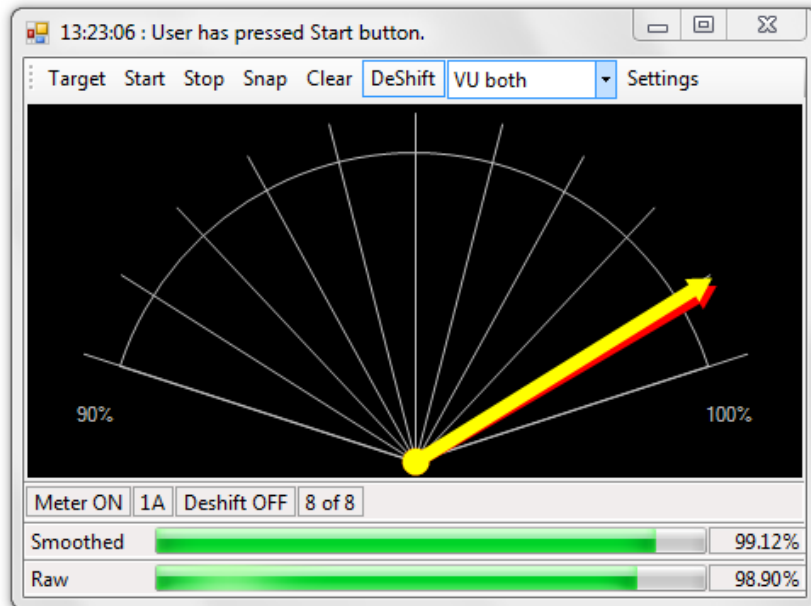


Dave's Focus Meter

User Manual



Copyright David Wilson
of
Starry Dave's Window Sill Observatory

www.starrydave.com

2015

Table of Contents

INTRODUCTION
QUICK START GUIDE
MAIN WINDOW
METERING TOOLBAR
SETTINGS MANAGER
ASCUM TOOLBAR

INTRODUCTION

Dave's Focus Meter (DFM) is software that gives an accurate reading of how well focused a video or still image is.

It is designed to be very simple to use with all commands available via buttons – it has no menu bar.

DFM can perform the following actions.

- Provide accurate measure of video sharpness in real time.
- Works with all video cameras.
- Control ASCOM focusers.

How it Works

First, the user selects an area of the video or image to measure focus on. DFM then processes that area and identifies any regions of high contrast. It measures these regions and converts the contrast areas into a percentage. This percentage is the raw 'focus reading'.

DFM continues to take focus readings and performs further analyses. These analyses provide the following information:

- Instantaneous raw focus level.
- Focus level averaged over several readings.

The % readings are based on the previous highest focus reading. If the current reading is the highest yet, it will show as 100%. You should aim to get the highest % reading for best focus. Note that video noise and other factors mean that your maximum may be a few percent below 100%.

There is a Sensitivity setting in the Settings Manager which will adjust the shape of the focus graph. 100% is normal while values above 100% will steepen the focus 'mountain'. Values of less than 100% will flatten it out.

You can adjust the number of readings to average over in the Settings Manager.

DFM QUICK START INSTRUCTIONS

Install ASCOM Platform

Currently, DFM needs the ASCOM platform to work. You can install it from [here](#).

Install Microsoft .NET Framework 4

You need the Microsoft .NET Framework 4 on your PC for this software to run. If it is not already on your PC or you can install it from [here](#).

Download DFM

Download the zipped software package and unzip it to your hard drive. Open the unzipped folder and run the file called DFMv4.7(.exe) or similar. You can create a shortcut to this file or pin it to your start menu to make it easier to launch.

Select Focus Area

Move and resize the Choose focus target area window so that the red rectangle is over the area you want to focus on your video window.

Click the Set button.

DFM will now show the instant and smoothed focus readings in the lower bars.

Adjust Focus

Check that DeShift is turned on.

Select VU Both from the drop-down that currently shows Live.

Focus your instrument on one side of best focus and slowly focus past the best focus point.

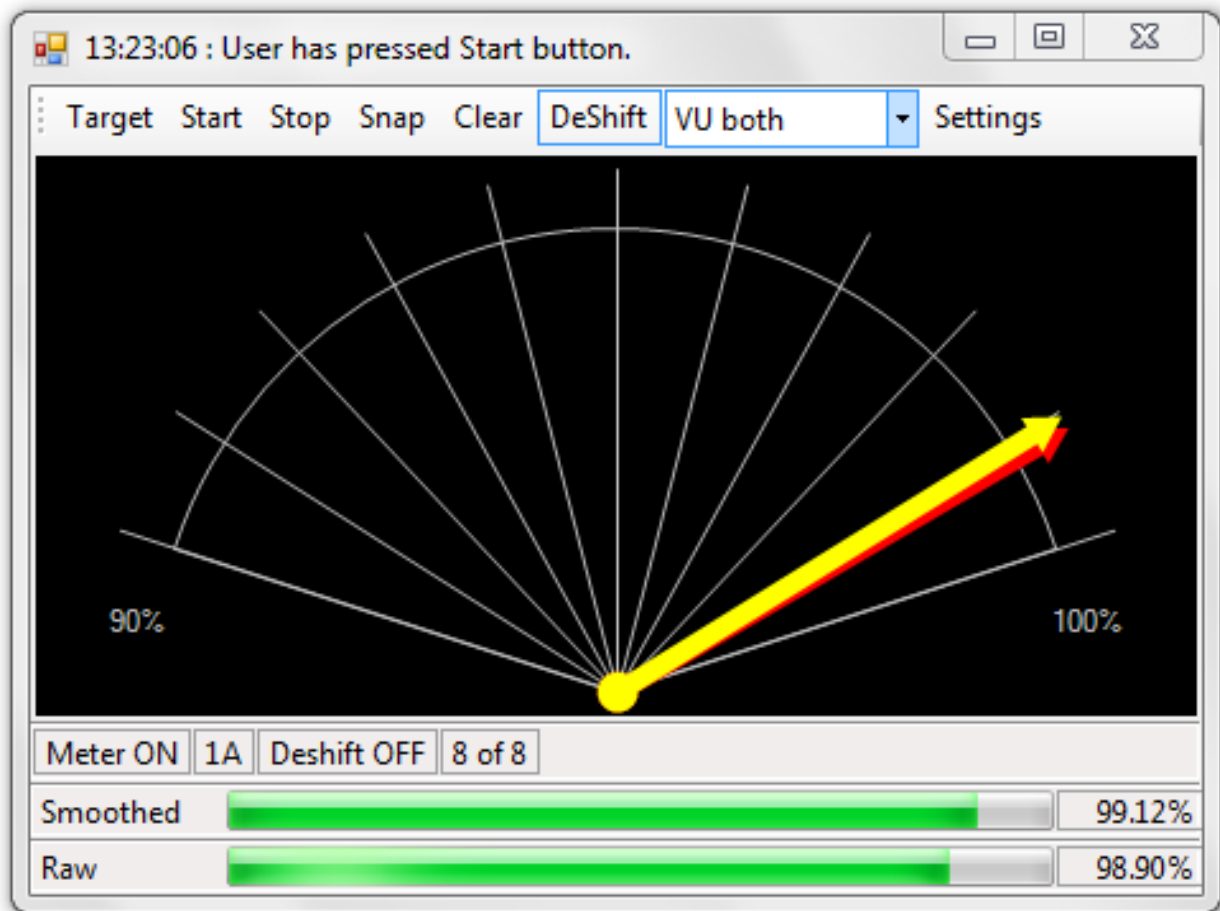
Slowly focus back to the approximate start point. This gives DFM a range of focus values on each side of focus.

Fine tune your instrument to give the maximum focus level as shown by the needles. The red needle shows the raw instantaneous value and yellow is the smoothed value

Display Notes

DFM takes a lot of snapshots of the video window during its operation. Some PCs are configured such that these snapshots are blacked out. If this happens, go into your Windows Control Panel and select Display properties. Then find the setting called 'Hardware Acceleration' and turn this down until DFM can show the video snapshots properly in the Live view.

DFM MAIN WINDOW



The DFM main window has a toolbar at top and status bars at bottom. Also, the top title bar is used to display messages to the user.

There is an optional toolbar for ASCOM focuser controls that you can turn on using the Settings Manager.

The bottom status bars display the following (left to right):

- Metering status
- Focus method and index
- Deshifting status
- Number of CPU cores used by DFM
- Connection status of ASCOM focuser (optional)
- Current position of ASCOM focuser (optional)
- Current temperature of ASCOM focuser (optional)

Linear meters display the current instantaneous and smoothed meter values.

METERING TOOLBAR

Target Button

This displays the focus target picker which lets you pick the area to use for the focus meter readings.

You can then move and resize the picker so that the red focus area is over the region of your video that you want to monitor. The size of the focus area is shown in the bottom status bar.

You can adjust the transparency of the picker by moving its slide bar pointer.

Press the Set button when you are happy with the focus area. DFM will then start metering the chosen area.

Start and Stop Buttons

These buttons start and stop the continuous focus metering. Metering status is shown in the bottom status bars.

Clear Button

This button clears the history cache for the focus graphs and resets the 100% value to the current reading. You can use this if your focus target area changes a lot over time. Choosing a new target or focus method automatically clears the cache.

DeShift Button

DFM can minimise image shift during focusing (deshifting) by tracking the focus area across your video window. This ensures consistent and reliable meter results. Use this button to turn deshifting on or off. Deshifting status is shown in the bottom status bars.

Display Drop-Down

Use this to select what to display in the DFM main window. You can choose from:

- Live view of focus area
- Processed view of focus area
- VU type focus meter
- Graph of meter readings history

You can choose to display raw, smoothed, or both raw and smoothed on the VU meter and graph.

Settings Button

Displays the Settings Manager.

SETTINGS MANAGER

This is a powerful feature because it lets you store different settings files for each of your session types. For instance, you can have one settings file for solar prominences and another for Jupiter time-lapse animations.

The Settings Manager has the following controls.

Save Current Settings As Default

Saves the current settings as the DFM default settings which will be loaded on startup.

Load Default Settings

Loads your DFM default settings. These settings are loaded by DFM on startup.

Save Current Settings

Saves the current settings to a file of your choice.

Load Saved Settings

Load a previously saved settings file into DFM.

Delete Default Settings

This deletes the default settings file. Factory settings will be loaded by DFM at next startup.

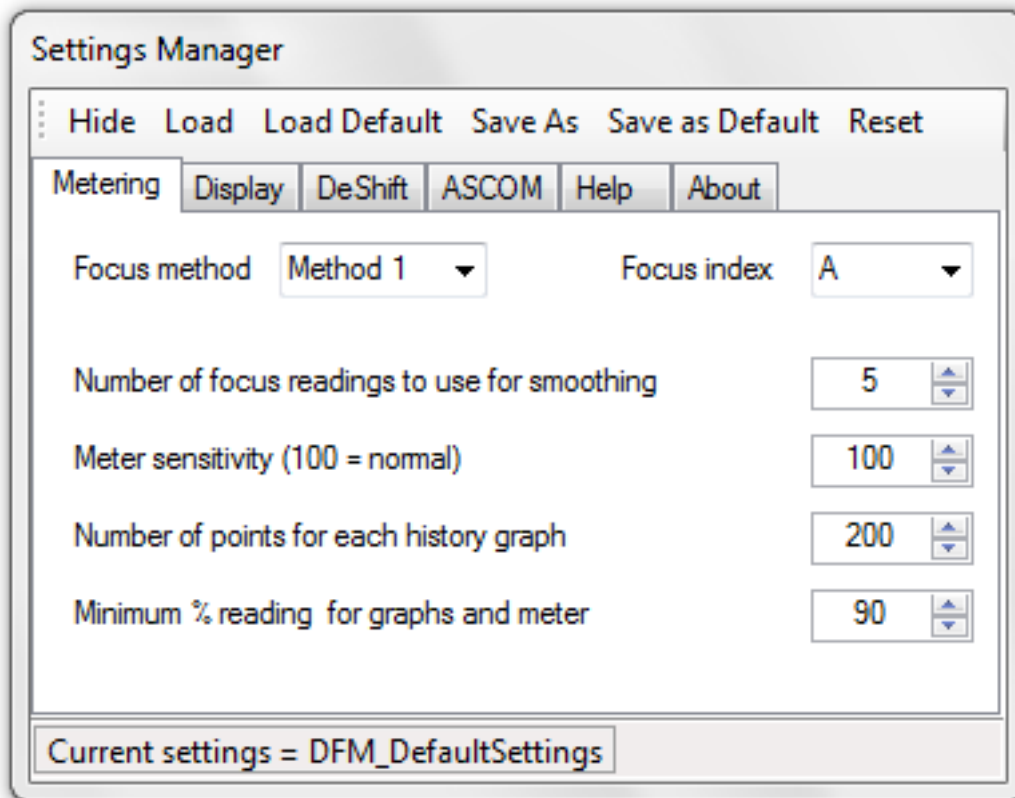
Notes.

You should save a default settings file as soon as possible. Otherwise, DFM will startup with factory settings.

The default folder for settings files is My Documents\Window Sill Observatory\DFM. You can change this folder to 'hidden' if you don't want to display it.

The various settings pages are explained overleaf.

Meter Settings



Focus Method

Select the method to use to assess focus level to suit your target image. Method 4 gives weird results and method 5 is the inverse of 4. I have left them in in case they are of use to someone.

Focus Index

You have a choice of 7 indices A-G for each method. These allow you to trial different measures of sharpness. A-D are single indices while E = Ax B , F = CxD and G = ExF.

In theory, A should be the best measure of focus sharpness.

Number of Focus Readings

Sets the number of raw values to use to produce the smoothed readings.

Meter Sensitivity

Values above 100 increase sensitivity, values below 100 reduce sensitivity.

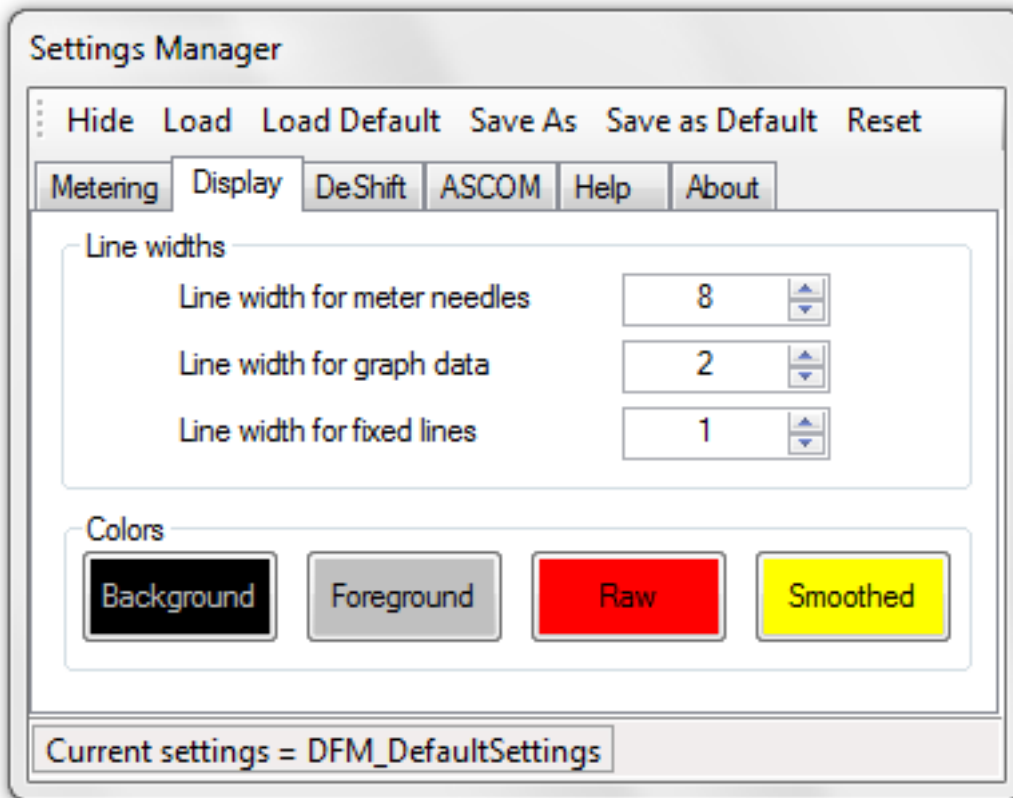
Points on History Graphs

Set the number of focus readings to use on each graph.

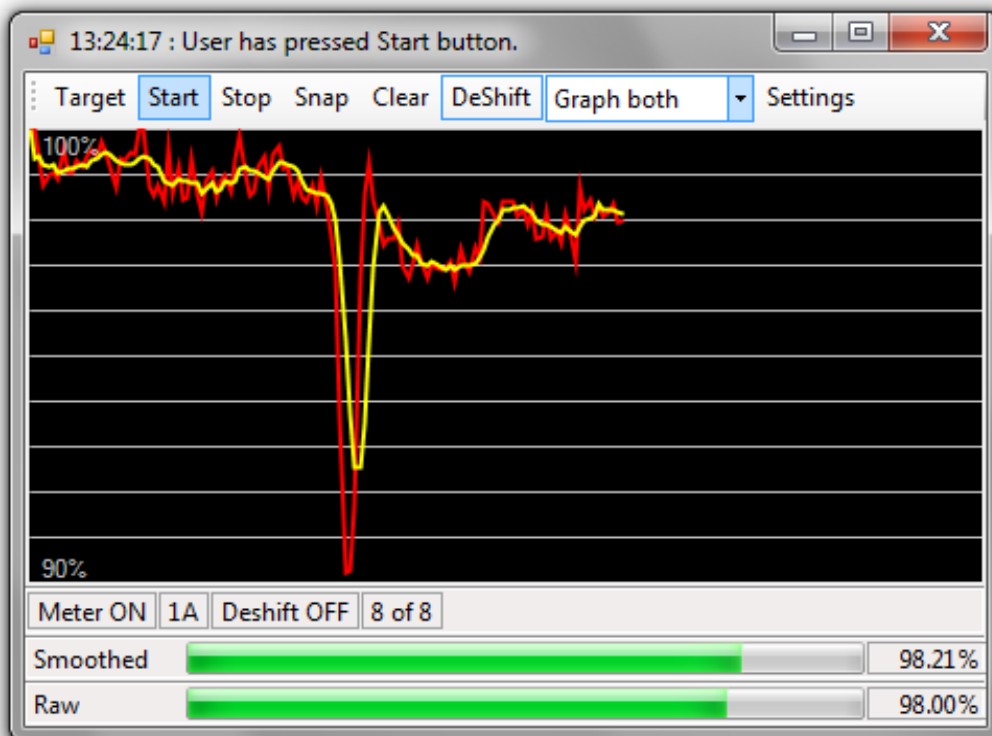
Minimum % for Graphs and Meters

Use this to exaggerate the movement of graphs and meters for ease of finding maximum focus. I use 90%.

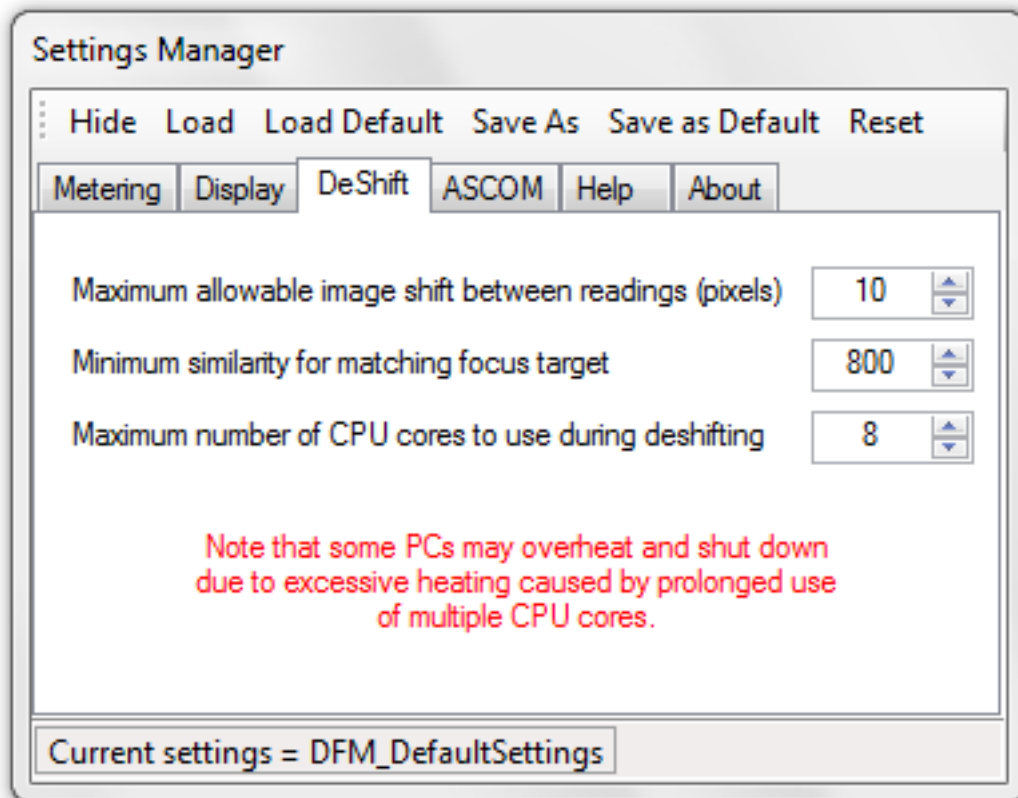
Display Settings



Use these settings to control how DFM displays meters and graphs. Line widths are in pixels.



DeShift Settings



DFM deshifting attempts to track the focus area as it moves around due to mirror shift, camera movement or atmospheric distortion. This ensures consistent and accurate focus readings.

Maximum Image Shift

Set the maximum image drift between focus readings. The actual horizontal and vertical drifts (dH and dV) are shown in the status bar. Increase this value if deshifting keeps turning itself off. Higher values slow down the focus meter.

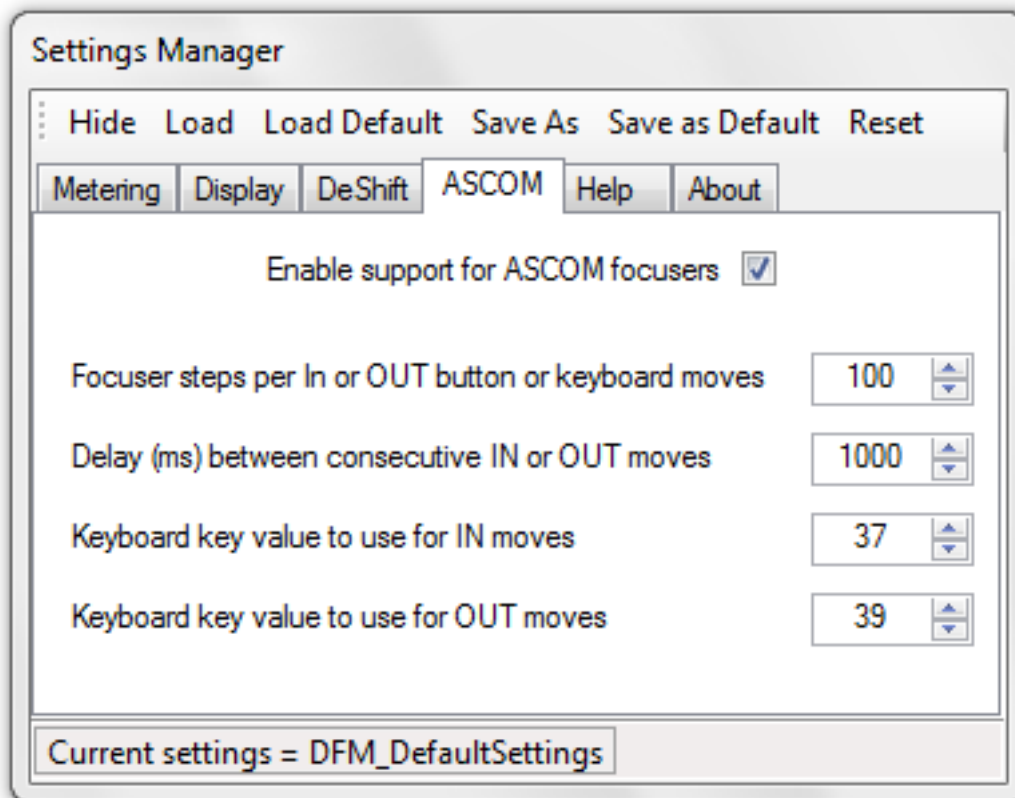
Minimum Similarity

This controls how similar the focus area needs to be to the original area for deshifting to accept it. A value of 1000 is identical.

CPU cores

DFM can use parallel processing to speed up deshifting and hence metering speed. However, please read the red warning sign.

ASCOM Settings



Enable ASCOM Focusers

Check this box if you want to control focusers using the ASCOM standard. This will show a dedicated toolbar and additional status readings in the main window.

Focuser Steps per Press

Use this to adjust the number of steps your focuser moves with each press of the In and Out buttons or keys.

Delay

Sets the time in milliseconds to pause after the first press of a button or key. This pause prevents accidental multiple focuser movements.

Keyboard In and Out Values

Enter the keyboard key codes for the keys you want to use to move in and out. The default is the left and right arrow keys. To find a key's code, hold down the Shift key and press the key. The key code will appear in the title status bar. For instance, keys "i" and "o" have values of 73 and 79.

ASCOM TOOLBAR

These buttons allow control of motorised focusers via the ASCOM framework which is here:

<http://www.ascom-standards.org/>

Focuser Button

Left click to choose your focuser. Right click to change focuser settings.

In and Out Buttons

Move the focuser in or out by the 'Steps per move' setting in the Settings Manager.

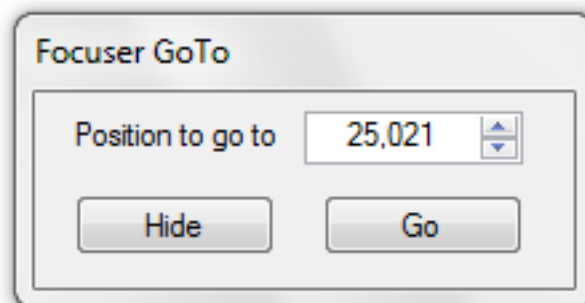
DFM also allows you to use keyboard keys instead of the In and Out buttons. The defaults are the left and right arrow keys. You can alter these keys by entering the key values to use in the Settings Manager. To find out a key's value, hold down the left Shift key and press the key you want. The key's value will be displayed in the top status bar. e.g 'a' = 65.

Holding the button or key down will keep moving the focuser until you release. There is an in-built delay to prevent single moves being interpreted as multiple moves. The default delay is 1000ms and you can change this in the Settings Manager.

Halt Button

Halts the current focuser move.

GoTo Button

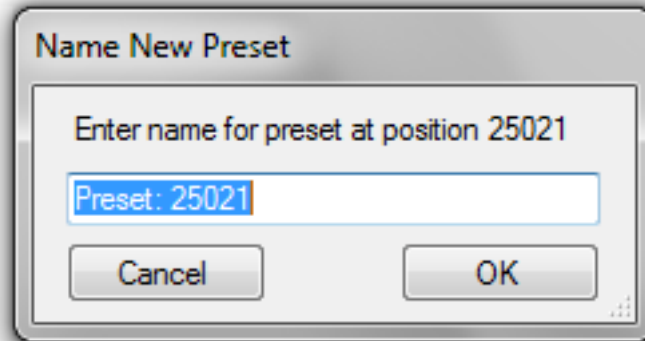


Enter the position you want to move to and press Go.

Preset Button

Use this to manage a list of position presets for your focuser. DFM has default presets of Minimum, Middle and Maximum.

Select Add to add and name the current position as a preset.



To delete a preset, hold down the Shift button and click on the preset on the dropdown.

Presets are saved with the settings files.