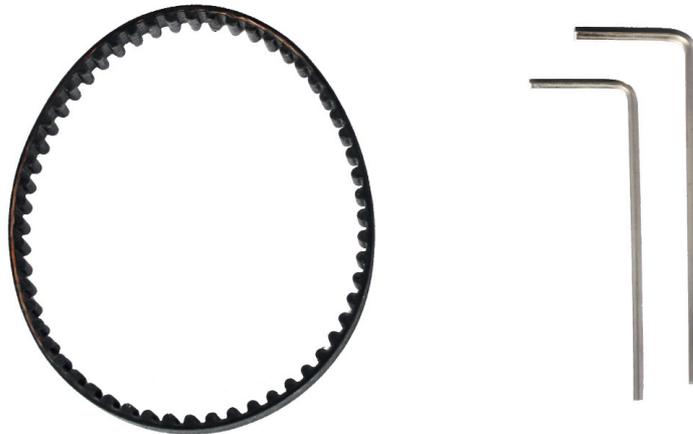


# DIAMOND STEELDRIVE

## Baader SteelTrack Focuser Motor Drive



## Baader SteelDrive Instruction Manual

– ENG ver. 09/2015 –



# BAADER PLANETARIUM

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# 1. What's in the Box

The Baader SteelDrive Focuser comes with the following:

- a. 1 pc SteelDrive unit with aluminium pulley
- b. 1 pc Transmission Belt
- c. 1 pc CDROM with drivers, software and instruction manuals
- d. 1 pc USB cable
- e. 1 pc Thermo Probe

Optional: 12V [Baader Outdoor Telescope Power Supply](#) #245 7610 and the 5,5/2,5mm adapter #245 7611, for powering the dedicated Hand Controller.

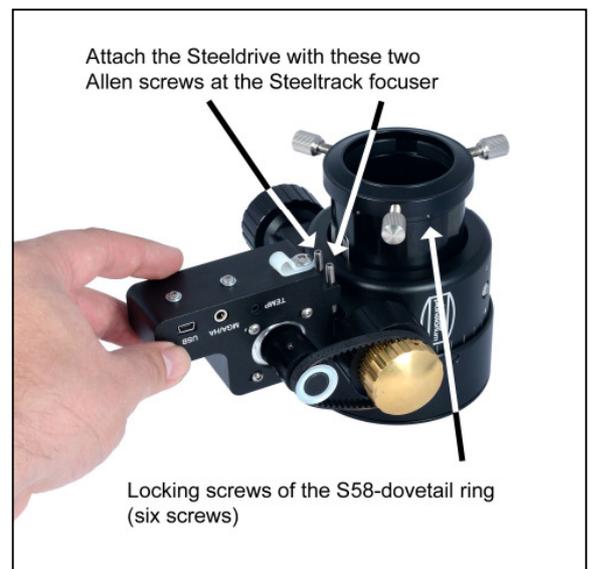
**Important Note: The dedicated Hand Controller must be connected to the SteelDrive BEFORE power is connected.**

## 2. Installing the SteelDrive

The Baader SteelDrive is straightforward to install on to the Baader Steeltrack focuser without any part of the focuser needing to be removed at all. If you use the 2" eyepiece clamp which is premounted to the Steeldrive, you need to rotate it ca. 45°. Otherwise, the lower screw would collide with the Steeltrack. Simply untighten the six Allen screws, rotate the clamp a bit with the S58-dovetail ring, and retighten the screws.

### Installing the SteelDrive to the Steeltrack Focuser

1. Screw out the 2 set screws placed each side of the SteelDrive Diamond until the black housing can touch the Steeltrack focuser base where there are placed two small dovetails. You do not need to unscrew them completely, just sufficiently so that the unit can be placed over the Steeltrack.
2. Screw in the 2 set screws so that they and the opposing part of the housing push against the small dovetails. Do not tighten yet.

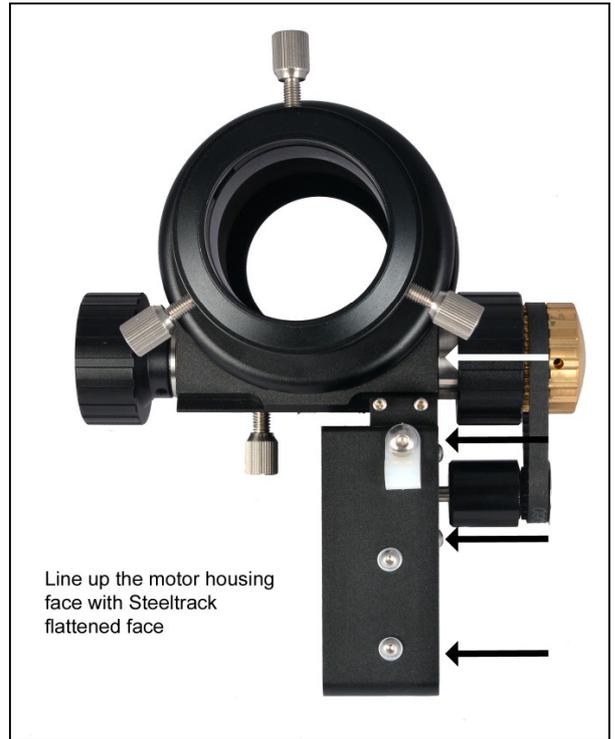


3. Wrap the belt around the Steeltrack brass gear and SteelDrive pulley.

4. Align the SteelDrive with the Steeltrack by making sure that SteelDrive motor housing is lined up with the flattened face of the Steeltrack focuser as shown below.

5. Tighten the set screws adequately (and not excessively!) until the motor housing is firmly fixed in place with no tilt or rotation with respect to the Steeltrack focuser. The belt should self-tension when the set screws are tightened.

6. Once the set screws are tightened check the belt position to ensure that it is completely free to gently rotate by hand with no force or lateral “escaping” movement, which denotes a poor co-axiality between the two pulleys.



If this happens then a more adequate SteelDrive positioning must be performed again by adjusting the set screws to ensure good alignment. In addition to this, the tension of the motor and belt can be adjusted below.

### Adjust the Tension of the Belt

When the belt is correctly aligned with the pulleys but the tension is low or too high, the stepping motor position can be adjusted until a correct tension is found.

1. Use a 2.5mm hex wrench to loosen the four screws keeping the stepping motor safely in place inside the aluminium housing.
2. The SteelDrive pulley position can be adjusted inward or outward until the correct tension is found.
3. When the belt is correctly tensioned tighten the



Correct tension is when the belt is tight but not tense, so that rotation of the brass knob is not impaired. The belt should yield about 5 mm when you tighten it by hand. The focuser can still conveniently be moved manually by hand, and the belt does not show any looseness or tendency to jump off the teeth. If the tension is too high, SteelDrive can't move the Steeltrack any longer, and it will stall.

### **Obtain Perfect Alignment with the Steeltrack Focuser**

The SteelDrive motor position can be adjusted inward or outward for a perfect alignment with the brass pulley of the pinion of the Steeltrack pinion.

1. Using a 1.5mm hex wrench to loosen the 2 set screws keeping the black pulley firmly fixed onto the stepping motor shaft adjust the motor position up and down to obtain perfect alignment.
2. Tighten the set screws once perfect alignment is achieved.
3. When the belt is properly aligned with pulleys but tension is low or too high, the stepping motor position can be adjusted till a correct tensioning is found.

### **Backlash**

Focus backlash is excess play in the focus mechanism. This should be resolved where possible on the focuser, or dealt with by using focus backlash compensation which is available in popular imaging control software. Backlash is not caused by the SteelDrive as all the teeth between the focuser unit and SteelDrive are always keeping in touch with each other through the rubber belt.

Focus slip can also occur on the SteelTrack focuser if this is not adjusted properly, more commonly when a heavy load is attached to the focuser. If slippage does occur it is recommend to adjust the SteelTrack focuser to apply more pressure to the pinion, adjusted correctly no slippage will occur.

### 3. Connecting the SteelDrive for Operation

The SteelDrive can be controlled by the dedicated Control Box or by a PC, either using the supplied SteelGo software or through ASCOM. Furthermore, the SteelDrive is provided with a Thermo probe to compensate for the focal point variation with temperature change.

#### Connecting the SteelDrive to use with the dedicated Hand Controller

**Important Note: Be sure to connect all cables first before connecting power to the unit otherwise damage could occur.**



1. Firstly connect the Thermo probe to the THERMO socket on the SteelDrive.
2. Connect the dedicated Hand Controller to the MGA/HC socket.
3. Provide power to the dedicated Hand Controller.

## Connecting the SteelDrive to use with a PC

1. Firstly connect the Thermo probe to the THERMO socket on the SteelDrive.
2. Connect the provided USB cable to the USB socket and then plug into the PC.

Power is provided to the SteelDrive through the USB cable. In rare circumstances insufficient power may be provided by your USB to the SteelDrive which is a result of a number of factors. In this situation the unit may not move correctly, not move at all, or stop responding. In order to provide sufficient power to the SteelDrive consider to:

- Use a powered hub to provide more power to the SteelDrive. The SteelDrive can absorb up to 900ma of current.
- Connect the dedicated Hand Controller in parallel to connecting to a PC. The dedicated Hand Controller can be powered in the usual way with the 12v power supply. Movement updates will be provided to both the PC and the dedicated Hand Controller by the SteelDrive so that they stay synchronised. **Power to the dedicated Hand Controller must be connected last.**
- Try using a non-active USB cable to cover long distances. In some cases active cables have shown to cause issues due to the cable itself drawing current for itself leaving less insufficient for the SteelDrive.

## 4. Operating the SteelDrive with the Hand Controller

When plugging the dedicated Hand Controller to the DC 12V power supply, the unit will immediately switch on displaying the BAADER STEELDRIVE starting logo.



A while after the STEELDRIVE logo has rolled off the screen, the **SETUP** menu will appear. Follow the instructions to correctly setup the dedicated Hand Controller for use with your Steeltrack.

### Setup Mode

This option is to choose if to run the setup mode or not. Setup is for setting the appropriate settings for your SteelDrive in order for it to function correctly with your focuser.

#### SETUP



Pressing > button (option: **NO**), the dedicated Hand Controller will go straight to the **ZEROING** function. Find more details further in the manual.

Pressing < button (option: **YES**), the dedicated Hand Controller will enter in **SETUP** mode where **MODEL**, **POS. CAL**, **BACKLIT**, **T COMP** and **T COEFF**. Functions can be adjusted for a proper functionality.

#### MODEL



Pressing < and > buttons, the following focuser options can be set: **SC2**, **NT2**, **RT2**, **RT3**, **CUSTOM**. Pressing **MENU**, the selected focuser model is set and **BACKLIT** function will be then displayed. The software has only stored the data for the original Steeldrive. For **Steeldrive Diamond**, please select **CUSTOM** and specify a gear ratio of 0.2291. If the wrong model is set, a wrong trip will be loaded and the focuser

## POS. CAL.



POS. CAL?  
YES NO

If **CUSTOM** option is set in **MODEL** menu, the dedicated Hand Controller will then ask whether to run or calibrate the **CUSTOM** focuser.

Pressing > button (option: **NO**), the dedicated Hand Controller will run the early calculated gear ratio for **CUSTOM** focuser and the **BACKLIT** function will be then displayed.

Pressing < button (option: **YES**), the dedicated Hand Controller will run the **POS. CAL.** to achieve the correct gear ratio with **CUSTOM** focuser.

**Important Note: MAKE SURE THE DRAWTUBE IS COMPLETELY RETRACTED TO ZERO POSITION BEFORE PRESSING YES TO RUN POS. CAL. OR A WRONG CALCULATION WILL BE DONE!**



POS. CAL.  
025.00mm

**POS. CAL.** will move the drawtube outward till a 25mm trip is reached.

The dedicated Hand Controller will display the left image and the user will have to set the real trip measured through the vernier scale printed onto the focuser drawtube.

Pressing < and > buttons, the position value will, respectively, increase or decrease by 0.1mm step. Pressing **MENU** button, the dedicated Hand Controller will automatically calculate the **CUSTOM** focuser gear ratio and **TRIP MAX** function will let the user to manually edit the trip with **CUSTOM** focuser.

## TRIP MAX



TRIP MAX  
050.0mm

Pressing < and > buttons, the trip value shall, respectively, decrease or increase by 5mm step.

Pressing **MENU** button, **POS. CAL.** will calculate and save all the useful parameters with **CUSTOM** focuser and the dedicated Hand Controller will lead to the **BACKLIT** function.

## BACKLIT



BACKLIT  
FIXED ON

**BACKLIT** function allows the dedicated Hand Controller backlit adjustment.

Pressing < and > buttons, the following options can be set: **LCD OFF** (the

LCD will turn off in a few seconds when the unit will stand by), **FULL OFF** (both the LCD and the pushbuttons will turn off in a few seconds when the unit will stand by) and **FIXED ON** (both LCD and pushbuttons will always stay on). LCD and pushbuttons can be turned on again upon pressing any button.

Pressing **MENU** button, the **T COMP** function will be displayed.

### T COMP.



Pressing < and > buttons, the following options can be set: **ON – OFF** (default: **OFF**). When the function is **ON**, the compensation will be activated, **OFF** will turn it off.

If **OFF** option is selected, **MENU** button will lead the dedicated Hand Controller to the **SAVE** function.

If **ON** option is selected, **MENU** button will lead the dedicated Hand Controller to the **T COEFF** function for further adjustment.

### T COEFF.



Pressing < and > buttons, the following options can be set: **TC1, TC2, TC3, TC4, TC5** and **SET**. TC stands for Temperature Coefficient and the dedicated Hand Controller can save up to 5 values named as printed in

the screen.

**SET** will allow the Coefficient value editing by pressing < and > buttons.

Range is **0.01–0.50** °C/mm (step: 0.01). For example, a **T COEFF** set to **0.20** will compensate the focuser position by  $\pm 0.20$ mm when the temperature will change by 1 °C degree. Pressing **MENU** button, the dedicated Hand Controller will lead to the **SAVE?** function.

### SAVE?



Pressing > button, the dedicated Hand Controller (option: **NO**), will not allow any saving and the dedicated Hand Controller will go through the

Pressing < button (option: **YES**), will allow the saving of all the adjustable options within SETUP mode and the dedicated Hand Controller will then lead to the **SAVING** function whenever a **T COEFF** is adjusted. In such a case, the TC number will blink, press < and > buttons to set the saving position, **MENU** button will save the Coefficient in such a position.

### **SAVING..**



SAVING..  
TC1 0.15

The TC number will blink, press < and > buttons to set the saving position, then press **MENU** button to save the Coefficient in such a position and permanently store the value for future use. Any previous value is overwritten.

### **Run Mode**

When powered up, the dedicated Hand Controller can promptly run the **ZEROING** function a while after the starting BAADER STEELDRIVE logo has rolled off the screen.

### **ZEROING**



ZEROING  
STOP

The **ZEROING** function will completely retract the focuser drawtube to achieve the absolute zero position. Pressing the **MENU** button, the **ZEROING** can be stopped in any time.

*Important Note: Be aware that the Vernier scale on the focus drawtube is set outwards slightly. If you want the value reported by the SteelDrive through the dedicated Hand Controller to match this scale, stop zeroing and manually align the Focuser drawtube to the zero position on the Vernier scale. In most situations it is not important to align the scales.*

### **STATISTIC**



000.00mm  
\* ±00.0c

Celsius degree.

The top line displayed on the screen is showing the absolute position of the focuser drawtube, in mm unit. The bottom line is showing the temperature detected by the probe supplied with the STEELDRIVE, in



±0.00mm  
\* ±00.0c

The \* symbol displayed on the left side of the temperature will advise the **T COMP** is on and the STEELDRIVE will automatically compensate the focus shift due to the temperature variation during the night.

When compensating, the dedicated Hand Controller will switch in a few seconds the absolute position into relative by showing the variation of the tube position during the stand-by period.

Pressing < and > buttons, the absolute position will be again displayed and the focuser drawtube will move back and forth within the position range determined by the focuser model.

Pressing **MENU** button, the dedicated Hand Controller will lead to the **SETUP** mode.



Keeping **MENU** button pressed for 2 seconds, the dedicated Hand Controller will display the **POWER** message for a short time while saving all the parameters, then it will power off the device.

## 5. SteelDrive Software and Drivers

### Supplied Drivers

The CDROM supplied with SteelDrive includes all the required files for a complete PC control.

Files included in the CDROM:

- **EXAR Driver (Focuser driver).....ver. 1.8.0**
- **ASCOM Platform (ASCOM platform).....ver. 6 SP1**
- **ASCOM SteelDrive Focuser Driver (ASCOM driver).....ver. 1.0.6.1**
- **STEELGO Controlling Software (dedicated software).....ver. 1.1.15**
- **Instruction manual**

## 6. Installing the Software and Drivers

Earlier versions of ASCOM Platform 6 may not work correctly; the latest version is 6 SP1 and is required for a correct control of the SteelDrive through the PC.

Drivers should be installed into the PC according to the below listed sequence.

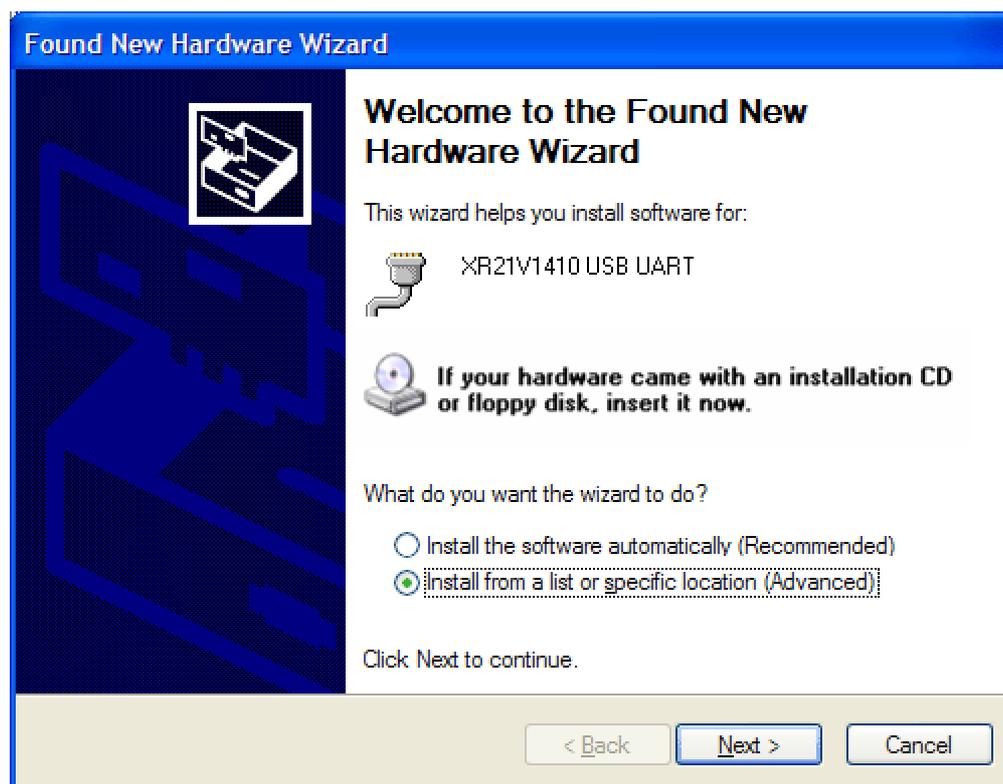
1. Install EXAR Driver
2. Install ASCOM Platform V6 with SP1
3. Install ASCOM SteelDrive Driver
4. Install SteelGo Controlling Software

### 6.1 Install EXAR Driver

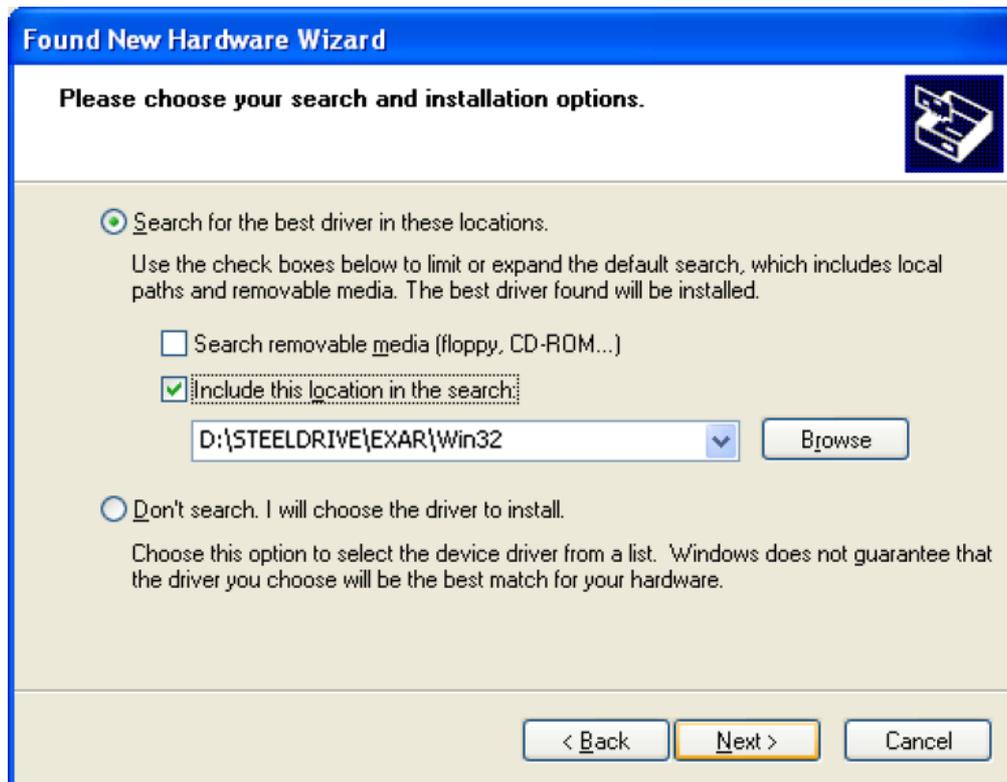
1. Plug the SteelDrive to the PC through the USB cable supplied following the correct connection sequence described in section 3 of this manual. You can always find the most up-to-date software at [Baader-Planetarium.de](http://Baader-Planetarium.de).
2. When the 'New Hardware' wizard will pop up, follow instructions step by step as pictured on the next page. If you're using Win 8 or above and Windows SmartScreen stops the execution of the app, click on Further Information and then on Install anyway (or similar buttons)



3. Click **NO, NOT THIS TIME** and click **NEXT**



4. Select **INSTALL FROM A LIST OR SPECIFIC LOCATION** and click **NEXT**



5. Select **INCLUDE THIS LOCATION IN THE SEARCH**

6. Press **BROWSE** to locate the <DRIVE LETTER>:\STEELDRIVE\EXAR\Win32 or Win64 directory according by your 32 bit or 64 bit Windows system. Once this directory is selected press **NEXT** and follow instructions prompted on the screen.

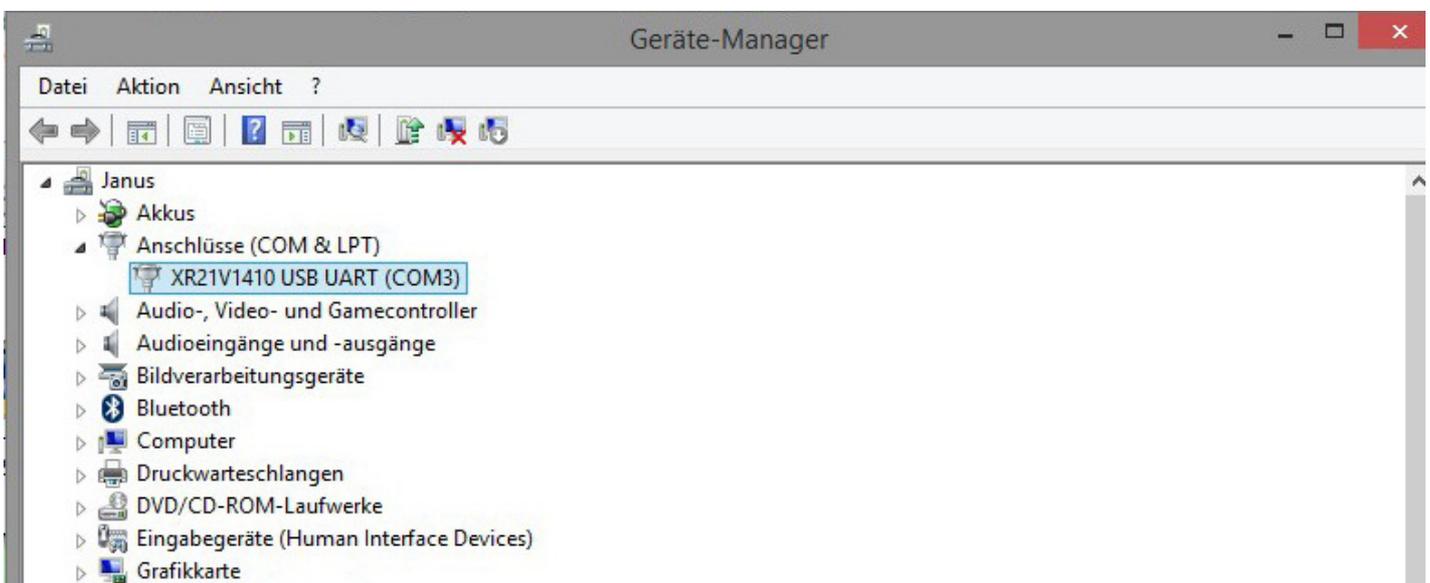


7. When the driver has been successfully installed, click **FINISH** and the SteelDrive will be ready to be used and controlled by the PC through the ASCOM driver.

If the driver wasn't installed properly or if Windows insists on automatically installing a driver, but can't find one, you'll have to install it manually. To do so, open the device manager, chose the unknown device and click on Search for Driver (or a similar button, depending on your Windows version). Now you can install it manually as described above.

### After successful installation of the EXAR-driver

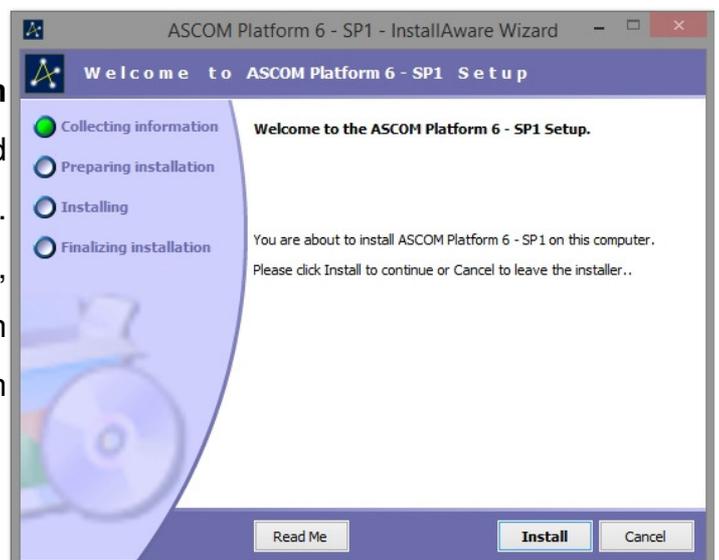
Once the driver is installed, please open your device manager and click onto PORTS (COM & LPT). Here you can see the port which is used by the Steeldrive. Use this value in the ASCOM-settings. In this example, Steeldrive uses COM3.



The port can change if you use a different USB-port.

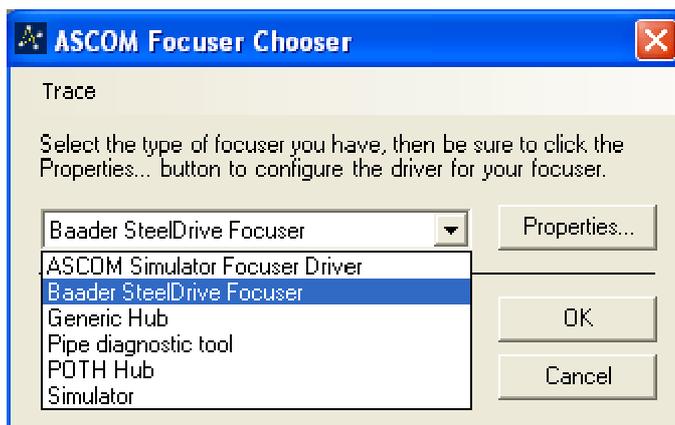
### 6.2 Install ASCOM Platform V6 with SP1

1. Double click above **ASCOM Platform 6SP1 setup** file and follow instructions displayed on the screen to install the ASCOM Platform v. 6. If this platform is already installed into the PC, there is no need to remove it to install this version unless you are coming from an earlier version which is below the requirements.

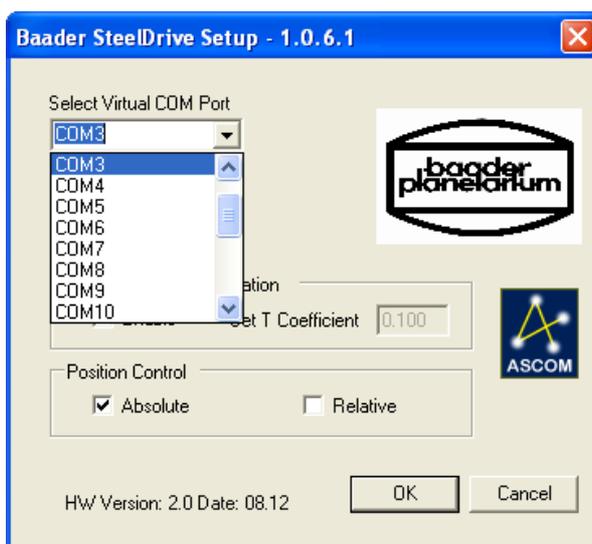


## Install ASCOM SteelDrive Focuser Driver

1. Double click Baader SteelDrive Focuser setup file to install the dedicated ASCOM driver and STEELGO Software which will let the SteelDrive PC control by all the ASCOM compliant software in the market.
2. Click **NEXT** to get started with installation, then follow the on-screen instructions.
3. When the driver has been successfully installed, the **Baader SteelDrive Focuser** option will be listed among other ASCOM devices installed in the PC as pictured here.



4. Select **Baader SteelDrive Focuser** option and click above **Properties** to set correct model.
5. Select the **Virtual COM Port** as seen in the Device Manager, then the pre-set **Focuser model** will be automatically loaded together with pre-set T Coefficient.



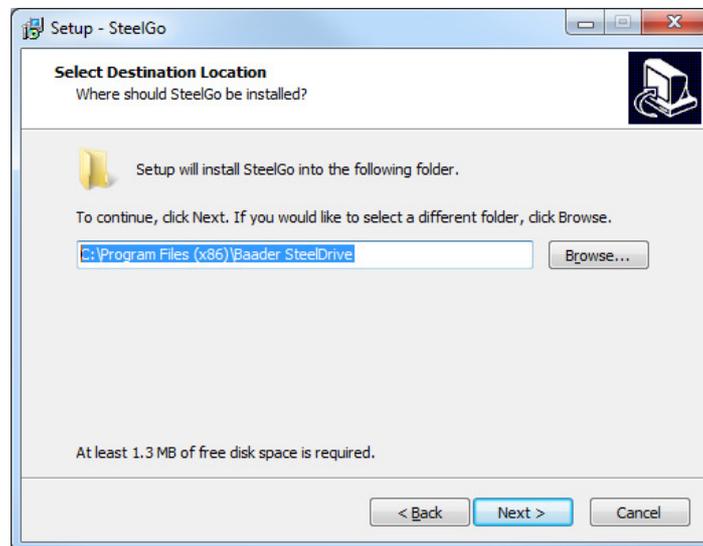
Please note, the latter two Position Control parameters are called back from the SteelDrive device, so there is no need to manually set them.

Nonetheless, both the **Model** and **T Coefficient** can be adjusted in any time and these will be then stored into the SteelDrive device for future re-use with both the PC and with the dedicated Hand Controller.

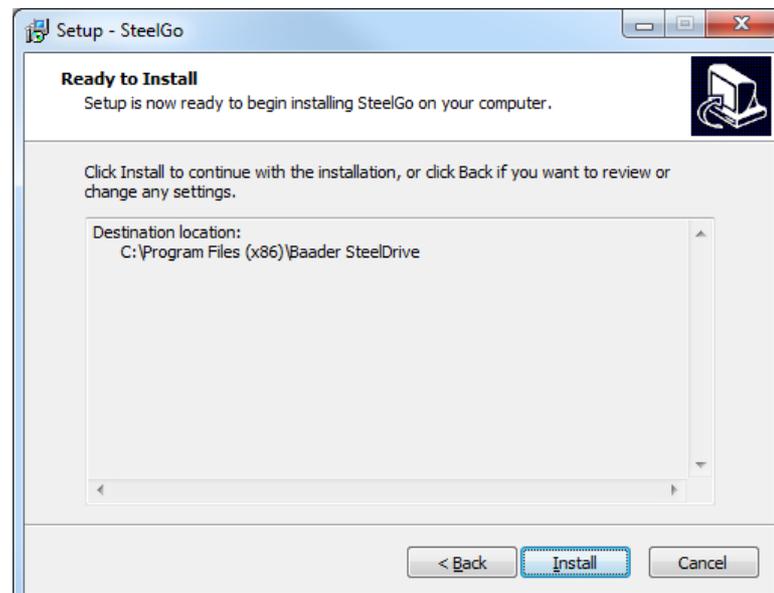
6. The SteelGo Software will be then installed and accessible from the **Windows Start Menu**.

### Install Baader SteelGo Controlling Software

1. Double click Baader SteelGo setup file to install the STEELGO Controlling Software which allows full control and calibration of the SteelDrive.
2. Click Next to continue the setup.



3. Select the destination where SteelGo should be installed and click Next.





5. Click Finish to close the installer.

## 7. Using SteelGo Controlling Software

### Requirements

The SteelGo Controlling software allows the SteelDrive Focuser control through the PC. The SteelGo Controlling software requires only the EXAR driver to be installed and does not rely on ASCOM.

### Updating SteelGo

SteelGo software is installed when you install the ASCOM SteelDrive driver. However, the program doesn't require any installation as it is a standalone executable. To update the software just decompress the latest zipped EXE file and replace the older EXE version saved in **Windows Start Menu**.

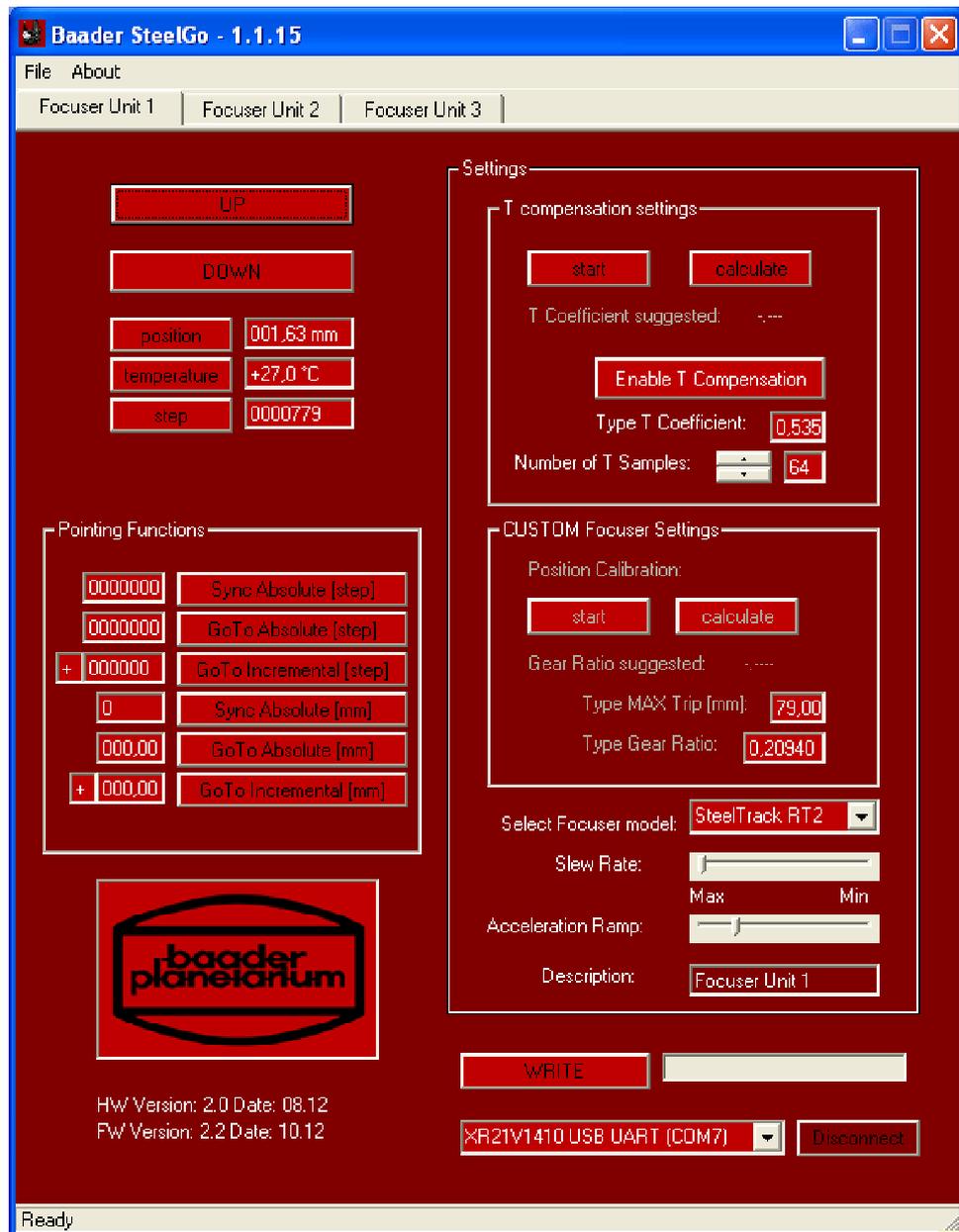
Future software releases and further documentation is available for free download here:

<http://www.baader-planetarium.de/updates/steelgo.htm>

### Controlling the SteelDrive with SteelGo

SteelGo allows complete control of up to three SteelDrives. With SteelGo you can:

1. Move the focuser inwards and outwards.
2. Move the focuser to an absolute position
3. Move the focuser using defined incremental steps
4. Sync the focuser Vernier scale with the software
5. Enable and disable temperature compensation
6. Set the temperature compensation coefficient
7. Set parameters for custom focuser



## UP

The focuser is moved outward.

## DOWN

The focuser is moved inward.

## POSITION

The position value (in mm unit) is displayed real-time updated every two seconds.

## TEMPERATURE

The temperature value is displayed real-time.

## STEP

## **POINTING FUNCTIONS**

**SYNC ABSOLUTE [STEP]** – Sync the step to be the value you define.

**GOTO ABSOLUTE [STEP]** – The focuser is moved to the position defined (in step unit). Sign + means a positive increment (outward). Sign – means a negative increment (inward)

**GOTO INCREMENTAL [STEP]** – The focuser is moved with the increment defined (in step unit). Sign + means a positive increment (outward). Sign – means a negative increment (inward)

**SYNC ABSOLUTE [MM]** – Syncs the SteelDrive position in mm

**GOTO ABSOLUTE [MM]** - The focuser is moved to the position defined (mm unit)

**GOTO INCREMENTAL [MM]** – The focuser is moved with the increment defined (mm unit)

## **SETTINGS**

### ***T COMPENSATION***

**START** – The self-learning T COEFF function will start by saving the present temperature.

**CALCULATE** - When the temperature will be significantly changed during the night (0.5°C or more), the STEELGO will suggest the T COEFF by pressing this button.

**WRITE T COEFF** – This button will save the T COEFF into the SteelDrive device for future re-use.

**ENABLE T COMPENSATION** – The T compensation can be enabled or disabled.

**NUMBER OF T SAMPLES** – The SteelGo will take this amount of samples to be averaged for a smooth (128 samples) or rough (16 samples) T compensation.

*Important Note: Once the temp compensation is enabled the focuser can continue to compensate even when disconnected from the software providing the SteelDrive remains powered via USB.*

## CUSTOM FOCUSER

**START** – The self-learning Position Calibration will move the focuser outward till a 25mm trip is reached.

**CALCULATE** – When the motor has stopped, the absolute 25.00 mm position will be displayed. Adjust this value by typing the effective trip measured.

**GEAR RATIO SUGGESTED** – This is the gear ratio of the focuser calculated by SteelGo.

**TYPE MAX TRIP [MM]** – Type the effective trip measured into the SteelDrive device.

**TYPE GEAR RATIO** – Enter here the gear ratio of the focuser.

**PLEASE NOTE:** These options are only available if you selected CUSTOM as focuser model. **For all Steeldrive Diamond models, you must select "CUSTOM" and enter 0.2291 as Calculated Gear Ratio. At "Type Max Trip", please enter 30, 40 or 80mm, depending on the model.**

## OTHER FUNCTIONS

**SELECT FOCUSER MODEL** – Set the proper model of the SteelTrack focuser.

**SLEW RATE** – Adjust the max speed with GoTo and manual movement with UP and DOWN buttons.

**ACCELERATION RAMP** – Adjust the speed profile when the SteelDrive is speeding up.

**WRITE** – Push this button to send any new value with T COMPENSATION, SLEW RATE and ACCELERATION RAMP to the SteelDrive device.

**VIRTUAL COM PORT** – Select the COM Port where the SteelDrive is plugged in.

*Important Note: ALL THE CHANGES WILL ONLY TAKE EFFECT WHEN WRITE BUTTON IS PRESSED*

Settings

T compensation settings

start calculate

T Coefficient suggested: -

Enable T Compensation

Type T Coefficient: 0,100

Number of T Samples: 64

CUSTOM Focuser Settings

Position Calibration:

start calculate

Gear Ratio suggested: -

Type MAX Trip [mm]: 300

Type Gear Ratio: 0,2291

Select Focuser model: Custom

Slew Rate: Max Min

Acceleration Ramp:

Description: Focuser Unit 1

WRITE

XR21V1410 USB UART (COM3) Disconnect

## 8. Troubleshooting

*Important Note: The correct connection sequence should always be used when connecting to the SteelDrive. See section 3 of this manual for connection sequences.*

Problem	Resolution
<p>Temperature is not being detected by SteelGo or ASCOM</p>	<p>There are two retaining screws keeping the circuit board in place. In rare circumstances it is possible for the circuit board to move inside the SteelDrive housing. A symptom of this is play in the circuit board positioning which may affect obtaining a good connection for the thermo probe, dedicated hand controller or USB. To correct this carefully push the circuit board up against the inside of the SteelDrive on the side where the connection sockets are located and tighten the two screws until no more play is present. This ensures that the sockets on the circuit board protrude far enough through the casing so that a good connections can be made with the cable plugs.</p> <p>If this does not resolve the problem then contact your supplier.</p>
<p>SteelDrive loses connection and is not controllable. A reboot is sometimes required to clear the problem.</p> <p>An error is present on the SteelDrive device.</p>	<p>This is typically due to insufficient power reaching the SteelDrive.</p> <ol style="list-style-type: none"> <li>1. Try to ensure your USB connections have sufficient power by using powered USB hubs.</li> <li>2. Use good quality USB cables.</li> <li>3. Avoid using Active USB cables as these take up power to boost signal which leaves insufficient power for the SteelDrive. Active USB cables are OK when used in conjunction with a powered hub and power requirements of all connected devices are considered.</li> </ol>
<p>The SteelDrive moved too far/or less.</p>	<p>This is commonly caused by incorrect parameters saved in the SteelDrive.</p> <p>To resolve use SteelGo and ensure that the correct SteelTrack focuser is selected. Press the Write button to save the values.</p>
<p>The SteelDrive moved 1mm too far.</p> <p>The SteelDrive Vernier scale does not match what the software reports as the Focuser position.</p>	<p>On some SteelTracks the vernier scales does not match what is reported in ASCOM or SteelGo. The Vernier scale actually starts 1mm up the focuser. This is usually not an issue as the scale is only used for manual focussing. When using the dedicated Hand Controller or SteelGo/ASCOM application those readings would be used instead.</p> <p>You can sync the Vernier position to the SteelDrive by using the SteelGo software Sync Absolute (mm) function. See section 7 of this manual on how to use SteelGo to sync the position as reported by the Vernier scale.</p>
<p>The rubber belt jumps on the</p>	<p>Incorrect tension is applied to the SteelDrive belt See section 2</p>

SteelDrive Focuser / SteelTrack	of this manual to correctly adjust the tension of the SteelDrive belt.
The SteelDrive does not move at a constant speed.	The SteelDrive Pulley/Belt is not correctly aligned with the SteelTrack Focuser which can cause the speed to fluctuate as the tension varies. See section 2 of this manual to correctly adjust the Pulley and Belt alignment with the SteelTrack Focuser.
There is backlash in the SteelDrive or connection to the SteelTrack.	<p>Focus backlash is excess play in the focus mechanism. This should be resolved where possible on the focuser, or dealt with by using focus backlash compensation which is available in popular imaging control software.</p> <p>Backlash is not caused by the SteelDrive as all the teeth between the focuser unit and SteelDrive are always keeping in touch with each other through the rubber belt, unless the belt is incorrectly tensioned, then it will jump.</p> <p>Focus slip can also occur on the SteelTrack focuser if this is not adjusted properly, more commonly when a heavy load is attached to the focuser. If slippage does occur it is recommend to adjust the SteelTrack focuser to apply more pressure to the pinion, adjusted correctly no slippage will occur.</p>
The SteelTrack cannot be manually focused by hand.	The rubber belt tension is too high. Adjust the tension of the rubber belt so that the Focuser is free to move by hand. See section 2 of this manual for instructions on how to correctly adjust belt tension.
The SteelDrive doesn't move smoothly or stalls	<ul style="list-style-type: none"> <li>- The tension of the belt is too high</li> <li>- The power supplied through the USB port is too low.</li> </ul>

## 9. Technical Specifications

### STEELDRIVE

focuser supported	SteelTrack NT2", SC2", RT2", RT3", CUSTOM
Power Supply	USB port or Jack 3.5mm stereo, 6-14V DC
Maximum current absorption	900 mA
Minimum Drawtube Feed	2.3 microns
Maximum Drawtube Speed	1 mm/sec

### MOTOR

Size and Model	Nema 14 - 1.8° Stepping motor
Bipolar Torque	9.9 Ncm
Voltage and Current	4.2V – 700 mA
Resistance and Inductance	6.0 Ohm – 7.5 mH
Housing material	Aluminum CNC machined
Color	Black, hard coating with silky gloss finishing
Total Weight	225g
Dimensions	(HxLxW) 78x58x30mm
Material	Aluminum CNC machined

### PULLEY

Material	Aluminum CNC machined
Color	Black anodized
Dimensions	(DxL) 24x26mm
Number of teeth	18

### TRANSMISSION BELT

Material	Neoprene, Fiberglass reinforced
Dimension	wide: 6mm, length: 168mm, pitch: 3mm (HTD)

### CONTROL BOX

Housing	ABS, black colour
Keypad	Membrane, 3 red backlit pushbuttons
Display	2x8 characters, red backlit
Power Supply	Jack 3.5mm stereo, 6-14V DC
Maximum current absorption	900 mA
Weight	110g
Dimensions	(LxWxH) 105x72x25mm

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