapter		
	U.S., Canada, Latin America, Japan, Taiwan	253629-001	FA130A#ABA
	Australia	253629-011	FA130A#ABG
	Europe, Brazil	253629-021	FA130A#ABB
United Kingdom, Asia Pacific, Hong Kong	253629-031	FA130A#ABU	
<b>Synchronization</b>	Desktop Cradle	343116-001	FA188A#AC3
	USB Charge/Sync Cable		FA122A#AC3
<b>Other</b>	Stylus Three-pack	331311-B21	FA113#AC3
	Foldable Keyboard	249693-xxx	FA118A#xxx
	Micro keyboard		FA162A#AC3
<b>Performance</b>	Photosmart Mobile Camera (SDIO Camera)		FA185A#AC3
	iPAQ Navigation System (U.S. only)		FA196A#AC3
<b>Cases</b>	Nylon Case	339657-B21	FA161A#AC3
	Leather Belt Case	339656-B21	FA160A#AC3
	Custom Cases: to view and order go to: <a href="http://www.casesonline.com/">http://www.casesonline.com/</a>		



### HP iPAQ Pocket PC h4150 is a Microsoft® Windows® Powered Pocket PC

For more information on HP iPAQ Pocket PC, visit our website at <http://www.hp.com/go/iPAQ>

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# **APPENDIX QUICKSPECS02**

## Index of /HP/Ipaq/Retired Products/h4150

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 [parent directory]

	<b>Name</b>	<b>Size</b>	<b>Date Modified</b>
	iPaq_4150_quick_specs.pdf	290 kB	11/20/03, 7:00:00 PM
	iPaq_h4000_Series_User_Guide.pdf	2.4 MB	11/20/03, 7:00:00 PM
	iPaq_h4150_1.JPG	124 kB	11/20/03, 7:00:00 PM
	iPaq_h4150_2.JPG	169 kB	11/20/03, 7:00:00 PM
	iPaq_h4150_3.JPG	375 kB	11/20/03, 7:00:00 PM
	iPaq_h4150_4.JPG	227 kB	11/20/03, 7:00:00 PM
	iPaq_h4150_with_desktop_cradle.JPG	172 kB	11/20/03, 7:00:00 PM
	iPaq_h4150_with_photomart_digital_camera.JPG	117 kB	11/20/03, 7:00:00 PM

# **APPENDIX MIO01**

# MIO ALPHA

*COMPLETE USER GUIDE*



# TABLE OF CONTENTS

## Welcome

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- 03 Important Safety Information
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## HAVE ANY QUESTIONS ABOUT YOUR MIO ALPHA?

We're ready to help!

Your complete satisfaction is our goal, so your feedback is crucial.

If you have any thoughts, questions, or concerns, just contact our knowledgeable support team at:

-  1.877.770.1116
-  support@mioglobal.com
-  mioglobal.com/support
-  facebook.com/mioglobal
-  twitter.com/mioglobal

# WELCOME

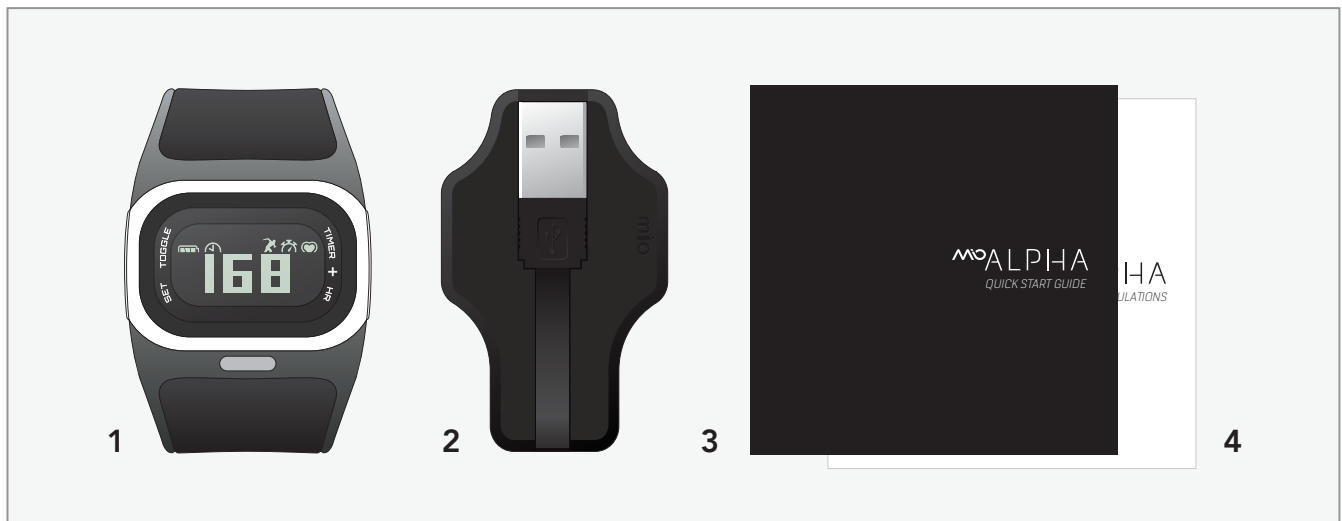
Congratulations on your purchase! Mio ALPHA is the world's first performance level, strapless, continuous heart rate monitor you can wear on your wrist. ALPHA uses *Bluetooth*® Smart technology to transmit your heart rate data to smartphones and other compatible devices. Take advantage of a wide range of fitness apps.

Remember to register your Mio ALPHA at [mioglobal.com/register](http://mioglobal.com/register) for full warranty service.

## GETTING STARTED

### What's Included

1. Mio ALPHA
2. USB Charger
3. Quick Start Guide
4. Warranty & Regulations



## IMPORTANT SAFETY INFORMATION

Consult your doctor before beginning a new exercise program.






Mio ALPHA provides very accurate heart rate measurements. However, it is not a medical device. The ALPHA watch and USB dongle contain strong magnets that could affect pacemakers and implantable cardioverter-defibrillators (ICDs). If you have any concerns, consult your doctor before using Mio ALPHA.

See page 09 for important battery care and battery safety information.

## YOUR MIO ALPHA



### Icons

-  Battery Indicator
-  Time
-  Exercise Mode
-  Timer
-  Heart Rate

### Activating Your Mio ALPHA

1. Remove your Mio ALPHA watch from the packaging.
2. Peel off the protective film.
3. Press and hold the **SET** or **+** button to activate the watch. The display will turn on and prompt you to set the time.
4. Press the **+** button to increase the value of the flashing digit.
5. Press the **SET** button to confirm the value and move to the next digit.

# USING MIO ALPHA

**Important:** Wash Mio ALPHA regularly with mild soap and water to prevent skin irritation. Make sure you allow both your arm and the ALPHA to dry completely before resuming wear.

## WEARING YOUR MIO ALPHA

To use the heart rate monitor on your Mio ALPHA watch, you must:


- Fasten the watch snugly so the optical sensor on the back of the watch makes tight contact with your skin. The tighter you can wear the watch, the better.
- Wear the watch above—not on—your wrist bone; wear it higher on the forearm when using ALPHA as a heart rate monitor, especially if you have a small wrist.
- ALPHA's performance is optimized with greater blood flow. Exercise for a few minutes to increase your blood flow before turning on the heart rate monitor.

When you're not using the heart rate monitor, you can wear Mio ALPHA like any watch.

## GETTING YOUR HEART RATE

You can view your heart rate and use the heart rate monitor when you put Mio ALPHA in EXERCISE mode. You must be wearing ALPHA for it to read and display your heart rate. The heart rate may take a few extra seconds to stabilize while your body is adjusting to the physical activity; we recommend wearing your Mio ALPHA during the warm up stage of your workout.

### Turning On Exercise Mode

1. Fasten Mio ALPHA tightly on your arm above your wrist bone.
2. Press and hold the **HR** button until the watch beeps and the display says FIND.
3. Hold your arm fairly still until the watch beeps again and displays your heart rate.  
**Note:** It takes a few seconds for your heart rate to register. The  icon flashes when ALPHA finds your heart rate.

If you don't get a heart rate but the watch face shows **-- --**, please refer to **Troubleshooting** on page 6.

### During Exercise Mode

- Press the **SET** button twice to peek at the time. The time will be displayed for 3 seconds before returning to your heart rate.
- If ALPHA loses your pulse it will beep quickly 4 times and display **-- --**. You may need to adjust ALPHA's position on your wrist.

### Turning Off Exercise Mode

1. Press and hold the **HR** button until the watch beeps and the display says QUIT or END.



## Troubleshooting

- You may need to tighten Mio ALPHA's strap and/or move the watch further up your forearm.
- On cold days ALPHA's technology can be impacted. We recommend activating the heart rate reading while still indoors and, if necessary, wearing a sleeve over ALPHA.
- If you are still having trouble, try wearing ALPHA on your other wrist.
- Minimize hand movement and extreme bending of the wrist while using ALPHA's continuous heart rate.

If ALPHA cannot detect your heart rate during the FIND period (2 min), it will leave EXERCISE mode and go back to TIME mode. Please refer to the steps above and try again.

## SETTING YOUR TARGET HEART RATE

To specify your target heart rate zone, your Mio ALPHA must be in EXERCISE mode.

Your target heart rate (HR) zone consists of your upper heart rate limit and your lower heart rate limit. These limits are usually a percentage of your maximum heart rate (MHR). This table shows some examples:


EXERCISE TYPE	LOWER HR LIMIT	UPPER HR LIMIT
Warm Up	50% of MHR	60% of MHR
Moderate	60% of MHR	70% of MHR
Fitness	70% of MHR	80% of MHR
Training	80% of MHR	90% of MHR


If you don't know your maximum heart rate or upper and lower heart rate limits, use your preferred method for calculating them or check with your doctor.

When you start using your ALPHA while you exercise, you'll soon get an idea of your personal heart rate zone for different levels of activities.

**Tip:** When you set your target heart rate zone, you will be prompted to set the upper heart rate first, then the lower heart rate.

### To Set Your Target Heart Rate Zone

1. With Mio ALPHA in EXERCISE mode, press and hold the **SET** button until the watch beeps and the display says SET UP .
2. Press the **+** button to select the first digit of the heart rate for your desired upper heart rate limit. The first digit will be a number from 0 to 2.
3. Press the **SET** button to confirm your choice.
4. Repeat steps 2 and 3 for the next two digits of the heart rate, selecting a number between 0 and 9 for each.

When you have set the upper heart rate limit, the display will say LOW . Repeat steps 2 through 4 to set the lower heart rate limit.

## Using Heart Rate Zone Alerts

Your Mio ALPHA can notify you by beeping once when you are not exercising in your target heart rate zone. A double-beep indicates your heart rate is 10 BPM or more outside the target zone. To use zone alerts, specify your target zone and turn on the timer while you are exercising.

### Heart Rate Zone Alert Led Signals

With your Mio ALPHA in EXERCISE mode and the TIMER on, the LED light below the watch displays alerts.

**Green flash:** you are exercising in your target heart rate zone.

**Red flash:** you are exercising above your upper limit. A red double-flash means your heart rate is 10 BPM or more above the target zone.

**Blue flash:** you are exercising below your lower limit. A blue double-flash means your heart rate is 10 BPM or more below the target zone.

## USING THE TIMER

Turn on the timer while you are exercising to:

- Track the length of time you have been exercising.
- Turn on heart rate zone alerts.

Your watch must be in EXERCISE mode to use the timer.

### To Turn On The Timer

- With your Mio ALPHA in EXERCISE mode, press the **TIMER** button. The display says START.
- Press the **TIMER** button to Pause/Resume the TIMER. Once the TIMER is running, the HR Zone alert will be activated.

### To View The Elapsed Time On The Timer

- From the heart rate display, press the **SET** button to view the timer. This will make the timer your default display.
- Press the **SET** button again to peek at the time. The time will be displayed for 3 seconds before returning to the timer.
- Press the **SET** button twice to return to the heart rate display.

### To Exit From Timer

- Press and hold the **TIMER** button until the display says END.


Turning off the timer also turns off EXERCISE mode.

## REVIEWING YOUR EXERCISE SESSION

Your Mio ALPHA exercise log shows:

- The length of time of your last exercise session (assuming that the timer was running for your entire session).
- Your average heart rate during the last exercise session.
- The amount of time you spent in your target heart rate zone in the last exercise session.

### To Review The Statistics From Your Last Exercise Session

1. In TIME mode (with EXERCISE mode off), press the **TOGGLE** button. The display says LAST RUN followed by the length of time of your last session.
2. Press the **TOGGLE** button again. The display says AVG  followed by your average heart rate.
3. Press the **TOGGLE** button again. The display says IN ZONE followed by the amount of time you spent exercising in your target heart rate zone.
4. Press the **TOGGLE** button to return to TIME mode.

**Note:** Once you start the timer, the data from your last exercise will be replaced by the new data.

## USING MIO ALPHA WITH YOUR SMARTPHONE

You can transmit your real-time heart rate data to a wide range of fitness apps on *Bluetooth*<sup>®</sup> Smart Ready or *Bluetooth*<sup>®</sup> 4.0 smartphones, including iPhone 4s and iPhone 5. For a complete list of compatible devices please refer to [mioglobal.com/apps](http://mioglobal.com/apps).

Compatible devices will *only* capture ALPHA's heart rate data in real time. This requires you to have the device with you while you are tracking your heart rate.

### Pairing With Smartphone Apps

1. Mio ALPHA must be in EXERCISE mode, reading your heart rate, before pairing.
2. Turn on the *Bluetooth* function of your phone. You may need to stay 10 metres (30 feet) from other *Bluetooth* sensors and devices.
3. Open the fitness app you would like to pair with. Instructions vary for each app, but typically you add or scan for the heart rate sensor using the app's Settings or Sensors mode.

**Note:** You must pair with the app itself; pairing with just the phone will not work. Once you have paired with an app, it will automatically recognize ALPHA each time you use that app.

4. Repeat for each app that you want to pair with.

## Exercising With Your Smartphone

- Wear the receiving device on your arm, in your front pocket, or in front of you on a belt or bike handlebar. Do not position the device behind you (e.g. in a back pocket or backpack).
- The ALPHA heart rate calculation is not based on instant R-R interval, and will not work for apps that require heart rate variability (HRV) data.

## USING MIO ALPHA WITH OTHER DEVICES

### Pairing With Receiving Devices Such As Bike Computers

Instructions vary for each device. Follow the instructions for receiving heart rate data from a chest strap; your device will register the ALPHA heart rate sensor.

# MAINTAINING YOUR MIO ALPHA

## CHARGING THE BATTERY

Your Mio ALPHA contains a rechargeable lithium polymer battery. Follow these instructions and guidelines to ensure long life for the battery.

If you do not follow these guidelines, the battery life could be shortened and there is the risk of damage to the watch, risk of fire, risk of electrolyte leaks and chemical burns, and risk of injury.

### Battery Indicator

- The battery indicator in the upper left of the watch face shows three bars when the battery is fully charged. Each bar represents about 1/3 of the battery's full charge.
- If you put the watch in EXERCISE mode and the battery charge is below 1/3, the display will say LOW BATTERY. You can still use the heart rate monitor.
- If you put the watch in EXERCISE mode and the display says NO BATTERY, you must recharge the battery before using the heart rate monitor again. The watch will automatically return to TIME mode.

### Battery Life

- The length of time you can use the heart rate monitor while EXERCISE mode is on varies from 8–10 hours.

## To Charge The Battery

1. Make sure that the four connection pads on the watch caseback are dry. If not, dry them with a towel.
2. Plug the USB dongle into the USB port of your computer.
3. Attach the 4 connection pads on the caseback to the 4 connection pads on the dongle. The magnets in the connection pads will help the two pieces lock into place.

The display will indicate that the battery is charging, and the blue LED will flash.

**Tip:** When the battery is finished charging, the display will say FULL .

## Battery Care Guidelines

- Recharge the battery at least once every 6 months.
- Do not expose the watch to high temperatures.
- Use the watch in the temperature range of 5°C to 45°C (41°F to 113°F).
- Store the watch in the temperature range of 0°C to 25°C (32°F to 77°F).
- Do not disassemble, puncture, or incinerate the watch or battery.
- If the watch casing breaks and the battery is exposed, keep the battery away from children.

## Battery Lifespan

- The battery lasts for approximately 300 charge cycles. If charged on a weekly basis, the battery should last for at least 5 years.
- The battery is non-replaceable. If the battery charge length is noticeably shorter than before, your Mio product may have reached its end of life. Contact your local recycling authority to properly dispose of the device and battery.

## USING YOUR MIO ALPHA IN WATER

- The Mio ALPHA is water-resistant; you can wear your ALPHA while swimming.  
**Important:** Do not press the watch buttons under water.
- The accuracy of the heart rate monitor might be reduced in cold water or if you are using large arm movements.
- Do not wear your ALPHA while diving.
- RF transmission does not work under water.
- After swimming, rinse your ALPHA with tap water and dry it with a soft cloth.

## CARING FOR YOUR MIO ALPHA

### Cleaning Your ALPHA

- Wash Mio ALPHA regularly with mild soap and water to prevent skin irritation.
- Make sure you allow both your arm and the ALPHA to dry completely before resuming wear.
- Avoid scratching the device to protect your Mio ALPHA from damage.
- Do not expose the Mio ALPHA to strong chemicals such as gasoline, cleaning solvents, acetone, alcohol, or insect repellents. Chemicals can damage the seal, case, and finish.
- After swimming, rinse Mio ALPHA with tap water and gently dry with a soft cloth.
- If your skin becomes irritated, wear ALPHA on the other arm or discontinue wearing until the irritation clears.

### Other Care Tips

- Do not attempt to disassemble or service your Mio ALPHA.
- Protect your watch from impact shocks, extreme heat, and extended exposure to direct sunlight.
- Mio ALPHA is water-resistant only if the lens, buttons, and case remain intact.

## MIO ALPHA SPECIFICATIONS

**Clock:** 12-hour

**Timer:** 9 hours 59 minutes 59 seconds

**Max Readable Heart Rate:** 220 BPM

**Min Readable Heart Rate:** 30 BPM

**Operating Temperature:** 5°C to 45°C (41°F to 113°F)

**Min Recommended Wrist Size:** 145mm

**Lens:** Mineral Glass

**Watchcase:** PA+GF

**Caseback:** PC+CF

**Caseback Contact Pads:** SUS316

**Strap:** Silicon

**Water Resistance:** 30M

**Battery:** 170mAh Lithium Polymer

**Expected Battery Life:** Up to 5 Years

**Magnets:** Neodymium – iron – boron (NdFeB)

**Radio Frequency/Protocol:** Bluetooth® Smart Wireless Technology

# WARRANTY AND REGULATIONS

## WARRANTY & SERVICE

Be sure to visit our Product Support pages to find online help, FAQs, videos, and manuals for your product: [mioglobal.com/support](http://mioglobal.com/support).

### Mio Limited Warranty Information

This product is warranted to the original purchaser to be free from defects of quality, materials or workmanship at the time of delivery for the Limited Warranty Period (see below). During the Limited Warranty Period, Physical Enterprises Inc. (Mio Global) will, at its sole discretion, remedy such defects free of charge either by a) repairing, or b) replacing, or c) refunding the original purchase price (excluding taxes, shipping, handling, duties, and similar amounts), subject to the terms and conditions of this Limited Warranty. Processing of all warranty claims will be handled by the distributor of the product for the geographic area where the original purchase was made. To obtain warranty service, contact the store/dealer where the product was purchased to make a warranty claim.

### Warranty Period

The "Limited Warranty Period" starts on the date of purchase and lasts for one year, ending on the first anniversary of the date of purchase. Your store/dealer (or its importer or distributor) may have offered you a longer warranty period as part of the sale; Mio Global is not responsible for such longer warranty period so please contact your store/dealer for more information. The Limited Warranty Period will automatically expire without notice, and this Limited Warranty is not enforceable, if (as determined at the sole discretion of Mio Global):

1. the product has been opened or otherwise tampered with (except where permitted by the relevant documentation, such as to properly replace batteries as instructed);
2. the product has been serviced by a person other than Mio Global;
3. the serial number has been removed, altered or made illegible in any way; or
4. the product was not purchased from an authorized reseller of Mio Global (please contact Mio Global to obtain a list of authorized resellers).

Please refer to [mioglobal.com/support](http://mioglobal.com/support) for country-specific warranty information.

### Exclusions and Limitations

This Limited Warranty does not cover, and customers will not be entitled to any claim under this Limited Warranty or otherwise for:

1. problems arising from abuse or rough, careless, or improper handling (and without limiting the foregoing, damage resulting from bending or dropping the product will be deemed the result of abuse or improper use);
2. problems arising from misuse contrary to intended or recommended use;

3. problems arising from alteration of the Mio product, such as moisture or water damage sufficient to affect the proper function of the product, and damage to the product case or visible cracking of the face;
4. problems arising from the use of the Mio product with any product, accessory, software and/or service not manufactured or supplied by Mio Global; or
5. replaceable batteries, or user manuals or any third-party items;

in each case as determined at the sole discretion of Mio Global.

## *EXCLUSIONS AND LIMITATIONS OF LIABILITY; DISCLAIMERS*


THIS LIMITED WARRANTY IS ONLY VALID AND ENFORCEABLE IN THE COUNTRY OF PURCHASE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE, MANDATORY LAWS:

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3. MIO GLOBAL, OR ANY OF ITS AFFILIATES OR THEIR RESPECTIVE EMPLOYEES, OFFICERS, DIRECTORS, REPRESENTATIVES AND AGENTS (COLLECTIVELY, THE "PHYSICAL ENTITIES"), SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, PUNITIVE, INDIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF ANTICIPATED BENEFITS, LOSS OF DATA, LOSS OF USE, COST OF CAPITAL, COST OF ANY SUBSTITUTE EQUIPMENT OR FACILITIES, CLAIMS OF THIRD PARTIES, DAMAGE TO PROPERTY RESULTING FROM THE PURCHASE OR USE OF THE ITEM OR ARISING FROM BREACH OF THE WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT, OR ANY LEGAL OR EQUITABLE THEORY, EVEN IF MIO GLOBAL KNEW OF THE LIKELIHOOD OF SUCH DAMAGES;
4. WITHOUT LIMITING THE FOREGOING, THE PHYSICAL ENTITIES DO NOT WARRANT THAT THE OPERATION OF THE PRODUCT WILL BE UNINTERRUPTED OR ERROR FREE, OR THAT THE PRODUCT WILL WORK WITH ANY HARDWARE OR SOFTWARE PROVIDED BY A THIRD PARTY, AND EXPRESSLY DISCLAIM ANY DAMAGES RESULTING FROM INACCURACY OR MATHEMATICAL INACCURACY OF THE PRODUCT OR THE LOSS OF STORED DATA; AND
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### **Contacting Mio Global**

For all matters related to this Limited Warranty, please contact Mio Global:

 1.877.770.1116

 support@mioglobal.com



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## REGULATIONS AND CONFORMITY

The Mio ALPHA Regulatory Sheet is available for download at [mioglobal.com/support](http://mioglobal.com/support).



EU RESIDENTS: Do not dispose of this product as unsorted municipal waste. It is your responsibility to return this product to your local recycling service.

EU-DECLARATION OF CONFORMITY Physical Enterprises Inc. declares this heart rate watch (MIO Alpha) in compliance with R&TTE directive 1999/5/EC. Please e-mail [support@mioglobal.com](mailto:support@mioglobal.com) to request a copy of the Declaration of Conformity.

If there are electrostatic disturbances in the environment, the product may malfunction or display an error. In this case, reset the product or relocate to an area without such disturbances.

Model Number 53P (Bluetooth® Smart)

Made in China

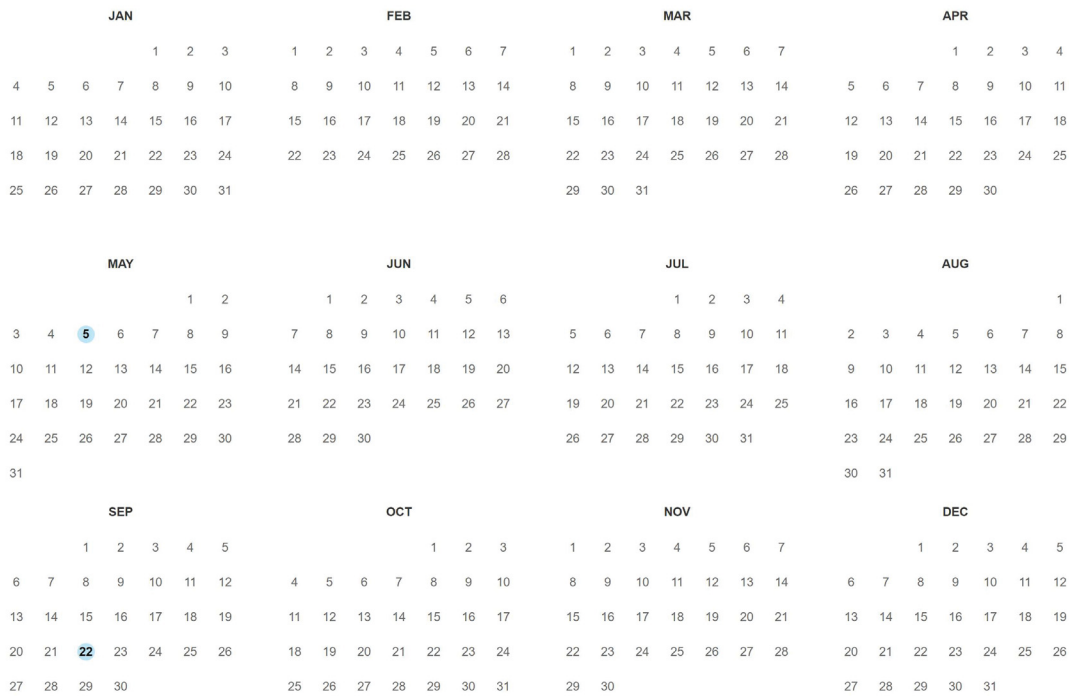
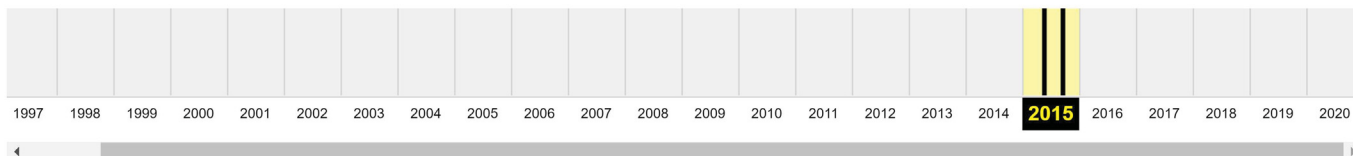
# **APPENDIX MIO02**

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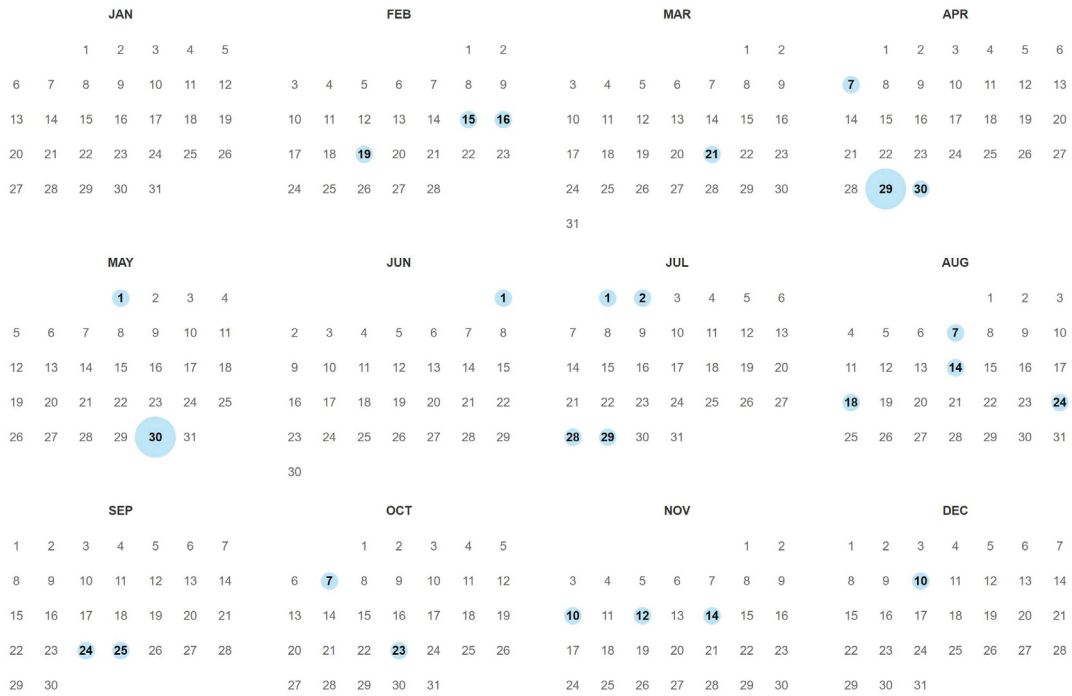
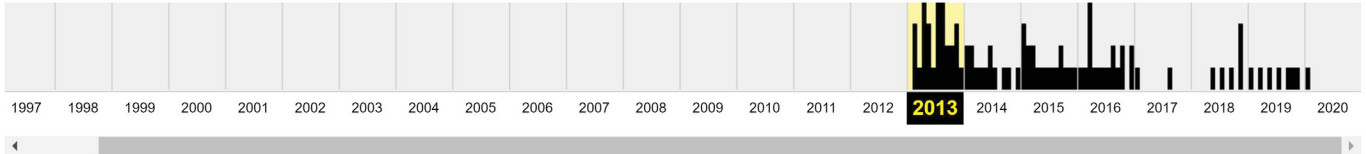
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## Mio Alpha Optical Heart Rate Monitor In-Depth Review (Bluetooth Smart/ANT+)

FEBRUARY 12, 2013 | BLOG » PRODUCT REVIEWS | COMMENTS (11)



### I'M DC RAINMAKER...

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## Mio Alpha Optical Heart Rate Monitor In-Depth Review (Bluetooth Smart/ANT+)

FEBRUARY 12, 2013 | [BLOG » PRODUCT REVIEWS](#) | [COMMENTS \(44\)](#)



The Mio Alpha unit may represent the longest I've ever actually tested something before writing a review. I initially got the chance to use a [unit back in July for a quick test run](#) as they were in the midst of their Kickstarter campaign. Then in September, I received some early prototype units to try out. Finally, in December I received the final production units. During this time I've been collecting mounds of data. Large stockpiles of it really. I've got a crystal clear understanding of how well the product works, and where it falters. So, how is it? Well, read on to find out.

In doing so, I've got a pretty good grasp on how the unit works, as well as all the inside and out details. In the case of the Alpha watch, I bought and paid for the Bluetooth Smart version, but Mio (company behind Alpha) also sent over two units (ANT+ and Bluetooth Smart) to test ahead of them being publically available. These will be going back to them shortly. Simple as that. Sorta like hiking in wilderness trails – leave only footprints.

Lastly, at the end of the day keep in mind I'm just like any other regular triathlete out there. I write these reviews because I'm inherently a curious person with a technology background (my day job), and thus I try and be as complete as I can. But, if I've missed something or if you spot something that doesn't quite jive – just let me know and I'll be happy to get it all sorted out. Also, because the technology world constantly changes, I try and go back and update these reviews as new features and functionality are added – or if bugs are fixed.

### Unboxing:

There are actually two variants of the Mio Alpha unit, one is Bluetooth Smart enabled, and the other ANT+ enabled. For those who bought-in via Kickstarter, they had the choice of either Bluetooth Smart, or ANT+. However, these days, they are also selling the Bluetooth Smart variant.

Each unit comes in a small square box. Slightly larger than a Rubik's cube.



As I noted earlier, the only difference between the two variants from a visual standpoint is the little ANT+ or Bluetooth Smart logo. In this case, both units are the color 'Shadow' (read: Black).





As you crack open the boxes you'll find the heart rate watch staring back up at ya:



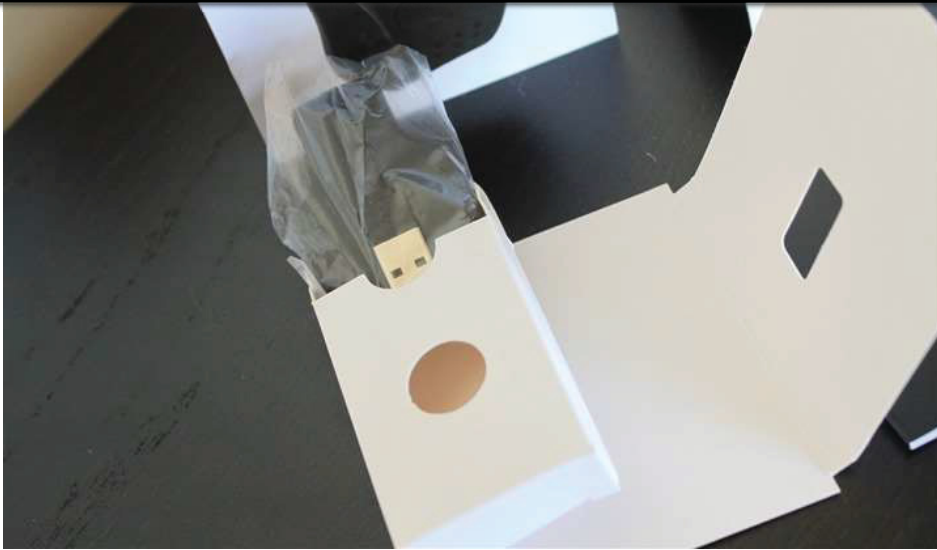
Here, a closer look:



Removing the inner watch box you'll find a small packet of instructional stuffs, and the charger.



Here's the charger:



And the whole kit unboxed:

The charger is actually pretty cool. Probably one of the more ingenious chargers I've seen around. The (albeit rather short) USB cable folds back onto the plastic unit itself, keepings things nice and tidy.



And to plug the USB cable in, you just pull it up. It'll twist around as you see fit, it's just like any other cable.



Flipping it over, the unit features a small magnetic clip that holds it tightly to the watch:

Speaking of the underside, here's what that looks like. We'll dive into it more in a section or two.

With that, we've got everything unboxed and ready to start using it.



**Unit comparisons:**

When looking at the size of the unit, it's about the same as most wrist watches:

You can see this a bit more clearly when compared against the Polar **RC3** GPS watch, and the Garmin **FR610** GPS watch. The Alpha is perhaps a touch bit longer in the watch face itself, but is about the same width and height. Plus, some of that length in the face watch is actually the band portion.

### Initial Setup:

Setup on the Mio Alpha is pretty straight forward and basic. There's not much to do really, beyond removing the sticker and setting the time. So with that, remove the sticker:

Once you've removed the sticker, you'll go ahead and turn on the unit by holding the right button down.



Upon startup it'll show you the Mio logo:

Then, you can go ahead and set the local time. The time isn't actually used for anything beyond just telling you what time it is.

The reason the time isn't used for anything is that the unit doesn't record anything. It's just like a heart rate strap in that respect – it just displays your heart rate and transmits it. And, beyond a basic timer that you can start/stop, there's NO other functionality on the watch. You turn it on, it transmits your HR and displays it, and then you turn it off and it shows you the current time. End of story.

**A bit of background on the technology and the strap:**

Unlike traditional heart rate straps, the Alpha isn't placed around ones chest. Instead, it measures heart rate at your wrist. You can use either left or right wrist, it doesn't really matter. Whichever is most comfortable for you.

The unit uses an optical sensor to measure your pulse. It does this by emitting a green light into your skin, which allows the unit to then more clearly read your pulse. You can see the green light below:

Unlike other watches such as the Basis unit, this doesn't measure any other attributes (such as skin temperature). It only does heart rate. But, it does it really darn well. And in particular, it does it with a focus on athletics. That's an area that the Basis folks themselves will admit their unit isn't focused on. They're core area is 24x7 monitoring, rather than higher performance running (or really, any running). You can see a photo I took of the Basis watch below. As you can see, it looks relatively similar. But of course, looks are deceiving.

Some of this come down to technology. If you think about what's going on, the sensor has to optically measure your heart rate while your running. That running often includes significant jostling, bumping, and just in a general a non-smooth ride. The technology is the Alpha is specifically optimized for that, whereas the Basis isn't. And, when it comes to the technology behind the sensor – it isn't something that Alpha just plopped out one night. In fact, the technology was exclusively licensed from Philips Medical (the company that makes hospital level stuff). The 'exclusive' part means that Mio has full rights to the technology, and can sub-license it if they wish to other companies (i.e. they could sub-license the optical portion to Garmin, and Garmin could build it into a watch).

can work while you run.

When it comes to tightness, many folks presume it must be boa constrictor tight. But I've found that usually isn't the case. I can get good solid readings in most cases without it being annoying tight. Just snug, but not super-tight. In fact, as you'll see later on, I've worn it for some stretches up to 30 hours at a time gathering data, with no issues when it comes to the wrist.

*(Side note for those curious about Basis: As soon as a unit actually shows up on my doorstep, I'll start using it for a review. Note that comparing Basis to Alpha is like comparing a fighter jet to a business jet. Yes, they both fly (optical HR), but one carries guns, missiles and bombs, and the other carries passengers and champagne. Totally different purposes. In the case of Alpha, it's all about athletic HR without a heart rate strap. Whereas Basis is all about 24x7 health monitoring beyond just heart rate...but not for athletics.)*

#### Day to day usage:

As I noted above, the unit is pretty basic in that it only transmits your HR and displays it. It doesn't record it. When you start to ask yourself what functionality the unit might have, the easiest way to obtain the answer is to ask yourself if the same functionality is found in a heart rate strap. Here, let me give you example:

Q: Does the unit record your distance?

A: Does a heart rate strap record your distance? No. Neither does Alpha.

Q: Does the unit display your location like GPS?

A: Does a heart rate strap display your location like distance? No. Neither does Alpha.

Q: Does the unit transmit your current heart rate?

A: Does a heart rate strap transmit your heart rate? Yes. So does Alpha.

Q: Does the unit record your heart rate for downloading later?

A: Does a heart rate strap record your heart rate for downloading later? No\*. Neither does Alpha. (\*Ok, one strap does, the Suunto Memory Belt).

Q: Will the Q&A continue like this?

A: No, I think my point has been made.

Make sense? Good.

Now unlike a heart rate strap, you do have to turn this on. To do so, simply hold the button on the right again for about 2 seconds, and it'll start searching for your heart rate. It's best to ensure the unit is already snugly on your wrist before you begin the search process.

Once it's found your heart rate, it'll display your current heart rate value on the unit. It's at this point that the unit will start transmitting that value over ANT+ or Bluetooth Smart (depending on version you bought). It will NOT start transmitting any value (zero, null or otherwise) until a heart rate is found. Meaning, if you're doing pairing, you'll need to get a heart rate value first, then it will pair. Zero or null doesn't count.

From a pairing standpoint, the unit works exactly the same way as any ANT+ heart rate strap (if you bought the ANT+ version). You'll simply go into the ANT+ settings on the unit and then pair it.

And, when using a phone app, it also works the same way. You'll go into any Bluetooth Smart compatible app and dive into the pairing menu. From there the unit will pair with the app. Note that unlike ANT+, you cannot pair the Alpha to more than one Bluetooth Smart device concurrently. Meaning, say you had a *Motoactv* (which has BT Smart connectivity), you couldn't pair it to both the *Motoactv* and your cell phone at once. That's because Bluetooth Smart has a 1:1 relationship, whereas ANT+ has a 1:Many relationship. Again, not a big deal for most people (especially today with virtually no Bluetooth Smart watches out), but worthwhile mentioning.

You can see above that I've got it paired to my phone, and via the Wahoo Fitness app. It's the app I tend to use for just about everything. The reason being that it's free, uploads to a bunch of different services, and has tons of options for data export. Oh, and it's free. And it 'just works'.

Above, you can see the 90BPM coming from the Alpha.

Now, what's important here is that I've seen a LOT of reviewers (for really big tech companies) not understand that Alpha is Bluetooth *Smart*. This means that your phone **has to be Bluetooth Smart compatible**, which means it has to have Bluetooth 4.0. Today, that's any iPhone from the 4s and later. And some Android phones and some Windows Phones.

However – and this is the REALLY important part – you **MUST ALSO have a Bluetooth Smart Heart Rate Strap** compatible app. Let me repeat that again. The app has to be specifically written to communicate with Bluetooth Smart.

And today the number of apps that do that is decidedly thin. All of the biggies do, and most of them actually use the underlying Wahoo Fitness API's to do so (developer stuffs). So, as a general rule you can use the Wahoo Fitness site to lookup apps that are compatible with their Wahoo Blue HR strap. If it works with the Blue HR strap, it'll work with Alpha.

With me so far?

Ok, now, when it comes to the ANT+ variant, it'll work with any ANT+ device you have that supports heart rate (heart rate device profile). Which is pretty much every ANT+ watch/bike computer/hiking unit ever made on earth. Garmin, Timex, Magellan, CycleOps, Mio, etc... Pretty much as long as you don't have a Polar or Nike unit, you're good to go.

When it comes to data display, you'll see the two track fairly closely. Usually within about 1-2 seconds of each other. For example, in the below picture you can see that the data from my heart rate strap (fed into the FR610 on the left) is off by two beats from the Alpha unit. Which one is correct? Well, hard to know.

But, within 1-2 seconds they matched again (actually, the below was taken 1-2 seconds prior):

It's worth pointing out that the unit doesn't always find my heart rate on the first attempt. I find that about 1:4 times I'll have to tell it to 'retry' and have it search for my heart rate again. I've found that if I then just move it slightly up my wrist (direction towards my elbow), perhaps 1-3cm (.5-1in) it usually solves it. It's not a huge deal, but it can be an annoyance at times. On the flip side, once it does find it, I never have any issues with HR dropouts or spikes. It just works...the entire run.

Now, that's for me. For The Girl, her wrists are too small, and it doesn't work for her with any high intensity runs. The reason being is that on lower-intensity runs the watch basically stays put. But on higher intensity runs with more jostling, it ends up sliding down her arm towards her wrist (she has to start it up higher, because the band is too big). Once it gets to her wrist though, the band is just far too big and it won't get any useful HR values. Below you can see a heart rate chart from one of her runs.

It's probably hard to see what she's doing, so let me slice it up a bit. Then you can see why it's so bad. She's doing mile repeats, but it's really hard to see because the data is all over the map. In reality, her pace is preset, and thus her heart rate would 'stabilize' within the first 45-75 seconds, and then slowly rise for the remainder of the interval. You can see how earlier on in the run the HR values weren't horribly off, but once she started the harder running sets, things got messy.



So while it 'works' up higher on her arm, it doesn't stay there. Simply put, the band is too big. For reference, she's 5'2" with tiny wrists. Though, I don't have a photo handy with her wrists and the watch on it (travelling at the moment). I'll try and get one added this week.

Unlike a traditional watch, you'll need to have this placed below your coat in cold weather. You can't have it over the top of the coat as it won't correctly pickup your heart rate through the fabric.

In looking at a few small features the unit has that a traditional HR strap doesn't, I'll first note that you can set a high and low heart rate alert. This will give you a beeping alarm when you're outside of the target range. It'll also change the LED color on the unit itself:

You can also start the timer that I mentioned above. This gives you a simple total time display while the unit is running.

Additionally, at the end of a run, it'll display the average HR value for your run, based on the last run that the timer was used.

Beyond that, it's all about data transmission.

### **Data comparison with normal HR straps:**

I've used the Alpha indoors, outdoors, running, cycling, walking and just about everything in between. From easy workouts to hard workouts, short intervals to long runs. You name, I've done it. And by and large, it works just fine and records generally accurate data. I can mix and match data from either heart rate strap or Alpha, and there's very little visible difference. I see an occasional dropout (1-3 per run), but I don't see the large spikes/drops that I often see on Garmin and other straps. And typically, those spikes last for prolonged periods of times (i.e. 5-10 minutes or longer). Versus a 1-second drop on the Alpha.

Of course, seeing is believing. So, I've taken a ton of random runs below to show what it looks like. In the four examples below, the data was recorded in parallel between a Garmin unit (varied) using ANT+, and an iPhone connected to Bluetooth Smart.

With that, let's dive into the data.

### Run #1: 80 Minute Run

Weather just about freezing level, dry and slightly breezy.

Figure 1: [Garmin FR610 + standard Garmin HR strap \(soft strap\)](#) (run file linked)

*Standard Strap Avg HR: 157 bpm*

*Standard Strap Max HR: 174 bpm*

Figure 2: [Alpha Bluetooth Smart + Wahoo Fitness app](#) (run file linked)

*Alpha Avg HR: 157 bpm*

*Alpha Strap Max HR: 173 bpm*

This follows pretty close, though I do see a few drops that aren't visible on the Garmin file. Beyond that, the units track fairly well against each other.

### Run #2: Short Lunch Run (40 minutes at Z2 HR)

Just below freezing, sunny and dry.

Figure 1: [Garmin FR610 + standard Garmin HR strap \(soft strap\)](#) (run file linked)

*Standard Strap Avg HR: 158 bpm*

*Standard Strap Max HR: 182 bpm*

Figure 2: [Alpha Bluetooth Smart + Wahoo Fitness app](#) (run file linked)

*Alpha Avg HR: 156 bpm*

*Alpha Strap Max HR: 164 bpm*

This is probably one of the clearest example of the Alpha unit performing perfectly, compared to a typical HR strap doing initial spikes on a cold day. Note all the wonkiness at the start with the chest strap, then compare it to the Alpha which mirrors what my HR would have been. It was an easy run, just starting off easy and then holding a steady heart rate.

**Run #3: Tempo Run (90 minute at two separate paces)**

Weather about 40-45°F, overcast and dry.

Figure 1: [Garmin FR610 + standard Garmin HR strap \(soft strap\)](#) (run file linked)

Figure 2: [Alpha Bluetooth Smart + Wahoo Fitness app](#) (run file linked)

In this case, you see that the Alpha did a better job getting the initial heart rate, whereas the Garmin strap lagged initially. They both tracked quite well, though it looks like the Alpha had three drops towards the end. Given I never stopped on my way back (out and back course), these seem a bit odd.

*Alpha Avg HR: 159 bpm*

*Alpha Strap Max HR: 177 bpm*

#### **Run #4: Long Run (2hr 10 minutes)**

Weather was generally miserable. Part snow, part rain, and running in a mix of snow/ice/slush, on and offroad. Rather unpleasant.

Figure 1: [Garmin FR610 + standard Garmin HR strap \(soft strap\)](#) (run file linked)

*Standard Strap Avg HR: 159 bpm*

*Standard Strap Max HR: 180 bpm*

Figure 2: [Alpha Bluetooth Smart + Wahoo Fitness app](#) (run file linked)

*Alpha Avg HR: 159 bpm*  
*Alpha Strap Max HR: 177 bpm*

In this example, you see a single errant point sorta towards the beginning a couple minutes in. Things then track fairly well until the last couple minutes. It's unclear on why the Alpha became happy towards the last few minutes, as the other unit did fine.

### **Indoor Trainer Ride**

This was just a 50 minute indoor trainer test. I was doing a lot of other data gathering on power meters, so I decided to knock out two birds with one stone in this test.

Figure 1: [Bluetooth Smart HR Strap \(chest strap\) paired to the Wahoo Fitness app](#) (bike file linked)

*Standard Strap Avg HR: 141 bpm*  
*Standard Strap Max HR: 154 bpm*

Figure 2: [Alpha ANT+ variant paired to the Wahoo Fitness App](#) (bike file linked)

In this sample, things look about as good as you're going to get similarity-wise. I see one tiny blip around the 5-minute marker with Alpha, but otherwise spot-on.

### Randomness: Continuous HR monitoring (all day long)

Just to briefly point out that in addition to doing athletic monitoring, the unit works pretty darn well for doing continuous HR monitoring. I wrote a fun post up on it back a couple months ago, showing some of the capabilities, where I recorded my heart rate from waking up to falling asleep – which included a full day trip for work on the high speed train and back. Fun stuff. You [can dig into it here](#).

In addition to simple all day tracking of non-athletic endeavors, just today I also did one all-day tracking while skiing. I paired the Alpha unit via ANT+ to the [Garmin Fenix](#) (which is ideal for longer term tests), and then went about my day. In my case, I had stashed the Fenix in my backpack instead – since I didn't really need/care to see it (just wanted tracking for later reference).



Worked great. It's funny to clearly see sitting on a chairlift versus powder skiing.

### Summary:

At the end of the day, I really like the Alpha from the standpoint of accuracy, functionality and ease of use. As a product, it does execute on exactly what it claims to do. No more, no less. It transmits your heart rate via one of two standards, and displays it – and it does it really well, bug free, without a heart rate strap around your chest.

Where I'm conflicted is the price point. At \$200, it's just really darn expensive for something that doesn't even record data or otherwise have any functionality of even a basic \$15 Target/Walmart watch. Yes, I understand that it has multi-million dollar optical HR sensing technology. But that isn't any of the functionality commonly found in sports watches these days even half its price.

Thus, from my overall recommendation standpoint, it comes down to your own cost-basis determination. Is the cost worth it to you? For those that hate heart rate straps (be it for comfort, or due to spikes/dropouts), then this is probably worth the cost. For those that don't mind the heart rate strap, then I suspect you'll see little value in this.

Long term, I think this technology is FAR more valuable licensed out to other companies. For example, seeing this built into the back of a GPS sports watch. Or perhaps, with the display removed entirely and just as a sleek heart rate watch wrist band that simply transmits (just like your heart rate chest strap, but for your wrist).

Please note that at this time, Mio is not offering the Alpha in the ANT+ variant. ONLY folks who paid last July as part of the Kickstarter campaign and specifically ordered the ANT+ version will receive theirs. Today, only the Bluetooth Smart version is

- Just works
- Both ANT+ and Bluetooth Smart versions made
- Data is generally quite accurate, even while running (hard)
- Battery is very solid, I can get about 30hrs of battery life before recharge
- Strap isn't uncomfortable when worn, doesn't need to be super-tight

**Cons:**

- Unit is REALLY expensive
- Virtually no functionality on watch, just HR display
- Doesn't record data, requires another device (only displays avg HR for last run)
- Band too large for small wrists

And as always, feel free to post comments or questions in the comments section below, I'll be happy to try and answer them as quickly as possible. And lastly, if you felt this review was useful – I always appreciate feedback in the comments below. Thanks! Finally, I've written up a ton of helpful guides around using most of the major fitness devices, which you may find useful in getting started with the devices. These guides are all listed on this [page here](#).

13 7 2

TAGS: ALPHA, HEART RATE STRAP, MIO ALPHA

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## 44 COMMENTS

**Richard**

February 12, 2013 at 3:04 pm

[Reply](#)

#1

The thing that would stop me from buying this is the fact that deciding between ANT+ and BT is a \$200 decision. If they had one product that supported both, I might well give it a go. But this is a luxury – its replacing a HR strap that I already have. And its expensive. \$200 for a one-time future proof luxury is one thing. \$200 for a one-time decision that might be the fitness equivalent of buying HD-DVD? No thanks, I'd rather sit on the sidelines instead.

**Parker**

February 12, 2013 at 3:25 pm

[Reply](#)

#2

Does the unit work for swimming? I recognize that the watch requires a device to record the data, but suppose one wanted to just have the instant read capability and was less concerned about being able to recover the data later.

**Tim**

February 12, 2013 at 4:35 pm

[Reply](#)

#3

I know the kickstarter backers who paid for ANT+ were going to get them... but I thought otherwise they were not going to be selling ANT+ models? Any update on that story?

**Rainmaker** *replied*

February 12, 2013 at 4:39 pm

#4

Yup, that's correct as it stands right now. I think they are monitoring whether or not folks want ANT+, and could do another production run if so.

91 captures

15 Feb 2013 - 6 Jan 2020

**Myria**

February 12, 2013 at 4:38 pm

Reply #5

Honestly for the cost I just don't see it.

HRM straps are a pain in the bum, especially if you're a woman (if I was a guy I don't think I'd be tempted by this at all, but the PITA of wrestling an HRM strap + sports bra is enough to at least tempt me), but this doesn't seem like enough of an improvement over them to justify the cost.

The need to chose up front between Bluetooth and Ant+ is problematic for the cost, IMHO, especially as I'll bet money both versions are using the same modem ASIC (granted, antenna or other details may vary, but I'm betting not by much, if at all), and I'm not sure that trying to make it into a watch wasn't a bad idea. Or, at least, a bad idea if it was going to be a half-arsed sub-standard watch. Better to have saved the cost/space/power of the display and drivers if making a dumb-sensor.

Does make me wonder how it'll stack up against the Amiigo, which, if I understand things correctly, will do heart rate, oximetry, and motion detection in one unit that costs half what the Alpha is going for.

Assuming the Amiigo isn't over-promising — granted, a big assumption at this point.

I do hope things move more in the Amiigo direction, regardless. I think wearable sensor platforms that focus on more than just BPM for tracking workouts have a lot of potential. I can see oximetry, GSR, thermal (both skin and external), among others, all having uses.

**Rainmaker replied**

February 12, 2013 at 5:08 pm

#6

I think the only challenge with Amiigo that I see is the inability to clearly segment portions of a workout. Meaning, today, I can't (without the corresponding app at the same time) segment pieces of my run or bike or swim. It's all or nothing.

The example I just gave to someone a short bit ago that asked was where they talk about swimming and showing data from that. Which is cool. Except, in order to add any sort of start/stop points (or lap points) you need your phone. But nobody takes their expensive iPhone out onto a pool deck, let alone into the pool. So it's good for simple ('I swam for 30 minutes', 'I played tennis for 1hr') type statements, but less good for accuracy like you'd get from something like a GPS running watch, or a swim-specific thing.

That said, I think it's really cool, I just wish there was a bit more flexibility there.

**Timster**

February 12, 2013 at 4:45 pm

Reply #7

I think this will be my first not positive only comment on your reviews...

Sometime back I noted if the unit would work for a swim when placed on the wrist right next to a 910XT (or 310XT).

In theory it should as the unit was supposed to be waterproof and the 310XT's only reason for non swim HR data is the lack of range of ANT+ under-water.

So please, can you amend your review (or send me a ANT+ alpha and I will test it myself).

**Rainmaker replied**

February 12, 2013 at 5:01 pm

#8

Sorry, just haven't had a chance to go to the pool with both yet and try it out. Just a lot of irons in the fire (work, life, blog, run-bike focused training).

I'm hoping to head over tomorrow while here on vacation since there's a pool nearby.

**Steve**

February 12, 2013 at 5:22 pm

Reply #9

Ray, how do you explain the significant difference in avg. HR on your Run #2 example? After the Garmin stabilized around the 1 mi mark the two plots seem to match fairly well, EXCEPT the Garmin data is shifted higher by about 10 bpm the entire time. That's a huge difference. Thoughts as to why that would be?

**Rainmaker replied**

February 12, 2013 at 5:27 pm

#10

Grr...I pasted in the wrong file on that. Changing...

**Rainmaker replied**

**Chris**

February 12, 2013 at 5:42 pm

[Reply](#)

#12

I purchased the ant + for ease of connection to many devices for cycling. In addition, I can make my ant+ bt enabled w a dongle for my phone so it was a Homerum for me  
I'd like the ability to turn off the alarm beeping and just keep the led lights so when I'm riding or in spin class, I can see by color if I'm working too hard or not enough  
Also would like a backlight so when I'm indoors in spin I can see my numbers if I need  
But I'm generally satisfied w the product

**Rainmaker** *replied*

February 12, 2013 at 5:50 pm

#13

If you don't start the timer, the alarm will never beep.

I don't use the timer mode 99% of the time, and instead just turn it on, and then just leave it in transmit mode until down with workout. That way I never have to hear the HR zone beeps. Works perfectly.

Though, I can see how that would break the colored LED side of things though. :-/

**Timster** *replied*

February 12, 2013 at 6:05 pm

#14

Which phone and app do you use?

I got a ANT+ dongle and can connect my ANT+ equipment to my S3. Nevertheless I have not yet found an App that supports the devices (Neither Endomono nor RuntasticPro does).

**Rainmaker** *replied*

February 13, 2013 at 12:36 pm

#15

In the review, I was using the Wahoo Fitness iPhone app with the iPhone 4s.

I'll be talking more about the ANT+ OTG adapter for selected Android phones (including the S3), once that releases (the software side, not the hardware side).

**Barry Reingold**

February 12, 2013 at 5:50 pm

[Reply](#)

#16

Your wife should try wearing a sweatband around her wrist. That might keep the watch from slipping down to her hand when she is running.

**Chris**

February 12, 2013 at 5:52 pm

[Reply](#)

#17

\*ant + dongle enabled so phone can read the ant+ data

Sorry for the confusion. Still a Homerum for me....

**Timster**

February 12, 2013 at 6:04 pm

[Reply](#)

#18

Oh, forgot to ask.

Any comparison of the Mio to a Garmin with a Polar Soft-Strap?

The latter config solved all of my reading/spike issues (as per your recommendation)

**Rainmaker** *replied*

February 13, 2013 at 12:35 pm

#19

So, from a comparison standpoint, as long as it's not spiking (and I know when that is), it's easy to compare

**Denise**

February 12, 2013 at 6:17 pm

Reply

#20

I've been eyeing this since the Kickstarter project. (didn't invest because I seem to have really, really bad luck with Kickstarter projects and now I just wait until they go to market.)

I don't mind HR straps until my runs head over the 2 hour mark. I'm scarred for life due to the straps ripping me to shreds. Sports bra + heat + salt + HR strap = bad.

This device is a great idea except that if I use another watch to track my workouts (like a 910), where does this thing go? On the other wrist? If they could give you the option to use it as a HR strap only and put it on an ankle I think it would be a FAR better and more useful device for some people.

Still waiting for a the solution to my attack HR Strap issues.

Thanks for another informative review!

**Trey**

February 12, 2013 at 9:09 pm

Reply

#21

I received one shortly after shipping. I train for marathons using the Maffetone Method (aerobic training). I gave up on Garmin due to inconsistencies. Tried various straps with Garmin. I moved to Polar RC3 as soon as it was available. Love the consistency but it doesn't do a good job with alerts if you are out of your training zone.

It is easy to set up a training zone with Mio and relatively easy to stay in zone while running. With Polar I have to look at watch far too often and closely. A glance at Mio serves purpose.

I've tested Mio against Polar RC3, Polar and Wahoo Bluetooth HR straps and found good consistency.

I have the same problem as your review with occasional drops with longer mileage. The Mio will suddenly show heart rates to 170-180 then drop down to 80-85 then slowly correct itself to my training heart rate of 135. This will happen over a minute or two. This has happened on several occasions. I've been also been running with Polar and it had no variance.

I don't like running with iPhone: problem..

It is cold now so I can't use.

I often run on known routes so won't be a problem with mileage when not training hard. Really needs GPS.

Not a bad investment. I will use during off season during warmer weather. I've recommended to friend that they pass on current model.

**gene**

February 12, 2013 at 9:25 pm

Reply

#22

Ray – most serious runners that I know don't run with their iPhone/Android. (Well you don't count because you're running with 10 devices!) Most serious runners I know have a garmin of one sort or another. Considering that Garmin's don't do Bluetooth Smart, is Mio missing the mark here by only doing Bluetooth? I agree with you that I think their best options are 1) sub-license the technology to Garmin, etc and make \$\$ through licensing and 2) make it cheaper/more heart rate strapish (maybe just green/yellow/red lights only) and cater to the people that like their Garmin but just want to get rid of the heart rate strap. I'm thinking they're missing a lot of their target audience by doing BLE only and ignoring the ANT+ users. I would buy one now, but I need it to work with a Garmin.

**Mark replied**

February 13, 2013 at 9:43 am

#23

They aren't ignoring ANT+. There is an ANT+ version – Ray shows it in the first 2 unboxing photos. You just have to chose which version when buying. Either the unit isn't big enough for both onboard (unlikely) or it would be even more expensive with both chipsets. So, you just have to chose.

**Rainmaker replied**

February 13, 2013 at 12:33 pm

#24

**Bob Quindazzi**

February 12, 2013 at 9:32 pm

Reply

#25

I would buy this technology if:

- 1. It was just a lightweight, as small as possible, displayless ANT+ watch that cost ~\$100. (actually, I'd buy it as is for \$100).
- or
- 2. I would replace my 910XT for another that had this technology even if it cost ~\$100 more.

I can't imagine Garmin not jumping on this.

Excellent review as always Ray. Thanks for all the great information you provide.

**Edward**

February 12, 2013 at 11:11 pm

Reply

#26

I actually own an Alpha, and I am somewhat ambivalent in my assessment of it at this stage. I got an ANT+ model through the Kickstarter campaign, and it pairs and functions just as well as any HR strap. Unfortunately, I have noticed multiple occasions in which my indicated heart rate dropped by 1/3 to 1/2 of what it had been moments earlier. Perhaps it's a software bug or a dodgy unit, or perhaps I'd doing something wrong. I just haven't been able to contact Mio to discuss the matter yet.

Beyond the above, it's worth noting that the \$200 watch doesn't have a \$0.02 backlight, at least not one that I've been able to turn on. This, I must say, is rather frustrating.

**Ian**

February 13, 2013 at 12:25 am

Reply

#27

I picked up the ANT version via Kickstarter as an alternative to a HR strap for my partner who doesn't get on with them. Paired with my Edge 800 for cycling I've found it doesn't seem to cope well with rapidly dropping heartrates. A few times I've climbed a hill for 2-3 minutes at 160bpm, and within two minutes of rolling over the top the Mio can be reporting a heartrate of 50-60bpm and slowly climb back up to something sensible (the watch was well tightened down). For steady-state efforts its seems to track much more accurately.

**Matthias**

February 13, 2013 at 3:38 am

Reply

#28

I can see people using this if they hate HR straps.

For me personally there is no use for a 200\$ ANT+ OR BT Smart transmitting-only-device. Will go for the 4iiii Viiiiva HR strap which supports ANT+ AND BT for less than half the price.

**Mart**

February 13, 2013 at 4:42 am

Reply

#29

You mention that "some" Android devices are BT Smart compatible. I'm afraid that's not accurate. Some Android devices are BT Smart \_ready\_, but this feature is not implemented in the Android operating system yet, i.e. does not work.

**Rainmaker** *replied*

February 13, 2013 at 12:31 pm

#30

Not quite.

The feature is there in (certain) Android OS versions on certain models to connect to Bluetooth Smart devices, and in fact, some devices already do. Take for example, the Fitbit. They just released their Android app in the last two days, to connect via Bluetooth Smart to the Fitbit.

What's challenging however is the lack of the Android support for the published Bluetooth Smart device profiles (i.e. heart rate straps). That's coming, it's just taking time because the handset companies are holding back on updates (much of this work was done months ago).

I demo'd the Wahoo Fitness app back at CES last month running on Android connect via Bluetooth Smart to devices (as well as ANT+ support via the micro-USB OTG dongle).

I have had the alpha watch for approx 1 month now, and I have also been comparing training with my garmin watch. But I have noticed that the alpha gives lower heartbeats than cheststrap does. (I use the bluetooth version) I used the runkeeper app for recording the alpha, and I also have a program that converts the garmin to runkeeper. alpha had an average on 136bpm and garmin had 157bpm. Also been trying the wahoo fitness app. but that also gives the wrong picture.

Im impressed by the alpha "strap" it stays on the wrist without feeling its there. I also have the basis watch. Id wish they could use the strap from alpha on the basis, that would have been nice

thanks for a great review of the watch, we've come to the same conclusion in pros and cons, another pro is when you dont use HR readings, the watch would "live" for a long time. But then its just a 200\$ watch that shows time

**ekutter**

February 13, 2013 at 11:02 am

Reply

#32

Andre, you actually have a MyBasis watch? I was starting to think they were just a myth even though they claim they had shipped some. I had placed an order but canceled it when I couldn't get more info on time frame or just exactly what functionality was even supported. The technical info on their site is very weak. What do you think? Does it work as expected?

**Rainmaker replied**

February 13, 2013 at 12:27 pm

#33

I've received e-mails from a few folks who have received them. And seen images from folks as well. A few units went out in late December. Then in theory a few more back in January. They were supposed to send all media folks theirs the 2nd/3rd week of January. It's now almost the 3rd week of February...none here.

**Steve Fines**

February 13, 2013 at 11:41 am

Reply

#34

Despite trying Glide, Band-aids and everything else I get a huge abrasion on my chest after any lengthy run with a chest strap. Those showers afterwards just hurt, and the blood stains on the shirts are a little too dramatic for group runs.

I've ordered one of these (hope it was the ANT – I'm not sure I realized that from the ordering page) to use with the Garmin.

I expect that I'll sell it in a year or two after the Garmin unit comes out with this integrated, or they have a "display-less" thinner lighter band unit, but for that time it will be easily worth \$200 to me.

**Rainmaker replied**

February 13, 2013 at 12:24 pm

#35

If you ordered it today (and not back in July), it will be Bluetooth Smart, and not ANT+. They are not currently offering ANT+ models.

**JD Griffis**

February 13, 2013 at 1:42 pm

Reply

#36

I'll be interested to see where this heads, because it's a fantastic idea. I would LOVE an alternative to a HR strap, especially for a long event like IM. And I have clients that just plain cannot get their HR strap to work (usually females). However, this appears to be one of those cases where a good idea has gone off track – in 2 very important areas: 1) price point: \$200 is just way too expensive for a HR strap alternative, no matter how cool it is; and 2) Not supporting Ant+. As someone pointed out above, the market of Garmin (and other ANT) users out there is huge; so to cut them all out of the equation is leaving money on the table.

**BillM**

February 13, 2013 at 2:24 pm

Reply

#37

Im guessing they are already some way down the road of licensing with Garmin and the product will not compete with Garmin product which will feature the optical HRM. They obviously have the capacity to produce Ant+ devices for the market if they supplied them to the kick starters so why not produce more unless a deal is being done with Garmin.

**Blake Helms**

February 13, 2013 at 6:59 pm

Reply

#38

February 13, 2013 at 9:46 pm

#39

If you are training by heart rate zone then the dark is no problem. It blinks Blue if you are below your target zone, Red if you are above your heart zone, and Green if you are in your zone.

I will also say that the battery life is phenomenal.

**Reeli**

February 13, 2013 at 8:39 pm

Reply

#40

When Garmin gets their hands on this technology and incorporates it into their fitness watches, such as 910 or 405, I would be very happy to burn my HR strap and pay extra for the watch. Just like few women above already mentioned, I too have salt+sweat+friction+sports bra on a petite frame equal bad irritation and even broken skin (HypaFlex tape or silicone patches can be very helpful during long runs). Needless to say, if the entire unit was also waterproof (swimming) and consistently accurate we may have a near perfect sport watch!

**dECEIT70**

February 14, 2013 at 3:37 am

Reply

#41

I'm really interested in a ANT+ CycleOps Powercal chest strap (the poor man's power device! Arf!), so I guess the Mio Alpha watch isn't for me, BUT...

1- the design is sleek

2- the idea is great, and i'd like to see it being developped as either a full watch with all the functionalities a wrist watch has or as a simple wrist band blindly transmitting data to an ANT+ device (in my case a 910XT). Under water use would be a great bonus and worth the 200€ price tag, IMO.

**John Peterson**

February 14, 2013 at 9:17 am

Reply

#42

With the chest strap is the only way to go. The watches that rely on wrist or other measurements are very inaccurate. Reading directly at the chest is the gold standard in HRM's.

Not mentioning they are much more accurate and convenient, using them with smartphones gives you access to functionality provided by dozens apps on appstore and google play.

Moreover, I recommend using HRM with Bluetooth Smart. It uses the most reliable and energy-saving technology available at the moment.

There are plenty sensors on the market, but the most cool are Polar H7, Wahoo Blue HR and Beets BLU Heart Rate monitor

Polar H7 is the oldest one, and costs a lot (and as for me it's strap lock system is not comfortable). I used to run with Wahoo Blue HR, but few months ago changed it to Beets BLU, cause it's the newest one, and what is really cool – it's compatible almost with every app on appstore. You can find out more on their site:

[link to beetsblu.com](http://link.to/beetsblu.com)

**ekutter** replied

February 14, 2013 at 12:20 pm

#43

John, sure you don't work for BeetsBlu? Is it anything other than a re-branded wahoo fitness strap? It claims it works in the water. But with what device?

Sounds like the wrist based sensors have there own issues but most people interested in them have had real issues with the chest straps. So trying to convince people that "the chest strap is the only way to go" isn't going to work here.

If they can incorporate the wrist technology in the sports watch that doesn't have more issues than the chest straps, that would easily be worth \$200. Then Ant+ vs Bluetooth becomes a non issue.

**Dirk** replied

February 14, 2013 at 1:34 pm

#44

Besides that it sounds like spam the details are also not correct.

For instance, the Wahoo Blue HR was released before the Polar H7.



