

# Focusmaster™ Autofocus Overview & Setup

TeleVue.com links in this version all go to the consolidated [Focusmaster / Digital Indicator links page](#).



*Good imaging starts with good focusing. Automation makes it simple.*

## Introduction

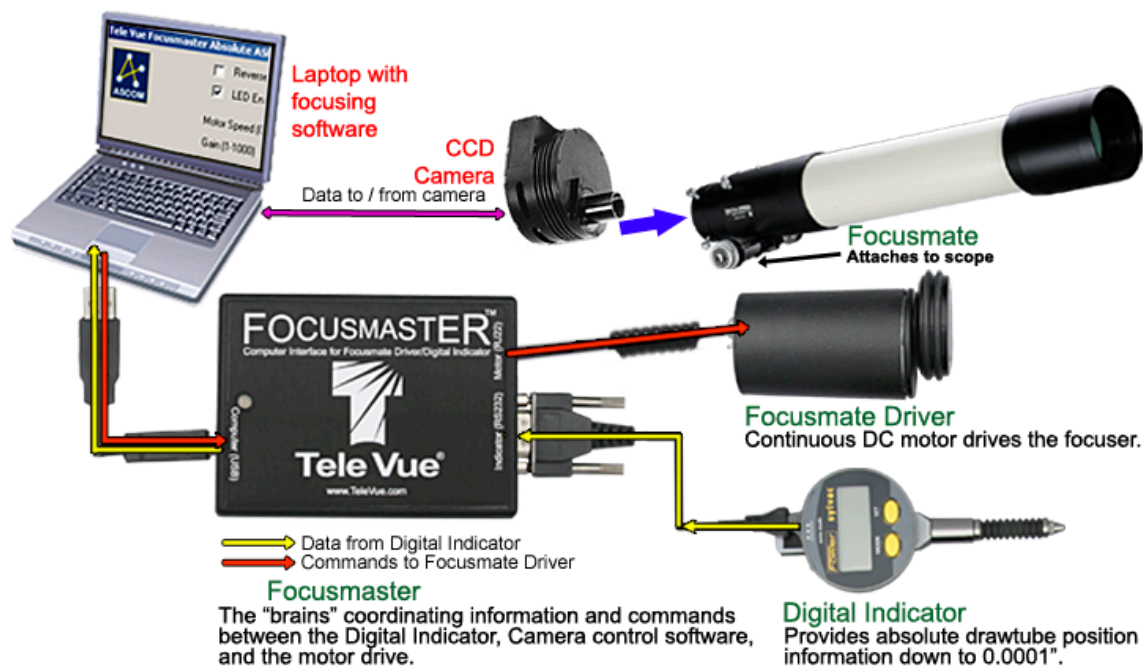
Autofocus imaging with Tele Vue scopes is possible with *Focusmaster™* computer interface for Focusmate Driver/Digital Indicator, a computer with the appropriate ASCOM compatible software (explained below), a camera controllable by the software, and the accessories listed in this document.

This document extends the information found in the *Focusmaster™ Operating Guide*. You will need the *Operating Guide* to setup *Focusmaster™* and test the hardware with the *TVFocusPlus* software.

Note that ASCOM software is a Windows-based standard and will not natively work with other operating systems. While autofocus is not possible, the [ShoeString Focus](#) for Mac OSX, by Stark-Labs, can be used to manually focus your telescope from a Mac computer. Visit their website for specs and details.

## The Focusmaster™ Automated Focusing System

Refer to the conceptual diagram below. The Tele Vue Focusmate (fine and course focus knobs) equipped Tele Vue telescope is outfitted with the Tele Vue Digital Indicator (focus measuring device) and Tele Vue Focusmate Driver (focus motor). These both connect to the *Focusmaster™* (computer control box). The *Focusmaster™* interfaces this Tele Vue hardware to your computer. A camera attached to the telescope is connected to the computer to take focus measurement images.



Starting with the image focused by the operator, third-party ASCOM compliant software (such as *MaxIm DL*) requests an initial image from the camera (purple arrows). Through the *Focusmaster™*, the software instructs the *Focusmate Driver* to turn the *Focusmate* fine-focus accessory (red arrows) to another focus position (yellow arrow is position data from Indicator to computer) and another image is taken. Comparison of the two images' full-width half-maximum (amount of energy concentrated in the center of stellar images) leads the software to decide which direction to move the focuser and take more images. The goal of this iterative process of fine-focusing and imaging is to take images on either side of focus and mathematically determine the central position of best focus. Because the indicator is measuring the actual position of the draw tube, the autofocusing routine can then drive the focuser to the exact calculated point of best focus.

### Required Tele Vue Hardware

Following is the complete list of Tele Vue hardware required in addition to your Tele Vue scope, camera, computer, and focusing software listed in the next section.

#### *FMU-2319 Focusmaster™ Computer Interface*

Focusmaster™ is the link necessary for computer readout and control of Tele Vue's Digital Indicator Kit and Focusmate Driver. Focusmaster™ was designed to be easy and convenient to use, from its in-line connectors which allow easy draping of cables, to the *TVFocusPlus* display/control software. Through the use of plug-ins, Focusmaster™ is compatible with ASCOM compliant focusing software.

Included Hardware Features:

- USB (cable included) port to connect to your computer and supply power.
- RS-232 port to connect to Tele Vue's Digital Indicator.
- RJ22 port to connect to Tele Vue's Focusmate Driver.
- Red/green status LED.

#### *FDU-2003 Focusmate Driver 6:1, Universal*

#### *FDF-2004 Focusmate Driver 10:1*

Either version of the Focusmate driver permits vibration-free, variable-speed, electronic motor control of the Focusmate Fine Focus Accessory. Vibration-free focusing in steps as small as approximately 0.0005" is possible. Model FDF-2004 is expressly for scopes with black pinions (TVNP-127 is S#: 1175+, TVNP-101 is S#: 1227+, TVNP101 S#: 1982+, TV-76, and TV-85 that came with Focusmate standard).

#### *RMK-2002 10 Micron Indicator Kit for 2" focuser*

#### *RMF-2003 1 Micron Indicator Kit for 2" focuser*

#### *LMK-2404 10 Micron Indicator Kit for 2.4" ("is" scopes) focuser*

#### *LMF-2405 1 Micron Fine Indicator Kit for 2.4" ("is" scopes) focuser*

The Digital indicator measures the focus position of the scope. Choose the indicator that matches your focuser (2" or 2.4" for "is"-series scopes) and the desired position accuracy.

#### *RSC-2320 Indicator to computer RS232 cable 10 ft.*

Allows readout from the Digital Indicator kits to appear on your computer. Connects to Focusmaster™ through 9-pin RS232 port. Can connect directly to computers with this port or through a serial to USB adapter available at computer stores. Requires software (below) to display the readout.

### Required Software

You'll need to make sure that several pieces of software are installed on your Windows computer to autofocus with Tele Vue's Focusmaster™.

#### *ASCOM Compatible Focuser and Camera Software of Your Choice*

For autofocus operation, you must acquire software that supports the ASCOM Focuser and Camera standards. Installation example further down in this document uses *MaxIm DL*. But there are many others to choose from. It is best to download trial versions of software to test out before settling on your choice.

#### *ASCOM Platform*

This must be installed on your computer in order for the Focusmaster™ ASCOM drivers to communicate with your ASCOM-compatible focusing and imaging software.

#### *ASCOM Drivers for Focusmaster™*

Focusmaster™ ASCOM plug-in drivers allow ASCOM compatible software to control the Focusmaster™. There are two plug-ins: *absolute* for autofocus with Digital Indicator and *relative* for manual-only focusing.

### TVFocusPlus Software (Recommended)

*TVFocusPlus* is a free, optional, stand-alone (no ASCOM required), Windows program that we recommend to verify the Focusmaster™ / Focusmate Driver / Indicator hardware setup. While not possible to perform autofocus, it can run the Focusmate Driver, display Digital indicator readout on your computer screen, store focus positions, and the built-in night-vision mode makes it fully usable for night-time imaging. You may want to try some imaging without the autofocusing ASCOM software to see if manual focusing with *TVFocusPlus* suffices for your needs.



#### Software Features

- Continuous or momentary position readout.
- Preset positions (saved between sessions) are handy if you use filters that change the point of best focus. Can also be used visually to return to focus position for non-parfocal eyepieces. Yellow and green indicators appear when you are approaching or have achieved a preset focus position.
- Zero reset allows you to zero the indicator at any point.
- Continuous or momentary motor motion in both directions.
- Full-control over motor speed.
- Night-vision mode.

### TVFocusPlus Computer Software Installation

#### Hardware Setup

Setup your scope near the computer and make sure all required hardware is connected. Refer to the Focusmate Installation sheet, Focusmate Driver Instructions, and Indicator kit sheet for installing those part. See the *Focusmaster™ Operating Guide* to make the final hardware connections between the above and Focusmaster™ before running this software. Make sure the Focusmate Driver engages the focus knob and the drawtube is not obstructed from moving.

#### Software Setup

The program is contained in a self-extracting archive file that must be downloaded, extracted, and installed before *TVFocusPlus* can run. Just follow the simple steps below.

1. [Download self-extracting archive file](#) (2.85 MB) containing the *TVFocusPlus* install software.
  - Select [Open] or [Run] button on download dialog to begin download and extraction.
  - ... or ...
  - Select [Save] button to download achieve to a local computer folder; then manually click achieve filename to begin the extraction.
2. In self-extractor dialog:
  - Select [Browse] button to locate an easy-to-remember folder to extract the install files to (or do nothing and accept the default 'Unzip to folder').
  - Select [Unzip] button to extract the setup program to that folder.
  - You will receive a confirmation if the files extracted successfully.
3. In the extracted-to folder:
  - Execute setup.exe and the program will then install and register itself.
  - You can delete the install files in the download folder after install.

### TVFocusPlus Computer Software Troubleshooting

You should be able to locate and run *TVFocusPlus* in Start/Programs/*TVFocusPlus*. If the *Missing Shortcut* dialog appears, follow steps below to fix the shortcut.

- At the Windows “Start” button, go to Start/Programs/*TVFocusPlus* and right-click the program file. Select *Properties* from the menu.
- In the Target box, locate the program name *TVFocus.exe*.
- Edit the program name in the Target box to *TVFocusPlus.exe* and click the [OK] button.
- Go back to Start/Programs/*TVFocusPlus* (note that the program icon now displays the Tele Vue “T”) and click the program to start it.

### TVFocusPlus Computer Software Uninstall

This will remove the *TVFocusPlus* files from your computer.

- In Start/Settings/Control Panel find *Programs and Features* (or *Add/Remove* in older versions of Windows).
- Select on *TVFocusPlus* and click the [Remove] button to uninstall.

### TVFocusPlus Usage

After completing the setup, you should read through the complete instructions for the *TVFocusPlus* software found in the *Focusmaster™ Operating Guide*. You can now carry out a “table top” test with *TVFocusPlus* to rack the telescope drawtube in and out, verify the Indicator readings on the computer screen, save, and return to focus positions, etc. If that all works, you may want to carry out a daylight test with camera on a distant target to further validate the focus readings and that the Indicator is setup for the desired range of motion travel near infinity focus.

## ASCOM Computer Software Installation and Setup Example

These instructions demonstrate the setup of the ASCOM drivers and ASCOM-compliant focusing and camera software to work with the Focusmaster™ and related hardware.

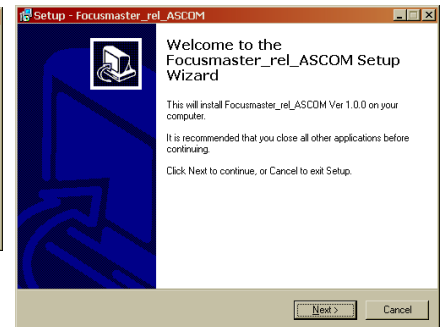
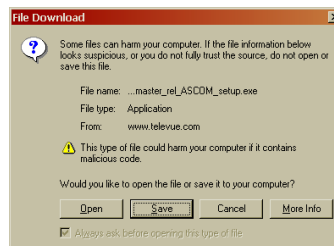
### Hardware Setup

Follow the *Hardware Setup* in the previous section. As a final step, make sure the Digital Indicator is set to *inches normal x1* mode to properly measure distance with the ASCOM driver.



### Software Install

1. Make sure ASCOM-compliant focusing and camera software is installed and you are able to start it and access the various menu options. Refer to the instructions that came with that software. In many cases this software automatically performs the next step of installing the ASCOM platform.
2. Check if the ASCOM Platform has already been installed by the software in the prior step. If your version of Windows displays a “Search programs and files” box (often when clicking the “Start” button), type in “ASCOM Diagnostics”. If you don’t have this search box locate “ASCOM Platform ...” by clicking the Windows “Start” button: Start/Programs and search for the “ASCOM Platform ...” folder. You can also check for “ASCOM Platform ...” in Start/Settings/Control Panel/*Programs and Features* (or *Add/Remove* programs in Windows XP and prior). If none of these methods prove that the ASCOM Platform is installed, visit the [ASCOM](#) website and go to the downloads area to download the ASCOM Platform. Follow their instructions for installation.
3. Download the correct Focusmaster™ ASCOM driver for your setup and install it.
  - [Download absolute driver](#) if using the Digital Indicator to autofocus.
  - [Download relative driver](#) to manually focus (taking test images with your camera control software to find the best focus position).Select [Open] or [Run] button on download dialog to begin download and install. You can also opt to click the [Save] button to download the file to a local computer folder; then manually click the file to begin installation.
4. Follow the prompts in the install dialog boxes.

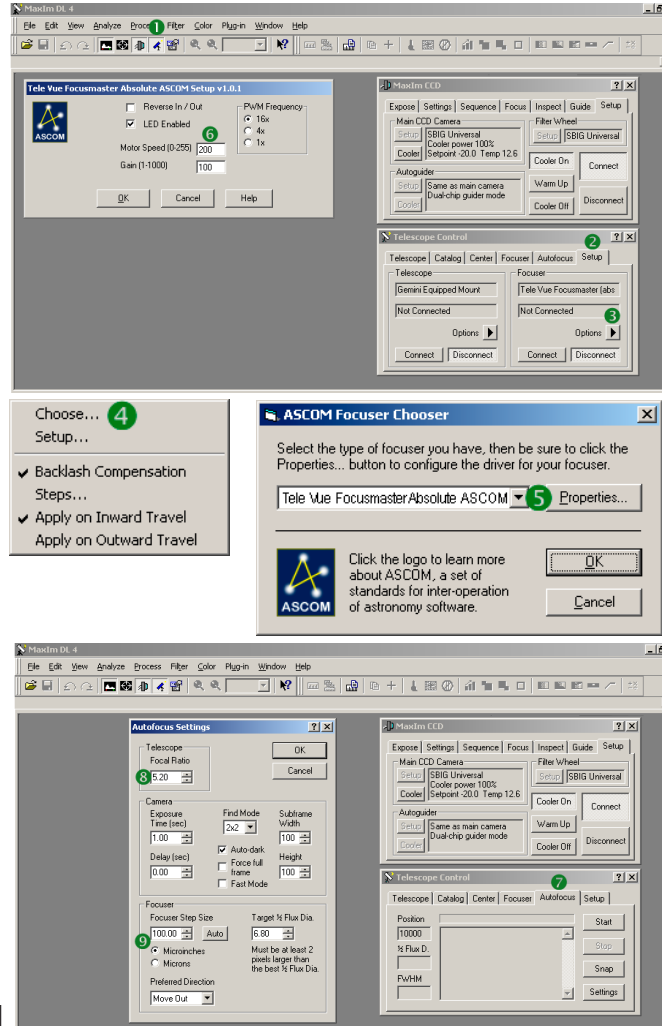


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### ASCOM Driver Setup in ASCOM-Compatible Software

Your ASCOM-compatible software must now be setup to recognize the Focusmaster™ through the ASCOM driver. The step-by-step example here uses *MaxIm DL 4*. Refer to the instructions that came with your software. Numbered steps refer to numbers on the images.

1. Start *MaxIm DL* and open the **Telescope Control** window.
2. In the **Telescope Control** window select the **Setup** tab.
3. Click the [Options] button below the **Focuser** selector.
4. Select [Choose] to display the **ASCOM Chooser**.
5. Select the Focusmaster™ driver and then click [Properties...] to open the Focusmaster™ setup dialog.
6. Optimum results can be had if the Motor Speed text box is set to 200 (refer back to first screen-shot in series). Click [OK] to return to the **Telescope Control** window.
7. Select the **Autofocus** tab of the **Telescope Control** window and click the [Settings] button to display the **Autofocus Settings** dialog.
8. In the **Autofocus Settings** dialog it is very important to set the correct value in the Telescope Focal Ratio text box. The correct value is engraved on your telescope or printed in the owners manual.
9. If using the *absolute* driver: **Focuser Step Size** should be set to 100 and the **Microinches** radio button selected. Neither setting is relevant for the *relative* driver.



### ASCOM Driver Software Uninstall

This will remove the ASCOM Driver files from your computer.

- In Start/Settings/Control Panel find *Programs and Features* (or *Add/Remove* in older versions of Windows) programs applet.
- Select *Focusmaster\_XXX\_ASCOM* (where XXX is *rel* or *abs*) and click the [Uninstall] (or [Remove] in older Windows) button to uninstall.