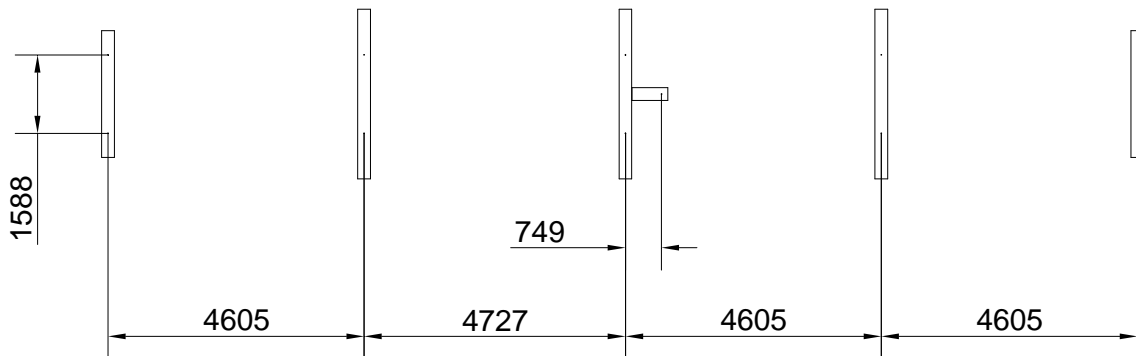
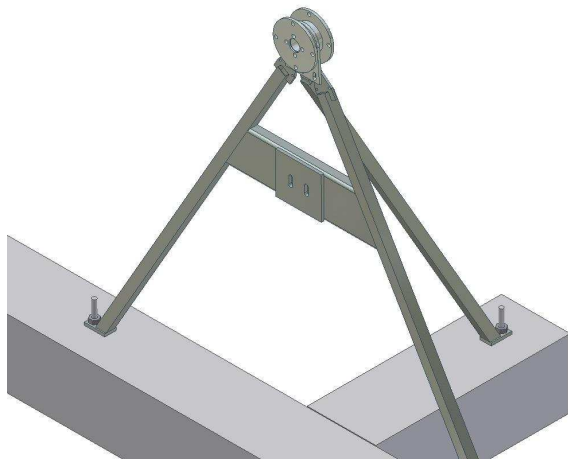


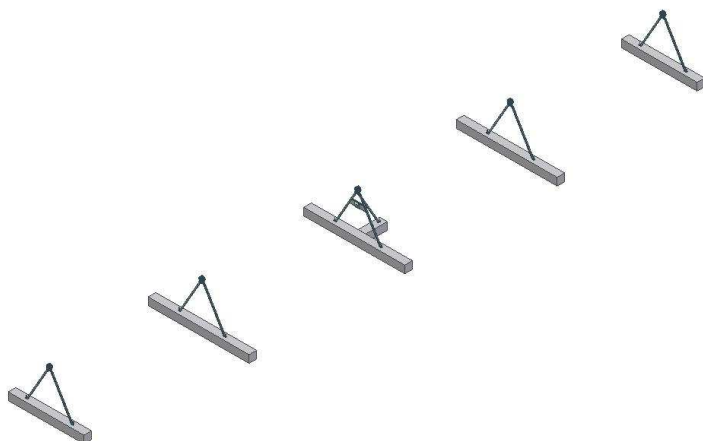
# SF40-1EH SOLAR TRACKER INSTALLATION MANUAL



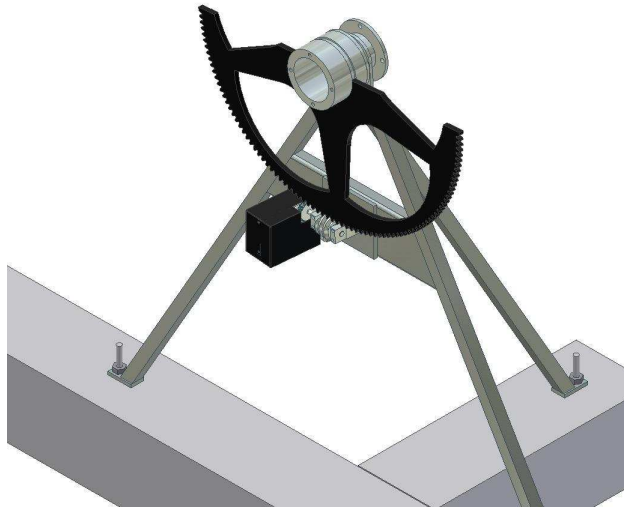
1- Place the concrete blocks; if they are not poured, the three central blocks can be 30x30x320 cm and the two with the tips can be 30x30x250cm. M18 10 cm long threaded rods will come out of the concrete blocks. The measurements for spacing the threaded rods are indicated in the drawing. They have to be placed so that the axis of the tracker is aligned north to south.



2- Place the 3 central feet and rotating set of the upper part.



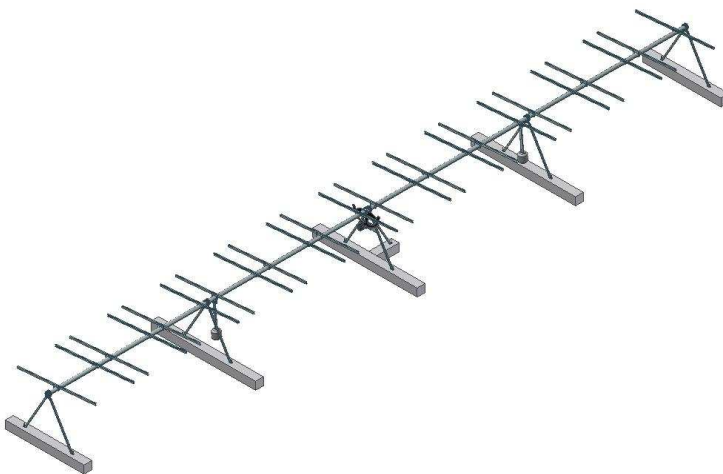
3-Repeat with the other feet.



4-Screw the cogged wheel and then the motor set with a worm screw.



5- Place the pipes among the legs, so that the bars that are longitudinally welded to the pipes remain horizontal, as can be seen in the following images.

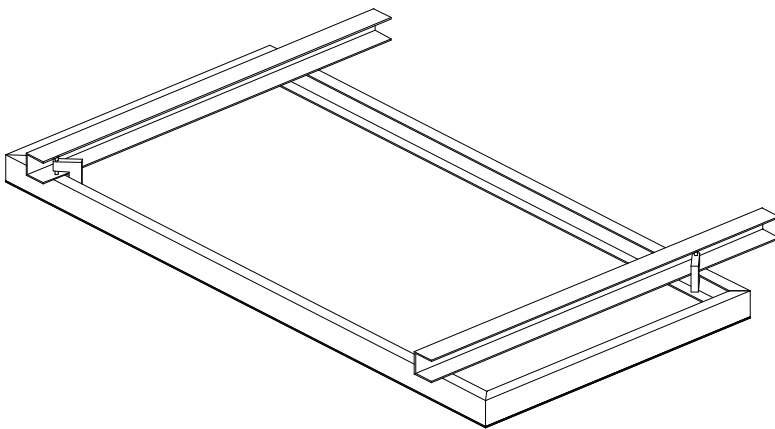


6- Install the transversal bars that are used for clamping the panels, by means of the plates that are seen in the following image. Additionally, the counterweights have to be put approximately where the image shows.

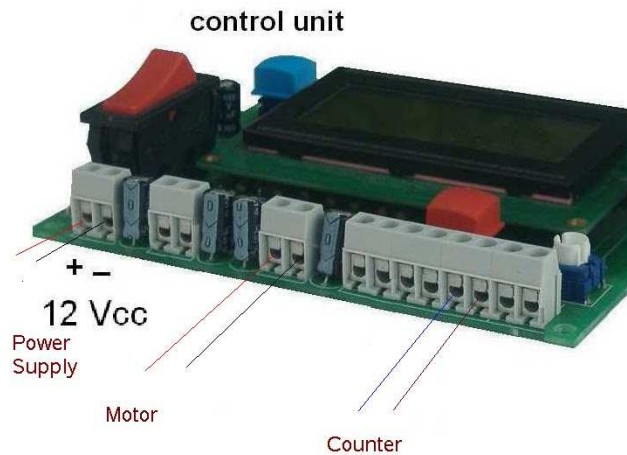


7- Detail of how the bars and the counterweights are placed.

8- Next, plug in all connectors and connect the cables to the electronics (see more details later on). Start the machine to test it.



9- Mount the panels with the clamps (anti-theft) supplied as shown in the figure.



## ELECTRONICS AND PROGRAMMING

Connect a cable from 1 to 4 mm<sup>2</sup> section (see below) in the strip is inside the airtight box with the electronics. It is indicated at the bottom where it connects the positive and negative. Be careful not to reverse the poles. The cable is passed through the bottom hole so that it is fairly airtight.

In the box are a set of cables with connectors at the top. The set is connected to the motor and its microswitch.

Near the strip is a switch. With it active electronics. It appears, after 2 seconds the following screen:

```

14/05/03  10:21
LON:E001° 52' 25''
LAT:N41° 42' 50''

```

That is, day, month, year, hour, minute, latitude and longitude.

With the **red** button will change the day. Each press will increase the number by one. When you reach 31 is put back to 0. When we have the right day, with the **black** button will pass to the next value to change the month. We proceed in the same way. Just as in the year, hour and minute

**Attention! We set the universal time.** Double clicking on the watch from your computer, and selecting "zone" will have an orientation of Greenwich Mean Time (GMT) on the clock hour of your country.

With the same procedure will get the longitude and latitude of the place, taking into account the need to put **east (E)** or **west (W)** in length and **north (N)** or **south (S)** latitude.

At any time, if the data were correct, a **blue** button would pass directly to the next screen.

Then it appears:

```
1          01
Inclination axis
Black:vertical
Red: horizontal
```

The first of the two ones and zeroes that appear in the top right of the screen tells us the state of the switch lap counter. The first number indicates if switch is cuentavueltas axis tilt. 1: connected, 0: off.

**This number can be very useful to know if the switch fails.** With the two buttons will move the axis to get it to be the greatest facing the sun. (If it's dark or cloudy it is preferable to wait the sun).

We press again blue and appear:

```
HOR:129
VER:000
LLU:085
```

This is only useful when it incorporates a solar probe concentration. When properly focused on the sun, the **HOR** value is close to 128. **LLU** value is the value of light. If below a certain value, the probe does not act and only moves by astronomical program.

Even with concentration or without, with the blue button will move to the normal operating screen. Which will be always active:

```
14/05/03 16:21
HOR: +270° 0120
VER: +022° 0000
00 00 120 000 01
```

This screen shows date, hour and minute. Pressing **black** will move the minute black and the delay by pressing the **red**.

The next line is the time position. In this case has no application.

The third line indicates the position must be the tracker. In the time it rises the Sun is 0 ° at solar noon, the tracker must be horizontal, is 90 degrees and at night, when sunset, will be west to 180 °. To the right is the number of pulses to be given early in the day, the lap counter tracker.

The fourth line numbers are numbers of control. In any case the last number of minutes reported missing to calculate the position of the tracker and is lit, if applicable, the engine. Pressing the blue back to previous screens to adjust the tracker facing the sun

## MALFUNCTION WARNINGS

When an motor doesn't work, or the tracker gets stuck or the switches fail, etc. the electronics detects it and an error message appears on the screen while the motors disconnects. There are two possible errors:

**ERROR 26:** The axis of inclination. This error appears on the screen when the electronics has ordered the inclination motor to start and during several seconds it has not detected any change of state in the counter switch of the engine. It's always opened or closed. From which it is deduced that one of the following things could occur:

- The inclination motor doesn't function
- The connections to the inclination motor fail
- The switch doesn't work or doesn't get activated
- The switch connections fail.
- The tracker is obstructed and therefore cannot move

**ERROR 27:** The same as in the previous error but with the hourly axis.

In two errors, the number of seconds that remains without receiving a signal change before disconnecting motors and going out, the error notice comes with a 6 second delay. In any event it's possible to change between 1 and 25 seconds. (See ahead, the V variable).

## CONFIGURATION OF SOME PARAMETERS

By default this tracker already comes programmed so that it works perfectly, but it has a great flexibility to adapt itself to an infinite number of circumstances.

By changing the value of some variables we'll be able to extend or to correct functions.

If we want to change variables we'll have to do the following:

Press the connection switch and before 2 seconds of connection goes by, press the red button. A screen will appear before us where there are 8 values, from A to H. With the red button we can change every value and with the black button we can proceed to the following value. When we come to the value H, by pressing the black button we'll continue to the following screen where the values from I to P will appear, and by the same method a third screen with values from Q to X.

Some variables are not applicable, other are. Here is an enumerated list of the different variables and their uses:

**A:** Clock velocity: By default it is 128, values are from 0 to 256. If the clock tend to move forward, to drop the value (127, 126, 125). For each unit we drop, clock will move backward 1.38 seconds daily. And will the other way around if we move forward the value.

**B:** (only for concentration) Value of the light of the sun. By default 76, usually a powerful sun it is 95. To adjust this value (that it may vary with the sensor), point the tracker to the sun (with clear sky) and sun above 30°. Write down the value “LLU” on the 3rd screen. Of that number take out 20. That is the value that must be in parameter B. For example if “LLU” is 94, parameter B must be 74

**C:** Minimal inclination of the tracker with regard to the vertical one. By default it's at 22°. The status goes from 0 to 85°. The tracker allows itself to set at almost 0° but it's not advisable because depending on the position with the axis of inclination it might run into any obstacle.

Modifying this variable can serve us for several things. For example, if we have an obstacle that makes interference when the device is very vertical. If for whatever reasons that maybe, we only want the hourly axis to move, we can put this variable to 85°. Such as in European latitudes the Sun never reaches this inclination, the axis of inclination will never move.

**D:** (only for concentration) hipster. It can be 3 if a really high accuracy is needed or 25 if is not needed. Below 3 tracker would have not enough stability. In the screen with parameters “HOR, VER LLU”, the first two numbers are the vertical and horizontal axis. The ideal value is 128, if the hipsters value is 10, it will always be between 118 and 138

**E:** Range of movement from east to west. By default, 180°. Otherwise, from the midday position, (south), the range of movement will be +/- 90°. It can be programmed from 0 to 255°.

In the case of 255° it would mean that it would go from -127,5° (Northeast) to +127,5° (Northwest) in reference to the south. Anyhow, the tracker doesn't permit such a wide range of movement.

**F:** Number of impulses from the switch of the hourly motor to complete its hourly course. By default 267. The number of impulses that the tracker generates to complete 180° that exists for default, is 267 in SF9, 0400 in SF20, 0560 in SF28, 0400 in SF40-1EH, 0641 in SF45 and 0560 in SF70-1EH.

If, in an SF20, we only want it to do 150°, besides modifying the variable I, we'll have to modify F, since doing 150° will only create 333 impulses.

**G:** Time, in minutes, between movements of the tracker. It can be programmed between 1 and 98 minutes. If it's 30 minutes, it means that every 30 minutes it will calculate the position of the Sun and if they correspond, the tracker will move. On the normal functioning screen the number that on the fourth line to the right indicates the number of minutes remaining until the next calculation.

**H:** Language. From 1 to 4. Number 4 is English

**I:** Night position activation. If it's at 0 the tracker will do its normal day movement and in the evening, when the Sun set, it will turn to the back towards the East, keeping the tracker in next closest vertical position (by default 22°). If it's at 1, in the evening the tracker shifts to horizontal. This can be useful to make the access to the panels difficult avoiding robbery. It can also be useful to minimise the time of vertical position in which it's in when the wind is the strongest. Although normally the maximum winds aren't at night but during the afternoon.

**J:** (only for concentration) Period of measuring of the solar sensor, in minutes. The default value is 82, and it measures the value every 10 seconds.

**K:** Not applicable

**L:** Not applicable

**M:** Not applicable

**N:** Not applicable

**O:** Maximum verticality of the tracker before it shocks with the inclination gear stopper. By default 4°

**P:** Only applicable for tracker connected on net. The identification number of the tracker.

**Q:** Angle, from vertical, when the wind safe position is set.

**R: backtracking.** This variable is so that tracker can be put very close together, so that

in the morning and afternoon, electronics calculates the optimum inclination is not to make shadows. The value to be set is the tracker axis ratio divided by width of panels on each tracker. For example, if we are among trackers distance is 7.5 meters, width is 3 meters, the variable should be  $7.5 / 3 = 2.5$ .

If the value placed is less than 1.0, the machine will be deemed not backtracking.

**S:** Not applicable

**T:** Not applicable

**U:** Not applicable

**V:** Time, in seconds, in which the electronics should be without receiving a signal to show the error. By default 6 seconds. It can be adjusted between 1 and 25 seconds.

**X:** Time, in minutes, by which the tracker will set itself horizontally if given the order because of the wind. By default 60 minutes. Values adjust from 10 to 190 minutes.

In the electrical grid there is a wire shaft of two contacts, one indicated with "V", that if the circuit closes between these two contacts, the tracker will set itself for us horizontally during the programmed time. If we have an anemometer that at a certain wind speed closes a circuit, it will allow us to use this system for major protection from winds.

## **SEMI AUTOMATIC INITIALIZATION :**

Once position, date and hour are correctly set up:

- 1- Switch on the electronic controller
- 2- Press the blue button before 2 seconds have passed by.

The tracker will start moving to the east till the stopper of the gear stops it. Once it stops it will take that point as a reference. After this it will go to the west till the point it should be according the time. The same procedure must be done with inclination axis.

## **AUTOMATIC INITIALIZATION:**

A GPS system can be provide. It allows to, automatically, set the exact time, date and position, and tracker will start working automatically.

All functions (also the GPS initialization) can be done from a central unit of control that connects all the trackers (A06 version).

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