wifi-nFOCUS ASCOM ALPACA Setup

What is ASCOM ALPACA?

ASCOM has undergone a rapid transformation from Windows-only to a universal technology. Classic **ASCOM** has been a fundamental cornerstone of astronomy innovation on the Windows platform. Now we have **ASCOM Alpaca**, a new way to accomplish the same things but via network connectivity and on any platform, even embedded controllers. Both **Alpaca** and Classic **ASCOM** seamlessly operate in the background of many of the products you are currently using. Both provide ***the same universal language*** so that any astronomy app/program can connect to any astronomy device which complies with the **ASCOM** standards. **ASCOM** has become essential through simplification and standardization.

Alpaca provides simple point-to-point **universal connectivity *within an observatory*** between client applications and devices in the same way that **COM** does in classic **ASCOM**. While it is a **network protocol**, **Alpaca's** design purposely does **not** include device-level hardened security measures that would be needed on the open public or campus internet. Instead it is intended to be used within an ***isolated protected in-observatory local network***. This keeps coding minimal, implementations lightweight, and management simple.

Simply stated, **Alpaca** and network security are ***separate things***. Alpaca does the job of providing apps with device access. Since security is an open-ended topic, combining the two could easily cause a device's astronomy functions to be completely drowned out by its internal security provisions. Keeping them separate also eliminates the need to prove to security personnel the "safety" of the implementations within each device in the observatory, an impractical task for manufacturers of the devices and for observatory managers as well. Finally, device level security means that applications have to become more complex in order to manage every device security scenario, thus more complexity and safety testing/certification.

Placing control apps and devices within a secure envelope offloads the need for security to well known trusted network tools and topologies with the strengths needed by the user. A simple home or club observatory can operate behind a common NAT router with appropriate IP whitelisting and port mapping without practical risks of hacking the devices. A multi-tenant shared observatory might not be a hostile environment, but if a hostile or bumbling tenant were encountered, it could cause trouble for other tenants. Most remote shared facilities eventually find that they need to use VLANs or tenant VPNs to provide isolation and protection.

Also, **Alpaca** is not designed to provide an entertainment system for providing read-only monitoring of devices. Such a facility would need to use a hub of some sort both to protect the devices from high-demand read accesses, as well as to provide the high-security required for public or campus network access. An example hub would be a multi-homed Apache web server with carefully controlled and *cached* back-end access to the observatory net's control system and devices, plus front end high-security access to the public / campus net.

Alpaca compliant devices such as the **wifi-nFOCUS** can be network connected and communicate through **ASCOM's** HTTP/REST **Alpaca** protocol. In the ever-evolving field of astro-photography where fast optics and advanced camera devices are essential, maintaining accurate focus is critical. **Wifi-nFOCUS's** built-in web server provides full integration into **Alpaca** that enhances the user experience by providing fast, reliable, and precise focusing of your telescope from an **Alpaca dynamic client** as well as control and monitoring from any device with a web browser such as a smart phone or tablet.

(Note the **wifi-nFOCUS** retains its capability to directly connect to a **Windows PC** and with **ASCOM clients** through Microsoft's Component Object Model (**COM**) technology as before.)

Alpaca Dynamic Clients are built right into the **ASCOM Platform** and can be created on demand through the **ASCOM Chooser**. These dynamically created clients:

- Will be configured automatically using information from **Alpaca devices** such as the **wifi-nFOCUS** that identify themselves over the network using the **Alpaca** discovery protocol.
- Will attempt to "self heal" by rediscovering an **Alpaca device** if its IP address changes.
- Will discover and communicate with **Alpaca devices** using IPv4 and IPv6

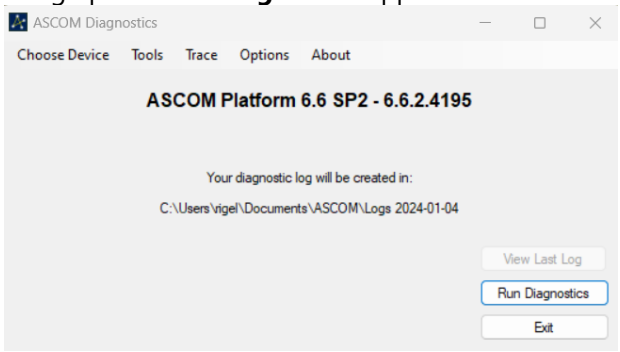
The steps showing how to create and use **Alpaca Dynamic Clients** to communicate with networked Alpaca devices like the wifi-nFOCUS are described on the Alpaca **through the Chooser** web page.

https://ascom-standards.org/Help/Platform/html/e3870a2f-582a-4ab4-b37f-e9b1c37a2030.htm

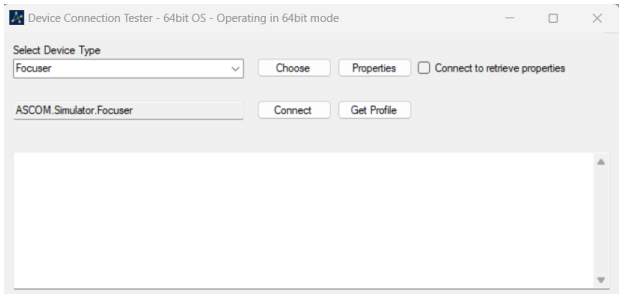
The next section walks through these steps for the **wifi-nFOCUS ALPACA** driver.

wifi-nFOCUS ASCOM ALPACA Setup

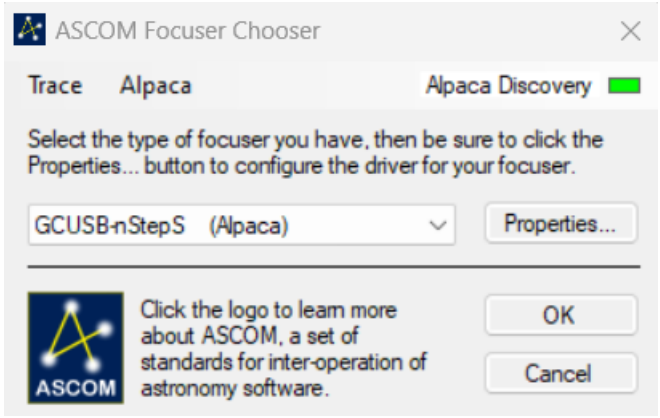
1) Bring up **ASCOM Diagnostics** app



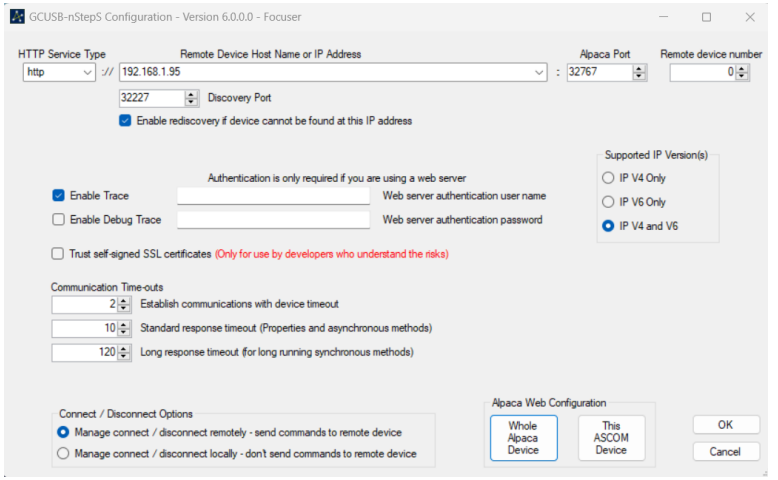
2) From **Choose Device** pulldown select **Choose and Connect to Device** and **Device Connection Tester** appears



3) From **Select Device Type** pulldown select **Focuser,** press **Choose** and **Ascom Focuser Chooser** screen appears



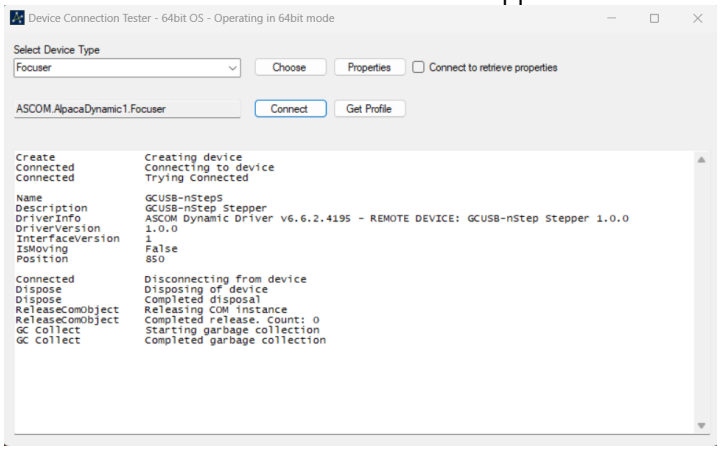
4) Under **Alpaca tab**, make sure to **ENABLE DISCOVERY**
5) From Pulldown select **GCUSB-nFOCUSS (Alpaca),** Press **Properties** and **GCUSB-nFOCUSS Configuration** screen appears.



Check that **Remote Device Host Name or IP Address** is correct for either direct connect to **wifi-nFOCUS AP** or your **observatory AP** and configure other driver parameters for your focuser.

If desired, at bottom under **Alpaca Web Configuration** press **This ASCOM Device** to review the **wifi-nFOCUS Setup screen** to adjust other parameters. See following section for full description of **wifi-nFOCUS Setup** screen.)

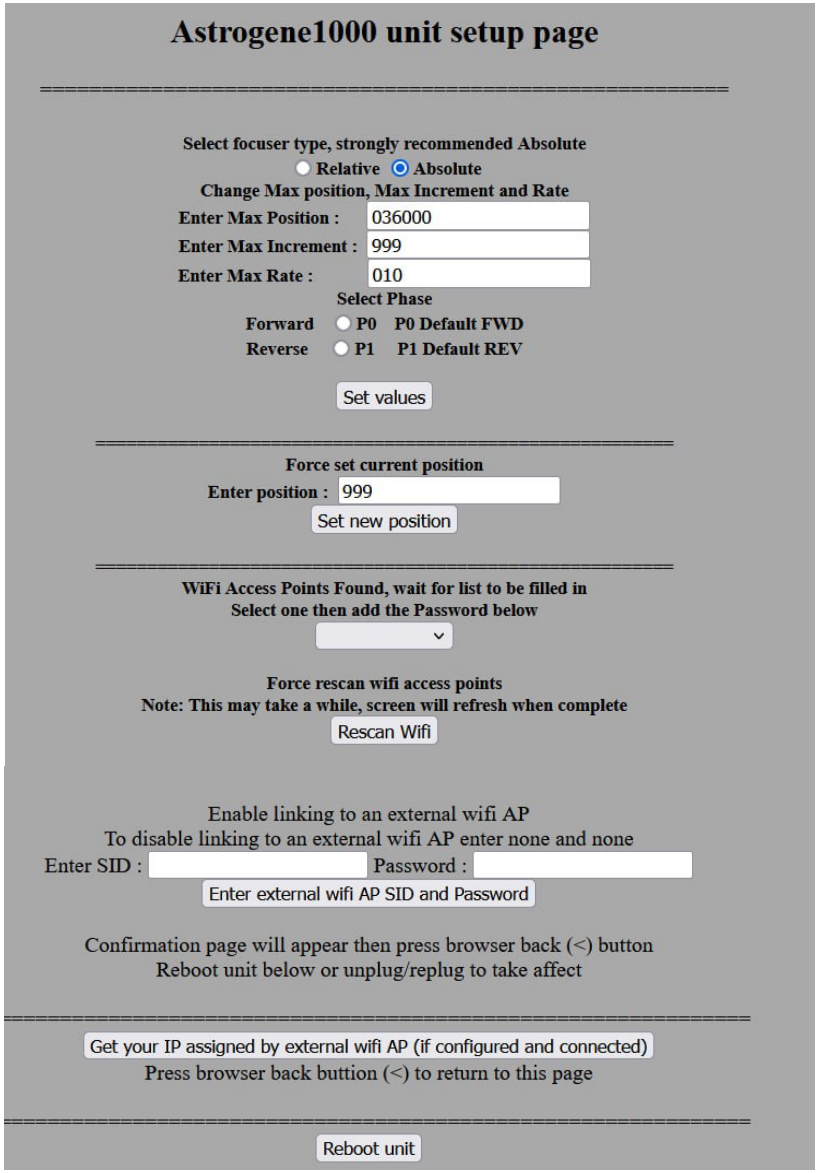
6) After checking properties, press **OK** to return to the **ASCOM FOCUSER Chooser** screen**.** Press **OK** at bottom and **Device Connection Tester** screen reappears.



7) Press **Connect** to check **wifi-nFOCUS** device connection.

wifi-nFOCUS Setup

1) In your **pc wifi menu**, connect to the **astrogene1000-XXXX access point** using default password **1234567890**
2) Go to **SETUP** page **192.168.200.1:32767/setup** in your browser



Configuring the wifi-nFOCUS

Select Focuser Type

Relative: Does **NOT** enforce limits on focuser position.

Absolute: **DOES** enforce limits on focuser position – **strongly recommended**

Change Max position, Max Increment and Rate

Enter Max Position: Value is used by the **Absolute Focuser Type**.

Enter Max Increment: Maximum number of "steps" to send to the nFOCUS at one time. Generally used to limits the number of "moves" an ASCOM autofocus application can execute during each call to the wifi-nFOCUS ASCOM driver.

Enter Max Rate: Sets the duration of a "step". Valid range is 1-250 ms.

Select Stepping Type

Half Step: Energizes 1 or two coils at a time, doubling step resolution but half the torque.

Wave: Energizes two coils at a time per step normal torque

Full Torque: Highest power mode, two coils always energized.

Select Phase

Forward / Reverse: **Set in factory to P0. If you desire reverse direction, set to P3**, typically for SCT/MAK.

Set Values

Press to implement above settings.

Force set current position

Enter position value and **Press Set new position**. Does **not** move focuser, just sets a new **step count value** for the **current** focuser position.

Connecting to an external wifi AP

Wifi-nFOCUS enables its wifi to connect to the external wifi you connect to with your computer and other wifi devices. This has the effect of extending the wifi range for your wifi-nFOCUS beyond its 20-30 ft wifi reach.

Wifi Access Points Found

1) Within a few seconds, **setup** discovers surrounding wifi access points and adds them to a **pulldown list**.
2) Select one of the wifi access points from the **pulldown list** and its **SID** will be populated in the **next step** awaiting entry of **password**.

   If necessary, press the gray **Rescan Wifi** to refresh the **pulldown list**.

Enabling connection to an external wifi AP

1) Type the **SID** (unless already filled in from **pulldown**) and **Password** of the wifi network you wish the wifi-nFOCUS to attach to.
2) Press the gray button labeled "**Enter external wifi AP SID and Password**".
3) Confirmation page appears. **Press browers's back (<) button** to return to **setup page**
4) Press gray "**Reboot Unit**" button at bottom of page or **unplug/replug** to cause wifi-nFOCUS or to reboot.

Get your IP assigned by external wifi AP (if configured and connected)

1) In your pc wifi setup screen, connect directly to the **astrogene1000-XXXX access point**.
2) Scroll down and press gray button labeled "**Get your assigned IP from external wifi AO (if configured and connected)".**
3) Confirmation page appears with **IP address** your **external wifi AP has assigned** to your wifi-nFOCUS
4) **WRITE DOWN that address**. **If it is 0.0.0.0 it is NOT connected.**
5) **Press your browers's back (<) button** to get back to setup page.

Removing connection to an external wifi AP

1) In your pc wifi setup screen, connect directly to the **astrogene1000-XXXX access point**.
2) Go to **SETUP** page **192.168.200.1:32767/setup** in your browser
3) Scroll down to "**Enable linking to an external wifi AP.**
4) **Blank out both SID and Password**
5) Press the gray button labeled "**Enter external wifi AP SID and => 8 Char Password**".
6) Confirmation page appears. **Press your browers's back (<) button** to get back to setup page.
7) Press gray "**Reboot Unit**" button at bottom of page or unplug/replug to cause wifi-nFOCUS or wifi-nFOCUS to reboot.

Confirming IP address assigned by external wifi AP is removed

1) In your pc wifi setup screen, connect directly to the **astrogene1000-XXXX access point**
2) Go to **SETUP** page **192.168.200.1:32767/setup** in your browser
3) Scroll down and press gray button labeled "**Get your assigned IP from external wifi AP (if configured and connected)".**
4) Confirmation page appears with **IP address** of **0.0.0.0**
5) **Press your browers's back (<) button** to get back to setup page.

For more information visit http://www.rigelsys.com