

Temma Driver

Table of contents

Introduction	3
What's new	3
Revision History	3
Getting Started	6
System requirements	6
Installing	7
Using the Temma Driver with Client Apps	7
Using the Temma Driver with Thesky 6	10
Using the Temma Driver with Thesky X	11
Getting help and reporting driver issues	11
Temma Mount Setup Window	13
Advanced Features	13
GPS	13
Automated Mount Safety	14
Initialization	15
Mount Configuration	17
Offset Scale	17
Site Setup	18
Telescope	18
Temma Handbox Window	20
Flip Mount	20
Guide Correction Speeds	21
High Precision Slew	22
Meridian Delay	22
Miscellaneous Frame	24
Mount Safety Timer	25
Parking	26
Power Voltage	28
Save Current Position	28
Slew to Prior Coordinates	28
Syn to Alt/Az	28
Sync To Zenith	28
Tracking Rates	29
Troubleshooting	33
Resources	34
Cable Drawings	34
Driver Updates	35
Join the YAHOO! Temma Users Group	35

Introduction

This help file describes how to configure and operate the Temma V2 ASCOM Telescope driver.

The Temma V2 telescope driver supports the ASCOM Telescope Driver Interface standard V2.0.

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What's new

Temma V2 ASCOM driver features:

- 100% compliant with ASCOM Platform 6
- Improved logging capabilities
- Improved operation and many bug fixes (see [version history](#) for details)
- Adheres to the ASCOM Telescope V2 Standard.
- Hand box window that provides comprehensive status and control over mount operations.
- The Temma driver is a telescope "hub", This allows multiple ASCOM client applications to connect simultaneously without the use of POTH.
- Provides custom RA/Dec tracking rates.
- Provides PulseGuide support.
- Allows custom tracking rates.
- Added CHM style help file to set-up Window

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Revision History

- 6.2.0 - Fixed bug in slew settle time
- 6.1.25 - Added automatic discovery of Temma mounts to the setup dialog box
- 6.1.24 - Fixed bug that prevented parking to low Altitudes when Meridian delay was implemented
- 6.1.23 - Testing
- 6.1.22 - Added ability to switch Pole scope offset display to display HA of Polaris or PoleFinder offsets
- 6.1.21 - Add option to default Windows color scheme
- 6.1.20 - Added Polar Scope offset calculations to setup window for all Tak polar scopes.
- 6.1.19 - Testing
- 6.1.18 - Fixed bug in polar scope offset calculation when DST, minor color scheme changes

- 6.1.17 - Fixed bug that halted high precision slew when bad data was received from client, enhanced error logging
- 6.1.16 - refined alt az position reporting
- 6.1.13-15 - testing
- 6.1.12 - Added 'tracking off' notice when connecting
- 6.1.11 - Fixed bug in 'Tracking Off on Connection' logic
- 6.1.10 - Fixed bug in 'Tracking Off on Connection' logic AGAIN!
- 6.1.9 - Fixed bug in 'Tracking Off on Connection' logic
- 6.1.8 - Refined the formula used for Adaptive King Tracking Rate based on Mel Bartels' <http://www.bbastrodesigns.com/scopeToSky.html>
- 6.1.7 - Fixed bug that asked to unpark when the 'SyncZ' button was pressed even though the mount was not parked
- 6.1.6 - Finally zapped bug preventing tracking off on connection
- 6.1.5 - Fixed bug causing freezes when displaying init window
- 6.1.4 - Fixed bug preventing site Hemisphere from being retained
- 6.1.3 - Fixed bug preventing parking at 0 Alt/Az positions
- 6.1.2 - Fixed pesky bug preventing tracking off
- 6.1.1 - Fixed bug preventing tracking off on connection

Major Release:

- 6.1.0 – Redesigned all windows to be dark adapted friendlier
 - Added Meridian Delay feature to defer mount flips
 - Fix several bug hampering proper application of Meridian flips
 - Added a 'large font' check-box to correct clipping of captions when Windows screen font sizes are enlarged
 - Added chm help file
- 6.0.29 - Disallow calls to 'Sync-Z' when mount is parked.
- 6.0.28 - Made Handbox move directions and speed sticky
- 6.0.27 - Fixed a bug preventing the proper increasing/decreasing keeping count of client connections
- 6.0.26 - Added error handler for 'error 13' message when 'Sync to Alt/Az' was clicked without first setting a park position
- 6.0.25 - Fixed bug that did not register driver properly on new system installations
- 6.0.24 - Added feature to apply an offset to the RightAscension after unparking. The offset is equal to the elapsed time between powering the Temma on and unparking
- 6.0.22 - Refined GOTO precision
- 6.0.23 - Fixed bug reporting declination
- 6.0.21 - Renumbered for release
- 6.0.20 - BETA - Fixed a bug that prevented synchronous slewing, initial startup modes now do not make mount slew in wrong directions, reduced mount polling issues
- 6.0.19 - Fixed bug that invoked high-precision pulseguide slews for manual moves
- 6.0.18 - Recompiled to correct corrupt installer, no other changes

- 6.0.17 - Added display of EM-200/400 polar scope offset to Setup Dialog window
- 6.0.16 - Fixed end of slew bug preventing final pulseguide slews introduced in v6.0.15
- 6.0.15 - Added additional slewing = false detection
for supplying the code snippets and support implementing this new feature).
- 6.0.14 - Refined pointing for GOTOs, added new feature that corrects pointing errors after slews via PulseGuide Commands Special thanks to Hartmut Bornemann
- 6.0.13 - Fixed bug that sent wrong declination seconds coordinates, added MoveAxis commands back (experimental)
- 6.0.12 - Fixed Let SideOfPier to flip mount then allow additional slews on that side of the Meridian
- 6.0.11 - Changed log file to write coordinates in HMS and DMS format
- 6.0.10 - Made log form topmost and added check for missing log file
The log file is also accessible from the Setup Dialog's menu bar.
- 6.0.9 - Added log file to report positions before and after slews, and after a sync (filename = Temma_Log.txt, located in the public documents folder)
- 6.0.8 - Fixed bug that allowed slews in wrong direction after unparking
- 6.0.7 - ASCOM Conform validation
- 6.0.6 - Fix bug that momentarily reported SideOfPier unknown after a slew
- 6.0.5 - Fix bug that prevent correct RA and Dec reporting when multiple clients were attached
- 6.0.4 - Added feature to flip scope for best advantage before an imaging run
- 6.0.3 - Fixed bug that kept instance of driver alive if setup dialog was opened and mount not connected
- 6.0.2 - Fixed bud that prevented East Longitudes in setup
- 6.0.1 - Added 'Sync to Alt/Az' feature
- 6.0.0 - Fixed bug preventing flip when button pushed, removed automatic flip

Getting Started

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System requirements

Software

1. A computer running in Windows XP, Vista, or Windows 7 operating system (32-bit or 64-bit).
2. ASCOM Platform 6 (or later) must be installed.
3. .Net Framework 3.5 must be installed (a requirement of the ASCOM platform).

Hardware

1. Takahashi Temma, Temma 2, or Temma 2M mount.
2. A computer with a serial port or USB/Ethernet to serial port converter.

Note: Users should avoid Keyspan USA-19HS serial adapters, BSOD crashes occur when used with the ASCOM Temma driver. The crash dump file points to the Keyspan driver, this issue was reported to Tripp Lite on 12/12/10. BSOD occur from flaws in kernel level drivers, the ASCOM TEMMA driver is user level, indicating a hardware fault or a buggy kernel mode Keyspan driver.

3. A Serial cable to connect a PC to the telescope.
4. Power Source

Select the appropriate power setting from the 'Power' drop-down box. You must have the appropriate 24 volt power supply to run at the 24 volt high slew rates.

High Speed Drive	Working Voltage	
	DC12V	DC24V
EM-400 Temma2	250X	500X
EM-10 Temma2 Jr.	120X	250X
EM-200 Temma2 Jr.	120X	250X
EM-200 Temma2	350X	700X
NJP Temma2	175X	350X
EM-500 Temma2	260X	520X
EM-200M	700X	Not Supported
EM-400M	500X	Not Supported
EM-12M	150X	Not Supported

Installing

Before installing the Temma V2 telescope driver please make sure you have installed the ASCOM 6.0 (or later) platform. You can download it from <http://www.ascom-standards.org>. You will also need to install the Microsoft .Net Framework 3.5 and possibly service packs. More details on the requirements can be found on the ASCOM-Standards site.

You can always install any version of the V2 driver without uninstalling the previously installed version of the V2 driver.

The minimum setup includes:

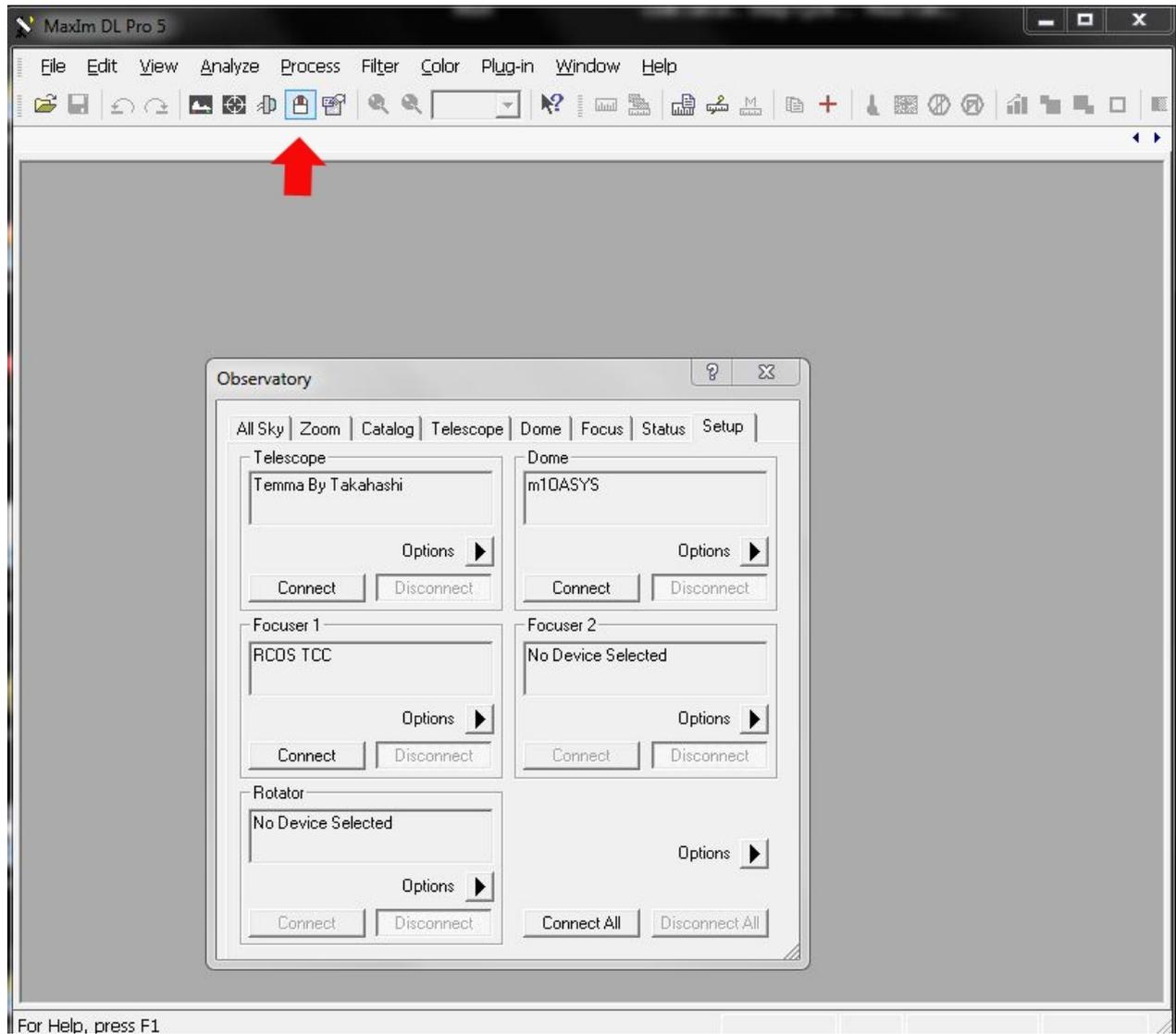
1. Mount Type
2. Controller. All mounts made within the last few years have the GTOCP3 controller.
3. COM Port. If you have your PC connected click "Check Port" to make sure you have the correct port selected.
4. It is recommended that you configure Unpark From to "Last Parked"
5. Select your desired park position
6. Site location... [see this section for more details](#).

Click Finish to exit the installer. The driver is ready to be used!

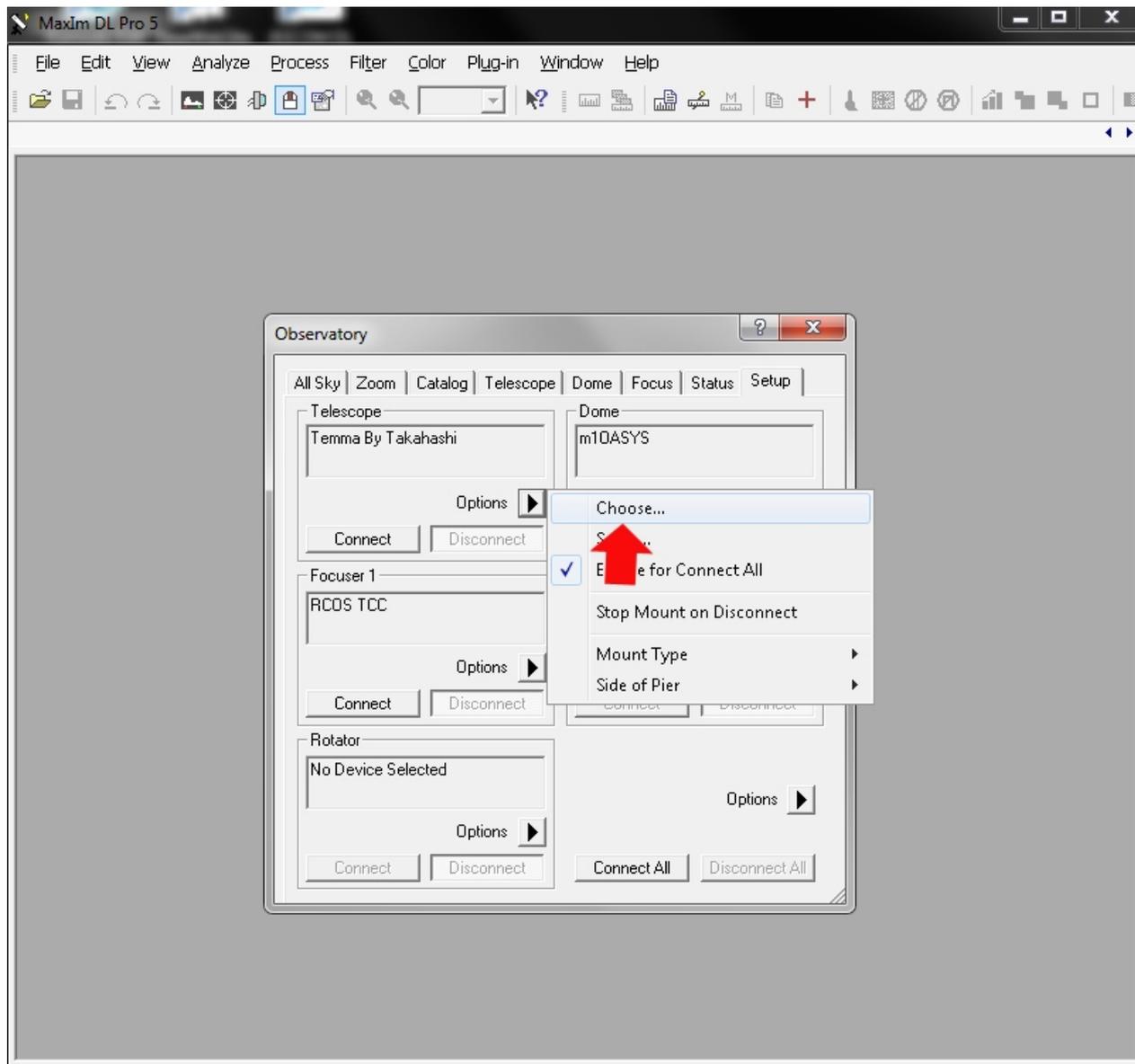
Using the Temma Driver with Client Apps

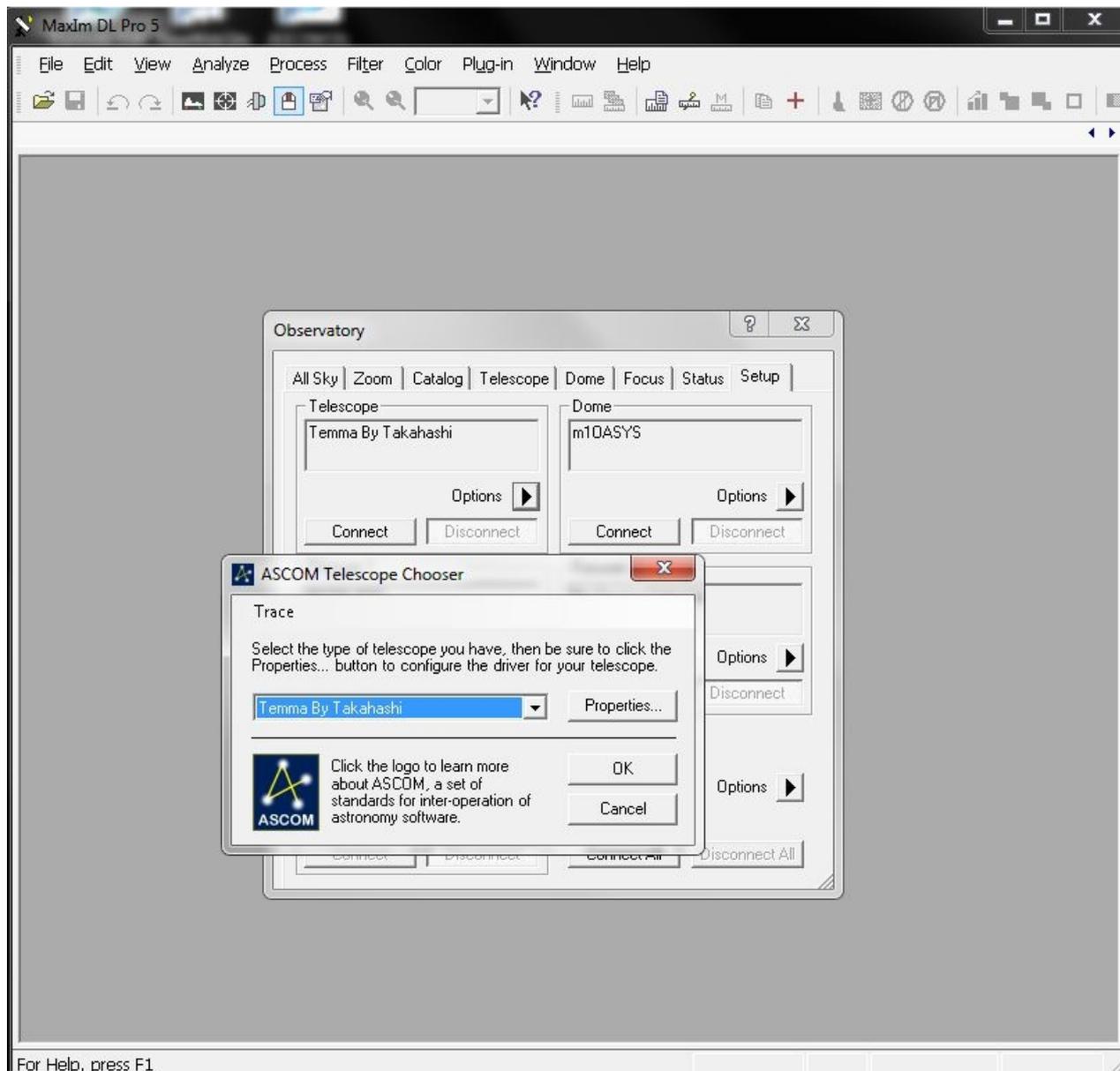
To use the driver select it in an ASCOM application.

For example, in MaximDL click the 'Observatory Control' icon as shown below.



Click Options then click Coose to expose the ASCOM 'Chooser' window.





Using the Temma Driver with TheSky 6

1. Start TheSky 6 Professional.
2. In TheSky's Telescope menu, select Server Settings...
3. In the Server Settings window, Remote client capabilities section, turn on all of the options ("allow"

checkboxes).

4. Also turn on Remote clients use Orchestrate's "ImageThenSlewTo" command.
5. Click OK to close the Server Settings window.
6. Now try connecting from your ASCOM astronomy program again. It should work.

Install the ASCOM "TeleAPI" plug-in from here: [Download TheSky TeleAPI plugin.](#)

1. Start TheSky 6
2. In the Telescope menu, select Setup... TheSky's Telescope Setup window will appear.
3. Set the Telescope or control system name to Telescope API.
4. Click Settings... to display the ASCOM Telescope Chooser
5. Select Temma by Takahashi telescope type in the ASCOM Chooser.
6. Now click Properties in the Chooser. Verify the settings are correct.
7. Click OK in the Chooser.
8. Click Close in Telescope Setup.
9. Now, in TheSky's Telescope menu, select Link/Establish. You should see the crosshairs indicating your telescope's current position, and you now have telescope control in TheSky.

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Using the Temma Driver with TheSky X

See <http://ascom-standards.org/FAQs/Index.htm>

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Getting help and reporting driver issues

In order of preference potential driver problems can be reported via several methods:

1. Posting a message to the Yahoo Groups forum for Temma mounts: <http://tech.groups.yahoo.com/group/ASCOMTemmaDriver/>
2. E-mail to temma@ccdaastro.net.

IMPORTANT: When reporting a potential ASCOM driver bug here are some general guidelines:
--

1. The first aim of a bug report is to let us see the failure with our own eyes. Please give us detailed instructions so that we can make it fail for ourselves.
2. The second aim of a bug report is to describe what went wrong. Describe everything in detail. State what you saw, and also state what you expected to see. Write down the error messages, especially if they have numbers in them. Better yet, take a screenshot!
3. By all means try to diagnose the fault yourself if you think you can, but if you do, you should still report the symptoms as well.
4. Be ready to provide extra information if we need it, like trace logs.
5. If other programs are involved state the EXACT version number of each program. Usually you can find this information in the programs Help->About menu item.
6. Write clearly. Say what you mean, and make sure it can't be misinterpreted!

Thank you in advance for following these guidelines! For more details please see this link:

<http://www.chiark.greenend.org.uk/~sgtatham/bugs.html>

Temma Mount Setup Window

ASCOM Setup

Telescope Setup window:

Note: the Mount Type, Controller, Port, and Use ASCOM Serial Object fields will be disabled if an ASCOM client program is already connected to the mount.

If you click the Advanced >>>>> button you will see additional controls:

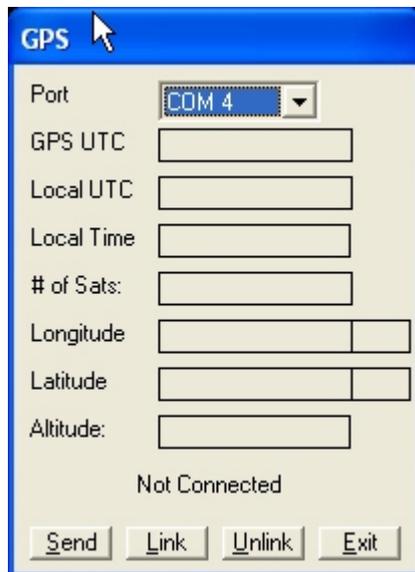
Detailed explanations of each field follows in the next sections.

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GPS



GPS

Port: COM 4

GPS UTC:

Local UTC:

Local Time:

of Sats:

Longitude:

Latitude:

Altitude:

Not Connected

Send Link Unlink Exit

To use the GPS the Temma must not be connected.

Procedure:

1. Your GPS must be set to send data in NMEA format, baud rate 4800.

2. Press the 'Link' button to connect to the GPS.
3. Once connected press the 'Send' button to send the GPS time and location to the Temma and to update your systems computer clock.
4. Press the 'Unlink' button to disconnect the GPS then press 'Exit to return to the setup window.

Automated Mount Safety

The mount safety features is not a failsafe way to protect your equipment from damage, and it is not intended to be a substitute for good judgment or and attendant at the scope. Please use with caution. Keep the checkbox checked to disable these features.

Setup the Parameters:

note: scope movements started via the Temma's hand paddle can not be controlled via the driver's mount safety features. Rules imposed by the driver will only affect slews initiated by the driver. These features are mainly designed to help avoid crashes from the telescope tracking in to the mount, tripod, or other object.

Minimum Allowable Altitude - Input a number representing degrees in altitude that the mount will stop all movement when it is reached or exceeded.

Maximum Allowable HA (hourangle) - A positive number for the maximum HA permitted (e.g. 5.5 = a HA of +/- 5.5 hours from the Meridian). Calculations for declinations other than 0 will automatically be performed using this input.

Allowable Tracking Near the Meridian - Enter a number for the minutes tracking near the Meridian when the scope is West on the pier and pointing East (e.g. -.5 will stop tracking when the mount reaches 30 minutes of the Meridian).

When a crash is avoided by these features you must take the following actions to reinitialize your mount and the Temma driver:

1. Disconnect the driver
2. Enter the Temma Driver's setup and check the 'Disable



Mount Safety Limits' checkbox

3. Reconnect to the Mount

4. Move the mount to a safe position

5. Enter the Temma Driver's setup and uncheck the 'Disable Mount Safety Limits' checkbox

6. Resume

Checking the 'Disable Mount Safety Limits' button will deactivate this feature.

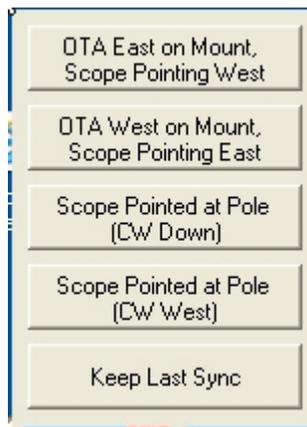
If you want to be warned before the mount flips check the 'Warn..' button.

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Initialization

Temma Setup and Initialization Procedure

1. Turn off the Temma telescope mount.
2. Connect the RS232 serial port on the Temma to an open serial port on your computer.
3. Turn the Temma Power switch on. Each time the Temma is powered on, the Temma control system is initialized with the following default parameter:
 - * The optical tube assembly (or telescope) is assumed to be on the West side of the mount.
 - * The telescope is pointing to 0.00 in both right ascension and declination.
 - * Right ascension and declination correction speeds are set to 90 (unless you have entered a different rate in the Temma driver's main window).
 - * The control system tracking is for the Northern Hemispheret.
4. Open your planetarium software.
5. In the 'ASCOM Telescope Chooser Control list, select **Temma by Takahashi**.
6. Click **Settings** and then select the correct COM port and input your info in the other fields (e.g. longitude/latitude).
7. Establish a link to the Temma.
8. Select one of the orientation modes from the 'Init' windows
9. When the link is established, center the appropriate star as directed and then synchronize the planetarium software (e.g.: for TheSky press its 'Sync' button).



Synchronizing

To synchronize with the optical tube assembly on the East side of the mount, Scope pointing West

To synchronize with the optical tube assembly on the West side of the mount, Scope pointing East

Scope Pointed at Pole, Counter-weight down position

Scope Pointed at Pole, Counter-weight West

Keep Last Sync

Procedure

1. Loosen the clutches on the mount and move the telescope to the East side of the mount.
2. Center a known star that is on the West side of the Meridian in the field of view.
3. Identify the star in your planetarium software.
4. Sync on the star.
5. An on screen dialog will notify you of the correct side of the meridian to select the sync star.

1. Loosen the clutches on the mount and move the telescope to the West side of the mount.
2. Center a known star that is on the *East* side of the Meridian in the field of view.
3. identify the star in your planetarium software.
4. Sync on the star.
5. An on screen dialog will notify you of the correct side of the meridian to select the sync star.

This method is intended for remote users. The CW down method gives a rough initial alignment that must be refined by a subsequent sync for accurate GOTO operations. It is recommended that the subsequent sync be accomplished using ACP (Pinpoint) to plate solve a CCD image after the initial alignment. Obviously, a manual/visual sync can be used if desired.

The CW West method gives a rough initial alignment that must be refined by a subsequent sync for accurate GOTO operations. Place the CW on the West side of mount with the CW shaft and OTA parallel to the ground.

The Temma telescope was previously synced and not powered off, or

the Temma was 'Parked'

New feature: 'Sync Z' allows the user to initialize and accurately sync the mount in the Takahashi 'pointed at the Zenith' position. To use this feature first turn off tracking, point the scope at the Zenith (using a level helps position the scope accurately), then click the 'Sync Z' button.

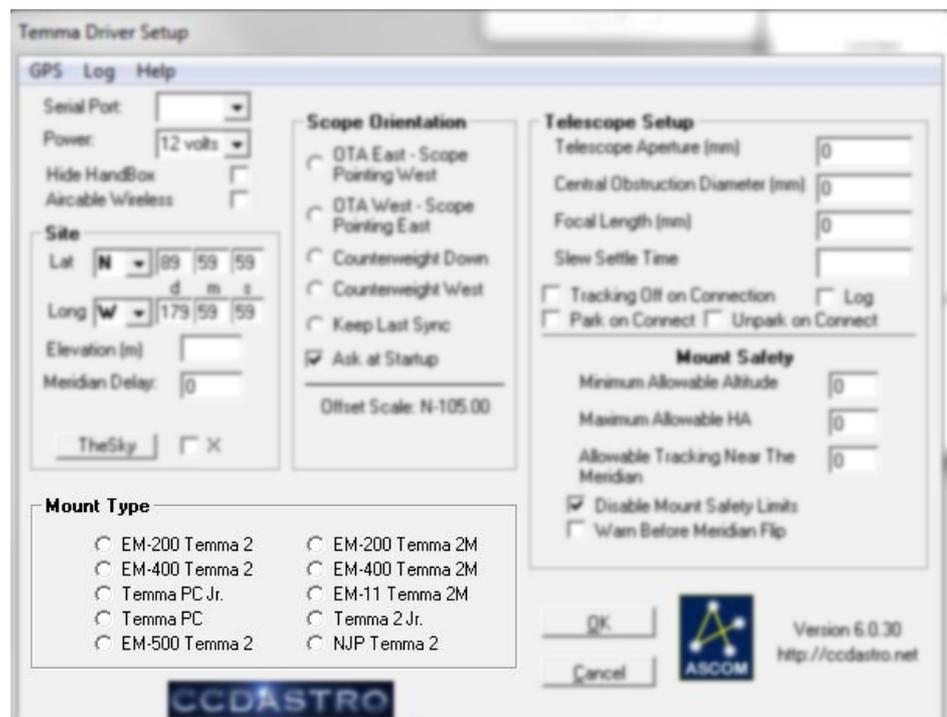
SyncZ

- * power on the mount
- * start the driver and turn off tracking
- * polar align
- * move the scope manually to point to Zenith (use a level for best results)
- * press SyncZ and the mount starts with RA=sidereal time and Dec=Latitude

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Mount Configuration

Mount Type: Select the mount type that matches your mount.



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Offset Scale

Displays the proper offset for the polar scope based on the users site.

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Site Setup

Site Setup

Latitude: Latitude of the selected site. Latitude must be in degrees: minutes: seconds format.

Longitude: Longitude of the selected site. Longitude must be in degrees: minutes: seconds format.

Elevation: Elevation in meters

To get Longitude/Latitude from TheSky: clicking the button will retrieve the longitude and latitude from TheSky (check the 'X' box if you are using TheSky X). The Longitude/Latitude fields will be populated with the data from TheSky's site data .



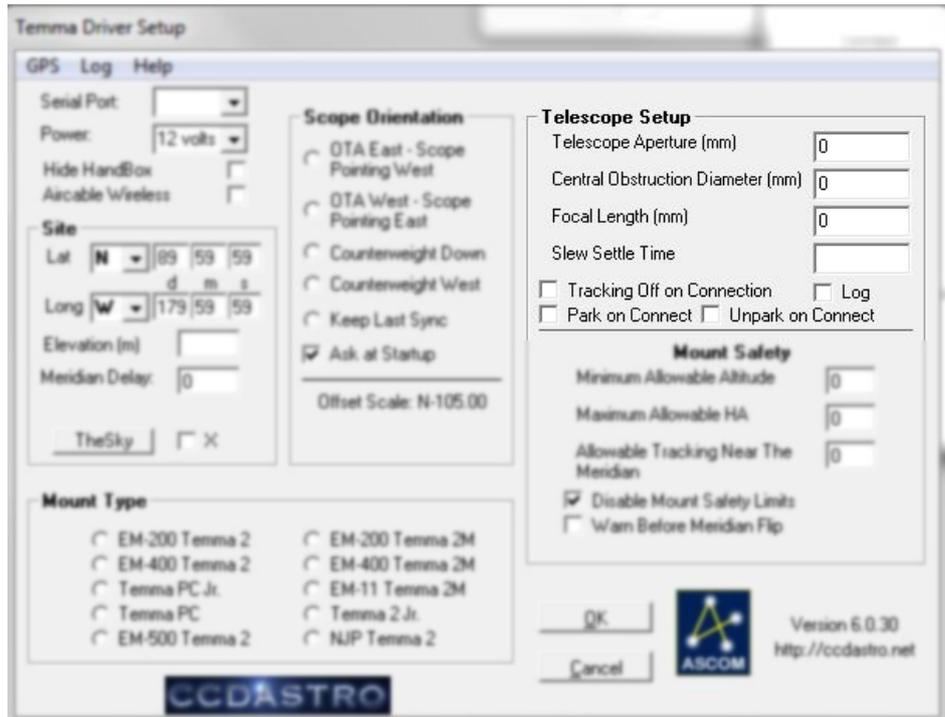
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Telescope

Aperture: Enter the primary telescope's aperture in millimeters.

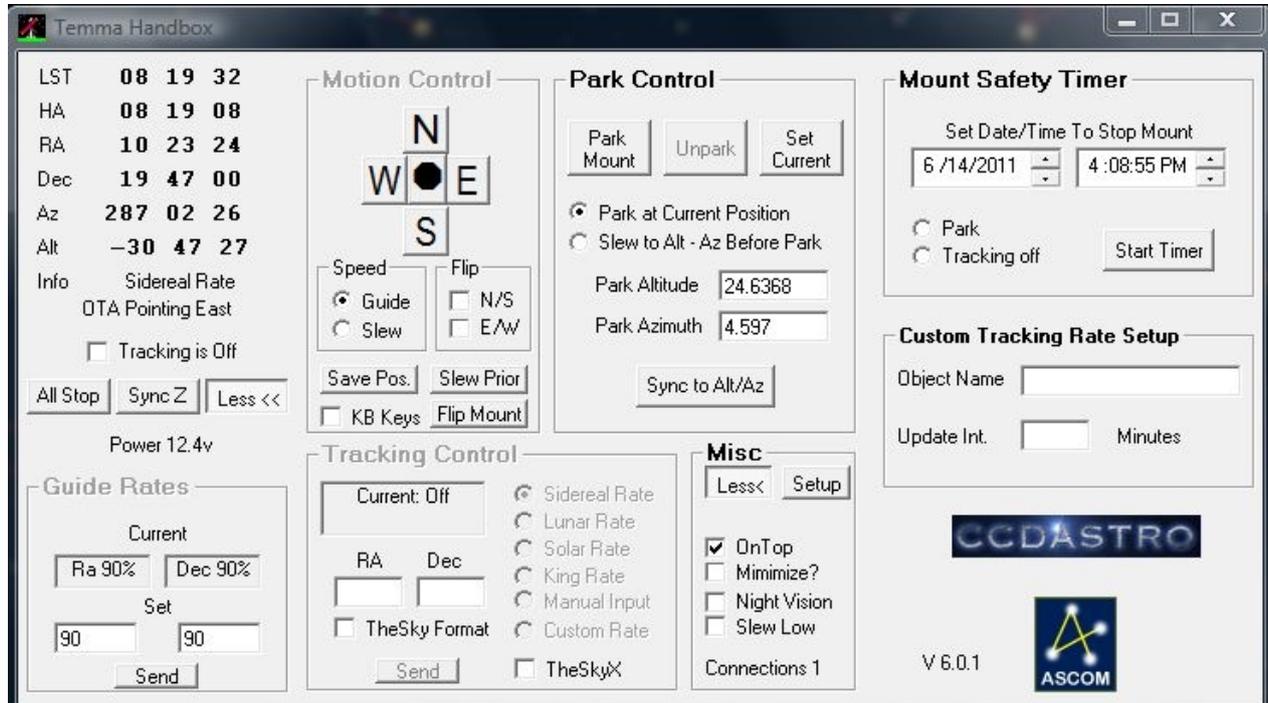
Focal Length: Enter the primary telescope's focal length in millimeters.

Note: these fields are not specifically used by the driver but they are passed up to clients if the client asks for them.



Temma Handbox Window

Temma Handbox



 Clicking the 'More' buttons will expose additional handbox features.

 The 'Always Show' checkbox, when checked, will make the handbox visible on connection to the Temma. If unchecked the handbox will remain minimized in the tray until called.

Flip Mount

CAUTION! Please use care and common sense when flipping the mount or using the Meridian Delay feature to ensure that your telescope equipment will not strike your pier.

Care is needed when slewing to objects on the 'wrong' side of the mount. Please test your equipment

and determine the safe limits of travel and do not exceed them before attempting to do a Meridian flip of use the Meridian delay feature. Training and using the mount safety feature of the driver is recommended.

The 'Flip Mount' button, when pressed, will prompt the user to perform a manual Meridian Flip. This is very useful to place the mount in a position that allows the longest time for astroimaging. For example, a GOTO to an object that is near and has not yet crossed the Meridian will leave the mount positioned with the OTA on the West side of the pier. Pressing the 'Flip Mount' button will move the mount 180 degrees to position the OTA on the East side of the pier allowing the longest possible time for astroimaging of the object.

Procedure for flipping:

1. Click the 'Flip Mount' button the select 'Yes' - the mount will begin slewing and flip
2. Once the slew completes click the Flip Mount' button again then select 'No'
3. Use your planetarium program to sync to the current position.

Flipping can also be accomplished by client software and scripts by calling the ASCOM SideofPier property.

Note: flipping the mount will automatically invoke the [Meridian Delay](#) feature to ensure subsequent small slews are in the right direction and do not cause the mount to re-flip.

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Guide Correction Speeds

Guide Rates

Set

Enter the right ascension and declination correction speed (as a percentage of the Sidereal rate, 10 - 99%). This setting is used for the slow speed moves or for guiding.

Current

Displays the right ascension/declination correction speed (as a percentage of the Sidereal rate).



Send

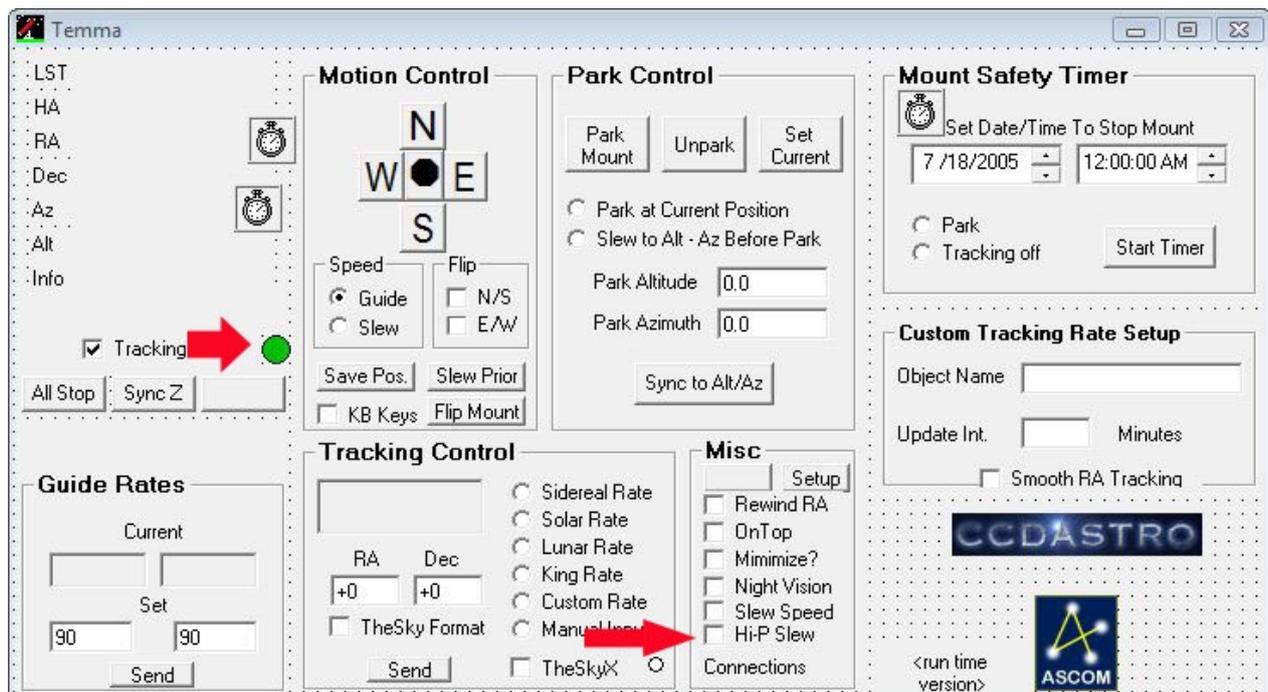
Check the 'Send' button

to set the tracking rates.

High Precision Slew

High precision slew

Check the 'Hi-P Slew' checkbox (marked by red arrow below) to activate this feature to reduce the Temma's inherited encoder resolution errors after a GOTO slew. This offers an automated centering that may be faster and better than doing manual corrections to bring objects to the edge of the FOV.



 The green LED to the right of the Tracking checkbox will be lit when Pulsguiding

Special thanks to Hartmut Bornemann for supplying the code snippets and support implementing this new feature.

Meridian Delay

CAUTION! Please use care and common sense when flipping the mount or using the Meridian Delay feature to ensure that your telescope equipment will not strike your pier.



Care is needed when slewing to objects on the 'wrong' side of the mount. Please test your equipment and determine the safe limits of travel and do not exceed them before attempting to do a Meridian flip or use the Meridian delay feature. Training and using the mount safety feature of the driver is recommended.

Temma mounts have the capability to track through the meridian. This means that an imaging sequence can often be started with the telescope well to the east of the mount (and even under the mount, with the weights above the mount). As the mount tracks it will cross over to the 'right' side of the mount, as it crosses the meridian. This allows imaging sequences that can be completed without ever having to stop and flip the mount. With this capability a Temma mount can maximize imaging time.

The Temma ASCOM V2 driver now has 'Meridian Delay' which enables the mount to slew to objects on the 'wrong' side of the mount, as shown in the above photo. There is a great advantage to this, as described above. Of course, not all objects can be reached in this way - there are two primary limitations; the length of the OTA / CCD camera train, and the declination of the desired object. Generally, the shorter the OTA and the further south the object (towards the celestial equator) then the further east the mount can go, and vice versa. I can image objects in the Southeastern sky with a Takahashi FSQ-106N with the counter weights pointing up.

Using the Meridian Delay feature:

1. Verify the Eastern limits of your equipment
2. Determine the Hour-angle of the the Eastern most point you can safely reached at all Declinations
3. Input that absolute value (no negative) in the Meridian Delay box on the Setup Window. Note, slightly under-estimate your limit then add a very small amount to that to allow plate solving corrections to center objects without reaching the limit. If the limit is exceed the mount will flip back to safely slew to the object you selected outside of Meridian delay limit.
4. You should now be able to safely slew to objects within your tested range without flipping.
5. Entering a '0' (zero) in the Meridian Delay box will disable this feature.

Note: When the Meridian Delay feature is active slews to the Western side will be limited near the horizon by the same amount enter for your Meridian Delay.

Miscellaneous Frame

Less/More button: hides or shows additional features like the safety timer.

Setup Button: exposes the driver's setup window.

On Top: keeps the HB window on top of all other windows

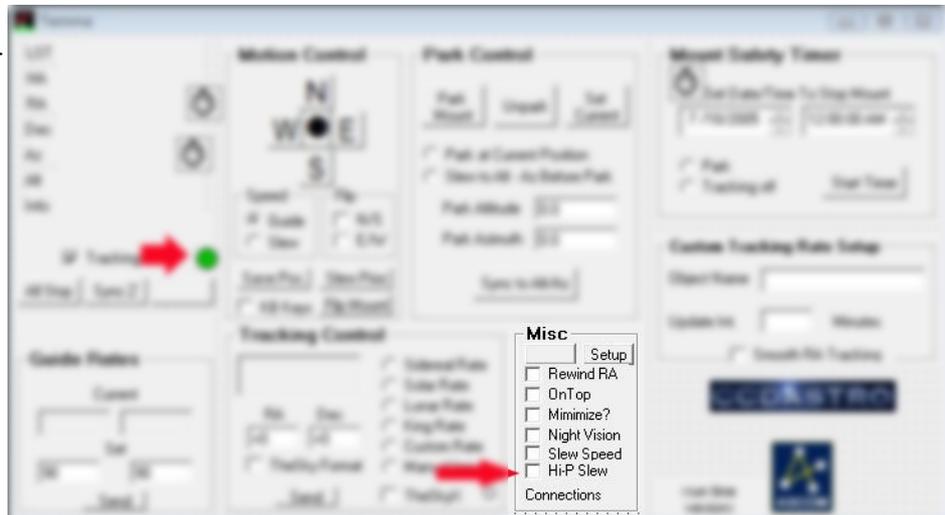
Minimize: sends the window to the tray

Night Vision: places the screen in night vision mode.

Slew Speed: Toggle fast and slow slew speeds.

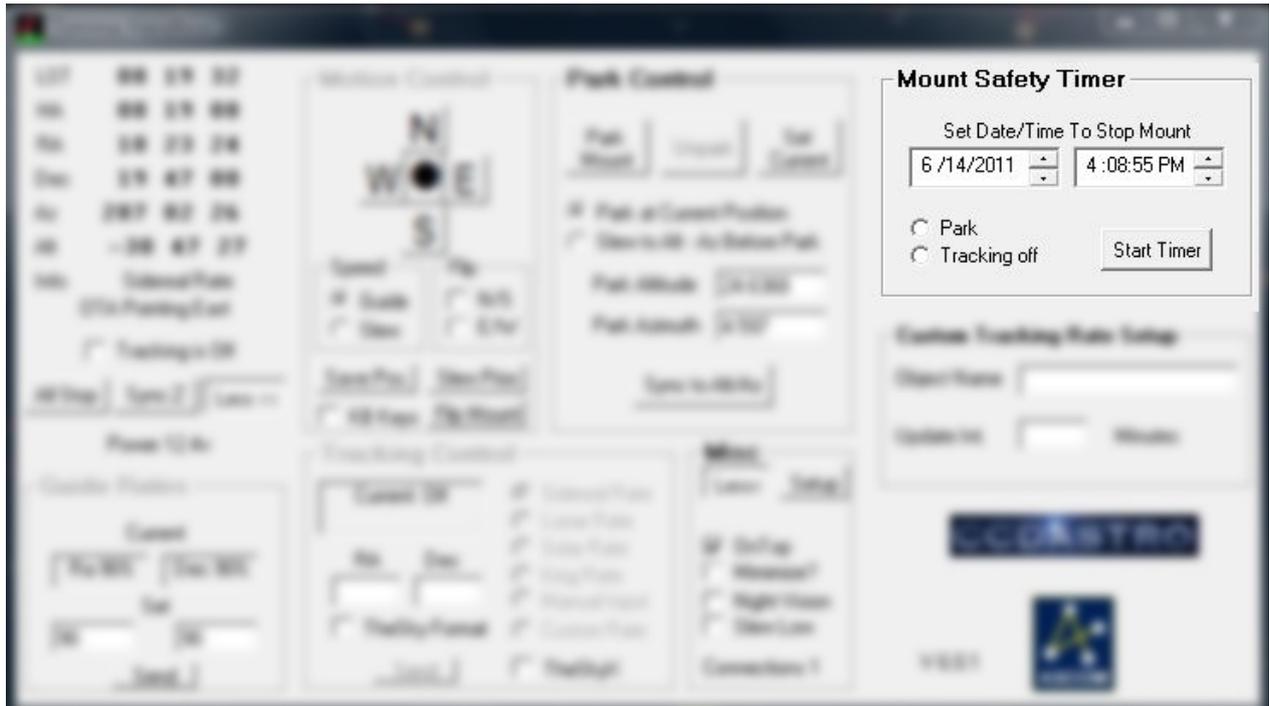
Hi-P: activates high precision slewing (see [here](#) for details).

Connections: Displays the number of clients currently connected to the driver.



Mount Safety Timer

Automatic Stop Tracking:



This feature is useful as a precaution against mount damage in the event you fall asleep or otherwise leave the mount unattended for extended periods.

Procedure:

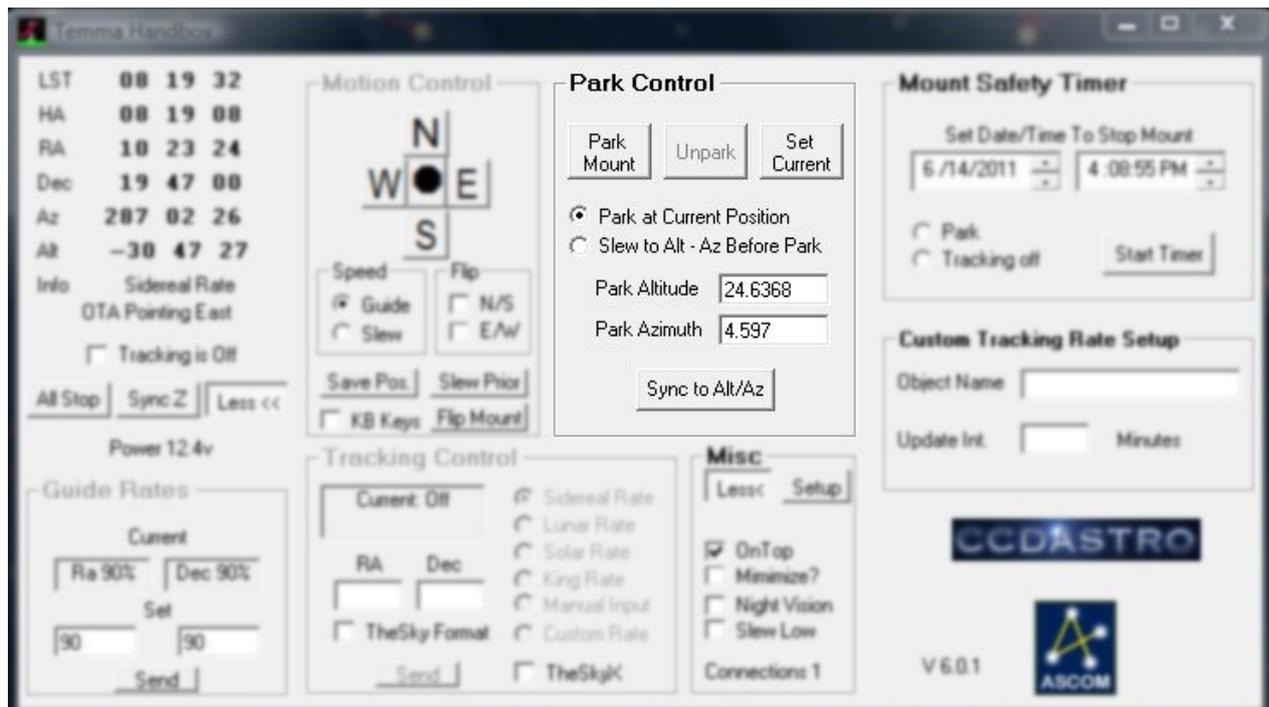
1. Use the scroll bars to set the local time (in 24 hour format) that you want to stop tracking (make sure it is before the mount will track into itself!)
2. Select either 'Park' or 'Tracking off'
3. Click the 'Stop tracking' button.
4. When the set time is reached the driver will set tracking to off or park.

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Parking

Parking the Temma

The Temma's electronics do not have the ability to park the mount via its firmware. However, this driver offers a solution via software.



Park Procedure:

Two park methods are available:

'Slew Before Park' slews to the inputted alt/az position before parking
 'Park at Current Position' parks the current alt/az position of the mount.

 Prior to using the park feature the mount must be correctly synced as described above.

 The 'Set Park' button can be used to select the mount's current position as the parking position whenever the Temma is connected. The position will be saved thus removing the need to manually input the values.

1. Input the desired park altitude and azimuth
2. Select one of the park methods
3. Click the 'Park Mount' button
4. When the park slew is completed disconnect the driver and immediately power off the mount or the mount can be left parked.

However, if the power is not turned off the mount will remain in the simulated 'tracking off' mode for NON-Temma 2 models.

 Upon reconnection to the mount the unpark sequence will begin.

Power Voltage

Displays the mount's voltage.



Save Current Position

The 'Save Pos.' button is used to set the current RA and Dec, when the mount is moved via the hand paddles clicking the 'Slew Prior' button will return the mount the the previous position.

Slew to Prior Coordinates

Clicking The 'Slew Prior' button will return the mount to the position last reported before the current slew.

Syn to Alt/Az

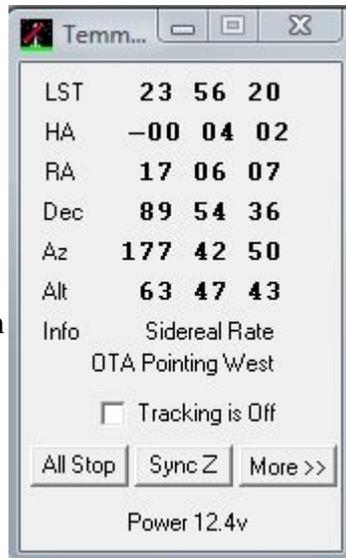
The 'Sync to Alt/Az' and the 'Slew Prior' button is used to re-sync the mount to the Altitude and Azimuth shown in the user input boxes. This feature is useful when the mount appears to be lost after an unpark.

Sync To Zenith

'Sync Z' allows the user to initialize and accurately sync the mount in the Takahashi 'pointed at the Zenith' position.

To use this feature:

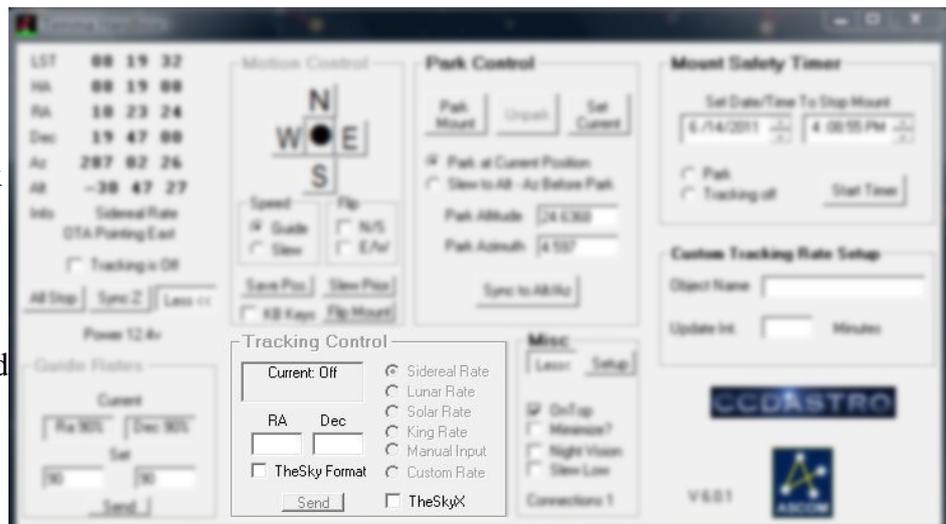
- * power on the mount
- * start the driver and turn off tracking
- * polar align
- * move the scope manually to point to Zenith (use a level for best results)
- * press SyncZ and the mount starts with RA=sidereal time and Dec=Latitude



Tracking Rates

Tracking Rates

- Sidereal (default)
- Lunar - When used in conjunction with the 'TheSky Format' checkbox the lunar rate will be set to a high precision mode that will control both the RA speed and Dec rate to account for parallax
- Solar
- King - Rate will compensate for



atmospheric
refraction

- Manual - When selected rates must be inputted into the RA and DEC boxes, then press the 'Send' button
- Custom - This feature requires TheSky v6. When selected users can input the objects name and update interval in to the 'Custom Tracking Rates' frame. Updates to current offsets will be made at the desired intervals.

Clicking on the 'Tracking Rate' option buttons will toggle the rates.

'Tracking On/Off' is used to stop/start the tracking on Temma 2 mounts, or slow the tracking rate to ~60% sidereal rate for **non** Temma 2 mounts. This is useful if you want to pause viewing. The slower rate will avoid the mount running in to itself when left unattended. Checking the 'Rewind RA' box in the Misc frame (when using **non** Temma 2 mounts) will rewind the right ascension back to the point where the tracking was stopped adding one more level of mount protection for unattended pauses in observing or imaging.



Custom/Comet Tracking Rates

RA Adjustment (sidereal sec/day)

- Enter the adjusted tracking rate for the right ascension axis in *sidereal* seconds per day max = +/- 32767. There are 86,164 seconds in one *sidereal* day (1 "earth day" = 1.002738 "sidereal day").

Dec Adjustment (min/day)

- Enter the adjusted tracking rate for the declination axis in minutes per day, max = +/- 1180 (plus = North, - = South).

Example:

1. +140, +50 - Entering **+140** into the **RA** text box will speed up the RA tracking by 140 seconds per day (one revolution normally takes 86164 seconds at sidereal rate), +50 into the **Dec** text box will move the declination axis 50 minutes per day North. Check the 'Manual Input' box 'Send' to apply the new comet settings. The maximum offsets are +/- 32767 for RA, and +/-1180 for Dec

TheSky Format

- **Checking this box allows for the direct input of RA/Dec rates obtained from TheSky's object info box**
- Input the name of the object (as recognized by TheSky) and the data will be inputted and used automatically to calculate custom rates when the 'Use TheSky' box is checked.





Troubleshooting

Troubleshooting:

The telescope crosshair in my planetarium software jumps	<p>The coordinates reported by the Temma control system (when the telescope is not slewing) can vary by one arcsecond. This causes the telescope cross hairs to "jump" between the reported positions.</p> <p>The Temma protocol reports coordinates to the nearest second in right ascension (15 arcseconds at the 0 degrees declination) and to the nearest 6 arcseconds in declination.</p> <p>The Temma's control system accepts declination coordinates to the nearest 12 arcseconds, so, at small fields of view, the cross hairs will not exactly match the coordinate that was used to synchronize the telescope</p> <p>These are limitations of the Temma protocol.</p>
The telescope crosshair in TheSkyX does not move when slewing or syncing	Increase the crosshair update frequency to 1000 ms or more.

Resources

Created with the Standard Edition of HelpNDoc: [Easy EPub and documentation editor](#)

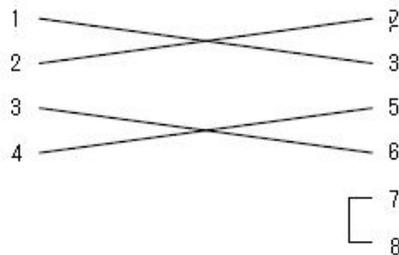
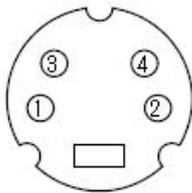
Cable Drawings

----- RS-232C CABLE -----

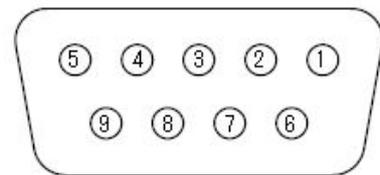
for

- Temma, TemmaPC, Temma2
- TemmaJr, TemmaPCJr, Temma2Jr

MINI DIN 4P MALE
(TOP VIEW)

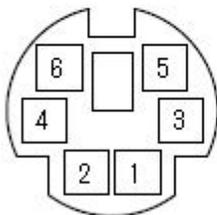


D-sub 9P FEMALE
(TOP VIEW)



----- AUTO GUIDE CONNECTOR -----

- USD, USD II, USD3
- Temma, TemmaPC, Temma2
- TemmaJr, TemmaPCJr, Temma2Jr
- PD-7XY, PD-8XY



MINI DIN 6P FEMALE
(TOP VIEW)

No.	
1	NC
2	RA(+)
3	RA(-)
4	DEC(↑)
5	DEC(↓)
6	GND

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