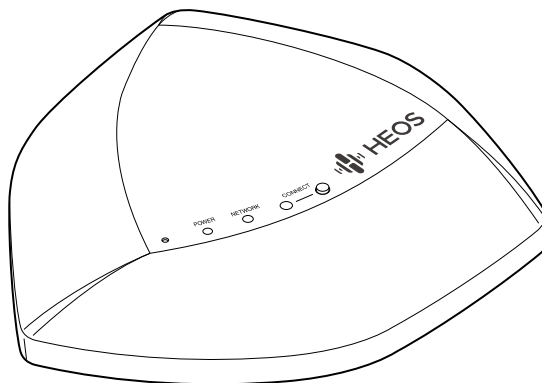




Wireless Range Extender

Owner's Manual

HEOS Extend



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Thank you for purchasing this HEOS product. To ensure proper operation, please read this owner's manual carefully.

NOTE

THIS DOCUMENT CONTAINS INFORMATION THAT IS SUBJECT TO CHANGE WITHOUT NOTICE.

For latest information, please visit HEOSbyDenon.com

INTRODUCTION

The HEOS Extend is designed provide wireless network access to your HEOS devices which may be located beyond the range of your existing home wireless router. You can use multiple Extends to provide wireless network access for HEOS devices in very large homes or offices.

If you are in a hurry, you can learn how to install the HEOS Extend by following the steps outlined in the HEOS Extend Quick Start Guide.



Please continue reading this Owner's Manual for more detailed information about the features and benefits of your HEOS Extend.



BEFORE YOU BEGIN

System Requirements

Before you begin installing the HEOS Extend, please make sure you understand and meet a few basic requirements.

■ Network Requirements

Wireless Router – In order to use your HEOS system, you should have a working wireless (Wi-Fi) network in your home.

NOTE

If you do not have a wireless network, the HEOS Extend can optionally be configured to act as a wireless access point (instead of a wireless range extender). Please see the section “USING YOUR EXTEND” (page 14) below.

High Speed Internet Connection – HEOS accesses the Internet to stream music to your home from many popular online music services. HEOS is also designed to provide you with software updates, which are delivered via your home Internet connection. DSL, Cable, and Fiber services will provide the best experience and reliability. You may experience performance issues with slower Internet connections like satellite based services.



■ Controller Requirements

You can control your HEOS system using the free HEOS app on any iOS or Android mobile device that meets these minimum requirements:



iOS Minimum Requirements

- iOS version 5.0 or later
- iPhone® (3GS or newer)
- iPad®
- iPod touch® (3rd generation or newer)



Android Minimum Requirements

- Android OS version 2.3 or later
- All resolutions



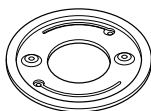
Getting To Know Your Extend

Unpack your Extend from the box and verify that the following items are included:

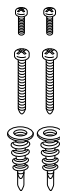
① HEOS Extend



② Mounting Bracket



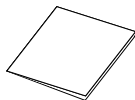
③ Screws



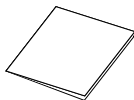
④ Quick Start Guide



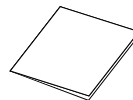
⑤ Safety Information Sheet



⑥ Warranty
(North America model only)



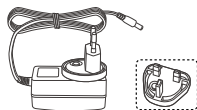
⑦ Extended Protection Plan
(North America model only)



⑧ Ethernet cable



⑨ Power supply

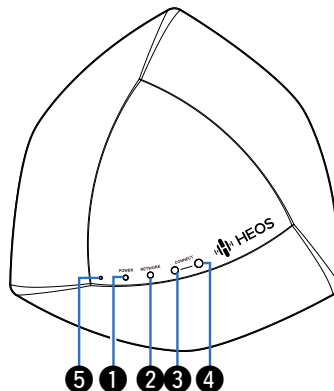


(European model only)



■ Controls

Front Panel



❶ Power LED

❷ Network LED

❸ Connect LED

LED	Color	Description
POWER	BLUE	[OFF] AC power is disconnected [Blinking] Starting up [ON] Power On - Ready
NETWORK	GREEN	[OFF] Not connected to any networks [Blinking] Connecting [Solid] Connected
CONNECT	GREEN	[OFF] Connection mode is not running [Blinking] Searching for a device to connect

❹ Connect Button

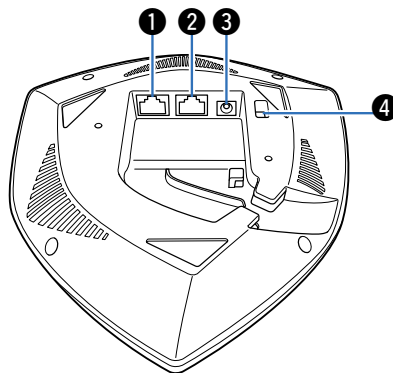
Used for Wi-Fi setup ([page 23](#)).

❺ Reset Button

Used to reset the Extend ([page 24](#)).



■ Back Panel

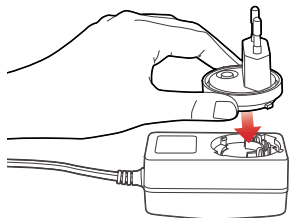


- ❶ Ethernet Connector 1
- ❷ Ethernet Connector 2
- ❸ Power Input (DC)
- ❹ Power Switch (mains)

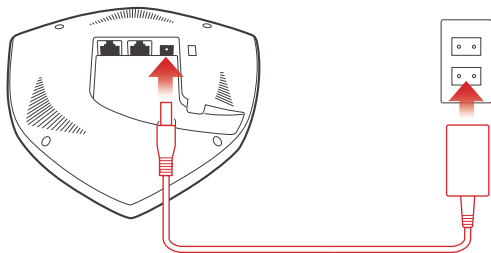


Powering Your Extend

- 1 Insert the appropriate adapter into the power supply (make sure it snaps into place).**



- 2 Connect the power cord to the back of the Extend and the plug into a wall outlet. The Extend is capable of automatically switching between 100 – 240v.**



Getting the HEOS App

The HEOS app is the heart of the HEOS experience. Using your mobile device and the HEOS app, you can setup, browse, explore, and control your HEOS system right in the palm of your hand, from anywhere in your home. Download the HEOS app for iOS or Android by searching App StoreSM or Google PlayTM store for “HEOS by Denon”.

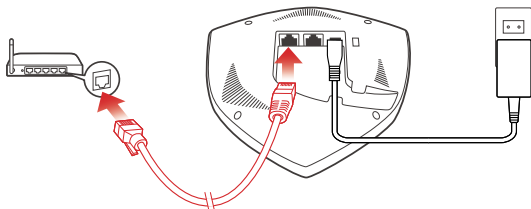


CONFIGURING YOUR EXTEND

Your HEOS Extend can be configured to operate in two different modes, “Extender” mode and “Access Point” mode. Extender mode is used to extend the range of your existing wireless network. Access Point mode is used to set up a new wireless network in the event you don’t have a wireless network installed in your home or office.

Extender Mode


- 1** Make sure the Extend is plugged into a wall outlet and has power (the blue power LED should be solid blue).
- 2** Connect the included Ethernet cable between one of the two Ethernet jacks on the Extend and your existing wireless router or switch.



- 3** Make sure your mobile device is connected to the wireless network you want to extend. (You can check this in the Settings/Wi-Fi menu of your mobile device)

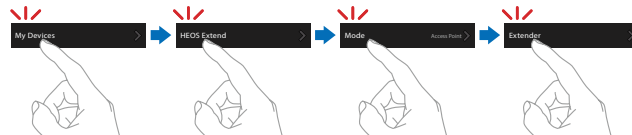
- 4** Launch the HEOS app on your mobile device.



- 5** Select the Settings  icon in the upper left corner of the screen or tap “Setup Now” button at the top of the screen.



- 6** Select My Devices -> HEOS Extend -> Mode -> Extender.

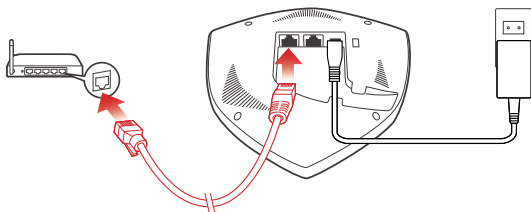


- 7** Follow the instructions on the screen to complete the configuration.



Access Point Mode

- 1 Make sure the Extend is plugged into a wall outlet and has power (the blue Power LED should be solid blue.)**
- 2 Connect the included Ethernet cable between one of the two Ethernet jacks on the Extend and your existing router or switch (the Network LED will be flashing green.)**



- 3 In a few seconds, the Network LED will stop flashing and turn solid green indicating that the Extend is connected to your router.**
- 4 HEOS Extend is now operating in Access Point mode. You can connect to the HEOS Extend by selecting the network name (SSID) that starts with "HEOS_" and entering the password printed on the bottom of the HEOS Extend.**



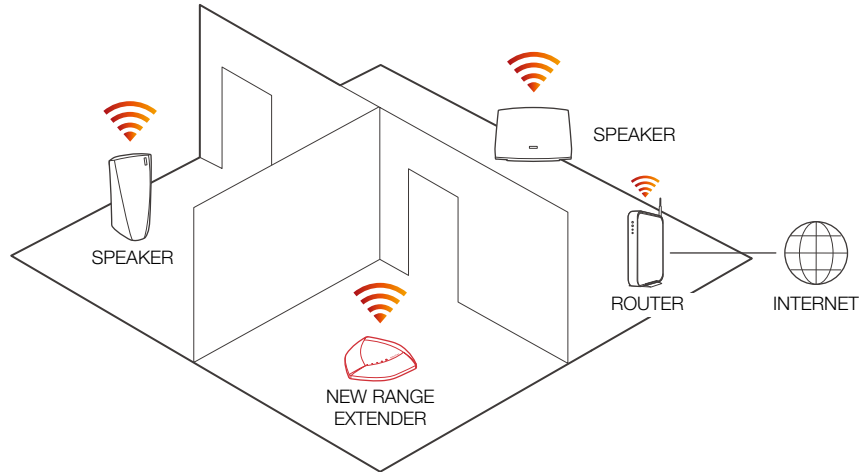
NOTE

- The default network name and password are unique for every HEOS Extend. This information is printed on the bottom of your HEOS Extend.
- Access Point mode will automatically be configured with both 2.4 GHz and 5 GHz networks enabled and set to the factory default settings. If you wish to change any of the default settings, please see the Advanced Settings section below.
- Once your HEOS Extend has been configured in Extender Mode, the default network name is erased. If you decide to reconfigure your HEOS Extend in Access Point Mode, the network name (SSID) will be set to the same name as the network it was previously set to extend. Please see the Advanced Settings section for instructions about how to change the network name using the Web UI.



Placing Your Extend

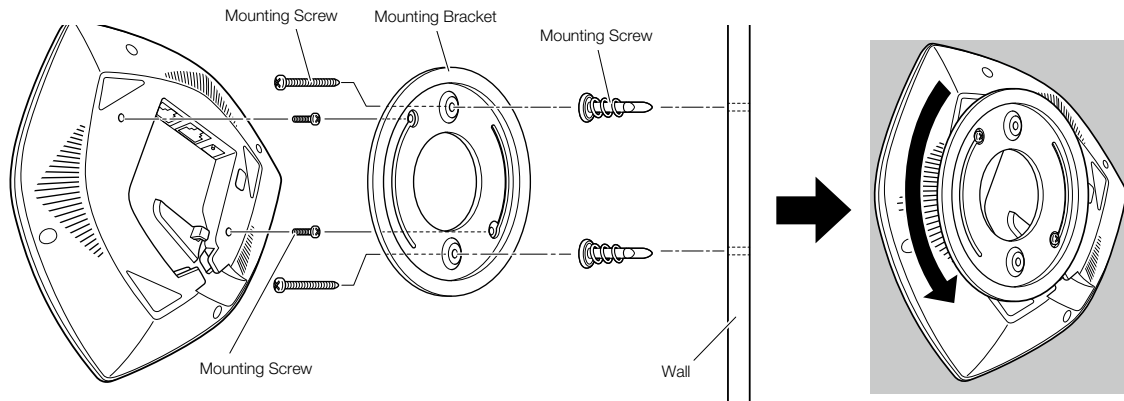
Locate the HEOS Extend in a convenient location between your existing Wireless Network Router and the device that might be out of range of your Wireless Network Router.



■ Wall Mounting

The HEOS Extend can optionally be mounted on a wall using the included mounting hardware.

- 1 Attach the mounting bracket to the wall using the provided wall mounting hardware.**
- 2 Insert the provided short screws into the bottom cover of the Extend.**
Finger-tighten the screws, do not overtighten!



- 3 Mount the Extend on the mounting bracket by rotating the unit clockwise about 90 degrees to secure it in place.**




USING YOUR EXTEND

Once you have your Extend connected to your network it will automatically extend the range of your existing wireless network. There are only a few settings that you might want to adjust or confirm by following these steps using the HEOS app on your mobile device:

- 1 Select the Settings icon located in the upper left corner of the main Music menu to display the Settings menu.**
- 2 Select “My Devices” to display a list of your HEOS devices and Extends.**
- 3 Select the Extend you want to adjust or confirm.**

Changing the Name

If you have more than one HEOS Extend, you may want to rename your Extend so you can tell them apart. For example, you may want to give the Extend a name that helps identify where it is located. “Extend – Office”, or “Extend – Garage”.

- 1 Select “Name”.**
- 2 Select or enter a new name for your Extend.**
- 3 Select the Save  icon to save your changes.**

About Your Extend

Used to view status information about the selected Extend.

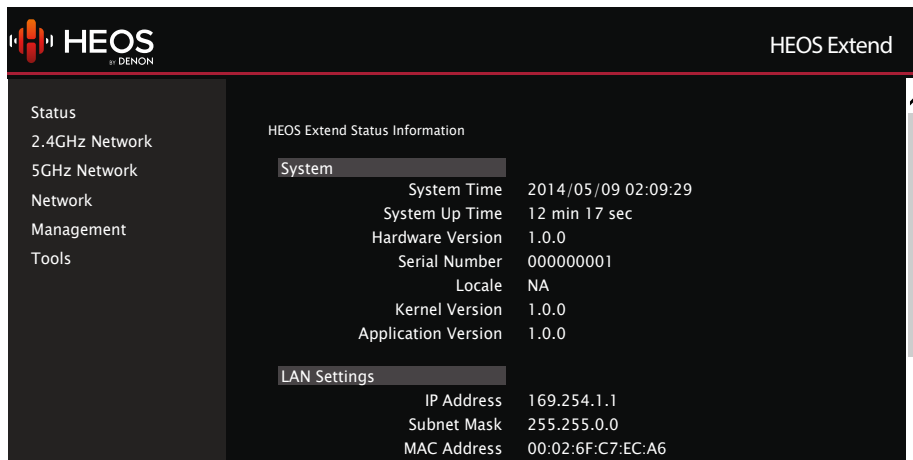
- 1 Select “About”.**
- 2 Scroll down to see information about the Extend.**



ADVANCED SETTINGS - ACCESS POINT MODE

CAUTION

Adjusting these settings may disconnect your HEOS devices from your network and possibly render your HEOS devices unusable. Do not use these features unless you are comfortable making advanced adjustments to your system!



The screenshot shows the HEOS Extend web interface. On the left is a dark sidebar with a menu: Status, 2.4GHz Network, 5GHz Network, Network, Management, and Tools. The main area has a dark background with white text. At the top left of the main area is the HEOS logo (three vertical bars of increasing height) and the text 'HEOS by DENON'. At the top right is 'HEOS Extend'. Below the logo is a vertical scrollbar. The main content is titled 'HEOS Extend Status Information'. It has two sections: 'System' and 'LAN Settings'. The 'System' section lists: System Time (2014/05/09 02:09:29), System Up Time (12 min 17 sec), Hardware Version (1.0.0), Serial Number (000000001), Locale (NA), Kernel Version (1.0.0), and Application Version (1.0.0). The 'LAN Settings' section lists: IP Address (169.254.1.1), Subnet Mask (255.255.0.0), and MAC Address (00:02:6F:C7:EC:A6).

HEOS Extend Status Information		
System		
System Time	2014/05/09 02:09:29	
System Up Time	12 min 17 sec	
Hardware Version	1.0.0	
Serial Number	000000001	
Locale	NA	
Kernel Version	1.0.0	
Application Version	1.0.0	
LAN Settings		
IP Address	169.254.1.1	
Subnet Mask	255.255.0.0	
MAC Address	00:02:6F:C7:EC:A6	



Connecting to the Web Interface

The HEOS Extend provides a web browser based user interface that can be accessed by following these steps:

■ Connecting to the Web Interface via IP Address

- 1** Determine the IP address of your Extend using the “About” feature described above.
- 2** Enter the IP address of your Extend into your web browser using your PC.
- 3** Enter the default username and password (you can change this using the Web Interface).

Default username : **admin**

Default password : **password**

■ Connecting to the Web Interface via UPnP (Windows 8/7/Vista)

- 1** Open Windows Explorer (File Explorer in Windows 8).
- 2** Click Network, then your HEOS Extend icon should appear.
- 3** Right-click the HEOS Extend icon, then click Properties.
- 4** Click on the address link in Device webpage. Your web browser opens.
- 5** Enter the default username and password.



■ Connecting to the Web Interface via Bonjour (Mac OS X)

- 1 Open the Safari browser.
- 2 Select “Safari” – “Preferences” – “Advanced”, and select one or both of these options:

Bonjour : ✓ Include Bonjour in the Bookmarks menu

✓ Include Bonjour in the Favorites bar

- 3 Select “HEOS Extend” from the Bonjour – Webpages menu in the Favorites bar or Bookmarks Menu.

- 4 Enter the default username and password.

■ Connecting to the Web Interface via wired PC

- 1 Connect the included Ethernet cable between your HEOS Extend and your PC.
- 2 Enter “http://169.254.1.1” into your web browser.
- 3 Enter the default username and password.

Configuring the Advanced Network Settings

■ Status

Displays status information and current configuration data about the Extend.

■ 2.4 GHz/5 GHz Network

Basic

Used to edit the Band, SSID, and Wi-Fi channel settings.

Radio	Enable or disable the 2.4 GHz/5 GHz network.
Band	Select which network bands to enable.
SSID	The name (SSID) that appears on your network for each radio (2.4 GHz/5 GHz).
Auto Channel	Enable or disable auto channel selection.
Check Channel Time	Select auto channel selection period.
Site Survey	Used to perform network site surveys.



Advanced

Used to access advanced network parameters.

Fragment Threshold	Specifies the maximum size for a packet before data is fragmented into multiple packets. If you experience a high packet error rate, you may slightly increase the Fragmentation Threshold. Setting the Fragmentation Threshold too low may result in poor network performance. Only minor modifications of this value are recommended.
RTS Threshold	The RTS threshold is used as a trigger to engage the back and forth of RTS and CTS messages between AP and client.
Beacon Interval	The Beacon Interval value indicates the frequency interval of the beacon. A beacon is a packet broadcast by the router to synchronize the wireless network. 50 is recommended in poor reception.

DTIM Period	Indicates the interval of the Delivery Traffic Indication Message (DTIM). A DTIM field is a countdown field informing clients of the next window for listening to broadcast and multicast messages. When the router has buffered broadcast or multicast messages for associated clients, it sends the next DTIM with a DTIM Interval value. Its clients hear the beacons and awaken to receive the broadcast and multicast messages.
N Data Rate	Select 11n data rate.
Channel Bandwidth	Select channel bandwidth.
Preamble Type	If your wireless device supports the short preamble and you are having trouble getting it to communicate with other 802.11b devices, make sure that it is set to use the long preamble.
CTS Protection	When set to Auto, a protection mechanism will ensure that your Wireless-B devices will connect to the router when many devices are present. However, performance of your wireless devices may be decreased.
Tx Power	Higher power settings are not recommended for users due to excess heat generated by the radio chipset, which can affect the life of the router.



Security

Used to edit the wireless security options.

ESSID	Shows current SSID.
Broadcast ESSID	Enable or disable Broadcast ESSID.
Encryption	Select which type of network encryption to use or turn off encryption by selecting "Disable".

- In case WEP is selected in above "Encryption"

Authentication Type	Select authentication type.
Key Length	Select WEP key length.
Key Type	Select WEP key type.
Default Key	Select Encryption Key 1 to Key 4.
Encryption Keys 1-4	Specifies encryption key up to 4.

- In case WPA is selected in above "Encryption"

WPA Type	Select WPA Type.
Pre-shared Key Type	Select pre-shared key type.
Pre-Shared Key	Specifies pre-shared key.

Access Control

Used to enable MAC Address Filtering to limit access to the HEOS Extend.

Wireless MAC filtering	Enable or Disable MAC address filtering.
MAC Address List	List of registered MAC address.

WPS

Used to edit the Wi-Fi Protected Setup mode settings.

WPS Current Status	Shows whether the WPS function is Configured or unConfigured. When it is Configured, the WPS has been used to authorize connection between the device and wireless clients.
Self Pin Code	Shows the WPS PIN code of this device.
SSID	Shows the SSID (wireless network name) for reference.
Authentication Mode	Shows the encryption method used by the WPS process.
Passphrase Key	Shows the pre-shared key configured in Security section.
WPS via Push Button	Click this button to start WPS using the push button method.

Wireless Clients

Displays a list of the MAC addresses for all connected devices.



■ Network

LAN

Configuration Type	Select Dynamic or Static configuration.
IP Address	IP address, subnet mask, default gateway.

■ Management

Admin

Old Password	Enter the current password for the Extend. (default is "password")
New Password	Enter the new password that you wish to use.
Confirm Password	Re-enter the new password that you wish to use.

Firmware Update

To perform the Firmware Update:

- 1 Click the Browse button and navigate the OS File System to the location of the upgrade file.**
- 2 Select the upgrade file. The name of the file will appear in the Upgrade File field.**
- 3 Click the Apply button to start the firmware upgrade process.**

Caution

The device is unavailable during the upgrade process and must restart when the upgrade is completed. Any connections to or through the device will be lost.



Configuration

Restore to Factory Default	Click Reset button to restore the HEOS Extend to its factory default settings. This is the same as using pressing the button on the top panel with a paper clip.
Backup Settings	Click Save to save the current configured settings to your PC.
Restore Settings	Restore settings that have been previously backed up, click Browse, select the file, and click Upload.

System Log

Displays information about the operation of the system over time.

Restart

Used to remotely reboot the wireless network extender. Settings are not changed. To perform the restart, click on the Restart button. The restart will be completed when the LED Power light stops blinking.

Tools

Time Server

Time Setup	Select what method to use for time synchronization.
Time Zone	Select the time zone for the location of the Extend.
NTP Time Server	Select the name of the NTP time server from which to retrieve the correct time over the Internet.
Daylight Saving	Enable or disable Daylight Savings time and specifies when it is active.

Ping

Address to Ping	Enter the address you want to send a ping test to.
Ping Frequency	Select how many times to perform the ping test.

Iperf

Used to perform an iperf server.



BASIC TROUBLESHOOTING

The HEOS Extend doesn't connect to my existing wireless network

Solution	Refer to Page
<ul style="list-style-type: none"> Move the HEOS device and the HEOS Extend closer to existing wireless access point and try again. 	–

My HEOS devices still can't connect to my network after I successfully added a HEOS Extend

Solution	Refer to Page
<ul style="list-style-type: none"> Move the HEOS device closer to the HEOS Extend. 	–
<ul style="list-style-type: none"> Move the HEOS Extend closer to your wireless access point. 	–

I can not connect to HEOS Extend when it is configured as a Wireless Access Point

Solution	Refer to Page
<ul style="list-style-type: none"> Connect to the HEOS Extend from your mobile device using the network name (SSID) and password printed on the label which is located on the bottom of HEOS Extend. 	–
<ul style="list-style-type: none"> Once your HEOS Extend has been configured in Extender Mode, the network default name is erased. If you decide to reconfigure your HEOS Extend in Access Point Mode, the network name will be set to the same name as the network it was previously set to extend. 	–
<ul style="list-style-type: none"> Make sure you have an Ethernet cable connected between your HEOS Extend and your network interface (cable modem, router, switch, etc...). 	–
<ul style="list-style-type: none"> Make sure your mobile device and/or HEOS device is within range of HEOS Extend. 	–



I can't access the Web Interface

Solution	Refer to Page
• Make sure you have connected the power supply to the Extend and the Power LED is solid blue.	<u>7</u>
• Make sure your Extend is connected to your network and the network LED is solid green.	<u>7</u>
• Make sure your PC is on the same network as your Extend.	–
• Connect your Extend and PC to the same network using Ethernet cables.	–

Music cuts out or delays sometimes

Solution	Refer to Page
• Make sure your Internet connection is operating correctly.	–
• If you are sharing your network with other users or devices, they may be using most of your bandwidth (especially if they are streaming video).	–
• Make sure your HEOS devices are within range of your wireless network.	<u>12</u>
• Make sure your HEOS devices are not located near other electronic devices that could interfere with it's wireless connectivity (like microwave ovens, cordless phones, TVs, etc...).	–

Connecting to a network using WPS

Solution	Refer to Page
<p>If your wireless router support WPS (Wi-Fi Protected Setup™) your HEOS Extend can optionally connect to your network using the "Push Button" method by following these steps:</p> <ol style="list-style-type: none"> 1. Press the WPS button on your router. 2. Within 2 minutes, Press and Hold the Connect button on the front panel of the HEOS Extend for 5 seconds. 3. The CONNECT LED on the front of the HEOS Extend will flash green for several seconds as it connects to your router. 4. When the connection is complete, the NETWORK LED on the front of the HEOS Extend will turn solid green. 	–



Resetting Your HEOS Extend

Solution	Refer to Page
Resetting your HEOS Extend will reboot the system. To reset your HEOS Extend, gently insert a small paperclip into the Reset button hole on the front of the HEOS Extend and press, the POWER LED will begin to flash blue in a few seconds.	–

Restoring the HEOS Extend to Factory Defaults

Solution	Refer to Page
<p>Restoring the HEOS Extend to its factory defaults will clear all of the settings and restore the factory defaults including restoring the default network name (SSID) and password (as printed on the bottom of the HEOS Extend).</p> <p>Caution</p> <p>All settings will be erased.</p> <p>To restore your HEOS Extend to the factory defaults, insert a small paperclip into the Reset button hole on the front of the HEOS Extend and hold it in until the NETWORK and CONNECT LEDs begin to flash green.</p>	–



INFORMATION

Contact Denon

For US & Canada only:

If you need further assistance with your HEOS Product, please contact HEOS by Denon Customer Support Services below:

Website: www.HEOSbyDenon.com/Support

Email: Support@HEOSbyDenon.com

Live Chat: www.HEOSbyDenon.com/LiveChat

Telephone: Toll Free (855) 499 2820

(M-F 10:00AM to 10:00PM EST / Sat 12:00PM to 8:00PM EST)

For the other region:

If you need additional help in solving problems, please contact Denon customer service in your area or visit HEOSbyDenon.com



Specifications

■ Wireless LAN

Network type (wireless LAN standards):

Conforming to IEEE 802.11a/b/g/n

Used frequency range:

2.4 GHz, 5 GHz

Ethernet Port:

RJ-45 x 2 ports

■ General

Operating temperature:

41 °F – 95 °F (5 °C – 35 °C)

Power supply:

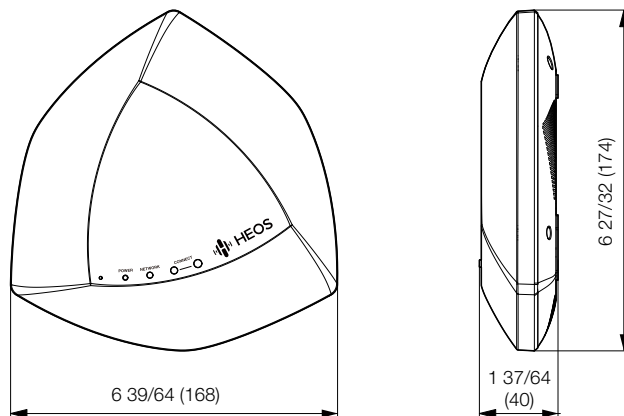
AC 100 – 240 V, 50/60 Hz

Power consumption:

5 W

Dimensions:

Unit : in. (mm)



Weight: 8.6 oz (245 g) (without the power supply)



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This section describes software license used for this unit. To maintain the correct content, the original (English) is used.

□ GPL

Open Source Used	Version
bridge-utils	1.2
busybox	1.7.5
linuxigd	1
mtd-utils	1.2
u-boot	1.1.4
udhcp	0.9.9-pre
utelnetsd	0.1.9
wget	1.11.3
wireless-tools	2.8
hostapd	0.8
iptables	1.4.4
Linux Kernel	2.6.34
ntpcient	2003_194
termcap	1.3.1

□ LGPL

Open Source Used	Version
uclibc	0.9.29

□ howl-1.0.0

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❑ Iperf-2.0.5

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Iperf performance test

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❑ libupup-1.6.18

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❏ pcre-6.x

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THE BASIC LIBRARY FUNCTIONS

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❏ popt-1.7

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❏ zlib

<http://www.zlib.net/>

zlib.h -- interface of the 'zlib' general purpose compression library version 1.2.3, July 18th, 2005 Copyright (C) 1995-2004 Jean-loup Gailly and Mark Adler

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