



LACERTA FMC

User Manual

v1.1.xx



Thank you very much for choosing our product!

The **LACERTA FMC** is an **ASCOM** compatible focusmotor controller for the **MFOC motor** with position and temperature feedback. It is an alternative to the standalone Handbox with display and buttons. Precision is 1µm and lifting power 5kg.

Key features of the full package:

- completely encapsulated gear and powerful stepper motor driving and holding >5kg
- temperature probe (approx. 180cm)
- max. positions definable (min = 0)
- backlash compensation
- Goto function (filter offset positions via Ascom compatible software)
- 250000 steps, reproducibility 0,001mm (if focuser allows for)
- ASCOM driver compatible to most software (FocusMax, MaximDL, APT, ...)
- free download of new firmware
- manual focussing possible

The content of the package (may vary if you buy part of it):

- **LACERTA FMC** controller
- capsuled Motor unit
- inlay spacer rings to mount the coupling on 4, 6, 8 and 9.5mm worms
- Temperature probe 1,8m
- USB cable, 1,9m (for PC connection)
- RJ45 cable 2m (for motor unit connection)
- DC power cable 3m with cigarette lighter plug.

Please visit Lacerta FMC website to check for drivers and additional information, firmware updates (free), or links to user discussions. Download the latest firmware files from the Support Tab (and check the readme file there):

<https://lacerta-optics.com/FMC>

Connection details:

Connections on the hand controller:



12V DC socket(5,5/2,1mm center positive) _ Power Led _ Serial Led _ USB-B mini and RJ45 to motor unit

Connections on the motor unit:



Left side:

2,5mm stereo socket (from MGEN's camera port, in the absence of a compatible program, FMC does not handle it.)

3,5mm stereo socket (to DSLR, in the absence of a compatible program, FMC does not handle it.)

Right side:

RJ45 (from handbox)

3,5mm stereo socket (temperature probe)

Connection to the focuser:

The Lacerta **FMC** is compatible to a growing number of focusers. For some focusers you will need an extra adapter ring (please refer to the MFOC website or ask), but it will fit all Lacerta and Skywatcher focusers (except the older simple R&P found on Achromates).

Using one of the 3 provided Inlays and the proper hex screws the MFOC coupler fits worms of different diameters:

- smallest Inlay - for 4mm worm
- medium Inlay - for 6mm worm
- large Inlay - for 8mm worm (Takahashi)
- without Inlay - for 9.5mm worm (Feathertouch)



Slip the spacer Inlay over the worm and align the holes with the threads in the coupler, so the screws are able to contact the worm directly. Using the proper length hex screws (2 pcs, 180° positions) fix the coupler to the worm, but at first not tightly. Move the focuser worm manually to let the coupler align with the worm, when done only then fix the coupler to the worm tightly, and the motor to the worm housing.

Technical data:

Size:	79x117x24mm (120gr)
Main power:	12V DC (9-15V) Plug size: 5.5/2.1mm, center positive polarity (with polarity protection).
Fuse:	built-in regenerating fuse

Stepper motor:	200 step/revolution, 2 phase bipolar, 800mA / coil max. current.
Motor connection:	RJ45-8p8c, pinout: 1 = Temperature signal 2 = Motor coil A-Plus 3 = Exposure signal 4 = Motor coil A-Minus 5 = +5V 6 = Motor coil B-Plus 7 = GND 8 = Motor coil B-Minus Only use with 1:1 UTP cable. NEVER use reverse UTP (cross-link) cable!
PC connection:	USB-B mini
Temperature Probe	180cm long with hole to be screwed somewhere, 3,5mm stereo jack

version 1.1.08:

- first version

Installation

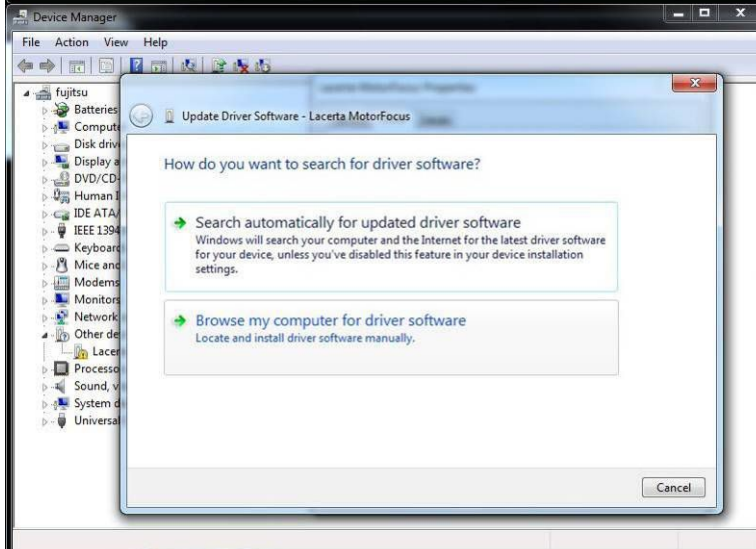
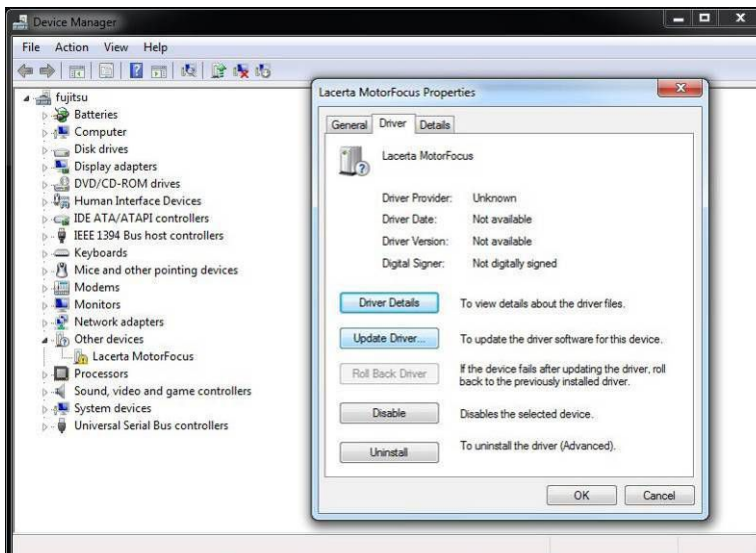
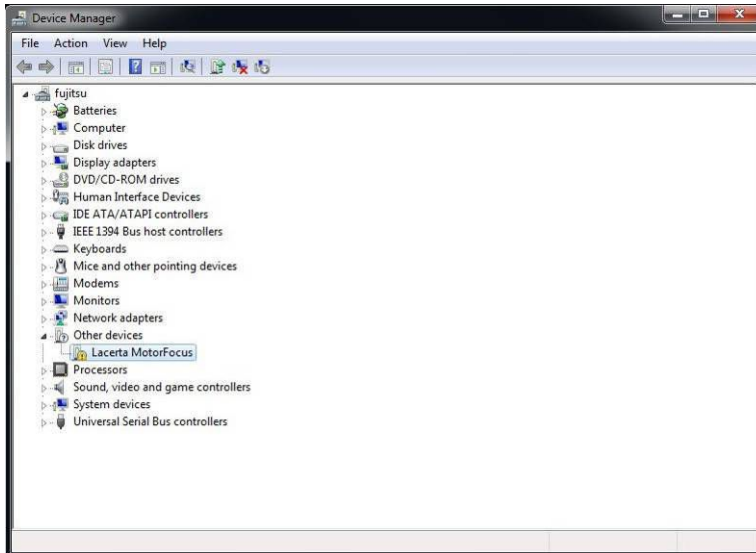
For comprehensive use of device, it's necessary to install the USB driver and PC applications first. You can see below the installation steps on a Windows 7/64 bit system

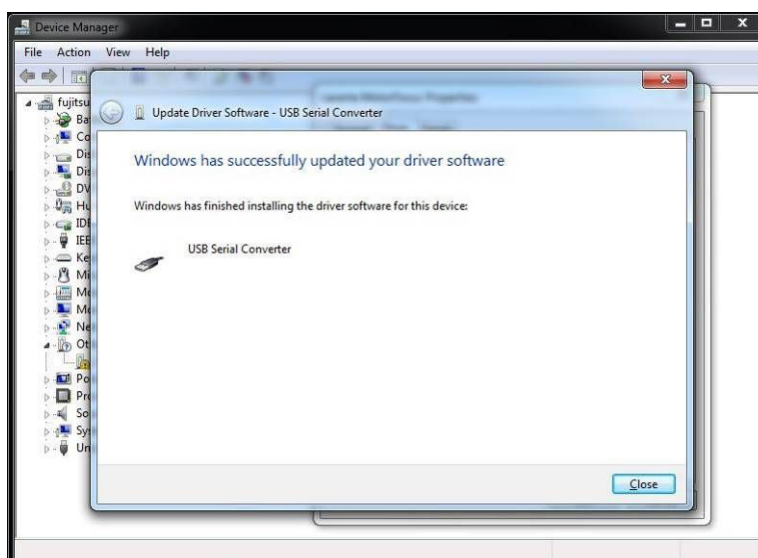
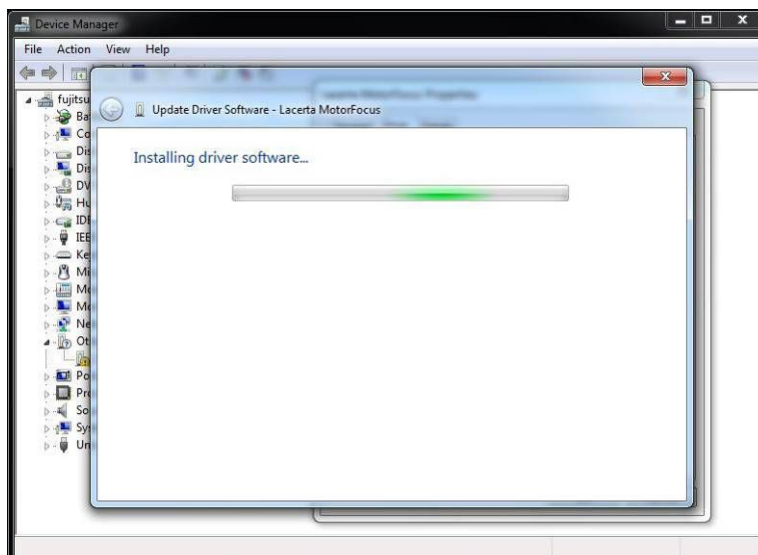
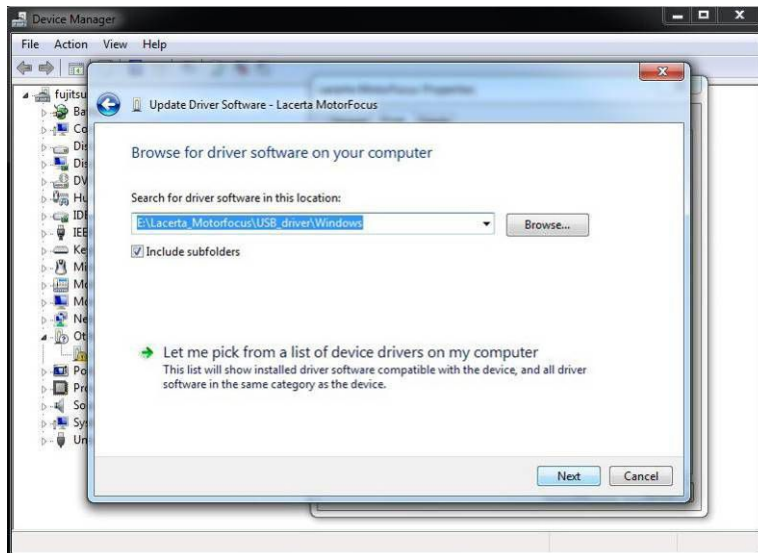
Installing the FTDI USB driver:

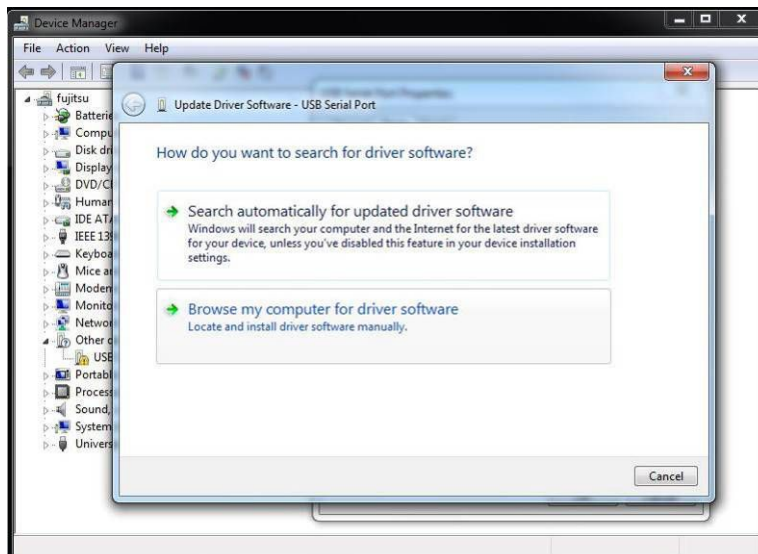
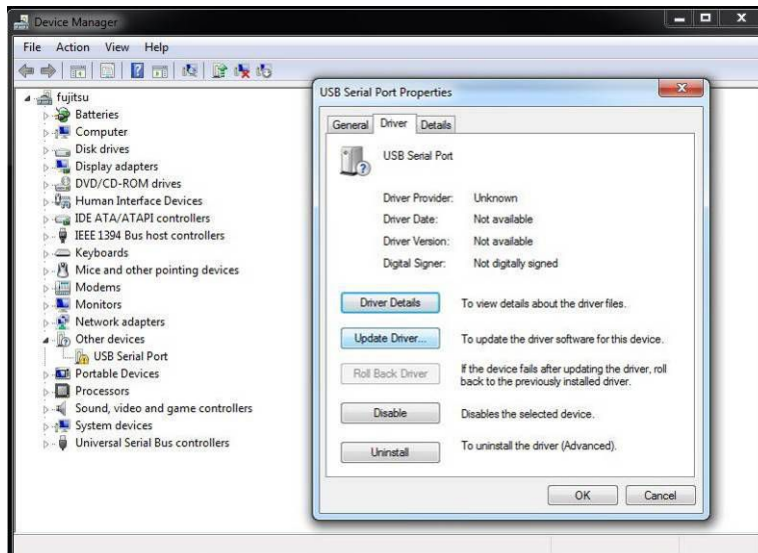
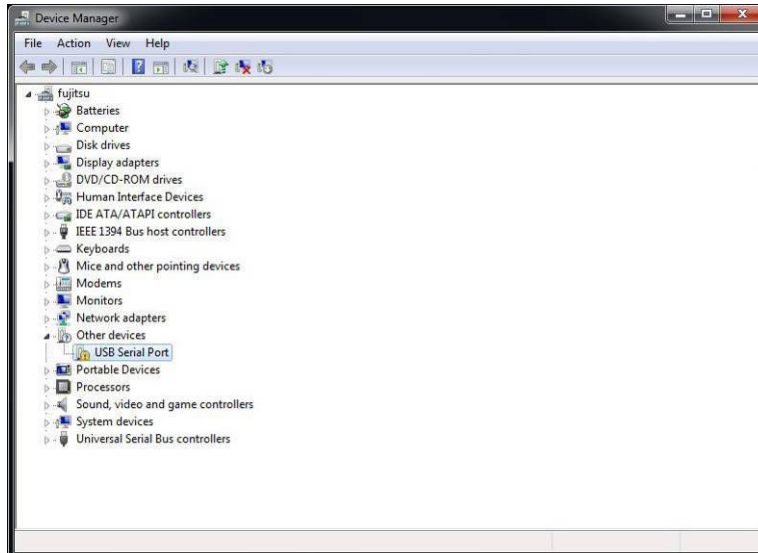
Connect **LACERTA FMC** to PC and your power supply using accessory cables. Turn on the device. The Operating System recognizes the device and it's looking for a suitable driver. If it does not find the driver automatically, the screenshots below help you to successful install the driver after opening the Device Manager. The FTDI USB driver is found either in the firmware zip file at the USB_driver folder, or you can download the newest version from the FTDI website:

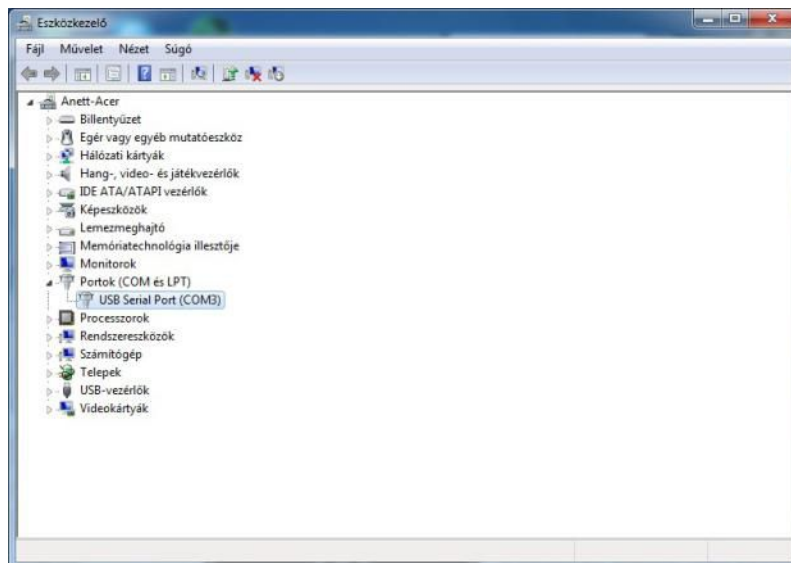
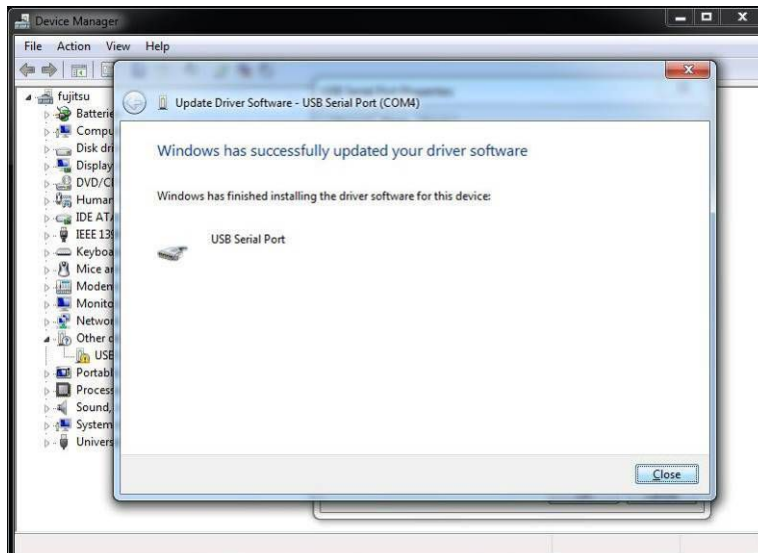
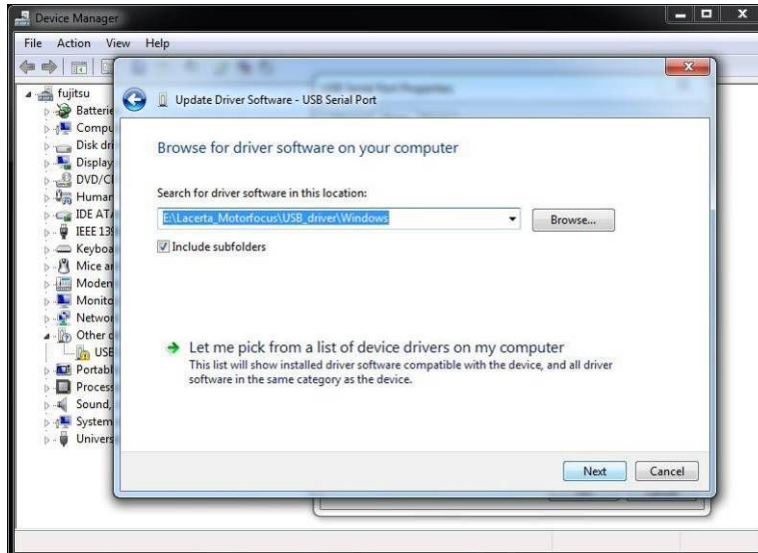
<http://www.ftdichip.com/Drivers/D2XX.htm>

(a setup executable is provided in the column at right, and you find more installation advices there, if needed)







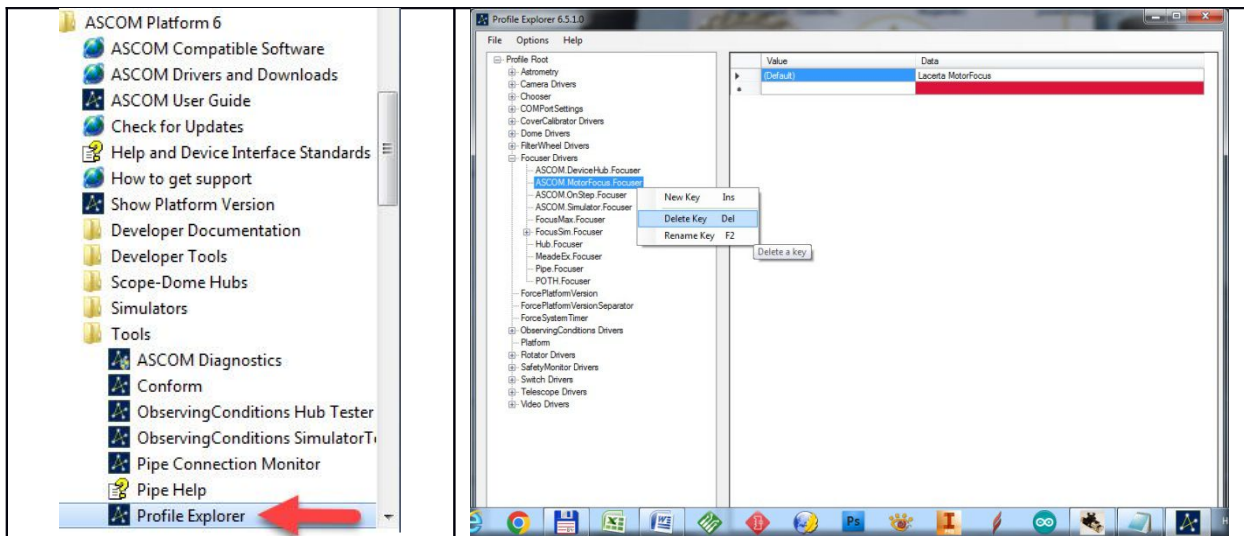


Installing the ASCOM driver:

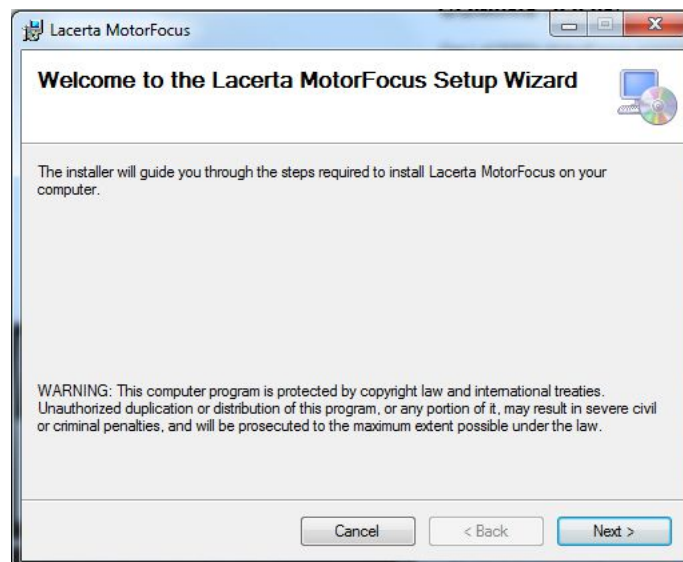
The required **setup.exe** is found in the firmware file at **x86** (32bit OS) or **x64** (64bit OS) subfolder of **ASCOM_driver** folder. **ASCOM 6.4** platform at least is needed! If it's not installed, you can download it from

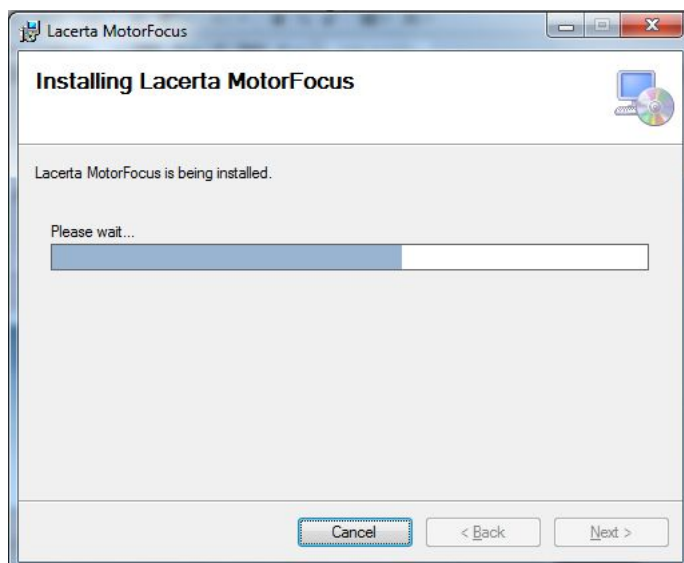
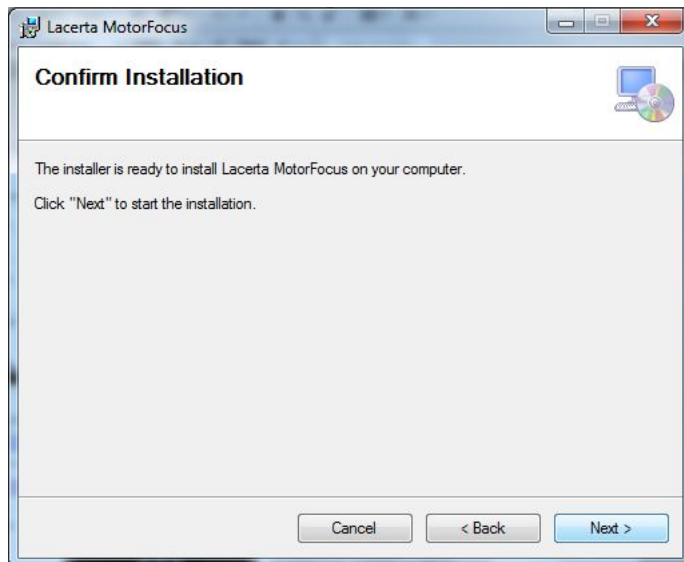
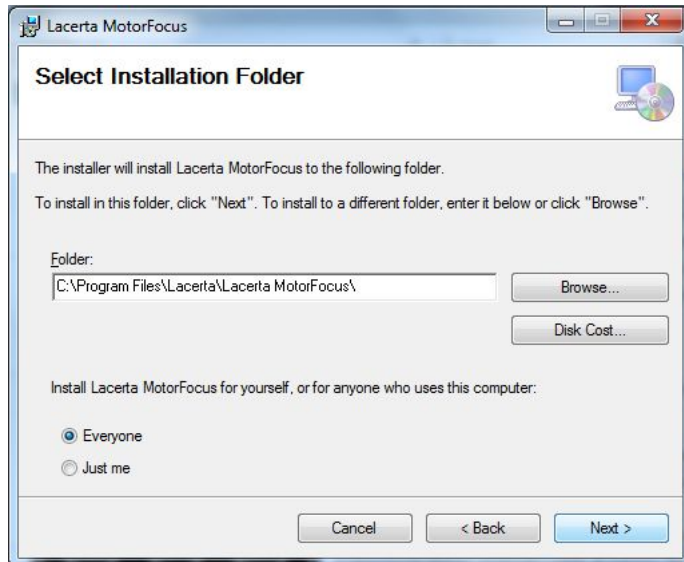
<http://ascom-standards.org/index.htm>

If an older Ascom driver was already installed, it must be deleted first. After the deletion is complete, run the Ascom Profile Explorer. If Motorfocus is visible in the list that appears, right-click on it and delete it using the delete key:



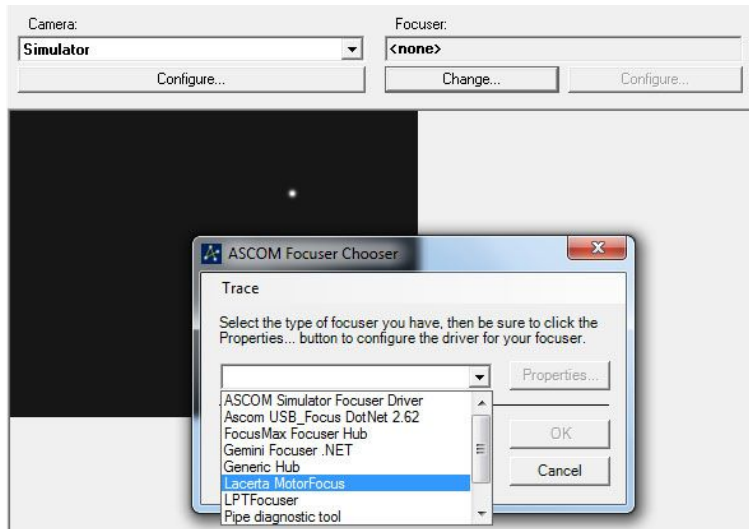
Only then start the installation:



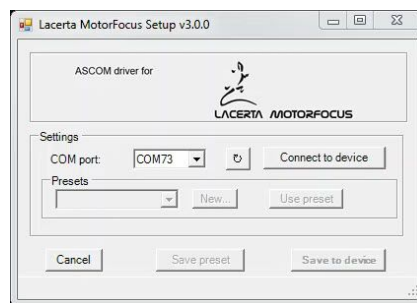


Settings of the ASCOM driver:

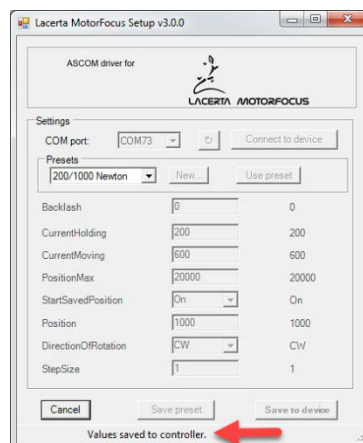
Choose Lacerta MotorFocus on the ASCOM Focuser Chooser drop-down panel in your compatible software (MaximDL, APT...).



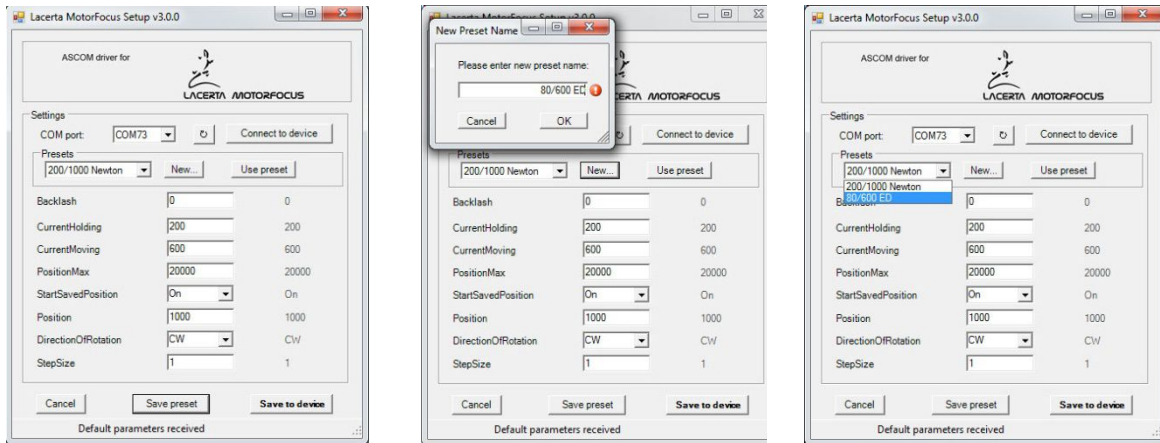
If the port was chosen previously, the device can be connected by pressing the OK button. For device parameters press the properties button.



The serial port of **LACERTA FMC** can be selected in the COM port drop-down menu. When the connection is created, parameters are loaded from Eeprom. After parameter modification click the „Save to device” button to write changes into the Controller. After successful uploading, you will receive feedback at the bottom of the window. Then we can access the ASCOM Chooser window.



Presets: It is possible to recall stored presets. Select the desired telescope from the drop-down list. Then the right-hand column shows the configuration data of this telescope. Click on the "Use preset" button to load the data to the left-hand column, where you can modify them if necessary. Use the "Save Preset" button to save the contents of the list, then select "Save to device" to load the data into the **FMC**.



Click on the "New" button to create a new list.

Write the name of the new telescope, and then click "OK" to save it. Then press the "Save Preset" button, and it will be filed to the list of configuration data.

Path to the file to store the data:

"c:\Users\xx\AppData\Roaming\Lacerta MotorFocus\ settings.json"

Save this file to another location or make sure that it is not deleted during an Ascom driver update.

Values that can be set on the Ascom Setup panel:

Backlash:

Its value should be 0 if the compensation is to be used from a PC program. If we still want the FMC to perform backlash compensation, enter the desired value here. The FMC performs backlash compensation using the uncounted step method: for every change of direction, it takes the step specified here in addition, so that the steps are not added to the display of the Position!

Current Holding:

The value of the holding current is in milliamperes. In the case of the FMC, this value can be increased to 1000mA, but in practice, we should not use a holding current higher than necessary, in order to avoid undue heating of the controller. 160-200mA is sufficient in almost all cases.

CurrentMoving:

The value of the moving current is in milliamperes. In the case of FMC, this value can be increased to 1000mA.

PositionMax:

The value of the maximum available position. It can be a maximum of 250,000, which means a 250m path with 0.001mm steps, which is

sufficient for all focusers. To avoid collisions, do not use a value greater than what our focuser allows.

StartSavedPosition:

If the value is Off, the starting position will be 0 when switched on. In the case of the On value, the starting position will be the stored (current at power-off) value when switching on.

Position:

It is possible to overwrite the current position. The value entered here will be the current position entered in the device! It is advisable to use it with a fully wrapped focuser and with a value of 0 so that the limits cannot be exceeded.

Danger of collision!

DirectionOfRotation:

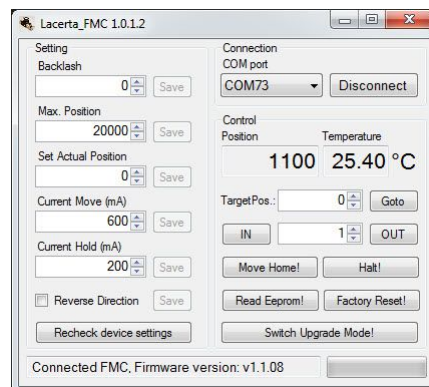
It is used to set the direction of rotation of the motor. Increasing the position value should cause the engine to move the draft outward. If this is not the case, the direction of rotation must be changed. (CW or CCW)

Step size:

It provides ASCOM with information about the movement of the focuser per motor step in microns (1 = 0.001mm).

Install and use the Lacerta FMC ClickOnce application:

Extract the "*LacertaFMC_PC_v1.0.1.2.zip*" file to a temporary directory. then start the setup.exe file from there and follow the instructions. Let's run the application:



After connecting, you can see the name of the connected device and the firmware number at the bottom of the window. After entering the values, press Enter to activate the Save button, press Enter again to load the entered data into the controller.

Adjustable values:

Backlash:

Its value should be 0 if the compensation is to be used from a PC program. If we still want the FMC to perform backlash compensation, enter the desired value here. The FMC performs backlash compensation using the uncounted step method: for every change of direction, it takes the step

specified here in addition, so that the steps are not added to the display of the Position!

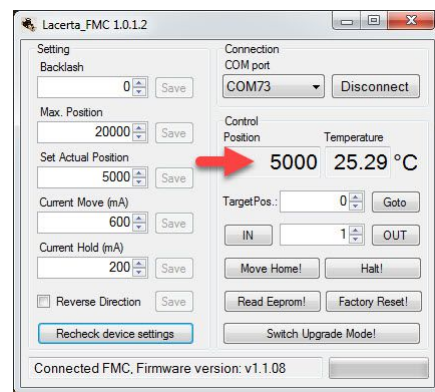
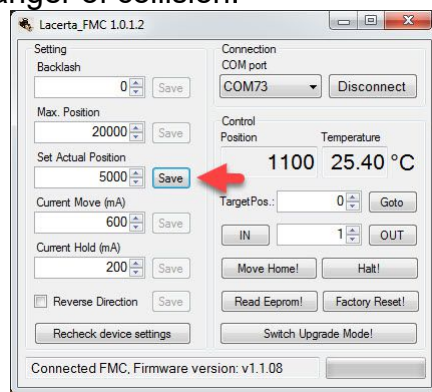
Max. Position:

The value of the maximum available position. It can be a maximum of 250,000, which means a 250mm path with 0.001mm steps, which is sufficient for all focusers. To avoid collisions, do not use a value greater than what our focuser allows.

Set Actual Position:

It is possible to overwrite the current position. The value entered here will be the current position entered in the device! It is advisable to use it with a fully wrapped focuser and with a value of 0 so that the limits cannot be exceeded.

Danger of collision!



CurrentMove (mA):

The value of the moving current is in milliamperes. In the case of FMC, this value can be increased to 1000mA.

Current Hold (mA):

The value of the holding current is in milliamperes. In the case of the FMC, this value can be increased to 1000mA, but in practice, we should not use a holding current higher than necessary, in order to avoid undue heating of the controller. 160-200mA is sufficient in almost all cases.

Reverse Direction:

It is used to set the direction of rotation of the motor. Increasing the position value should cause the engine to move the draft outward. If this is not the case, the direction of rotation must be changed, check it.

Command buttons:

The **Goto** by pressing the button, it is possible to send the draft to the desired position under Target pos. after filling in the field.

The **In/Out** can also be used to control the movement: by pressing a button, the focus pen moves with the value written in the field between them.

The **Move Home!** by pressing the button (after confirmation) the focus marker can be sent to the 0 position.

The **Halt!** the movement can be stopped at any time by pressing the button.

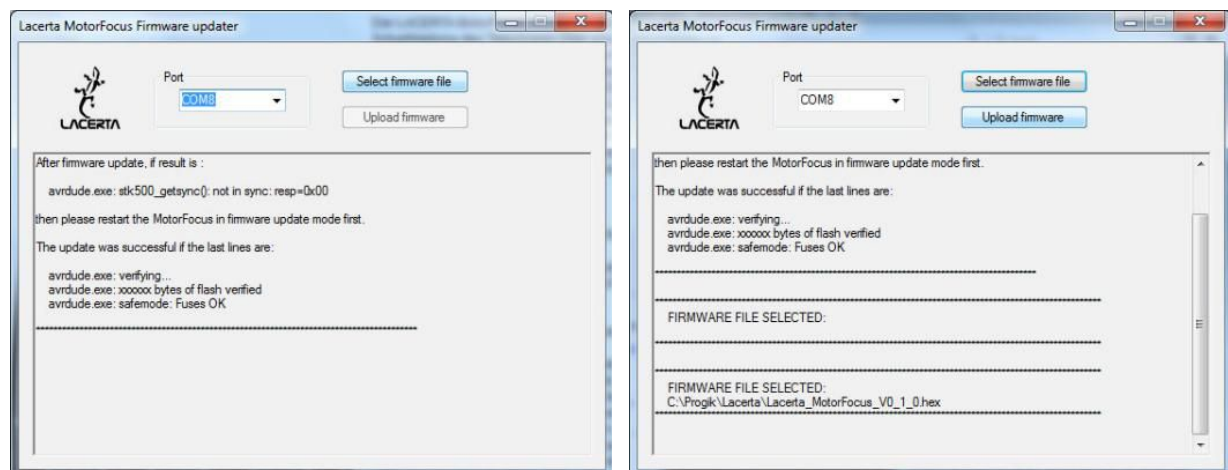
The **Read Eeprom!** by pressing the button (after confirmation), we can start saving the setting data written in the Eeprom of the device to the file. (C:\Users\...\AppData\Roaming\Lacerta_FMC, Log file is also saved here)

The **Factory Reset!** button (after confirmation) Deletes the Eeprom and after a reboot or firmware update, it is loaded with the factory values. The process is also shown by the blinking of the Power Led. After the deletion is complete, it will ask you to restart the device or put it in Upgrade mode.

The **Switch Upgrade Mode** button (after confirmation), the device goes into Upgrade mode, which is indicated by the flashing of the Power Led.

How to use the Firmware Updater:

Extract the "*LacertaMotorfocusFirmwareUpdaterV1.zip*" file to a temporary directory. We will also copy the HEX file of the program updates here, as the program opens this directory by pressing the Select firmware file button. Click on the *MotorfocusV1.exe* file to run the program. We select the port and the firmware to be uploaded. The name of the selected HEX file is shown at the bottom side of window.



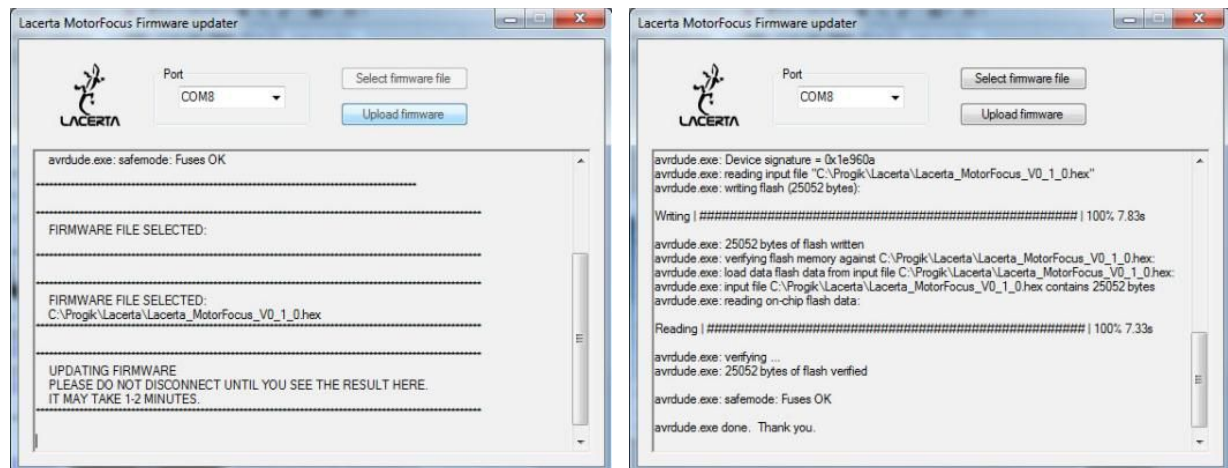
We also start the FMC_PC program, and after connecting, the **"Switch Upgrade Mode!"** button, after confirmation in the pop-up window, in the case of FMC, you can see that the upgrade mode has been entered by the flashing of the Power led. In the new pop-up window that appears, select the NO button, then Disconnect! You can then start the upload via the Firmware Updater.

If it is necessary to upload Eeprom with new starting data, then the **Factory Reset!** we use the function **Upgrade Mode!** instead of After deleting the Eeprom (which can be seen by the flashing of the Power led), it offers to put the device in Update mode.

If we choose this, we can see on the display or when the Power led flashes that the device is in upgrade mode, then Disconnect!

You can then start the upload via the firmware updater. It may happen that some anti-virus programs prevent the Updater from working. In such a case, temporarily disable our anti-virus application.

To start uploading, press the **Upload firmware** button. An uploading message at the bottom of the window shows the process status. When the uploading is in progress, the LED light of the serial communication is flashing. Red flashing is the sign of back reading.



When the process is complete, the device is restarting and the display shows the new version number.

Troubleshooting:

If you encounter problems with your **FMC**, please refer first to the following advices, before you contact your dealer. It may help to regain full functionality.

- the focuser moves out when pressing **IN**:
Reverse motor direction in motor menu
- the motor is moving, but the focuser is not:
Check if the coupler is connected properly to the focuser worm
- the motor is not moving:
is it at min or max position? Change the cable (Ethernet cable, not crossed),
See if the PIN contacts in the jacks are ok and clean
- the motor sounds irregular sometimes:
especially when not connected to the focuser worm, there are resonances
- the worm is connected, but at some rotation position it feels tighter:
make the motor fixation slightly loose and turn the worm manually, to allow
the motor to settle in respect to the focuser worm
- after firmware update the screen is dark:
restart in in update mode and do a factory reset
- when power on, **FMC** always starts with Position 0 (zero):
set **StartSavedPos** to **Yes**.
- my computer does not connect to **FMC**:

Check the USB driver installation. Sometimes it is needed to run the installer with administrator rights (right-click on setup.exe and "install as administrator")
- the temperature is not displayed:
Check if the temperature probe is plugged in properly.

We wish you clear skies and great success using **Lacerta FMC!**

