

# Helios Analytics user manual

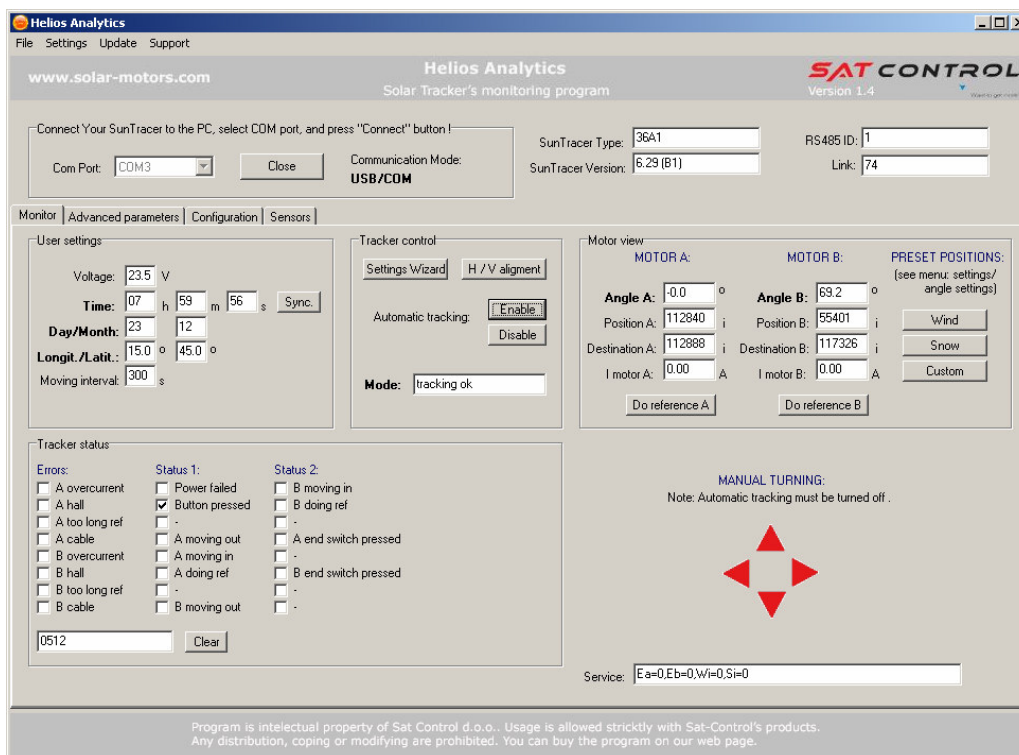
The basic tracker operation is not conditioned by the use of a PC. But it provides additional functions that can be useful for advanced users. In addition, different values of the solar tracker can be seen in this menu.

**ATTENTION!!** Changing the values in the menu may influence the solar tracker operation!

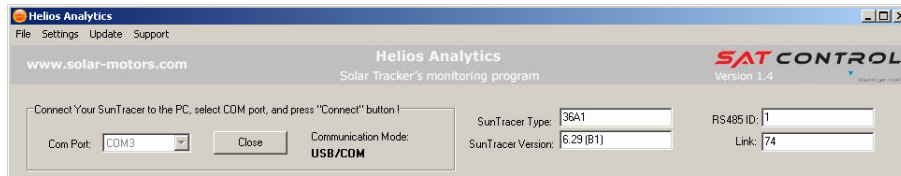
Each white input field displays the current value, i.e., the solar tracker setting. Clicking in a particular input field turns the field **yellow**, which means you can change the value. As long as the input field is yellow, you can enter a new value in it. When you are satisfied with the new value, press »Enter« or click the »Send« button. The entered value will be sent to the solar tracker, the input field will turn **white** again, and will show the **new** (changed) current value.

Some input fields are only intended to show the values and can not be changed (for example: supply voltage display). In such fields, a change will not take effect.

**CONNECTION:** SunTracer is connected to the Helios by with **USB bus** (default) or RS485 bus (optional). Use enclosed USB cable. Note: for RS485 you will need a RS485 dongle on the PC side, as PC doesn't have RS485 standard port. Please refer to additional paper.

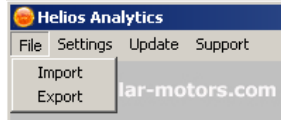


## Helios's top row



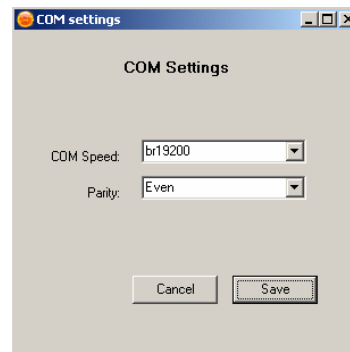
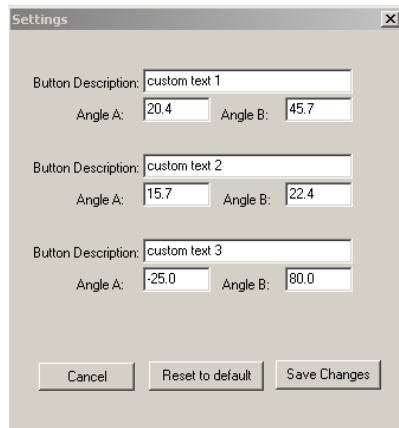
### 1. Files

All values in the fields can be **exported** into one file with extension "hss". This is suitable to backup current settings. It is also possible to **import** values from saved "hss" file.



### 2. Settings

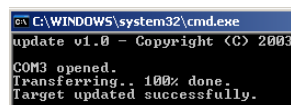
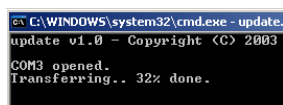
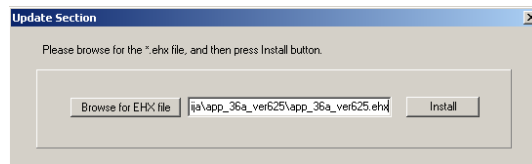
Angle settings define behaviour of three "**preset positions**" buttons in Monitor tab. See description at chapter 22. COM port settings are communication properties for RS485 bus (excluding USB).



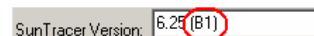
### 3. Update

Driving electronic (firmware) in the solar tracker is **upgradable**. It means that we constantly complements and improves the program, which is running in your product. Check on our web site [www.solar-motors.com](http://www.solar-motors.com) for the latest version, tab »support« or direct path: <http://www.solar-motors.com/gb/support-d24.shtml>. If newer version exists, download and save zip file to your local disk. Unzip the file to some known location.

In the Helios select upgradeable file (\*.ehx) and press update. Wait until transferring reaches 100%. Than close DOS prompt window and open COM in Helios again to continue. Later will be shown on the program new number of FW version if you done job well.



**Note:** Described feature is available only for versions "B1" and higher.



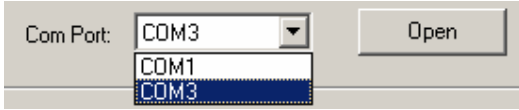
Others need to update manually. Manual updating is possible in any case. See upgrading manuals in the archive file.

#### 4. Support

Info window with our contact informations.

#### 5. COM port

Before getting any data from solar tracker, **select** proper **COM port** and press **"open"**



**Note:** you need to have USB (VCP) driver installed. Drivers are included in the archive file.

#### 6. SunTracer type

Type of electronic module inside the tracker. You will be asked about it if you will contact our service team.

#### 7. SunTracer Version

Version of program running inside the module. After upgrading this number will be changed.

#### 8. RS485 ID

Tracker's network address in RS485 network, which data are currently seen on »Helios«. To be used only when using RS485 network. **Note:** before using RS485 bus, **be sure to set equal** RS485 ID to the tracker's positioner (see chapter 34.)

#### 9. Link

Showing communication status. If this number is incrementing, Helios have a good connection to the Solar tracker. In opposite case check cables, re-plug connection.

### Monitor tab

#### 10. H/V alignment button

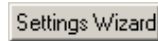
Pressing this button causes solar tracker to move in totally horizontal position. This is suitable when mechanically setup the tracker and to align correct angles.

H / V alignment

Set angles will be: motor A = 0° and motor B = 90,0°. If panels (or mirror,...etc) are not in horizontal position after motor were stopped and some minor shift appear, you need to adjust mechanically (screws, clamps) to get proper horizontal position. For completely horizontal position, take spirit level as a sufficient measuring device.

### 11. Settings wizard button

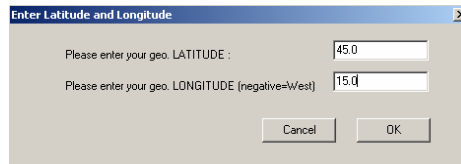
With it you can make a few basic settings required for Solar tracker to work. Click the »Settings Wizard« button.



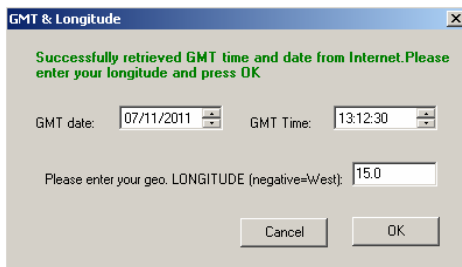
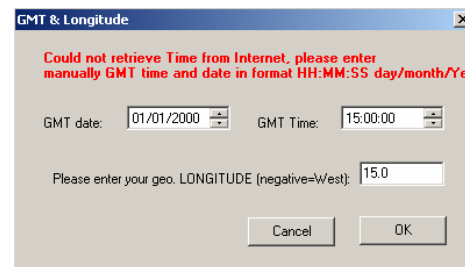
The system will ask you to enter a few basic geographical data items:

Your geographical **latitude** (geographical parallel). Positive values are for North hemisphere, negative for South hemisphere.

Your geographical **longitude** (meridian). Enter positive values for places east of Greenwich, and negative values for places west of Greenwich.

A dialog box titled "Enter Latitude and Longitude". It contains two input fields: "Please enter your geo. LATITUDE :" with the value "45.0" and "Please enter your geo. LONGITUDE (negative=West)" with the value "15.0". There are "Cancel" and "OK" buttons at the bottom.

The last data item required by the wizard is the precise coordinated universal time (UTC, GMT). If you are connected to the internet, you will get it from there (green text). If so, just click on OK. Otherwise, you have to enter it manually (red text).

A dialog box titled "GMT & Longitude". It displays green text: "Successfully retrieved GMT time and date from Internet. Please enter your longitude and press OK". It has "GMT date:" (07/11/2011) and "GMT Time:" (13:12:30) fields. Below is a "Please enter your geo. LONGITUDE (negative=West):" field with the value "15.0". "Cancel" and "OK" buttons are at the bottom.A dialog box titled "GMT & Longitude". It displays red text: "Could not retrieve Time from Internet, please enter manually GMT time and date in format HH:MM:SS day/month/Yea". It has "GMT date:" (01/01/2000) and "GMT Time:" (15:00:00) fields. Below is a "Please enter your geo. LONGITUDE (negative=West):" field with the value "15.0". "Cancel" and "OK" buttons are at the bottom.

Now, the solar tracker is correctly set for your location. It will rotate to the current position and track the Sun from there.

### 12. Usupply

Current supply voltage connected to the solar tracker.

### 13. Time

Current solar time for your location (see geo. longitude/latitude). By entering new values, you can change the current time. Note that this time could differ from your zone time. It is correct only for your accurate geo longitude. The range for hours is 0-23, and minutes 0-60. Hint: if you set geo. longitude to 0.0, time must completely equal with UTC time.

### 14. Day/month

Current date. By entering new values, you can change the current date. The range for days is 1-31, and for months 1-12.

### 15. Synch button

Pressing the »Synch.« button automatically sets the current time and date. If your time or date is incorrect (by more than ten minutes), press the »Synch.« button to open a window for the input of your geographical longitude. Enter the longitude, and confirm it. The Web application connected to the internet calculates the coordinated universal time (UTC), and writes it in the solar tracker memory as the mean solar time for your location. If you are not connected to the internet, you will have to enter UTC manually in the next window.

**Note:** The mean solar time used by the solar tracker is set for your geographical longitude, and differs from your zone time. Therefore, do not worry if it differs by a few minutes from your time zone clock.

### 16. Angle A, B

They show current angle for each tracker shaft. Usually angle A means hour angle and angle B elevation. The hour angle has negative values in the morning and positive values in the afternoon. Direct angle entering causes manual turning of selected tracker shaft to the wanted angle (automatic tracking must be turned off).

### 17. Position, destination, A,B

They show the current and the destination positions of both trackers measured in pulses. These details can only be used to diagnose the solar tracker operation.

### 18. I motor, A,B

Show current of each motor at that moment.

### 19. Longitude, latitude

Mean your geographical longitude and latitude. They are both important in order to get proper tracking. Negative values mean »West« and »South«.

### 20. Moving interval

It means at what interval the solar tracker will correct its position to trace the sun. The possible values are from 60 in 900 seconds (1-15 minutes). If you have precision down to 0.1°, minimum limit is 1 second (instead of 60).

### 21. Run, disable buttons

With buttons you can enable or disable automatic tracking. Automatic tracking must be disabled, if you want to move each shaft manually - with red arrows below or by entering direct angle. Field on the right denotes current state of automatic tracking:

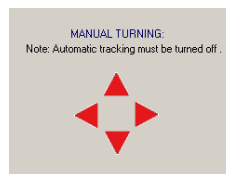
- » **track ok** « - automatic tracking enabled, the Sun is above the horizon, tracking is possible (according to mechanical range)
- » **sun too far** « - automatic tracking enabled, Sun is unreachable (i.e. in the night)
- » **Disable** « - automatic tracking disabled

### 22. Preset position buttons

These are predefined buttons with predefined angles. You can use them, for example, emergency park position in strong wind weather or snow parking position for cleaning it from the panels or your custom park position. Pressing any of these buttons automatic tracking will become **disabled** and tracker will turn the panel into wanted position. You can **define** all three buttons by your own: go to "Settings" and press "Angle settings". Change text, angle A and angle B. See chapter 2.

### 23. Manual movements with buttons

With all 4 red buttons you can manually move both trackers. Only automatic tracking must be **disabled**.



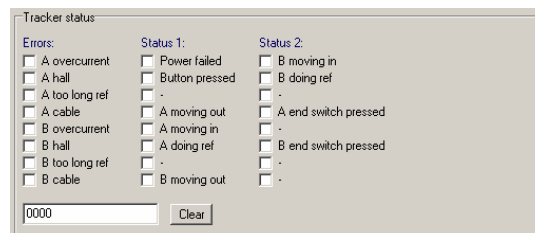
### 24. Ref A, B buttons

Use buttons to synchronize motors. In the case of any shift between real shaft position and internal counters (impulses) or after mechanic/electronic service synchronization needs to be done. After pressing each button, shaft runs to its reference position (home). After stopping the shaft is synchronized.



### 25. Tracker status

These flags show a working status of the tracker. Left flags are errors. If any of errors are set, this axis will not work until error is removed. Other status flags only inform about working states. If status shows some error value and you already did solve the problem, click on "clear button" to enable motors again.



### 26. Service

Field shows some service data, errors or similar. Useful when contacting our support team.

## Advanced parameters tab

Motor A	Motor B	Common
A1: <input type="text" value="355.0"/>	A1: <input type="text" value="40.3"/>	day mode time: <input type="text" value="10"/> h
A2: <input type="text" value="335.0"/>	A2: <input type="text" value="430.0"/>	night mode time: <input type="text" value="22"/> h
A3: <input type="text" value="39.6"/>	A3: <input type="text" value="388.9"/>	RS485 ID: <input type="text" value="1"/>
A4: <input type="text" value="40.4"/>	A4: <input type="text" value="95.4"/>	panel wide: <input type="text" value="0.0"/> m
A5: <input type="text" value="0.0"/>	A5: <input type="text" value="39.6"/>	panel space: <input type="text" value="0.0"/> m
A6: <input type="text" value="0.0"/>	A6: <input type="text" value="0.0"/>	rtc correction: <input type="text" value="0"/> s
B1: <input type="text" value="31.2"/>	B1: <input type="text" value="0.0"/>	H target angle: <input type="text" value="0.0"/> o
B2: <input type="text" value="0.0"/>	B2: <input type="text" value="0.0"/>	V target angle: <input type="text" value="0.0"/> o
min range A: <input type="text" value="0"/> i	min range B: <input type="text" value="0"/> i	group: <input type="text" value="0"/>
max range A: <input type="text" value="195500.0"/> i	max range B: <input type="text" value="195500.0"/> i	U supply factor: <input type="text" value="115.0"/>
gear ratio A: <input type="text" value="380.8"/>	gear ratio B: <input type="text" value="380.8"/>	run delay n. p.: <input type="text" value="0"/> s
I motor max A: <input type="text" value="1.00"/> A	I motor max B: <input type="text" value="1.00"/> A	run delay: <input type="text" value="0"/> s
coordinate mode A: <input type="text" value="3"/>	coordinate mode B: <input type="text" value="4"/>	SN1: <input type="text" value="107741013"/>
geometry mode A: <input type="text" value="2"/>	geometry mode B: <input type="text" value="3"/>	SN2: <input type="text" value="1431406408"/>
I motor factor A: <input type="text" value="80.0"/>	I motor factor B: <input type="text" value="80.0"/>	SN3: <input type="text" value="-2027738844"/>
night position A: <input type="text" value="0"/> o	night position B: <input type="text" value="45"/> o	
go to reference A: <input type="text" value="7"/> d	go to reference B: <input type="text" value="7"/> d	

### 27. Coordinate mode

Means which coordinate system astronomic equations are using. General known is Azimuth-Elevation system (AE), other less know is Polar-Mount system (PM).

**Note:** In the case of using our tracker, parameters are already set.

	which coordinate system to use	axis
1	AE system	azimuth
2	AE system	elevation
3	PM system	hour angle
4	PM system	polar elevation

### 28. Moving properties

Each motor uses some moving range measuring impulses by hall incremental encoder. **Max range** means maximum permitted impulses, at which value motor will stop. Above, motor will be hard stopped. The same is for **min range** limit. Relation between impulses and degrees (slew drives) or millimeters (linear motors) is defined by gear ratio. **Gear ratio** is counted number of impulses by positioner per one degree or one millimeter.

**Note:** In the case of using our tracker, parameters are already set.

### 29. Geometries

Different trackers have different geometries. Geometry includes parameters **A1-A6, B1, B2** and number of selected geometry **geometry mode**.

**Note:**

- ♦ In the case of **using our tracker**, parameters are already set. **Do not change anything**.
- ♦ If you have **your own** tracker, see Geometry document available on our web side. Or contact our technical support.
- ♦ If Geometry mode is 0, this axis is not in use. Will not be controlled.
- ♦ Geometry mode parameters are fixed by purchasing conditions. Contact our sales team to add additional geometries.

### 30. Day mode time

Is the hour, when tracker starts to track. Before this hour it waits in the night position. It can be set between 1:00 and 12:00.

### 31. Night mode time

Is the hour, when tracker stops to track and goes to night position. It can be set between 14:00 and 23:00.

### 32. Night position

Is the position in degrees where the tracker will park during the night. This is between night mode and day mode time.

### 33. SN1,2,3

Are serial numbers of solar tracker positioner module. Usable when contacting our support team.

### 34. RS485 Id

Means ID number for RS485 bus. The tracker will respond only to this number. ID = 0 is broadcast for all trackers, no tracker will respond on this ID, but all will listen – suitable for set parameters in all trackers at once.

**Note:** changing ID during usage of RS385 mode, can cause communication lost. In this case set proper ID also in Helios or connect via USB to correct the values.

### 35. U supply factor and I motor factor

Are measuring factors for voltage and motor current in “web monitor”. We do not encourage you to change these values.

### 36. Anti-shadowing

Applies only to solar plants, where many trackers are mounted close together in the East-West line. In the morning and in the evening even a small shadow from neighbor panels could dramatically reduce output power of the panel. This effect appears when one cell inside serial chain is in shadow, causing all cells in serial chain to fail with power. Some panels have bypass diode. Or tracker should move in opposite direction to eliminate any shadow. And this way our tracker does.

Write panel width into **panel width** field and distance between trackers (in E - W line) into **panel spacing** field. If any of those two fields are 0, function is disabled.

### 37. RTC correction

Applies to real time clock divergence. If time is faster or slower than real solar time (expected difference is less than a minute per month), than you can set this value to correct this divergence. Value means add or subtract one second every N seconds (N is a value). Negative value will subtract one second, positive will add. Example: RTC correction=172800 (2 days) means on every 172800 seconds add 1 second.

### 38. H/V target angle

Applies only to Heliostats. Means horizontal and vertical angle at which solar tracker sees the target. Target is the point in a front of the tracker, where you want to have a spot. Positive angles are up from the horizon (vertical direction) and west from the south (horizontal direction). Negative are below the horizon (vertical direction) and east from the south (horizontal direction).

## Configuration tab

The screenshot shows a web-based configuration interface with two main sections: "Configuration Flags" and "Options".

**Configuration Flags:**

- Axis A: one hall in use
- Axis A: swap halls
- Axis B: one hall in use
- Axis B: swap halls
- Focus sensor in use
- Wind sensor in use
- Snow sensor in use

Below the flags is a text input field containing "0032" and a "Send" button.

**Options:**

- Secondary communication bus
- Resolution 0.1 degree
- Heliostat

Below the options is a text input field containing "0000" and a "Send" button.

### 39. Configuration flags

Refers on mechanical configuration for which the motor was made. Some flags are mechanical depend and are not meant to be changed by user (Axis flags). Sensor flags are available for the user.

### 40. Options

Show which additional features and functions are opened. Those features user can buy for additional payment. They are not included by default. Field is read only, it can't be changed.

## Sensors tab

Configures focus, wind and snow sensor. Sensors are enabled in the "configuration" tab.

Section	Parameter	Value	Unit
Focus	Sensor output A	1183	
	Sensor output B	1175	
	Middle A	1180	
	Middle B	1180	
	Offset A	0.0	°
	Offset B	0.0	°
Wind	Wind speed	2.3	km/h
	Speed Threshold	40.0	km/h
	Fall time	30	minutes
	Wind safe angle A	0	°
	Wind safe angle B	90	°
	Conv. factor	1.600	
Snow	Snow clean angle A	20	°
	Snow clean angle B	0	°

Note: each sensor can be enabled in the "Configuration" tab

### 41. Focus

Focus sensor is fine tune sensor to eliminate mechanical tolerances made by installation and therefore to achieve better accuracy. It is essential for concentrator applications. Sensor outputs are direct readout misalignment for both axis. Expected values are from 0 to cca 2000 (@24VDC powering). According to the "Middle" values, offsets are incremented or decremented slowly to get sensor output values more or less equal to middle values. Offsets will be added to the tracker's angles. Maximum offset is  $-2.0^{\circ}$  to  $+2.0^{\circ}$ .

### 42. Wind

If the wind is strong enough, it could damage the panels. Therefore it is suitable to move the panels into **wind save position** (normally in horizontal position), when wind is over **speed threshold**. **Wind speed** is output data of the measuring wind speed. **Conversion factor** is factor of wind sensor, meaning how much speed causes 1 revolution per second (at impulsed type) or how much speed causes 1 volt. Sensor must be impulsed type – with no additional resistor by the reed switch (not current loop 4-20mA impuses output type).

### 43. Snow

When snow sensor is activated, the tracker will move into **snow clean angle** in order to push snow to fall down (normally in vertical position). If wind mode is activated, snow mode will **not** be.