

## About SENER

SENER is a world reference in the design and production of Control and Actuation Systems for critical applications as defense, space, medical systems and solar.



SENER is pioneer in solar tracking, designing and installing its first 150 heliostats in 1980. The drives installed are still performing perfectly at the Plataforma Solar de Almería (PSA). SENER supplies the 2,650 drives for the heliostat field of the Central Tower Receiver Gemasolar plant, as well as for CPV and PV large-scale plants.

SENER is a reference in high accuracy solar trackers for HCPV, these being selected by the Instituto de Sistemas Fotovoltaicos

de Concentración (ISFOC), the National Renewable Research Center (CENER) and National Institute for Aerospace Technology (INTA), for HCPV modules certification according to the IEC 62018:07 international standard.

SENER, as a leader company in the solar field and specialist in turn key projects of CSP plants, has a privileged know-how concerning the needs of this kind of installations, therefore the drive. For this reason MASS is leader being the most commercialized drive for CSP in the world.



The information provided in this brochure is intended to provide a general overview of our products.

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## MASS: High Performance Two Axes Drive

BORN FOR SOLAR TRACKING  
 rely on the technology of a company leader in solar innovations



[www.sener.es](http://www.sener.es)

The Sun is one of the most promising renewable energy sources. Concentrated Solar Power (CSP) plants represent the present and the future of the electric energy obtained from the sun, in large scale.

These installations require high technology to meet the new arising challenges. SENER's MASS high accuracy two axes drive series, is born to guarantee heavy duty and accurate solar tracking.

## Applications

SENER's MASS drive has been specifically engineered from its origin, to meet the demanding requirements of CSP and CPV technologies:

- Central Tower Receiver Heliostat
- Stirling Dish
- High Concentration Photovoltaic (HCPV)

All of them have in common the need of concentrating the solar radiation into different elements by means of the accurate pointing of large surfaces to the sun. This accurate tracking must be done under hard operating and environmental conditions (wind, rain,

snow, dust, sand, etc), operating in the open air and along the whole life cycle of the plant.

Therefore, it is necessary to rely on robust, reliable and validated technology that meets the most demanding requirements, ensuring the energy production during the complete life cycle of the installation and, therefore the profitability of the investment.

SENER's MASS drive was born with this aim, a unique drive in the market for its performances, specially conceived for this application.



MASS drive in a 120 sqm heliostat  
120 sqm PV solar tracker  
85 sqm HCPV solar tracker  
45 sqm heliostat

## Product

**SENER's mechanism is an electromechanical drive with features unique in the market.**

Its compact design, fully closed and sealed, integrates Azimuth and Elevation gears in a single housing, maintaining the adequate lubrication conditions of all components and protecting them against dust and oxidation, providing maximum stiffness.

The drive has only three mechanical interfaces: two elevation flanges and one azimuth flange, enabling a reduced installation. The mechanism is delivered fully mounted and perfectly integrated, ready for operation.

Among its main features the mechanism's remarkable actuation capacity stands out, allowing the operation of heliostats up to 120 sqm and fulfilling reliable emergency manoeuvres, providing a torque above 36 kNm. The mechanism also has a notable efficiency and low self-consumption compared with other solutions in the market.

The MASS drive is an own product, designed, patented and manufactured by SENER. The production is done under the tightest quality controls (ISO 9001). Each drive undergoes an exhaustive test plan to verify that every unit accomplishes the guaranteed performances.

As design and production authority, SENER adapts the MASS drive to the needs of its customers, both in capabilities and interfaces, and is able of performing specific tests under demand on the test bench or on field. MASS is CE Marking.

## Advantages

- Compact design, single housing that withstands and protects azimuth and elevation gear trains.
- High pointing accuracy.
- High static and dynamic load capacity.
- High reliability and stiffness.
- Low backlash.
- Low operation and maintenance cost.
- Reduced installation.
- Life time of 30 years.
- Reliable, installed and bankable technology.



MASS manufacturing facilities

## Main Data

**SENER markets MASS for CSP and CPV worldwide.**

### Dual axis tracking

|                 |         |
|-----------------|---------|
| Azimuth Range   | 350 [°] |
| Elevation Range | 200 [°] |

### Compact, self supported and robust

|                                   |         |
|-----------------------------------|---------|
| Protection against dust and water | IP55    |
| Self lubricated in oil bath       | 44l     |
| Corrosion protection              | C3-High |

### Operating performance

|                          |                   |
|--------------------------|-------------------|
| Elevation torque output  | >36,000 [Nm]      |
| Azimuth torque output    | >24,000 [Nm]      |
| Reduction ratio          | 42,000:1          |
| Tracking speed           | 0.5 to 15 [°/min] |
| Max. Backlash (absolute) | <0.05 [°]         |

*This data corresponds with MASS 120 model. Consult us for product catalogue.*

