

# Suntrack Advanced Manual

Custom hardware

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# Advanced Manual

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## Introduction.

This document is for user using their own motors and encoders. Valid for Suntrack controller version 5.0 and up. The connections are on the long side.

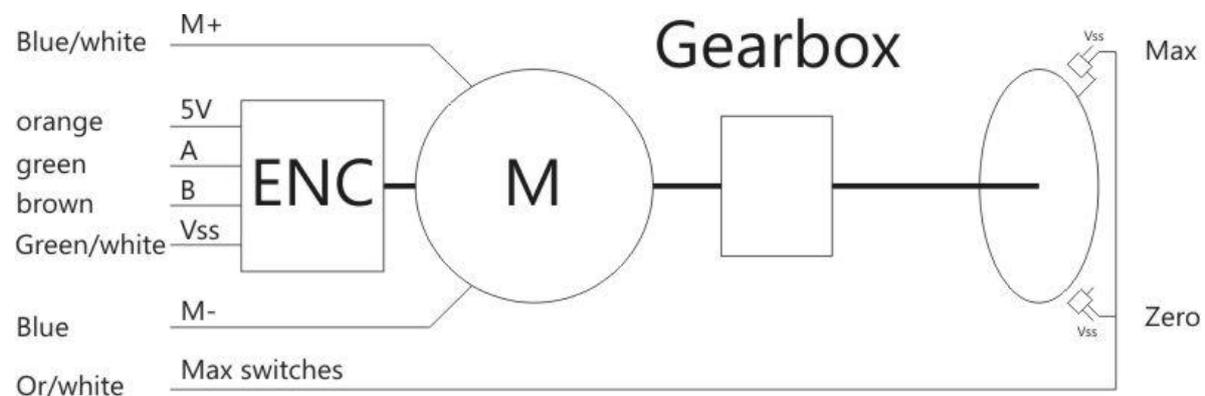


## Description

The suntrack controller is standard configured for a SG2100A/ TM2300/TM2600 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 CAT6 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 harm the microprocessor.*



## 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  $0.01^\circ$  so the resolution of the encoder has to be high, at least 30 pulses per degree. When the mirror moves  $360^\circ$  (usually not possible) the encoder gives  $360 \times 30 = 10800$

pulses. The AB encoder is mounted on the dc motor axle with 1 or 2 pulses 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 option input. Use a pulse contact (reed contact) type.



The wind pulses are counted for 1 minute and if the value is higher than parameter *windpulse* the system goes to mode off and brings the mirror to position park.

## Connection to PC

The suntrack has a mini-USB connector for optional serial communication. Connect this to a PC and the FTDI driver will be installed automatically. Use a terminal program like Teraterm and set it for communication 115200 baud.

Setup -> Serial port ->

Tera Term: Serial port setup

**P**ort: COM3

**B**aud rate: 115200

**D**ata: 8 bit

**P**arity: none

**S**top: 1 bit

**F**low control: none

Transmit delay

0 msec/char 0 msec/line

OK

Cancel

Help

## Using the command line

The command available are shown by *help* The actual setting are printed by *show*

```

Now-----
hours          = 1973.51
GPS receiver OFF valid for 22.35h
Location latitude 52.647 longitude 5.089
Sun azimuth      184.128 elevation 22.647
Mirror x= 13189 calc= 13193 at 206.769°
Mirror y= 6200 calc= 6195 at 13.000°
Target Azimuth = 227.641° Elevation = 1.904°
Hardware-----
serial number    = 2671119322
maximum          x,y = 20311,12516
Hardware_atimuth = 19067
Hardware_elevation = -4139
Park position    x,y = 15416,2629
Sun down angle   = 10
User settings-----
Tracking interval = 10 sec
Remote control    = 8004574
MaxWind          = OFF
Motor-----
Step per decrees x,y = 156,156
min pwm          = 10 (0..100)
max pwm          = 100 (10..100)
hysteresis       x,y = 5,5
zero deviation   x,y = 0,0
PID-----
process time     = 5 ms
Kp               = 1.000
Ki               = 40 ms
Kd               = 0
softstart       = 500 ms
end switch x    x,y = NO,NO
-----
Mode 1 state [FOLLOW MANUAL]

```

## Commands, Info

Command	Description
help	This tekst
ver	Software version
time	get the internal (GMT)time
show	Show all paramaters
list	List the set targets
serial	Serial number of the suntrack controller
hours	Tracking hours

## Motor control parameters

Command	Description
stepsx	Steps per degrees horizontal
stepsy	Steps per degrees vertical
hystx	Hysterese horizontal
hysty	Hysterese vertical
kp	PID controller P where 1.000 = 1000
ki	PID controller I time the intergrator rises (ms)
kd	PID controller D unused for now
Ktime	PID procersss time (ms)
softstart	Time (ms) the motor power rises to max
debounce	Debounce time the switch is ignored (ms)
minpwm	Minimum pwm value (0..100%)
maxpwm	Maximum pwm (0..100%)

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

## General Control

Command	Description
trackingtime	Tracking interval (sec)
remote	Save last received remote controller
sundown	sundown angle (decree)
windpulse	windpulses per minute, 0 to disable
contrast	LCD contrast
factory	Restore factory settings

## Manual control

Command	Description
up	Move up x steps
down	Move down x steps
cw	Move Clock wise x steps
ccw	Move Counter Clock wise x steps
posx	Set motor to absolute position
posy	Set motor to absolute position
stop	Stop motors

## Takeover the remote control

Command	Description
settarget	set target 1..5
followsun	Follow sun for solar panels
savesun	Save sun position

savetarget	Save target 1..5
savepark	Save parkposition
calxmax	calibrate X Max
calxmin	calibrate X Min (zero)
calymax	calibrate Y Max
calymin	calibrate Y Min (zero)

## Debug

Command	Description
inputs	Show external inputs status
tle	TLE motordriver read
gpsdebug	GPS debug 0:off, 1:on 2:reset on
desync	Set GPS not synced
dspinit	Init display again
reboot	reboot controller

## Setting up for custom motors

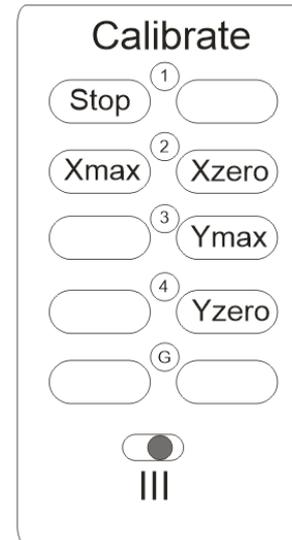
Power up the suntrack controller. Wait for a GPS fix.

Set the custom steps/degree for the motor. Leave the PID values for now.

Test the hardware connections. The absolute value of the encoder (C) has to count up moving horizontal clockwise and vertical upwards.



Use the remote control slider position 3 to check if the motors turn the right direction and if the absolute value (C) counts the right way. If the encoder counts the wrong direction the motor will not stop running, press Stop and cross the AB signal.



## Steps per degree

Test if the pulses per degrees are correct. Look at the parameters *show* at the terminal:  
*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 by slider position 2 and 3 and measure a movement of 90°. Now check if the software knows it is moved 90°.

Ask 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.

## Option inputs

The suntrack controller has 3 optional inputs. The first is used for the windsensor pulse. The 2nd and 3th are unused, these inputs are available for custom software on request. Optional a CAN2.0b interface possible. Ask for possibilities.

