**myFocuser2ASCOM – For Arduino**

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© Developed by [Robert Brown](mailto://brown_rb@yahoo.com), November 2014

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Latest Version is v263, 23-11-2018 (see version changes at end of this document)

**Overview**  
This is documentation concerning the myFocuserASCOM driver, based on the myFocuser design and code provided by Robert Brown.  
This is the ASCOM driver that supports all the various Arduino and driver board combinations.

This ASCOM driver runs on ASCOM 6.1 and is fully compliant. There are a few things that should be noted

1. The ASCOM driver will remember the COM port value entered in the setup dialog form
2. If the Update checkbox is ticked, the ASCOM driver will send the following values to the controller on Connect()
   1. Focuser Position
   2. MaxSteps
   3. Step Mode
   4. Reverse Direction
   5. Coil Power
   6. Speed
3. If the Update checkbox is not ticked, the ASCOM driver retrieves the following values from the controller on Connect()
   1. Focuser Position
   2. MaxSteps
   3. Step Mode
   4. Reverse Direction
   5. Coil Power
4. MaxIncrements (the maximum number of steps per move) is limited to 2048 – one full revolution of the stepper motor
5. StepSize is not supported

**The Arduino myFocuser is supported by the following**

1. Base code that runs on the Arduino
2. The focus controller remembers MaxSteps and Focuser Position and retrieves these settings from EEPROM when connected
3. The 0 position can be set in software
4. A Windows application program that can remotely control the focuser
5. A dedicated ASCOM driver that can be used with the controller to support 3rd party applications like Focusmax(TM)

**Typical Setup and Operation**

1. Mount the focuser motor so that it connects to the focuser shaft of the telescope but do not tighten the flexible coupler yet.
2. Do a manual focus of the telescope on a star and adjust so that the star is in focus
3. Turn on the focus controller, which defaults to position 5000 on startup (can be verified on the LCD version)
4. Now tighten the flexible coupler shaft so that the focuser is connected to the stepper motor shaft securely
5. This sets the midpoint range to be at or close to focus (ie position 5000 = in focus) and gives about two full rotations of the stepper in either direction from focus

The focuser is now setup to use (for more detail on initial setup, [please see below](file:///C:\Program%20Files%20(x86)\Common%20Files\ASCOM\Focuser\myFocuser20.htm#Detail)).

If the imaging train is changed (by using barlows, reducers etc) then you will need to repeat the steps above as the focus point may not be achievable because of the changes.

**Defaults**  
Maximum Focuser Position MaxStep - stored by the controller - only available once an application connects  
Initial Focuser Position - stored by the controller - only available once an application connects  
Maximum steps per move  2048  MaxIncrement  
Stepper Coil Power  - remembered by the setup dialog form - sent to the controller when an application connects   
Reverse Direction - remembered by the setup dialog form - sent to the controller when an application connects  
StepMode - remembered by the setup dialog form - sent to the controller when an application connects

Note: Stepper Coil power means that at the end of the move, when the stepper is stationary, power is either OFF or ON to the coils. If OFF, this saves power, but it might mean that a heavy focuser might start to slip if pointed towards zenith. To prevent this, set the Stepper Coil Power to ON. The ON settings consumes power when the stepper is not moving. Some steppers might get hot in operation if this setting is ON. You will need to check your stepper motor if this is happening. For the DRV8825 driver, coil power is always ON and cannot be disabled.

Note: StepMode: ULN2003 and L298N driver boards only support FULL stepping. L293D driver board supports FULL and HALF stepping. DRV8825 driver board supports F, H, 1/2, 1/4, 1/8, 1/16 and 1/32 stepping. EasyDriver driver board supports F, H, 1/2, 1/4 and 1/8 stepping.

The following settings are saved/remembered in EEPROM of the controller and the ASCOM driver gets these from the controller on connect()).

1. Initial Focuser Position
2. Maximum Focuser Position (Maxsteps)
3. Step Mode
4. Coil Power
5. Reverse Direction

The values of Coil Power, HalfSteps (or StepMode) and Reverse Direction are remembered by the application/driver and the settings on the form are sent to the controller on conect() if the Update checkbox is ticked.

**Detailed Setup Example**

**Examples**  
My example focuser has four (4) full turns of the focuser knob from the minimum full IN position to the maximum full OUT position.

**Example NEMA17 Stepper**  
For the NEMA17 stepper motor at (200 steps per revolution) using the DRV8825 driver board and stepmode of 1/8, this gives 1600 steps per revolution with the stepper attached to the single knob of the focuser, then this gives 1600\*4 or 6400 maximum possible steps. We unclamp the flexible coupler and manually position the focuser to be ½ turn out from the minimum IN position, then re-clamp the flexible coupler.

We turn on the focuser and run the myFocuser application, select the correct COM port and connect to the controller. The focuser is currently at position 5000 (the controller has defaulted to position 5000). We enter 0000 as the focuser position and click the SET POSITION button, which tells the controller that the current focuser position is reset to position 0. Thus ensures that the stepper cannot drive the focuser fully home (it will stop one half turn away).

Next we need to determine maxSteps. To determine maxSteps, we also assume that we will drive the focuser OUT but stop one half turn before the maximum stop of the focuser. This is three full turns of the focuser knob. In stepper motor steps this is 1600\*3 = 4800, so we need to set maxSteps to 4800 in the setup dialog box.

 In the myFocuser Application we enter 4800 as the Maximum Position and click the SET button to send this value to controller.

 For the initial focuser position, we determine the half-way point (0-4800) and so the initial focuser position will be 2400.

 Next, we move the focuser from position 0 to the mid-point by entering 2400 in the focuser position text box and then click the GOTO POSITION button to move the focuser. Once the focuser has stopped moving, we can then close the application and power off the focuser. *If you notice that the focuser does not move when the GOTO POSITION command is sent to the controller, it is likely that the direction is incorrect. Try enabling Reverse Direction and then clicking the GOTO POSITION button again.*

 To check that everything is set, we turn on the focuser and restart the myFocuser application. You will see that the focuser position will be set to the midway point (in our example 2400) and that the maximum position is set to 4800.

 As long as the focuser is not manually moved, or the coupler disconnected, the focuser is now setup with the correct values. Each time we connect to the focuser, the correct settings will be sent to the controller and will be saved so they can be recalled next time we run the software or access the ASCOM driver.

 PLEASE NOTE THAT IF A DIFFERENT STEPMODE IS USED (eg FULL, 1/32 etc) THEN THE NUMBERS IN THE ABOVE EXAMPLE WILL BE DIFFERENT.