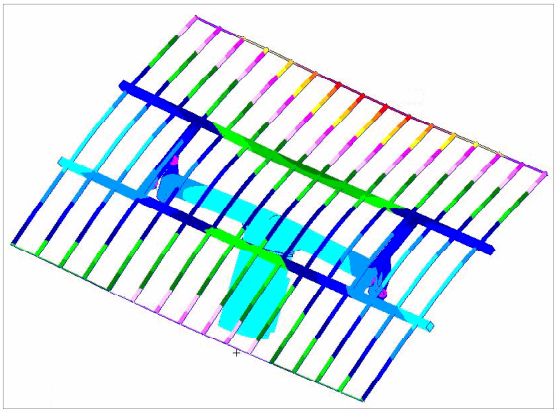
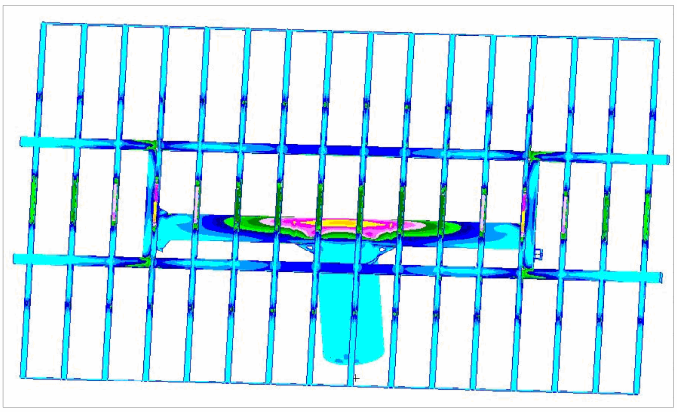
CLAVIJO GROUP SOLAR TRACKERS

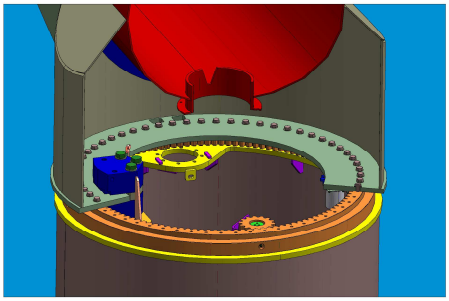
- Designed and analysed by finite elements with the loads and coefficients specified in the Eurocode.
- High performance: up to 35% more production on the photovoltaic modules compared to a fixed installation.
- 2 versions available:
  - **H version** the main feature is the use of the hydraulic system for vertical movement and the hydraulic brake option. Version with 2 cylinders located on the ends of the 'T' support.
  - **E version** the main feature is the use of one single electric motorised spindle located in the centre of the 'T' support.
- Innovative patented azimuth brake (optional in H version)

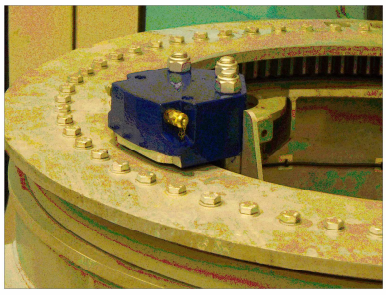


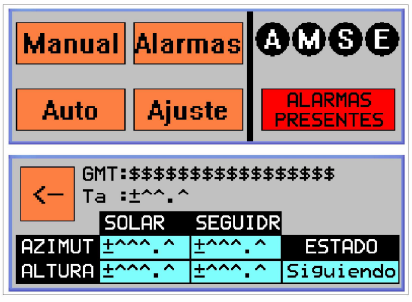


INNOVATIVE AND DIFFERENT FEATURES

- Sturdiness
- Flexibility to install the photovoltaic modules
- Bronze cases on the joints
- High performance of the tracking system (up to 0.5 degrees)
- Control programme with an alarm management and event log (make the maintenance and overhaul easier)







FREE HYDRAULIC BRAKE IN THE AZIMUTH MOVEMENT, PATENTED BY CLAVIJO GROUP (OPTIONAL IN H VERSION)

Protects the gear assembly between the planetary reduction gear box and the orientation crown, thus preventing critical points from breaking, such as the pinion teeth or the anchor flange on the reduction gear box. It is activated and deactivated with every azimuth movement, avoiding vibrations caused by the effect of the wind on the grid and in the gaps between the cogwheel on the crown and the reduction gear box pinion.

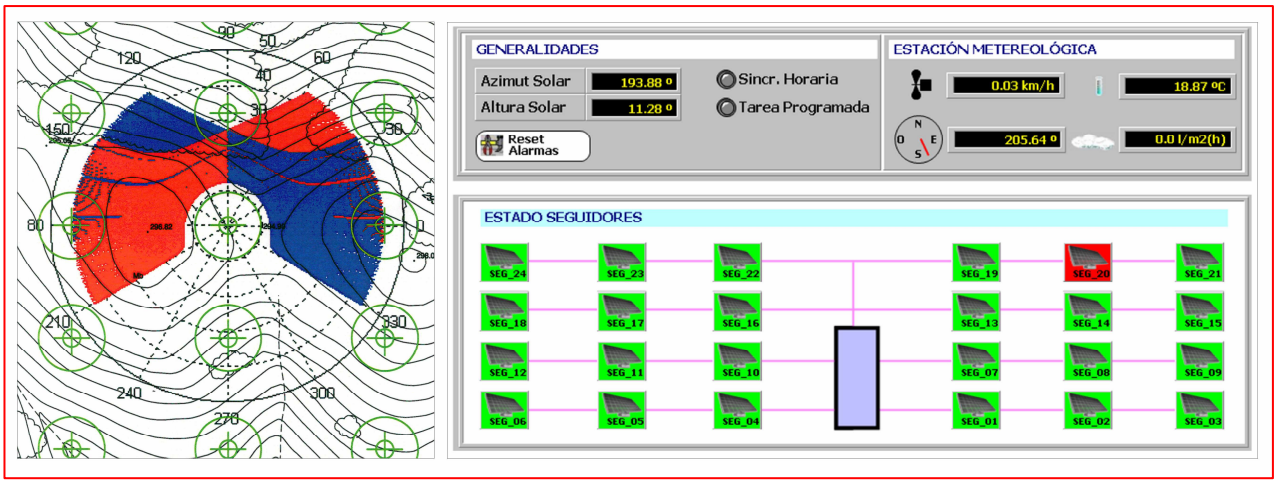
By using it, it **reduces the dynamic loads** which exponentially multiply the effort of the wind on the grid. It also stabilises and **secures the assembly when there are strong gusts of wind** – the grid moves more softly and it is more controlled (sail effect). Together with the electric brake on the gear motor, it guarantees the stability and durability of the assembly.

TRACKERS CONFIGURATION

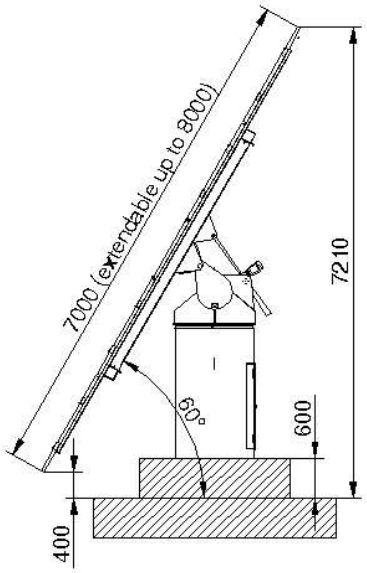
They can be modified globally if the site or installation is monitored or if they can be handled individually by the buttons in the electrical panel (emergency push button, reset button and switch to safety position for maintenance jobs), or by a portable terminal that enables the configuration of the tracker automatically or manually. It also enables other options such as visualisation and reset of alarms, or changing the configuration parameters (time, tracker location, rest criterion, minimum tracker operating angle, maximum azimuth and vertical turning angle…).

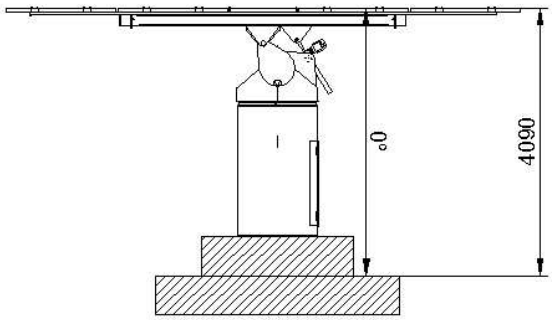
ADDITIONAL SERVICES

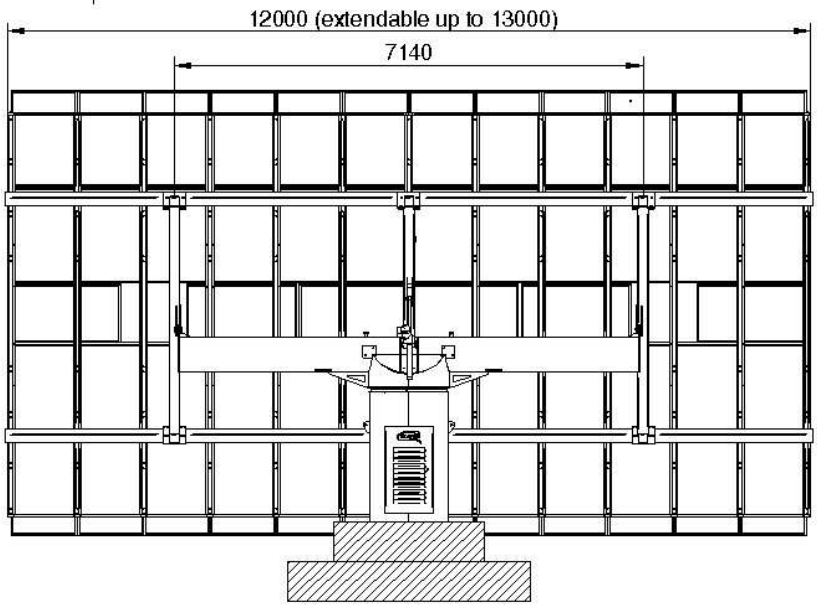
- Study of shadows
- Installation of trackers on site
- Studies of level curves on topographic plans
- Assembly of anemometers and data registers, communication and monitoring of the site
- Start-up
- Preventive maintenance
- Use of anemometers, digital displays to view the speed of the wind, weather vanes or date registers to store information (up to 3 different ways at the same time: internal memory, USB pen drive or via FTP).
- Possibility of protecting the trackers from power failures by using hydraulic accumulators that enable the grids to rise automatically.



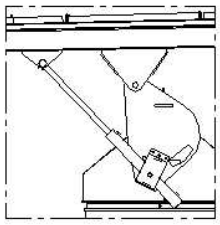
TECHNICAL CHARACTERISTICS







HYDRAULIC VERSION



		H Version	E Version
Tracker axes		2 axes: Azimuth and vertical	
Grid configuration		4.5 lines x 12 metres	
		Extendable up to 4.5 lines x 13 metres	
Module surface		84 m2	
		Maximum surface = 104 m2	
Module distribution	Type	Single-crystal module SOLARWATT model M230-96 with nominal power of 250 Wp. External measurements module = 1,604 x 1,054 x 50 mm	
	Amount / Power	4 lines x 11 panels + 1 line x 7 panels / 51 modules x 250 Wp = 12.75 Kwp	
	Amount / max. power	4 lines x 12 panels + 1 line x 8 panels // 56 modules x 250 Wp = 14 Kwp	

The final power and amount of the installed modules is by way of guidance, because it will depend on the needs of the investor and the module model that is chosen. Possibility of installing an extra central line.

Solar tracker 2 axis model SR10
4 lines – 13 metres (H or E version)

		H Version	E Version
Structure material		Hot-dip galvanised steel (in accordance with standard ISO 1461)	
Azimuth	Turn range	270 degrees (from -135 degrees to +135 degrees)	
	Action type	Planetary reduction gear box and orientation crown with reinforced teeth	
	Gear motor characteristics	Motor 0.33 Kw / 1,500 rpm / output speed = 0.93 rpm / reinforced pinion gear assembly (cemented)	
	Electric brake	Controlled braking torque	
	Hydraulic brake (OPTIONAL)	Braking strength 175 Kn	
	Movement control	Absolute potentiometer, precision ±0.1 degrees	Inductive sensor, precision ± 0.5 degrees
	Safety 1	Control and tracking movement by automatic machine	
	Safety 2	Physical stop with 2 limit switches with a wheel.	
Vertical	Turn range	From 0 degrees to 60 degrees	
	Action type	Central + 2 hydraulic cylinders	Electric linear actuator
	Central characteristics	Motor 0.75 Kw / 1,500 rpm	
	Movement control	Absolute inclinometer, precision ±0.1 degrees	Inductive sensor, precision ± 0.5 degrees
	Safety 1	Anemometer signal – Safety position (horizontal)	
	Safety 2	Physical stop with the cylinders, control and tracking movement by automatic machine and non-reverse installation on each cylinder.	Control and tracking movement by automatic machine and physical stop with limit switch and wheel.
Electrical panel	Power supply	230 Vac – 50 Hz, single-phase or 380 Vac – 50 Hz three-phase	
	Electrical characteristics	Metallic, IP55, all the elements connected by external connectors. Includes OMRON PLC, automatic protection circuit-breakers, and differential protection.	
	Tracking	Tracking programme by astronomic calculation on the PLC. Protection against wind and snow-	
	Operation and maintenance	Includes anti-fraud emergency push button, two-function push button for reset and maintenance position, alarm management for both current ones and past ones.	
	Connectivity (optional)	❑ Touch-terminal for configuration and manual movement. ❑ Serial port for configuration terminal accessible by external industrial connector ❑ RS422 port (included in advanced model) ❑ Optional Ethernet port ❑ Access by GSM/GPRS modem and SMS service	
Wind speed		Up to 50 km/h in working mode. Up to 120 km/h in resting and safety mode.	
Anemometer (OPTIONAL)		Polyamide anemometer + digital display for wind speed + tracker signal output relay	
		Polyamide weather vane to control the direction of the wind	
		Data register up to 3 types at the same time: internal memory, USB pen drives and remote FTP (local or via internet). Real-time viewing on touchscreen of the signal from several anemometers.	
Vertical movement safety (OPTIONAL)		Possibility of raising the grid (safety position) by hydraulic accumulators if there is a power failure.	N/A
Azimuth movement safety		Patented hydraulic brake system + braking disk that eliminates dynamic overloads caused by the effect of the wind on the grid. Independent brake pads and easy to replace.	

	H Version		E Version	
Electrical consumption	0.5 kw a day		0.3 kw a day	
Approx. module structure without modules	2,400 kg			
Approx. module weight	1,400 kg			
Foundation	Specifications included in the corresponding foundation plan			
Warranty	10 years for the metal structure			
Distance between trackers	N – S	23.5 metres	E – W	27.5 metres
The distances are by way of guidance, because they depend on the final dimensions of the grid and the location of the installation (longitude, latitude and altitude).				