SAT CONTROL
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SM34SPM+

SunTracer SM34SPM+

2–axis solar tracker with time-derived astronomical positioning for the automatic sun-tracking of a solar cell or a concentrating photovoltaic panel

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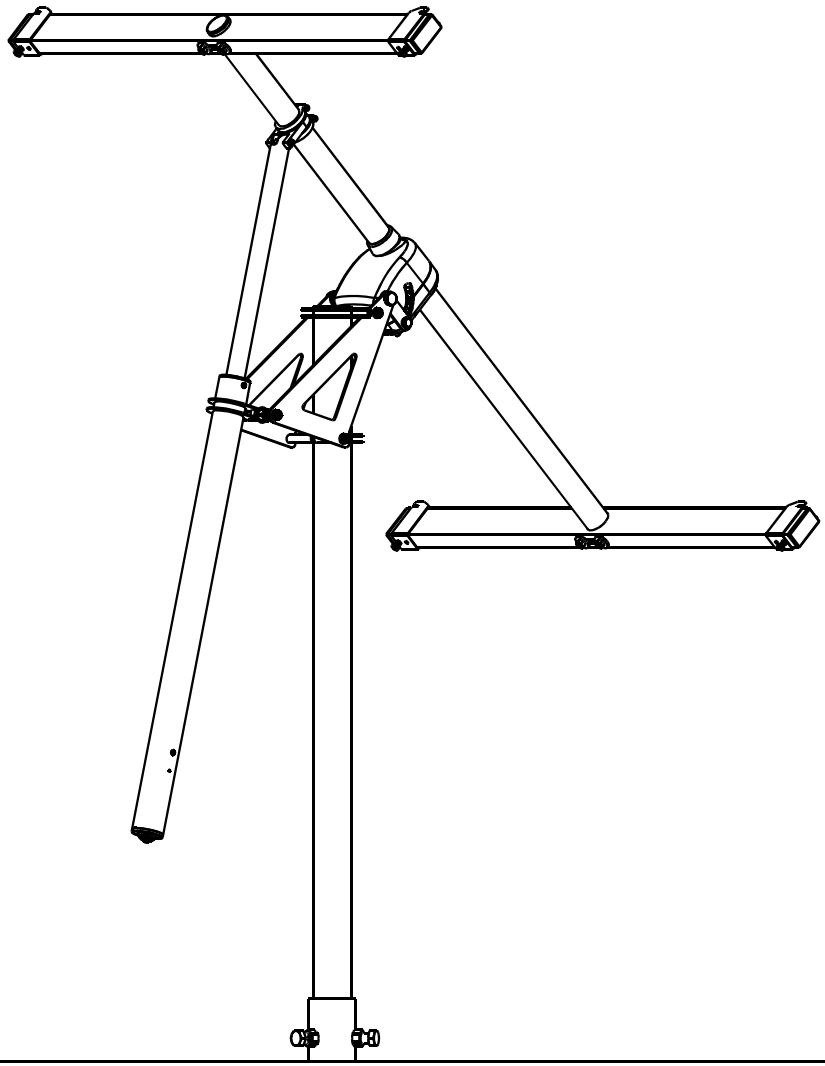
Communication protocol description



Applying to versions:
HW: TIV27B
SW: version 6

Connecting the motor to a PC over an RS232 connection

The motor operation is not conditioned by the use of a PC. But it provides additional functions that can be useful for advanced users. Usually "web monitor" (see www.solar-motors.com for your reference) is used for this purpose. But in this script only generic commands are described.

- Connect your PC to the motor using the enclosed communication cable. Use the serial COM port on your computer. If your PC does not have this port, you can use the RS232-USB interface and its virtual COM port.
- Communication is two-way, pure RS232. Refer to cable specification and pinouts at the bottom of this document. Settings are: **38400bps 8 data bits, even parity bit, 1 stop bit, No handshake**. Use any terminal program to see strings from SunTracer (i.e. Hyperterminal).

PC is receiving

SunTracer is continuosly sending its current parameters with refreshing rate on every 400ms. String structure is: START_BYTE – INDEX – DATA.

- Start byte is always ASCII character $, which is code 36 (0x24 hex). It is used to know where single data begins. No other character will be the same. It
- Index means which parameter is shown. Refer to description of single command below. Index is one byte long (in range from 0x25….0xFF in hex format).
- Data bytes are usefull information of each parameter. They are ASCII characters.

PC is sending

SunTracer will accept any command from PC anytime.
String structure is: START_BYTE – INDEX – DATA – CHECKSUM.

- Start byte is always ASCII character $, which is code 36 (0x24 hex). It is used to know where single data begins. No other character will be the same. It
- Index means which parameter is shown. Refer to description of single command below. Index is one byte long (in range from 0x25….0xFF in hex format).
- Data bytes are usefull information of each parameter. They are ASCII characters.
- Checksum is protection for unwanted string changes due to enviromental electrical disturbances on the communication path (cable). RS232 has parity bit for detecting errors, but it is a weak protection. Implementation of checksum avoid this weakness. All data in the string are summed in one byte (overflow is ignored). Than checksum byte is two's complemented. Example:

We want to send data: 1234. Struct a string→ $&1234 –(in hex)→ 0x24 0x26 0x31 0x32 0x33 0x34 –(sum)→ 0x114 –(overflow is ignored)→ 0x14 –(two's complement)→ 0x100-0x14=0xEC.
Sent string is than: **0x24 0x26 0x31 0x32 0x33 0x34 0xEC**

- If transfer is proper, a green LED on SunTracer will flash for a short time.

Indexes and commands

SunTracer Type:

- index:0x25
- receive-only

SunTracer Version:

- index: 0x26
- receive-only

Usupply:

- Supply voltage used for powering SunTracer
- index: 0x27
- receive-only

Hours:

- index: 0x28
- two-way
- data format is HH
- example: set hour to 08h: 0x24 0x28 0x30 0x38 0x4C (0x4C=checksum)

Minutes:

- index: 0x29
- two-way
- data format is MM
- example: set minutes to 32: 0x24 0x29 0x33 0x32 0x4E (0x4E=checksum)

Seconds:

- index: 2A
- receive-only

Day:

- index: 0x2B
- two-way
- data format is DD
- example: set day to 05: 0x24 0x2B 0x30 0x35 0x4C (0x4C=checksum)

Month:

- index: 0x3B
- two-way
- data format is MM
- example: set month to March: 0x24 0x3B 0x30 0x33 0x3E (0x3E=checksum)

Hour angle:

- Angle between the Sun and the South measured on Sun's path
- index: 0x2C
- two-way
- data format is XX.x or –XX.x or X.x (angle in degrees)
- example: set hour angle to 30.0°: 0x24 0x2C 0x33 0x30 0x2E 0x30 0xEF (0xEF = checksum)
- example: set hour angle to -30.0°: 0x24 0x2C 0x2D 0x33 0x30 0x2E 0x30 0xC2 (0xC2 = checksum)

Hposition:

- Current position of the first axis, measured in impulses. Meant for diagnostic.
- index: 0x2D
- receive-only

Hdestination:

- Wanted position for the first axis, measured in impulses. Meant for diagnostic.
- index: 0x2E
- receive-only

Elevation:

- Vertikal angle between horizontal plane and the Sun.
- index: 0x30
- two-way
- data format is XXX.x or XX.x or X.x (angle in degrees)
- example: set elevation to 105.0°: 0x24 0x30 0x31 0x30 0x35 0x2E 0x30 0xB8 (0xB8 = checksum)

Vposition:

- Current position of the second axis, measured in impulses. Meant for diagnostic.
- index: 0x31
- receive-only

Vdestination:

- Wanted position for the second axis, measured in impulses. Meant for diagnostic
- index: 0x32
- receive-only

User's latitude:

- index: 0x34
- two-way
- data format is XX.x (max value=67.9)
- example: set latitude to 46.4°: 0x24 0x34 0x34 0x36 0x2E 0x34 0xDC (0xDC = checksum)

Hemisphere:

- index:0x35
- two-way
- data format is 'N' for North or 'S' for South
- example: set hemisphere to South: 0x24 0x35 0x53 0x54 (0x54 = checksum)

Moving interval:

- How often is SunTracer correcting the position
- index: 0x36
- two-way
- data format is 'int', which toggle interval between 1 minute and 15 minutes.
- example: switch interval from 1 to 15 minutes: 0x24 0x36 0x69 0x6E 0x74 0x5B (0x5B = checksum)

Automatic tracking:

- Automatic tracking enabled (solar time is used) or disabled (moving will be manually with commands)
- index: 0x38
- two-way
- data format is 'n' for manual tracking and 'y' for automatic tracking.
- example: disable automatic tracking: 0x24 0x38 0x6E 0x36 (0x36 = checksum)

Manual move:

- motor will shift H axe for 50 impulses or V axe for 100 impulses. Sending this command constantly is needed for continuosly moving in one direction.
- index: 0x39
- send-only
- Data format is: 0x32 = left, 0x34 = right, 0x31 = up and 0x33 = down.
- example: move the first axis for 50 impulses to right: 0x24 0x39 0x34 0x6F (0x6F = checksum)

Appendix:

- RS232 cable wiring