

Suntrack Advanced Manual

Custom hardware

28-2-2012
Heliostaat.nl
Mark Ursum

Advanced Manual

Introduction.

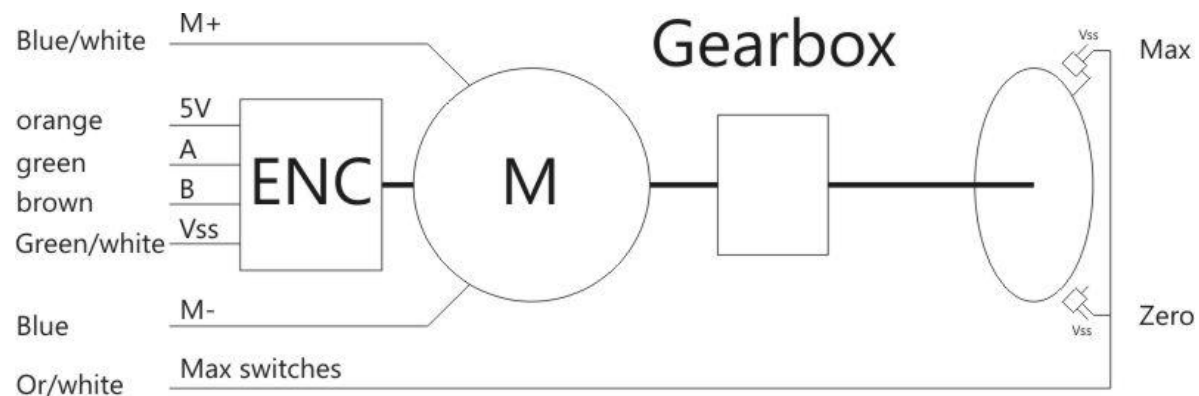
This document is for user using their own motors and encoders.

Description

The suntrack controller is standard configured for a SG2100A motor. The motor parameters can be changed for any type of motor 12 or 24 volt with AB encoder. Users can change the step/decrees, offset and minimum pwm value. GPS users can change the timezone.

Hardware connections

The CAT5 cable is connected to the motors, encoder and endswitches. *Mind the blue blue-white motor wires, they use 12volt or more and short circuit these to the other wires can destroy the microprocesor.*



The AB encoder

The AB encoder is a 5 volt type. The encoder is where it is all about in the suntrack system. The calculations are in a range of 0.01° So the resolution of the encoder has to be high, at least 30 pulses per degree. When the mirror moves 360° (usually not possible) the encoder gives $360 \times 30 = 10800$ pulses. Usually the AB encoder is mounted on the dc motor axle with 1 or 2 pules per revolution. So the gearbox needs to be in the range of 1:10000.

Endswitches

The endswitches *Zero* and *Max* are normally open and connected parallel. In the original SG2100 it is only one switch and a tab triggers both the begin and end. The *Zero* is used for recalibration and the *Max* is used to learn the controller the maximum value. In normal use the software limits the values 1° from the endpoints so it never touches the real switch.

Windsensor

The optional windsensor can be connected to the DCF connector.

- Simple pulse contact windmill is connected between *ground* and *signal*.
- Hal sensor windmill can be connected 1:1 to the 5V, signal and ground.

Hyperterminal	Explanation
P	Show parameters
L	List targets
T	Time: Current time and date
G	De-sync time, force a synchronization
S	Stop. Stop motors
D	Debug information, used for developmen
C	Change time zone, from -12 to +12
K	Change remote control
M	Minimum motor pwm from The dc motor will not work below a certain voltage.
W	Maximum wind, pulses per 60 seconds
R	Encoder steps/decrees. A full circle is 360*step/decrees
O	Offset difference between real and calculated value
N	Night parking
F	Factory setting, load the settings of the standard SG2100 motor
{	Reboot

Note: alle user changeable values are stored in nonvolatile memory.

Parameters

The command p shows the actual parameters:

```

---Parameters---
Now-----
Sun atimuth= 175.70 elevation= 29.53

Mirror x= 1019 calc= 1019 at 87.41
Mirror y= 5219 calc= 5219 at 18.33
Target atimuth = 6365
Target elevation= 661
Hardware-----
x max= 10371
y max= 7805
Hardware_atimuth = 5799
Hardware_elevation= -3789
Park position x= 1020 y= 5220
Time sync= 1
Wind pulses= 0
User settings--
Nightparking enabled= 1
Remote control: G
Time zone: 1
MaxWind= 10000
Motor-----
Step per decrees= 78.00
minimum pwm= 75
Offset= 1
Operation mode= Stop (7)
Zero offset x=0 y=0

```

Explanation of the parameter screen:

Hyperterminal	Unit	Explanation
Sun atimuth= 175.70 elevation= 29.53	dec	Where the sun is now
Mirror x= 1019 calc= 1019 at 87.41°		Calculated and real value at real word position of mirror
Target atimuth = 6365	Pulses	The position of reflection
Target elevation= 661	Pulses	
xy max= 10371	Pulses	The highest x and y value
Hardware_atimuth = 5799	Pulses	The calibration values of the mirror
Hardware_elevation= -3789	Pulses	Negative value means the zero position is facing the ground
Park position x= 1020 y= 5220	Pulses	Parking position
Time sync= 1	1 or 0	The time has been synchronized last 24h
Wind pulses= 0	Pulse	Pulses measured in 60 seconds
Nightparking enabled= 1	1 or 0	Mirror to parking when sun = 0°
Remote control: G	A..G	Selection of the remote control
Time zone: 1	-12..12	Place on earth
MaxWind= 10000	0.10K	Above this value the system goes to parking position
Step per degrees= 78.00	pulse	Steps per degree. So a 360 turn gives 360*78=28080 pulses
minimum pwm= 75	pwm	0..100% is 0..250
Offset= 1	Pulse	Calculated versus real value, too low can cause oscillation

Commands instead of remote control

The same commands of the remote control are also possible true the serial port. +++ to awake is not needed.

The keys are numbered 0..7 plus prefix (slider) 1..4

Example, follow target 1: \$15 Syntax: \$ [prefix] [key]



Getting started

Power up the suntrack controller. Connect the GPS receiver and wait for a fix. Now disconnect the GPS and connect Hyperterminal or Terraterm or Realterm. Awake the command mode by +++ now check your parameters with p and customize them for you hardware.

Once the parameters are correct for your hardware some checks:

- Press x-zero, the motor has to turn anti clockwise, if not change the motor wires.
- When the message HAL occurs the A and B signals of the encoder has to be changed.
- When the motors do not stop running the A and B signals might be wrong.
- Press y-zero, the motor has to run toward the ground, if not change the motor wires.

Now test if the pulses per degrees are correct. Look at the parameters 'p' at the
Mirror x= 1019 calc= 1020 at 87.41°

So the controller thinks it is in real world at 87.41° now move the horizontal motor 90° for real and measure the angle. Now check if the software knows it is moved 90°.

Ask hyperterminal again if it shows if 87.41+90 so

Mirror x= 2319 calc= 2320 at 177.41°

Now you can continue with the installation manual.