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### **Magellan Wins Ergon Energy Contract**

Magellan Powertronics has secured a contract worth over \$370,000 with utility Ergon Energy for innovative technology developed with the assistance of grant funding.

The grant, was awarded to Magellan last year to assist in the development of a Solar-Hybrid Power Line Conditioning Unit (PCU) used for keeping residents in rural areas connected to reliable power.

Already the new technology has been snapped up, with QLD based utility Ergon Energy signing a contract for two of the systems.

Magellan Managing Director Masoud Abshar says it's a win for the company after an intensive research and development period.

"It is a buzz for us that Ergon Energy has recognised the potential of this technology."

The PCU will be used to improve power quality and reliability for rural areas serviced by Single Wire Earth Return (SWER) technology.

With almost 200,000 kilometres of SWER line servicing nearly 100,000 rural customers, Australia has one of the largest SWER networks in the world.

However, SWER technology has its limitations, and customers connected to the network frequently experience poor voltage and unreliable power quality.

With the introduction of Magellan's PCU, power quality problems should be a thing of the past.

"The PCU can take extra energy gathered from a solar array, store it in batteries and then feed it back to the network during heavy load periods" said Mr Abshar.

Masoud Abshar said the Ergon contract win highlights the strength of home grown Australian technology.

"It is really pleasing to see bright WA minds finding innovative solutions to national problems," he said.





## Masoud On...



*This is the second in a series of technical tips by Masoud giving engineers important insight when choosing power equipment.*

### Thyristor versus Controlled/Switchmode/Chopper

*Which is better?*

Presently there is a great deal of confusion in engineering circles about the comparative merits of the three rectifier topologies commonly used in battery chargers and unfortunately most decisions are currently made based on the persuasiveness of the sales people selling these products. The table below will hopefully shed some light on the matter and allow a better engineering decision to be made.

Please Note: The table compares only the conversion (AC to DC) aspects of the battery chargers as any features (Alarms, Metering, Battery test facility, Communication features etc) is the function of the battery charger interface.

*Masoud Abshar - Director of Magellan Powertronics - holds a Masters Degree and 30 years experience in the Power Electronics industry, specializing in power electronics and industrial batteries. If you have any questions on this feature for Masoud or suggestions for future topics please contact Christie Simpson [csimpson@magellan-power.com.au](mailto:csimpson@magellan-power.com.au)*

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## Comparing phase (thyristor)-controlled power supplies and switched mode power supplies

<i>Criteria</i>	<i>1. Phase (thyristor)-controlled (PC)</i>	<i>2. Switched mode (SMPS)</i>	<i>3. Chopper based Switch Mode</i>	<i>Comment</i>
Configuration	Input Low frequency (LF) Transformer – Controlled rectifier – Low Frequency filter.	Input rectifier-Power factor Correction (PFC) stage – High Frequency (HF) converter – secondary rectifier and filter	Input LF Transformer – uncontrolled rectifier – Boost chopper with active PFC.	Both types 1 & 3 have Low frequency input transformers which provide isolation and immunity from line disturbances.
Reliability	The most reliable power conversion topology available today. Thyristors are rugged, can tolerate large transients and fired only at mains frequency.	Less reliable than phase-controlled. MOSFETs, which are commonly used for SMPS circuit, they are less capable of handling high voltages and currents.	Reliability comparable with Thyristor type. High voltage and high current IGBTs are used which provide larger margin compared to MOSFETs used in SMPS.	SMPS circuit has more active components and conversion stages (Rectifier-PFC- HF DC to AC- Rectifier) and stress levels are higher and generally they need active cooling. These contribute to its lower reliability and lower service life. Chopper circuit has reliability similar to the thyristor type.
Immunity to input Transients	Input transformer provides high degree of protection from input transients, including lightning strikes. Thyristors have large voltage tolerance margin.	Additional circuits are used for handling input transients. It is still less tolerant compared to circuits with input transformer. Usually have lower tolerance for high input voltage.	Input transformer provides high degree of protection from input transients, including lightning strikes. IGBTs can have large voltage tolerance margin.	Input transients are often the cause of failure of SMPS supplies as MOSFETs are working at high voltage. This makes them less suitable for industrial applications where high degree of input disturbances can be experienced. MOSFETs are also smaller devices with legs close together. This means they are more susceptible to bridging in dusty environment.
Overloads	Can handle overloads well. A short circuit would normally be handled by current limit.	Normally not much provision for overloading. Circuit shuts down on short circuits.	Can handle overloads well. Shuts down on short circuit.	
Redundancy	Two rectifiers can be used in redundant configuration using steering diodes.	N+1 redundancy with parallel modules is quite common.	N+1 redundancy with parallel modules is possible.	Redundancy is commonly employed for SMPS chargers to compensate for the lower reliability and service life of the modules. Large Power supplies 1000 amps or more can be built relatively easily by current sharing parallel choppers.
Design Life	High, 20 to 25 years	Low, 5 to 10 years	High, 20 to 25 years	
Operating Temperature	Can operate at up to 60 deg C. Naturally cooled.	Have to be derated for higher temperature. Forced cooling.	Can operate at up to 60 deg C. Naturally cooled.	Need for fan is a major drawback for SMPS. Some naturally cooled modules are available, but usually have lower operating temperature range.
Serviceability	Power Circuit is not modular. Card level servicing can be done.	Modular. Modules can be replaced easily. Card level servicing can only be done at the workshop.	Chopper modules can be easily replaced at site. The common input transformer and rectifier	An SMPS based system can be put back into operation by simply changing the defective module. Card level service is never done at site. Trouble



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			are very reliable and normally do not need any service.	shooting and replacing defective cards in a thyristor circuit usually takes longer.
Input power factor	Usually poor at typically 0.7.	Usually good with input PFC (0.99).	Good, in the range of 0.95 to 0.99.	Active PFC is a common feature for industrial SMPS. This is often a requirement to meet the input current harmonics limitations.
Weight	Relatively heavy, though the weight of the charger is only part of the total weight of the DC system which also includes the enclosure and the battery.	Relatively light, though charger weight is only part of the total weight of the DC system which also includes the enclosure and the battery.	Relatively heavy, though the weight of the charger is only part of the total weight of the DC system which also includes the enclosure and the battery.	Thyristor chargers and Choppers have large heavy mains input transformers and thyristor chargers have heavy output inductors as well. SMPS' have small PCB mounted transformers and chokes. SMPS modules can be installed and removed by one person.
Size	Relatively large.	Relatively small	Relatively large	Again in a DC system the size of the rectifier is only a component of the overall size.



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