



Optec WiFi 802.11 Board

Installation Instructions for the Optec 802.11b/g Wireless Board.

The Optec Wireless Networking Board (WiFi) is an optional accessory for the FocusLynx and Gemini control hubs. The WiFi Board adds 802.11b/g wireless networking capability to the FocusLynx or Gemini Hub in addition to the native RS-232 serial and wired Ethernet connectivity. The WiFi board can be used with the iPhone, iPad, or Android smartphone and tablet FocusLynx app to add wireless focusing for handheld devices.

Installation Video

A detailed installation video describing the installation and configuration of the original FocusLynx WiFi Option is still available for viewing online:

<https://optec.us/video/19755>



Note that the first generation FocusLynx WiFi boards worked with the FocusLynx hub only. The second generation Optec WiFi board can be differentiated by the blue board under the silver WiFi module. The original FocusLynx WiFi boards were green.

Package Contents

The Optec WiFi Kit (Optec stock no. 19755) should include the following items:

- 802.11bg Wireless daughter board with a single 6-pin header along the top edge,
- 2.4 Ghz 802.11bg wireless antenna with right-angle swivel micro-connector,
- plastic panel mount sleeve (two may be included but only one is required),
- two Philips head cross-tip 4-40 x 0.25" pan head screws,
- 3/32" Allen hex key.

If any items are missing from the package, contact Optec support (support@optecinc.com) for replacement.



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Precautions: Static Sensitive Components

Disconnect all power before attempting any work with the FocusLynx Control Hub. Use a grounding wrist strap (if available) to ensure no static discharge can occur when handling the FocusLynx boards and components. Be sure to ground your tools and work area before proceeding.

Installation Procedure: Step-by-Step

Step 1 - Remove Cover

Remove the FocusLynx or Gemini Hub top cover. Use the included 3/32" hex key to remove four (4) 4-40 socket cap screws. Push out the round plastic plug on the side of the top cover.

Step 2 - Install WiFi Board

Locate the 6-pin socket and two aluminum standoffs near the center of the board. The 6-pin header on the bottom of the WiFi board should be pressed carefully into the socket. The two standoffs should be lined up under the two mounting holes. Screw the two 4-40 pan-head screws in place to secure the board in place.



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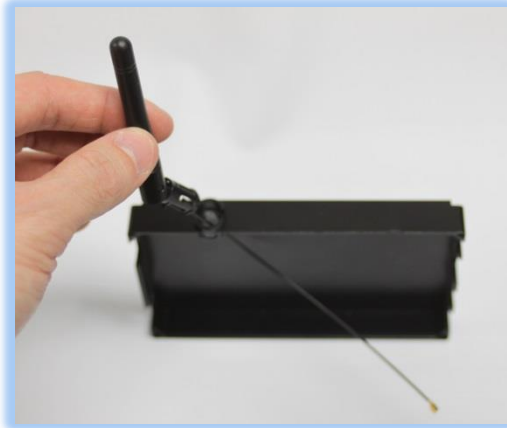


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Step 3 – Install Antenna

Open the antenna bag and locate the round (not hex shaped) plastic panel sleeve. Remove the plastic antenna hole plug from the top cover. Insert the round plastic panel sleeve into the top cover hole. Next feed the antenna lead through the sleeve and snap the antenna base into the sleeve. You should be able to rotate the antenna to a suitable orientation.



Step 4 – Attach Antenna to WiFi Board

Place the top cover with antenna beside the bottom case with main board and WiFi board installed. The end of the antenna lead has a small swivel micro-connector. This connector should be attached to the base on the WiFi board and snap into place. Rotate the antenna lead to be sure it does not come loose and ensure it will not be pinched when re-attaching the cover.



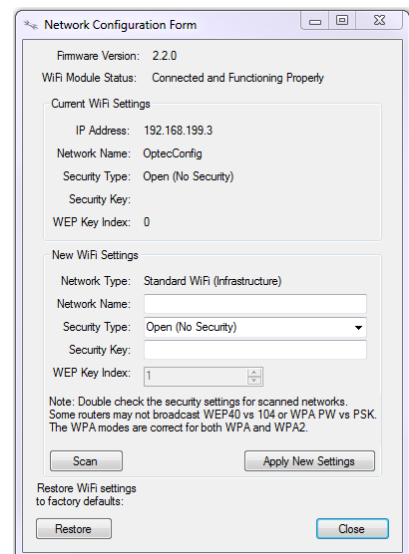
Step 5 – Replace Cover

Carefully replace the top cover without pinching the antenna lead and replace the four 4-40 socket caps holding the case together. The antenna should allow some swivel capability to orient the antenna for good reception. You are now ready to apply power to the FocusLynx or Gemini Hub.

Step 6 – Confirm WiFi Module Status

Insert the 12VDC power plug into the hub and connect the USB/Serial cable for RS-232 communications during configuration. Wait a few seconds until the red LED is illuminated indicating the boot cycle has completed. Confirm the presence of the WiFi board by opening FocusLynx or Gemini Commander and connecting via the USB/Serial connection. In FocusLynx Commander, click *Focusers: Focuser 1 – Setup...* In Gemini Commander, click *Tools – Settings*.

In the Focuser Hub Setup dialog, click *WiFi Setup...* Confirm the WiFi Module Status reads “Connected and Functioning Properly”. Note the WiFi Firmware Version, IP Address, and Network Name.



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In Gemini Hub Setup, click *Connect* and then the *Wireless LAN...* button. The WiFi Module Status should show DETECTED and the default IP address of 192.168.199.3.

Working with WiFi Networks and Firewalls

Configuring the Optec WiFi board requires an understanding of basic networking principles. In all cases, a valid IP route between the FocusLynx or Gemini Hub and the control computer or handheld device MUST be available and active. Any firewall rule prohibiting packet transfer between PC, tablet, or smart phone and the FocusLynx or Gemini hub will cause a communication failure and hours of frustration and misery. Specifically, any firewall rule prohibiting IP traffic on port 9761 must be suspended and an exception may be required. Port 9761 is the IP port used by the Optec WiFi board and is usually open on most networks. However each network is unique and may be locked down securely allowing traffic only through certain standard ports. Seek advice from a networking specialist if your observatory network has tightened security features.

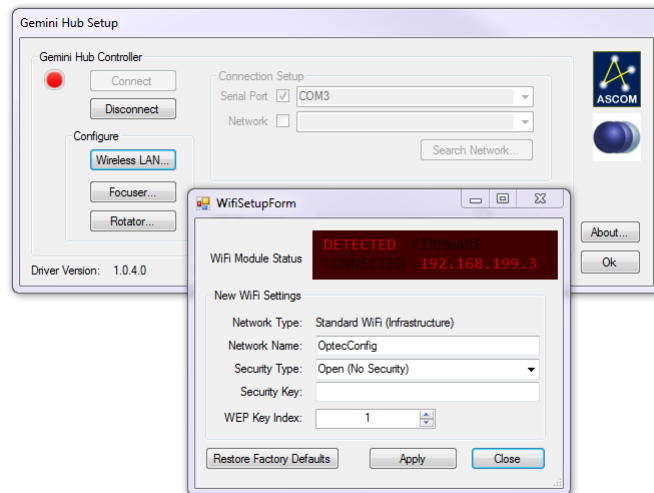
Note that a full description of wireless networking principles and configuration possibilities is beyond the scope of this document. Contact Optec Support (support@optecinc.com) if the steps below do not allow successful communication to the FocusLynx or Gemini hub via wireless Ethernet connections.

WiFi Configuration Overview

Because the FocusLynx hub has no display or keyboard, an external PC or wireless device must be used to configure the WiFi board. However, the process is fairly straightforward. First, the configuring PC or device should have an active 802.11bg wireless NIC to make the initial connection to the WiFi board.

First Generation FocusLynx WiFi

The first generation FocusLynx WiFi board defaulted to an Ad-Hoc network with the SSID name "FocusLynxConfig". The configuring PC or device would attach to this WiFi network to perform the configuration. In general, it is not recommended to operate the FocusLynx WiFi hub in Ad-Hoc mode for normal usage. Ad-Hoc networks are decentralized and do not require preexisting infrastructure making them ideal for initial configuration. However, for long-term use, it is highly recommended that you attach to your local WiFi network using a standard 802.11b compatible wireless router and DHCP server.



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Ad-Hoc vs. SoftAP

Ad-Hoc network support has fallen out of favor among the major tech companies and is becoming more difficult to implement. Some operating systems require extra steps to allow devices to connect via Ad-Hoc. Additionally, Ad-Hoc requires an external DHCP server to connect to a local wireless network. Because of these limitations, Optec's first generation FocusLynx WiFi boards can only function as a DHCP client and do not support static IP addresses.

Conversely, the new Optec WiFi module uses a SoftAP (software enable access point) protocol which includes a simple DHCP service onboard. This service allows easier initial configuration and connection to your local wireless network. Android and iPhone operating system platforms include SoftAP support without requiring extra steps to enable the protocol.

Local Wireless Network

The end goal of our WiFi Configuration is to connect the Optec WiFi board to the same local wireless network as your controlling computer or handheld device. This will ensure a route between the FocusLynx or Gemini hub, your computer or smartphone, and presumably the internet.

When planning to attach the Optec WiFi board to an active WiFi network (highly recommended), you will need to have the connection details for that network (SSID, security type, security key or pass phrase, etc.) readily available. Several configuration methods are presented below.

WiFi Webpage Configuration

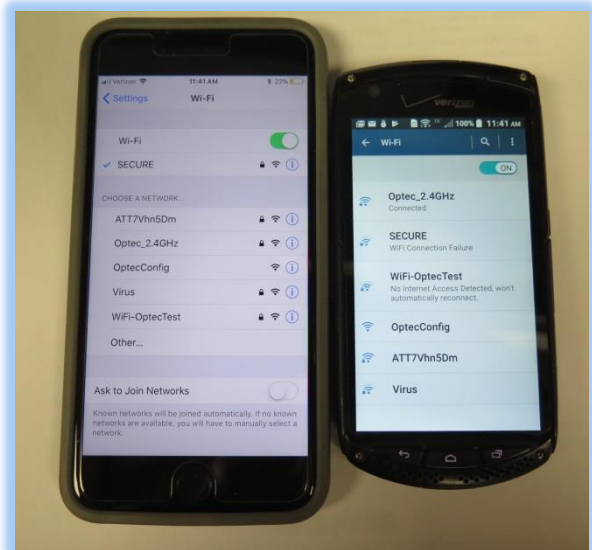
The Optec WiFi board can be connected to your local wireless network using the webpages built in to the WiFi module. No internet connection is required for this method. You should use your smartphone or tablet, or a Windows computer to complete the configuration.

Step 1 - Connect to the OptecConfig network

By default, the Optec WiFi board will operate in SoftAP mode creating a WiFi network broadcasting the SSID "OptecConfig".

Android or iPhone

Open your Settings – WiFi to see all local wireless networks. Look for the **OptecConfig** network and select it to connect.



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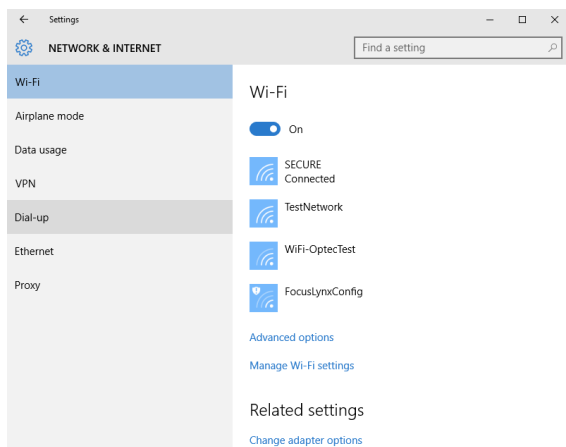
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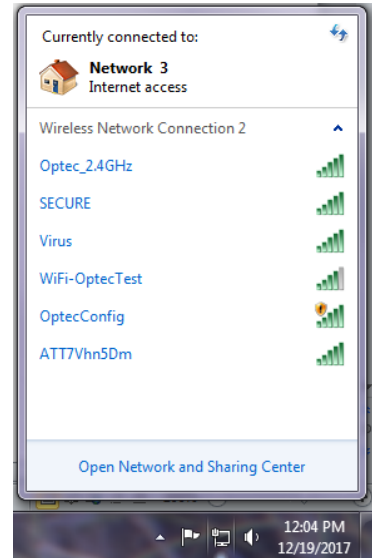
Windows 7/10

When configuring with a Windows 7 or 10 computer you will need a wireless NIC attached to your PC. You can see the available wireless networks by clicking the network tray icon in the lower right corner of your desktop. Alternatively, you can open the Control Panel, select Network and Sharing Center, and click "Connect to a network". You should see a panel similar to the Windows 10 image shown below.

Select the **OptecConfig** network, double-click to connect and disregard any security warning. Note that this network is not connected to the



internet. If you have only a wireless connection to your local network you will temporarily lose that internet connection. The internet will be restored when you re-join the local wireless network after configuration.



The next steps will describe how to connect the WiFi board to your local wireless network. When this occurs you will need to re-join your internet-

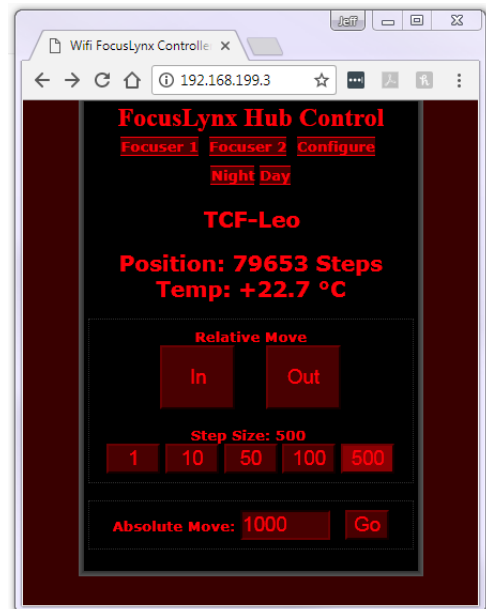
connected wireless network for the Windows 7/10 computer. Most Android and iPhone devices will automatically reconnect if the local wireless network has been previously saved.

Step 2 - Open WiFi Webpage

The default IP address for the Optec WiFi board is 192.168.199.3. Your device will be temporarily assigned an address in this same subnet – most likely 192.168.199.100.

Now, open your favorite browser and type <http://192.168.199.3> into the address bar. For FocusLynx users, the screen shown at right should appear.

The Gemini webpages are slightly different and are shown on the following page.



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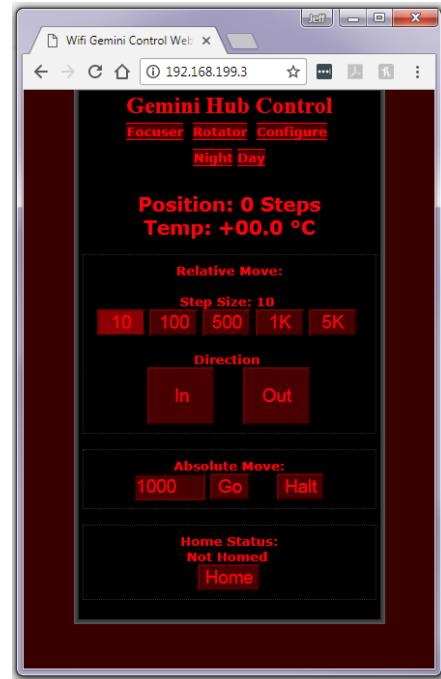
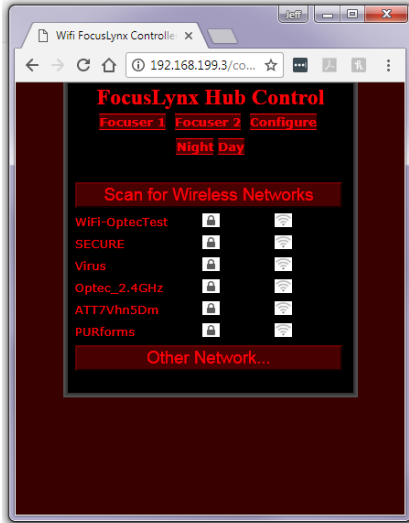


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Step 3 – Configure WiFi Network

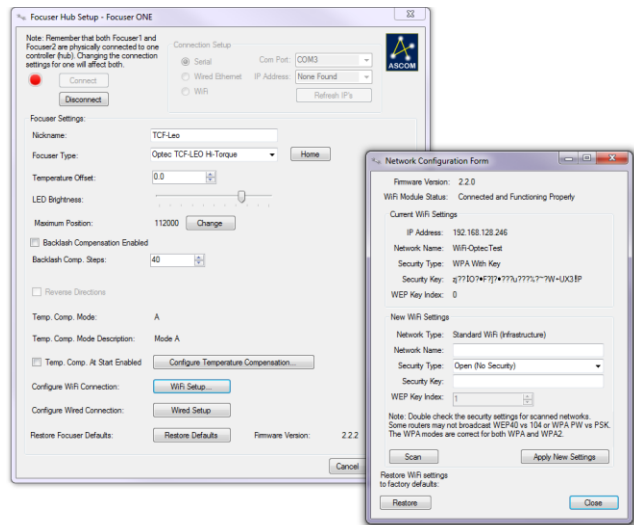
Click the *Configure* link and then *Scan for Wireless Networks*. Select your local wireless network from the list and enter any required network key or pass phrase. You will see a “*Reboot and Reconnection In Progress*” message page detailing the change of networks. At this point, you may see a notice indicating the Connection to FocusLynx Controller was lost.” This occurs because the FocusLynx or Gemini hub is now connecting to your local WiFi network and no longer broadcasting the OptecConfig SSID.



Step 4 – Connect PC to Local WiFi Network

Now re-connect your PC or device to the same local WiFi network and you will have valid route to the FocusLynx or Gemini hub WiFi board. Test by clicking the **Focuser** link and the **In** or **Out** buttons to move the focuser.

At this point your Optec WiFi board is connected to the local WiFi network. The hub will retain these settings after a power cycle and automatically re-connect to the same WiFi network whenever it is available. You may check the WiFi board settings in FocusLynx or Gemini Commander by connecting via USB/Serial, Wired Ethernet, or WiFi. Select the Connection Setup and click Refresh IP’s to automatically search for the assigned IP address. Click WiFi Setup to review the current settings. If for any reason, you need to reset the WiFi settings back to the factory defaults and re-establish the OptecConfig SoftAP network, click the Restore button in the lower left of the form.



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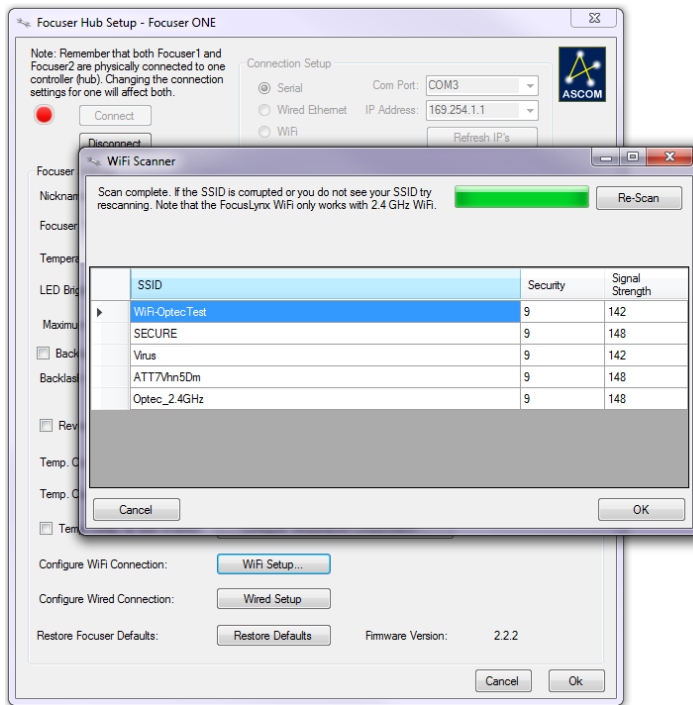


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Commander Software- Scan Networks

If you wish to configure using your Windows 7/8/10 computer and FocusLynx Commander or Gemini Commander software, we have added another method for attaching the Optec WiFi board to your local wireless network. Effective with FocusLynx Commander v2.0.4, a Scan button appears on the Network Configuration Form. You will need the current FocusLynx firmware version. Click **WiFi Setup** and then the **Scan** button to see all WiFi networks within range. Select the desired local WiFi network and click OK. You will be prompted for the security passphrase if your network requires one. The steps are similar for Gemini Commander and the Optec WiFi board configuration.



For nearly all modern routers, the Security Type will be “WPA With Passphrase”. Click Apply New Settings and allow a few minutes for the local WiFi DHCP server to assign a new IP address to the Optec WiFi board.

IMPORTANT: Be sure to connect your control PC to the same local WiFi network and re-open the WiFi Setup dialog to review the newly assigned IP Address and wireless settings. The local WiFi DHCP server should have assigned a valid IP address to the Optec WiFi board. If not, check to ensure you have typed in the WiFi network settings properly.

Once the Optec WiFi receives a valid IP address from the local WiFi router, you

may disconnect the Serial connection, click the WiFi radio button and click the “Refresh IP’s” button. Allow at least 30 seconds for the local PC to find the Optec WiFi board on the network. Click Connect and you will be able to control the FocusLynx hub using FocusLynx Commander and the ASCOM drivers.

Note, if this step fails, you should ensure that your PC is connected to the same local WiFi network as the Optec WiFi board. If not, a connection cannot be completed and you will see the “None Found” message in the “IP Address:” box for the Focuser Hub Setup dialog box. Re-check all your connections if “None Found” persists. Remember that you can always connect in Serial mode to confirm your WiFi board current settings.



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WiFi - Manual Configuration

Advanced Users may prefer to skip the steps above and enter the local WiFi network parameters directly. Connect to the FocusLynx hub via USB/Serial or Wired Ethernet. WiFi can also be used but requires connecting to the SoftAP network first, then switching over to the local WiFi network similar to the steps above. The USB/Serial connection is highly recommended.

Contact Optec Support (support@optecinc.com) for help with the Manual Configuration of FocusLynx Commander and the optional WiFi add-on board.

Upgrades

WiFi Firmware Update

If the Optec WiFi firmware needs to be updated, a PIC chip replacement must be ordered. The PIC chip is provided in a 28-pin DIP (dual in-line package) pre-programmed integrated circuit with the version number marked on top of the PIC chip. As of December 2017, the current version WiFi firmware is WIFI V2.2.0. Contact Optec Sales (sales@optecinc.com) for the latest WiFi firmware version and ordering information.

To perform the upgrade, first unplug all power and cables from the FocusLynx Hub. Remove the top cover from the hub using a 3/32" hex key. The WiFi board will be immediately visible in the center of the board. Note the position of the notch indicating Pin 1 on the existing PIC chip. Gently pry the existing firmware chip up and out of the socket and replace with the new firmware PIC chip. Ensure that Pin 1 is in the same orientation as the original. Re-attach the back cover and cables. Connect to the hub and watch for the firmware version number to appear.

WiFi Webpages Update

Occasionally, the WiFi Webpages may be updated and offered for user upgrade at no cost. The currently installed version can be found by typing <http://optecwifi/version.htm> into the address bar of a browser while the Optec WiFi is turned on and connected. On non-Windows networks, the assigned IP address will need to be typed into the address bar in place of "wififocuslynx". The display page will provide the currently loaded webpage version (V1.0.4 as of December 2017).

To update the webpages, contact Optec support for a new binary file and save it to your desktop or other convenient folder. Type <http://optecwifi/upload.htm> into the browser address bar. You will see a 404: error and link for "MPFS Upload". Click this link Choose File, pointing to the WebpagesWiFi...bin file provided and saved on your desktop. Click "Upload" and wait for file to upload. Click "Site main page" to navigate to the new main page.



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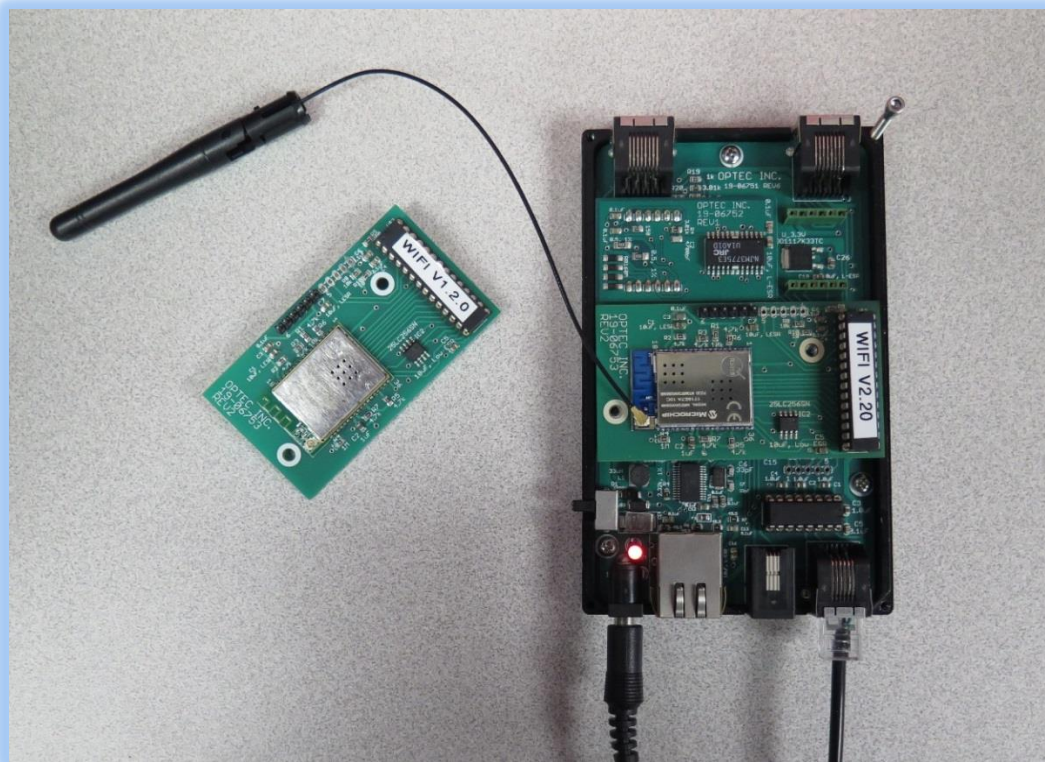
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Optec WiFi Second Generation Boards

Available in January 2018, a new second generation WiFi board is available from Optec with increased sensitivity, 802.11g support, and simplified configuration setup through a SoftAP interface. SoftAP stands for “software enabled access point” and is often referred to as a “virtual router”. Contact Optec Sales (sales@optecinc.com) for information regarding the Optec WiFi optional board for FocusLynx, FocusBoss II, and Gemini products.

Optec WiFi boards can be differentiated from Optec WiFi boards by the blue color of the WiFi module board has shown below. Firmware for the original Optec WiFi will be V1.x.x while the Optec WiFi boards have firmware versions V2.2.0 and above.



Troubleshooting

Contact Optec Technical Support (support@optecinc.com) with any other issues concerning the Optec WiFi option.



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Video Channel

Optec is developing videos for installation and configuration of our many products for various software packages. Visit our Rumble video channel by searching “Optec” or clicking the link below.



<https://www.optecinc.com/video>

Optec User Group

The Optec User Group is now located at Groups.io which provides a forum to communicate with other users of Optec instruments. Other end-users can often provide answers to specific configuration questions and Optec staff routinely follow and answer many questions as well. Click the banner below to subscribe.

The screenshot shows the Groups.io interface for the 'Optec, Inc. User Group'. The header includes the Groups.io logo, 'Your Groups 1', a search bar, and the user 'Jeff Dickerman'. The left sidebar contains navigation options: Home (Owner), Subscription, Admin (1), Pending (1), Members, Invite, Direct Add, Integrations, Settings, and Aliases. The main content area features a banner image of a galaxy with the 'Optec Optical and Electronic Products' logo. Below the banner, the group name 'Optec, Inc. User Group' and email 'Optec@groups.io' are displayed. The description states: 'The OPTEC user group exists to promote the proper usage of all of Optec's astronomy and telescope related products.' The 'Group Information' section lists: 'www.optecinc.com', '736 Members', '748 Topics, Last Post: Jan 6', 'Started on 10/01/02', and 'Feed'.

Or visit the Groups.io Optec User Group here: <https://groups.io/g/Optec>.



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