



LakesideAstro Focuser Manual V2.0.0

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System components:

Control unit
Stepper motor with 'D' type connector
Bracket to connect stepper motor to the telescope
Shaft coupler
USB cable
Stepper motor cable
12v DC power cable
Required screws etc. for fitting
Installation CD

Requirements for autofocus:

PC running XP, Vista, Windows 7 or Windows 8
ASCOM V6 or above
Suitable ASCOM compliant programs such as MaxIm DL and FocusMax
USB Port
12v DC power supply rated at 1 amp or better

Getting started with your focuser:

Fitting the stepper motor assembly

The stepper motor and shaft coupler should first be attached to your focuser. To do this you should remove the manual focus knob from one side of your telescope. This is usually the left hand side of the telescope, especially if you have a dual speed manual focuser which has the additional slow speed knob on the right hand side.

The shaft coupler is specific to a particular telescope/focuser combination, so it is important that this was specified at the time of order. This shaft coupler should be fitted to the focuser shaft in place of the knob that you have just removed.

When fitting the coupler you should ensure that it is properly located such that there is no side play in the focuser mechanism. The grub screws for the focuser end of the coupler should then be tightened to hold it in place. Please note that if the shaft on your focuser has a flat on it then the grub screws should be located on the flat as this will give a better connection.

Before you attach the stepper motor and bracket it is recommended that you position your telescope in about the middle of its focus range.

You should fit the stepper motor and 'D' type connector to the bracket with the screws supplied. Leave the stepper motor loose at first so that you can properly align the motor shaft to the coupler that you have just fitted. The bracket is telescope/focuser specific and it should be fairly obvious how it should be fitted. You may need to remove the barrel tension screw as this thread is often used to hold the bracket to the telescope.

You should ensure that the motor shaft, coupler and focuser shaft are all properly aligned to ensure smooth operation of the focuser.

Connecting the cables to the control unit

At this time you should just connect the 12v DC power to the control unit. The power cable plugs into the power socket on the control unit. The other end should be connected to a suitable 12v DC power source ensuring that the polarity is correct. (Note that the control unit is protected against reverse polarity)

You should then switch on the control unit using the slide switch to make sure that you have a proper supply to the unit. You should see the sign on message with the version number after which the AUTO mode will be displayed.

Note that you can change the contrast of the LCD display by carefully rotating the potentiometer which is behind the hole next to the ON/OFF slide switch.

Once you are happy that you have power to your control unit, switch it off and connect the stepper motor cable between the control unit and stepper motor. This cable is a flat ribbon cable and there is only one possible way that the cable can be connected.

Now switch on the unit and wait for the control unit to sign on and settle in its AUTO mode. Press and hold the centre button until you see the MANUAL mode indicated in the centre of the bottom line and then release the button.

Above the left and right buttons you should now see OUT and IN. Press and hold the IN button and you should see the position display slowly decrement. This will ramp up to full speed after a few seconds. Continue to hold the button down and observe the direction of movement of the focuser.

If the barrel is closing then the direction of the focuser is normal. If the barrel moves out then it is recommended that you reverse the direction of travel by going into the SETUP mode. See below in the Manual operation section for information on how to do this.

Before using the focuser in either AUTO or MANUAL modes you should run the calibration routine. Again, see below in the Manual operation section for information on how to do this.

Driver installation:

Before you can use the system to autofocus you must install the necessary driver onto your PC. To do this, insert the CD into any suitable drive and run 'LakesideAstro(2.0.0.x)setup.exe'. Follow the instructions on the screen to install the driver.

Note: If you are upgrading from an earlier version it is recommended that you un-install the previous version first.

The install program will check that you have the correct version of ASCOM installed.

If you wish to run two focusers from programs such as MaxIm DL V5 or independently from the chooser then you should install the second driver by running 'LakesideAstro2(2.0.0.x)setup.exe' which is also included on the CD.

You can also install the LakesideAstro Utility program by running LakesideUtils(2.0.0.0)setup.exe. This will install a simple utility program that will allow you to connect to the LakesideAstro focuser to access the setup and configuration screens and also to move the focuser using simple jog and goto routines.

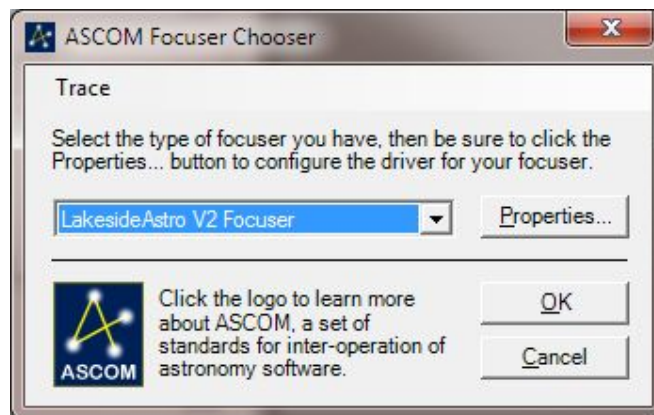
Connecting your LakesideAstro focuser to your PC or Laptop

When you first connect your LakesideAstro focuser to your PC or Laptop using the USB cable, the operating system, even if the power to the focuser is switched off, will try to install a driver for the on board USB to serial convertor. If you are connected to the internet this should just happen, but if you don't have an internet connection then use the drivers you will find on the CD. When the driver is installed you should look in the Control Panel to see what COM port has been assigned to your focuser. If you have two focusers then a different COM port will be assigned to each focuser.

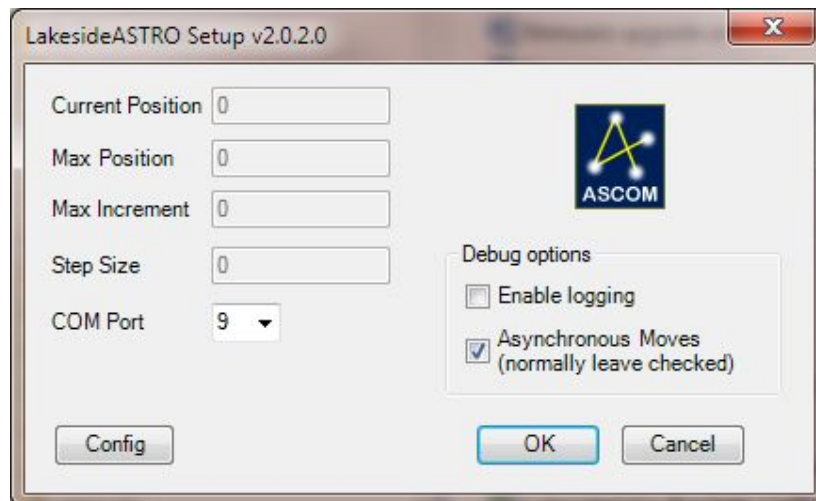
Selecting the focuser:

Once installed the LakesideAstro Focuser will appear in the ASCOM chooser list where you will be able to select the focuser.

Open the chooser using your favourite program such as MaxIm DL or FocusMax etc., and select 'LakesideAstro V2 Focuser'. If you have two LakesideAstro focusers then you could also select 'LakesideAstro V2 Focuser 2'.



You can then click on the Properties button to access the Setup screen to select the COM port you will be using. Note that although the LakesideAstro Focuser is connected to a USB port it should still be assigned to a COM port. There is on board USB to serial convertor inside the LakesideAstro controller that provides a virtual COM port. See the paragraph above about connecting to your PC or Laptop for more details.



You will also see a button marked 'Config' which can be used once the focuser is connected to view and modify some of the parameters of the system and to input temperature tracking data. See the sections on configuration and temperature tracking later in the manual.

The checkbox marked 'Enable Logging' will generate a log file if checked. This is only there for fault finding and debugging and should not normally be used.

The checkbox marked 'Asynchronous Moves' will allow you to disable such moves for software that is not properly set up to use this feature. In most cases this should be left checked so that asynchronous moves are enabled.

Autofocus operation:

Connect the USB cable between the PC and control unit.

Note that the unit will only connect to the PC if it is in AUTO mode. It will NOT connect if it is any other mode.

Using your preferred program such as MaxIm or FocusMax etc., make sure that you have correctly selected the LakesideAstro focuser and configured your COM port (see above), and then connect to the focuser.

The current focuser position and temperature should be displayed by the program.

Once the focuser is attached you should refer to the instructions for your chosen program, i.e. MaxIm or FocusMax etc., for further information about the autofocus routines.

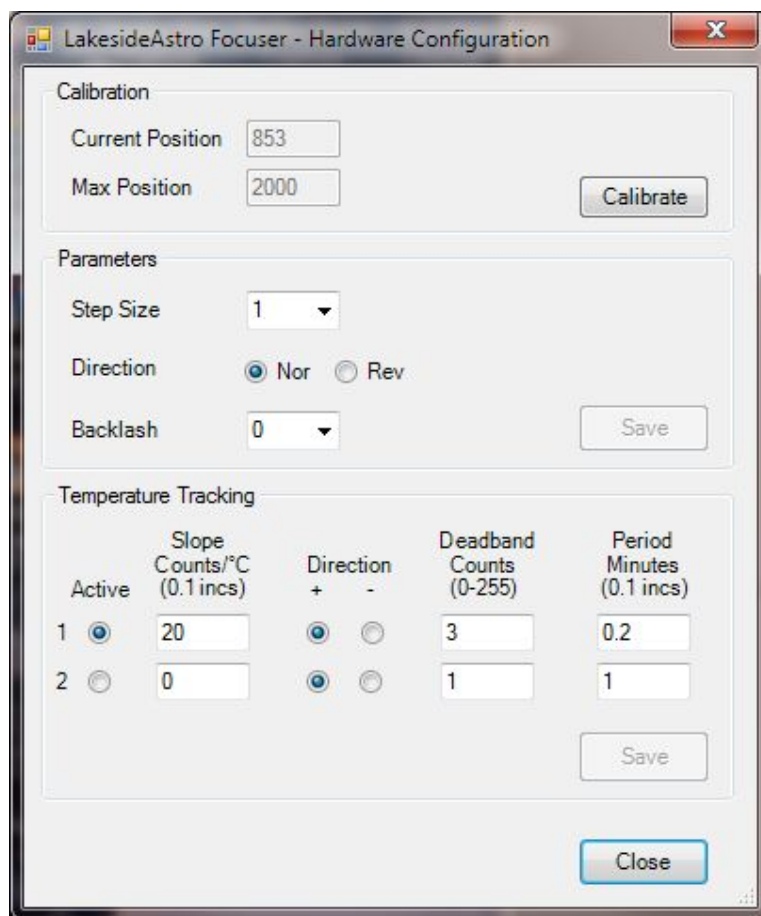
Temperature Tracking:

There are many schools of thought regarding temperature tracking. Some say it should be controlled externally, others say it can be done internally and there are those that say that it shouldn't be done at all and prefer to re-focus at regular intervals.

If you are going to do any form of temperature tracking either with routines built into the focuser or using an external program such as MaxIm DL, CCDAutoPilot or CCD Commander then you will need to have access to a temperature sensor. The LakesideAstro focuser is supplied with an external digital temperature sensor which is attached to the motor connector.

The LakesideAstro focuser has inbuilt routines that can track temperature and make adjustments to the focus position according to the temperature change and slope or gradient of the effect that a given temperature change has on the focus position. Two sets of data can be input to the focuser and selected for use as required.

The temperature tracking data is entered through the configuration screen shown below. This screen can be accessed from the Setup screen of the driver. The focuser must be connected to a control program such as MaxIm, FocusMax or the LakesideAstro Utility program before the screen can be displayed.



The temperature tracking data required is as follows:

ACTIVE

Select 1 or 2 for the active data set.

SLOPE

This is the gradient of the effect that a given temperature change will have on focuser position and is measured in focuser counts/°C, e.g. if the temperature changes by 4°C and the focus needs to be moved by 42 counts then the slope will be 10.5 Counts/°C.

For best results great care should be taken to collect data on change in focus position with temperature to enable the correct slope to be calculated. Programs such as FocusMax provide routines that can assist you in doing this, and it would be very worthwhile to do this on several occasions and under different conditions to ensure that you get the right figure. If the slope figure is wrong then as temperature changes your focus will be wrong!

DIRECTION

This determines the direction that the focuser will move the tube to track any temperature change. Click either the + or – symbols to move the tube in the correct direction. This may be different for any given setup so you will need to establish which symbol you should click for your particular configuration.

DEADBAND

This is provided to stop the focuser hunting if the temperature is fluctuating. The resolution of the temperature sensor is 0.5°C and it is likely that the temperature will flip up and down between, say, 1.0°C and 1.5°C when the sensor is close to the change point. If the sample period were short then this could result in the focuser moving backwards and forwards by however many counts half a degree relates to.

To stop this it is recommended that the deadband is set to maybe a count or so above the equivalent number of counts that relates to 0.5°C.

PERIOD

This is the frequency at which the temperature is checked to see if there has been a change. The minimum period is about six seconds, but it can be set for many minutes as required.

To use the inbuilt temperature tracking you will need to use a program that can provide the facility to switch temperature tracking on and off such as MaxIm or CCDSoft etc.

If you use MaxIm then you need to check the temperature tracking checkbox which will send a command to the LakesideAstro focuser to turn it on. Whenever temperature tracking is active you will see 'TRK' in the bottom right hand corner of the LCD display in the LakesideAstro control unit.

Note that with this method of temperature tracking the focuser may change during an exposure if the temperature changes sufficiently to require a focus change. This is because the MaxIm does not switch off the tracking during an exposure and the LakesideAstro focuser doesn't know when MaxIm is exposing. In most cases this should not cause a problem, but long focal length systems may experience some vibration when the motor adjusts the focus.

The only time that MaxIm will temporarily switch off tracking is when it calls for a focuser move, e.g. for a filter change etc. This is in accordance with the ASCOM driver rules that states that a program should not initiate a move command with tracking switched on.

It should be noted that when temperature tracking is active some programs poll the focuser for the temperature but do not poll for the position. This has the effect that the program will display a change in temperature but will not display the corresponding change in focuser position which can cause some confusion. The LCD display on the LakesideAstro focuser will however show the change in position.

Manual operation:

In addition to the fully automatic focusing functions that can be done using other third party ASCOM compatible programs, the unit can offer a comprehensive selection of manual and setup functions using the buttons and display as detailed below.

The default condition of the focuser is its AUTO mode. In this mode it is designed to be run from an external program, with the position of the focuser indicated on the screen. The left and right hand buttons are inoperative in this mode.

The centre button can be used to select other modes or options by pressing and holding it. If you press and hold the centre button it will cycle through the available modes and options. When you see the mode or option you require you should release the button. To move on to another mode or return to AUTO once again press and hold the centre button and watch the display.

A description of the available modes and options and their operation follows:

AUTO

This mode should be selected when auto focusing is required. The position of the focuser is displayed at all times.

MANUAL

In this mode it is possible to move the focuser in and out using the left and right keys to achieve focus.

To allow for fine control when manually focusing, when either button is first pressed the focuser will move slowly, then a little faster and finally full speed. If the focuser was moved at full speed initially it would be very difficult to make precise adjustments.

Once again the position of the focuser is always displayed.

PRESETS

The preset mode allows you to SAVE focus positions and then to GOTO those positions at a later stage. All saved presets are saved in non volatile memory and will be stored indefinitely.

The presets could be useful if you are using the unit in manual perhaps with different filters, or maybe swapping eyepieces or imaging equipment that have different focus positions.

GOTO

When you first enter the PRESET mode you will be asked to confirm if you want to use the GOTO routines. If you don't, then press the NO button and you will be moved on to the SAVE routine.

If you do want to GOTO a preset position then press the YES button. You will then be offered the list of available saved GOTO positions in turn. The saved position of the current preset will be displayed on the top right hand side of the display. The available GOTO positions are:

Park
Unpark
Pos1
Pos2
Pos3

The Park and Unpark presets work as a pair in that whenever you select the Park preset the current position is automatically saved as the Unpark preset. Subsequent use of the Unpark preset will send the focuser back to wherever it came from when it was last parked.

This could be useful if you have a portable system and want to close the telescope up at the end of a session, and then to return it to where it was next time you use it.

The Park, Pos1, Pos2 and Pos3 presets are user definable from the SAVE routine. To step past an available GOTO position press NO. When you reach the one you want press YES and the focuser will be instructed to move to that position. Once the move has started the centre button can be used to STOP the operation as any time.

If you step right through the sequence of available GOTO presets you will be returned to the AUTO mode.

SAVE

If you select NO when you first enter the PRESET routine you will arrive at the SAVE routine. Here you can save the current position as a preset for future use.

The list of available SAVE presets are:

Park
Pos1
Pos2
Pos3

Note that the Unpark preset does not appear in this list. This is because the Unpark routine is a dynamic preset that is automatically saved whenever you select the Park preset.

To step through the SAVE presets use the NO button. When you reach the one you want press YES and the current position of the focuser will be save in that preset.

Pressing NO right through the sequence will bring you back to the AUTO mode.

SETUP

This set of routines will enable you to calibrate and configure the system as required. The available routines are offered to you one by one and you can edit one or more of the parameters as required. In some cases, e.g. Direction, you may want to do these first and then come back to do, say, Calibration.

CALIBRATE

This routine is offered first and will allow you to easily calibrate your focuser using the buttons and LCD display. If you don't want to calibrate then press NO to step to the next routine.

If you do want to calibrate then press YES. You will then be asked to 'Set MIN', the minimum value, i.e. when the focuser is fully in.

To do this press and hold the IN key until the focuser moves in ALMOST as far as it can go in. It is not recommended to go all the way in as the focuser may hit the stop, and two or three millimetres from the end is a good position. When you are there press the set button and you will see '0' displayed as the position.

You will then be requested to 'Set MAX', the maximum value when the focuser is fully out.

To do this press and hold the OUT button until the focuser moves out ALMOST as far as it can go. The same logic applies; leave a little room at the end. You will see the position of the focuser displayed when you are moving out. When you are there press the SET button and you are done and you will be offered the next function.

Note that you could see a few strange large numbers appearing when you move the focuser in Calibrate mode. Don't be concerned as this is quite normal. You will not see this happening in normal mode.

Also note that when you have finished calibrating and using the focuser either manually or with a third party program you will not be allowed to move outside the end points you have just set.

It is very important that whenever you remove the stepper motor from the system or move the hand controller between different focusers that you re-calibrate the system before next use. Failure to do so could cause problems.

DIRECTION

This will allow you to change the direction of movement so that whenever you press the IN button the focuser actually moves in. If you need to change the direction press YES. Once you have the correct direction displayed press NO to move to the next routine.

BACKLASH

You can set the backlash value to account for any slack in a rack and pinion system or in the gearbox of the stepper motor. **Note that the value set here is ONLY used when the focuser is moved in MANUAL control. Backlash when used with a third party program is controlled from within that program.**

If you set a backlash value whenever you change direction the motor will move at high speed for however many counts you have set for backlash and will then revert to slow speed ramping up to full speed as usual. This is useful for fine manual focusing.

To set a value for backlash press YES. You can then press INC or DEC until you see the value you want, and then press SET to save it. You will then be back at the start point and unless you have changed your mind press NO to move to the next routine.

STEPSIZE

The maximum number of steps that the system can handle is 65536. The stepper motor has 4000 counts per revolution, so a focuser with, say, six and a half turns from end to end will result in 26000 counts.

There is no problem running a system with 26000 counts and I guess many people do, but it is possible with the stepsize routine to reduce this figure to a preferred value. With a stepsize of 2 the maximum number of counts would be 13000 and so on.

To change the stepsize press YES, then use the INC and DEC buttons to select the value you require and then press SET. Again you can go back and change it again by pressing YES or exiting the SETUP routine by pressing NO.

TEMP

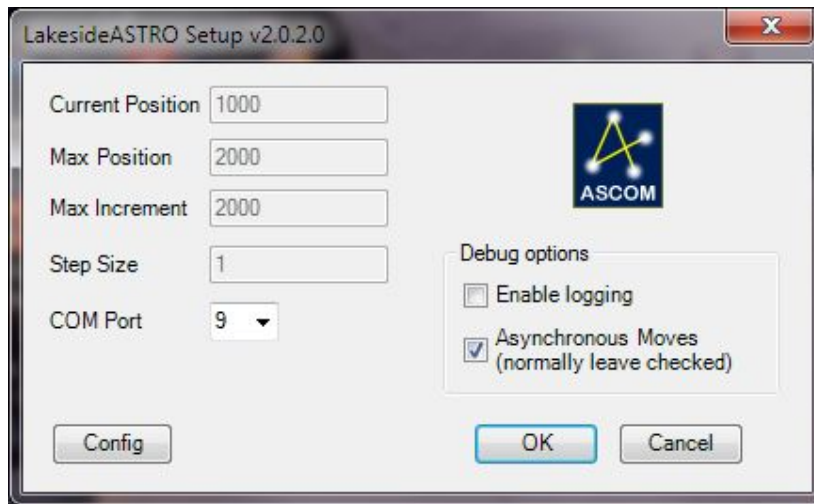
There is an external digital temperature sensor mounted on the motor connector. To view the current temperature on the control unit LCD display select TEMP.

The external temperature sensor can be used to provide temperature tracking to automatically adjust the focus position as the temperature changes. See the section on temperature tracking.

PC Configuration:

It is possible to calibrate and configure some of the parameters (but not all) from the configuration screen. Note that it is possible, and in some cases preferable, to calibrate and change these parameters using the control unit LCD screen and buttons. See the Setup instructions above.

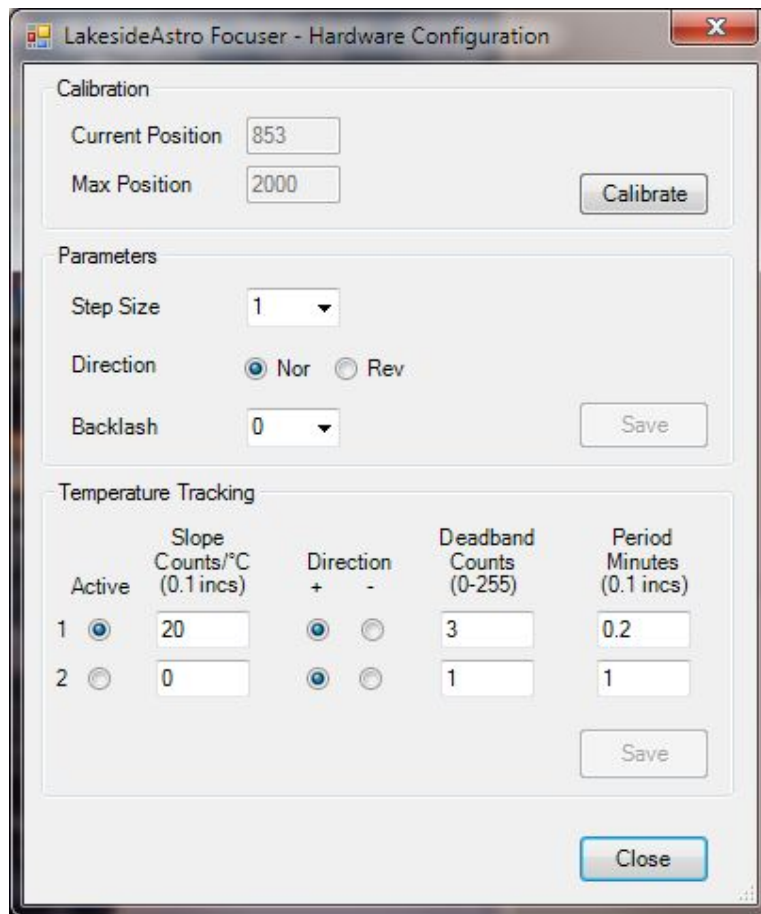
The screen also permits the entry of temperature tracking data. See the section on temperature tracking for more details.



The configuration screen is accessed from the setup screen by clicking on the 'Config' button. This screen can only be accessed when the focuser is connected to a program such as MaxIm, FocusMax or the LakesideAstro Utility program.

Note that before you attempt to calibrate you should determine the direction of focuser travel. To do this, use the manual controls on the control unit to set MANUAL (see above for full instructions) and try pressing the IN and OUT buttons.

Pressing the IN button should move the tube in. If not then change the direction parameter by clicking on 'Nor' or 'Rev' accordingly. Make sure that you save it before proceeding by clicking the 'Save' button. Note that the 'Save' button will only be active when a change has been made.



To calibrate the focuser click on the 'Calibrate' button. You will then be asked if you are sure you want to calibrate. If you click on 'Yes' you will see 'REMOTE' displayed on the control unit LCD display and 'IN' and 'OUT' will appear above the two outer buttons.

You will then be asked to move the focuser to the fully IN position. You do this using the two outer buttons on the control unit marked IN and OUT to move the focuser ALMOST all the way in. You should leave about 2mm of tube showing to prevent any possibility that the focuser could hit the stop.

When you have reached the desired position you should click the 'OK' button on the screen, after which you will be asked to move the focuser to the fully OUT position.

Again use the IN and Out buttons on the control unit to move the tube to the desired position, again leaving about 2mm of spare travel to avoid hitting the end stop. Then click on 'OK' to complete the process.

You can also edit the Stepsize, Direction and Backlash parameters from this screen.

The stepsize is effectively the resolution of the system. The maximum number of steps that the system can handle is 65536. The stepper motor has 4000 counts per revolution, so a focuser with, six and a half turns from end to end will result in 26000 counts.

With some of the larger SCTs the number of steps could exceed the maximum so the stepsize should be increased to bring the number of effective counts down within the permitted maximum of 65536.

The Direction of travel can also be selected by switching between normal and reverse direction. The setting is set by trial and error by pressing the IN or OUT button in manual mode. If the tube does not close when the IN button is pressed then the direction should be reversed.

The Backlash can also be set to the desired number of counts so that when the direction is reversed the backlash can be taken out.

Note that the backlash parameter shown here is ONLY used when in MANUAL mode. When autofocusing the backlash is handled by the controlling program.

LakesideAstro Utility Program:

This simple utility program will allow you to connect to the LakesideAstro focuser to access the setup and configuration screens and also to move the focuser using simple jog and goto routines.

Note that this routine will ONLY work with LakesideAstro focusers.

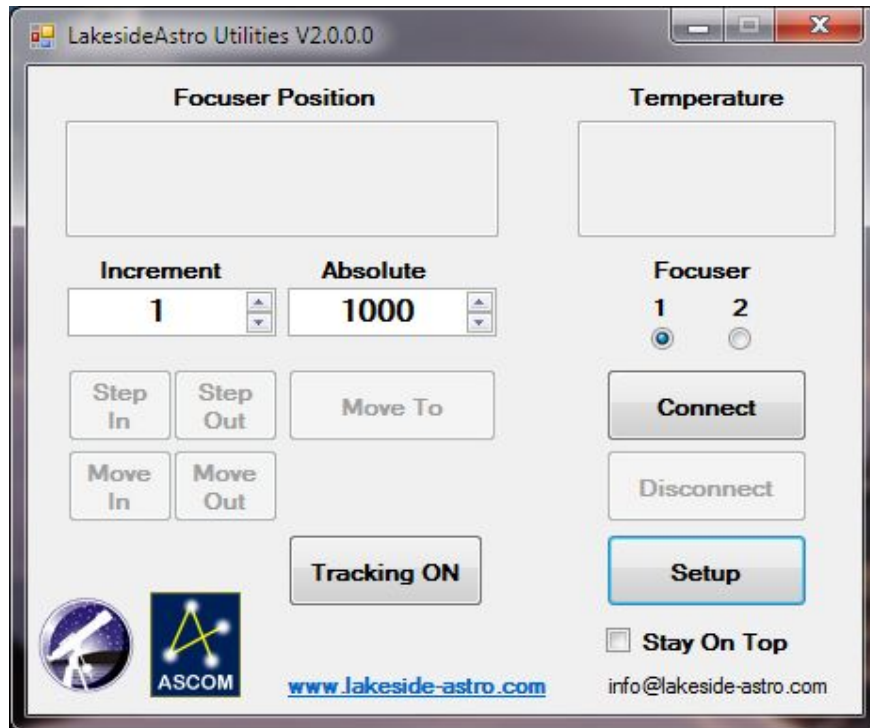
Note that the option to select one of two focusers is provided. This is because some programs, e.g. MaxIm V5 can now support two focusers. If you have one LakesideAstro focuser and another focuser from another manufacturer then it is possible to connect to both focusers at the same time using MaxIm.

If, however, you have two focusers from the same manufacturer, i.e. with the same driver name then it may not be possible to connect both at the same time because you can only run one instance of the driver.

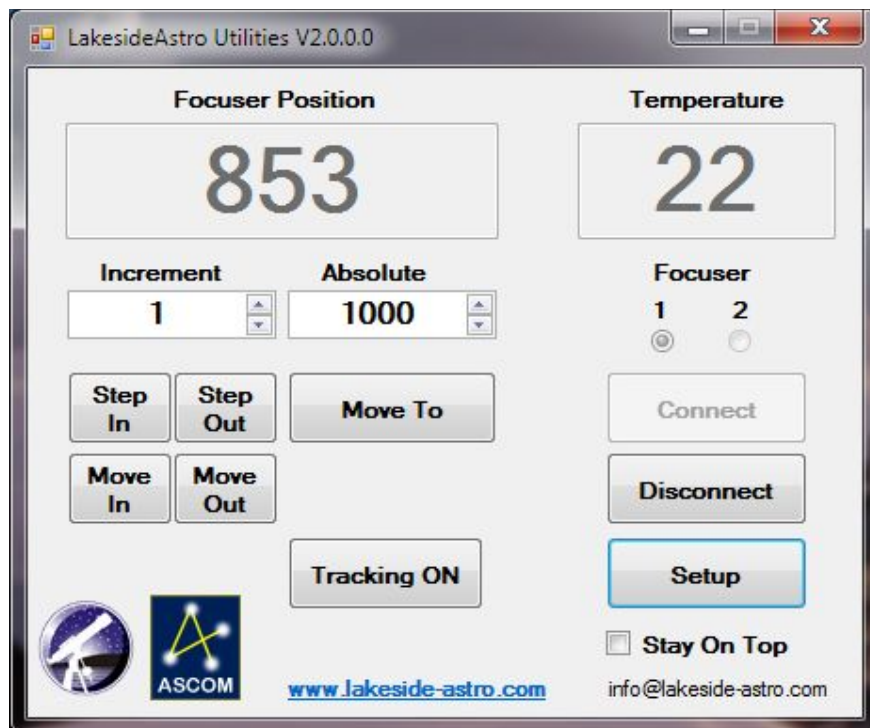
To overcome this problem we have provided a second driver with the same code but with a different name which is seen as a different driver so two LakesideAstro drivers can be run at the same time from MaxIm and from the LakesideAstro utility program.

The first focuser (1) is the original driver named in the chooser as 'LakesideAstro V2 Focuser', and the second (2) is named 'LakesideAstro V2 Focuser 2'.

The operation of the LakesideAstro Utility program is fairly basic. It does not autofocus but will allow you to move the focuser and to set and unset the temperature tracking mode. It can be used in a semi-auto mode by using the move in and out commands to move the focuser whilst watching the data and graphical displays in the MaxIm DL 'Inspect' tab.



To connect to your focuser make sure it is set to 'Auto' mode, select either focuser 1 or 2 and click the 'Connect' button. You should see something like the screen below.



Most of it is self-explanatory. The 'Setup' button gives you access to the configuration screen detailed above where you can calibrate the system or setup backlash, stepsize and temperature tracking parameters etc.

Step In / Step Out Buttons

These buttons will move the focuser either in or out the number of counts set in the 'Increment' box. If you press and hold either button you will only get one move of the focuser.

Move In / Move Out Buttons

These are similar in operation to the Step In and Out buttons expect that if you press and hold a button you will get repeated focuser moves again dependent of the number of counts set in the 'Increment' box.

Move To

This will move the focuser to the position set in the 'Absolute' box.

Stay On Top

If this box is checked the Lakeside utility screen will stay on top of other screens. This is useful if you are using the Move In and Out buttons to move the focuser whilst watching the 'Inspect' tab in MaxIm DL to adjust focus manually.

Tracking ON / OFF

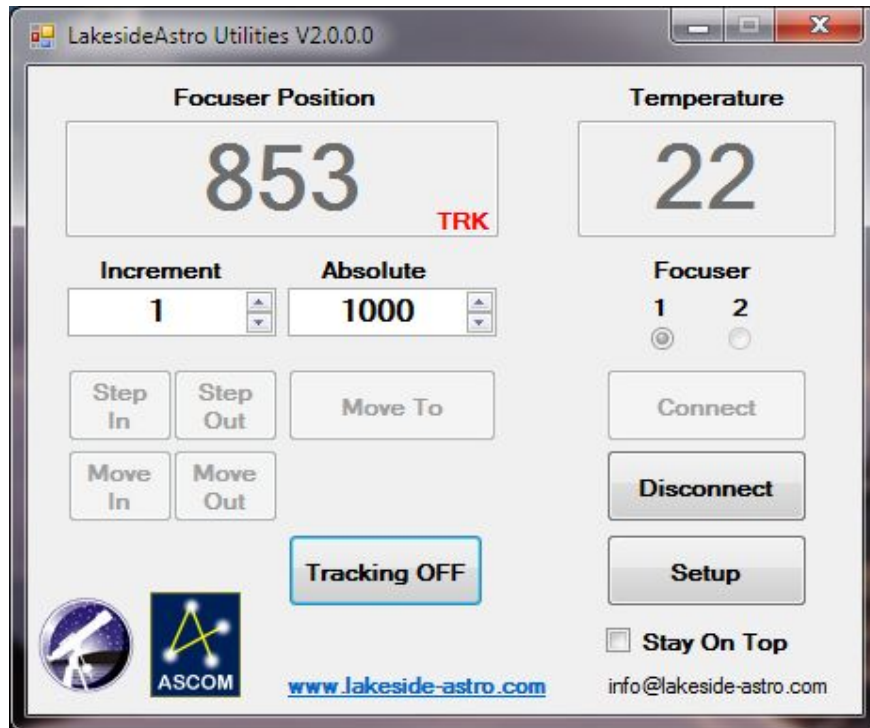
This will put the LakesideAstro focuser control box into temperature tracking mode. You will see 'TRK' on the screen in the Lakeside Utility program and on the controller digital display.

Note that for temperature tracking to work you must have first set up your temperature slope details etc. using the 'Config' screen which can be accessed from the 'Setup' routine.

Also note, that when in temperature tracking mode all other movement buttons are disabled as the movement relating to temperature changes will be controlled by the internal firmware in the LakesideAstro controller.

When in tracking mode the LakesideAstro Utility program will show the current temperature and the current focuser position even though the adjustments are made internally in the LakesideAstro controller.

See the screen below.



Click on the 'Tracking OFF' button to exit temperature tracking. If you click 'Disconnect' this will exit temperature tracking before disconnecting the focuser.