As a leader in the generation of reliable power from solar energy, Torresol Energy develops Concentrating Solar Power (CSP) plants. The company’s flagship project is GEMASOLAR, a new plant in Fuentes de Andalucía in Seville, Spain. As the first commercial plant in the world to apply central tower and heliostat technology, the installation comprises 2,600 heliostats occupying 185 hectares. The electricity generated by GEMASOLAR – approximately 110 GWh/year – will help to provide electricity for 25,000 households.

GEMASOLAR has an innovative high-temperature molten-salt heat storage system that allows the normal operating period of the plant to be extended. The GEMASOLAR autonomy will be some 15 hours, during which the plant can continue to generate power, even when there is no sunlight. The extension of plant operating time during the absence of sunlight, together with enhanced efficiency in the use of the sun’s heat means that the GEMASOLAR production is three times more than those attained by other technologies in installations having the same power.

The Installation’s Key Benefits

Sener, the engineering company responsible for designing and scope the project, appointed Schneider Electric Spain to be responsible as the main contractor for designing, producing and implementing the Solar Field Control System (SCS) and the Distributed Control System (DCS). Schneider Electric in turn chose to work with Hirschmann™, as they are the only one able to deliver – and guarantee – the following key benefits:

- Maximum up-time thanks to redundant ethernet ring topology
- Reduced installation time because the switch is fast DIN rail mountable
- Growing profit-per share ratio as no single point of failure can interrupt the communication
- Highest flexibility thanks to future network change options
- Technicians gain improved know-how through intensive technology and product training in addition to technical support during the complete planning and project phase as well as during the operation of the plant
- Optimized productivity of the plant as the operator has access to the solar thermal park network 24/7
- Continuous and efficient operation of the solar thermal power plant as any failure can be identified in advance through remote control and extended diagnosis via interface
- Stable operation and increased security of the power generation park as the data services transmissions can be separated and structured by using virtual networks (VLAN)
- Greater cost efficiency through effective planning of the network

Hirschmann™ Enables Profitable and Reliable Thermosolar Electricity Generation Technology
To be certain of system continuity, no single point of failure should be able to interrupt the communication within the power plant.

The right solution could only be supplied by a manufacturer with a thorough understanding of both the application and the network structure – and the ability to offer a comprehensive package that includes all the relevant hardware, software and services.

Drawing up a list of specifications, Hirschmann™ suggested that the required data communication could be realized via robust fiber optics with 24 fibers and with redundant Ethernet ring topology. For the network planning, key elements included fast redundant switching as well as data communication, monitoring and control based on fast Ethernet. Gigabit Ethernet with routing function was required at the backbone ring in addition to hot swappable media modules with high port density. Finally, all products were required to be both robust and resistant to temperature fluctuations with a high predictive lifetime of the hardware as well as a high Mean Time Between Failures (MTBF) of all devices. And easy-to-handle comprehensive network management software was required for effective status monitoring.

As it is vital that the network system is constantly available and the efficiency of the power plant is linked with the control of the tracking system of the heliostats, only products with highest reliability and quality were chosen for this project. The network structure must ensure that no single point of failure can interrupt the communication within the power plant. This would ensure system continuity and optimise the performance and productivity of the entire energy generation process.

The Installation's Key Requirements

Recommended Hirschmann™ GEMASOLAR Topology
Hirschmann™ was able to offer the right solution, based on a highest redundancy concept with the HIPER-Ring Backbone. The HIPER Ring guarantees a recovery time of less than 300 milliseconds. The ring structure allows both a cost optimised implementation of a redundant network as well as maintenance and network extension during operation. This makes the HIPER Ring especially suitable for complex applications.

With a long experience in the alternative power market, Hirschmann™ was able to meet the need for robustness in switch design. All parts of Hirschmann™’s comprehensive range of industrial switches fulfil the high requirements of this challenging environment and application.

The network topology is based on a redundant backbone ring with Gigabit Ethernet using MACH 4002 with routing functionality and managed compact switches for the 26 fiber optic rings. The network range included Hirschmann™ MACH 4002 and the compact RS 20 switches. For the comprehensive monitoring and visualization of the network, the Hirschmann™ management software Industrial HiVision was used.

There were a number of key reasons why the Hirschmann™ solution was found to be the best: “Hirschmann™ was not only able to supply the right industrial switches for the application, but their switches were also sufficiently robust to withstand the wide temperature range which they are exposed to in the course of a single day.”

– Francisco Juan Veigas
Architectures and System Manager, Schneider Electric Spain
**Hirschmann™ Product Range**

As a specialist for automation and networking technology, Hirschmann™ develops innovative solutions, which are tailored to its customers’ requirements in terms of performance, efficiency and investment reliability.

Hirschmann™ not only offers a complete range of products for company-wide data networks but also a broad support package direct from the product manufacturer. Customers not only receive support while their tailor-made communications solution is being designed, but also throughout the subsequent planning, design, commissioning and maintenance of their networks.

Seminars and workshops, in which trends and developments are evaluated and technical subjects put into practice, complete the range of services.

### Product Details

**RS20**
- Compact fast ethernet switch
- Fully managed switch (web, SNMP and CLI)
- VLAN, IGMP snooping/querier
- DIN-rail mountable
- Industrial fanless design
- With copper and optional fiber ports (multimode or singlemode)
- Dual power inputs
- Signal contact
- 0°C up to +60°C operating temperature (optional -40°C up to +70°C operating temperature and conformal coating)

**MACH4000**
- Gigabit Backbone Layer 2/3 switches
- For mission critical applications
- Highest availability
- High port density
- 19” rack-mount
- Continuous operation due to hot swap able media modules
- HIPER-ring, redundant Ring coupling and link aggregation capable
- Flexible power options: 100-240 V AC, 24 V DC and 48 V DC
- 0°C up to +60°C operating temperature

**Industrial HiVision**
- Network management software for Hirschmann™ managed products and other third party devices
- Automatic topology discovery
- Graphical topology display
- Alarms and events
- Asset management
- Long-term reporting