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DC Electronic Loads Span 1.25-kW To 120-kW+ Range

Magna-Power Electronics' MagnaLOAD product line of dc electronic loads spans 1.25 kW to 120 kW+, encompassing 39 air- and water-cooled models with voltage ranges as wide as 0 to 1,000 Vdc and current ranges as wide as 0 to 1,200 Adc. The product line consists of three product series—the ALx, the ARx, and the WRx series.

The MagnaLOAD product line launches with Magna-Power's all new distributed DSP architecture, MagnaLINK, featuring digital control loops and an internally developed high-speed product-to-product communication protocol. The MagnaLOAD product line is designed to dissipate dc power during development, manufacturing, and validation of dc sources, including power supplies, dc-dc converters, batteries, solar panels, fuel cells, motors, and electromagnets.

The ALx series MagnaLOAD, 1.25 kW and 2.5 kW, uses conventional linear MOSFET-based dissipative elements, allowing the series to achieve a very wide voltage-current operating range within a model's maximum power rating. Using the same heat management innovations developed for Magna-Power's high-density programmable dc power supplies, the ALx series' conservative cooling ensures long product life in environments up to 50°C ambient operating temperature.

The ARx series MagnaLOAD, 7.5 kW to 45 kW+, introduces Magna-Power's Active Resistance Technology, combining a binary-switched resistor network in series with linear elements. Used in conjunction with the new MagnaLINK DSP controller, the ARx series achieves 16-bit programming and measurement resolution and, as a result of the Active Resistance Technology, at a fraction of the price of traditional electronic loads.

In addition to typical voltage, current, power, and resistance control modes, the Active Resistance Technology enables the product's rheostat control mode, providing direct on-the-fly control of an internal binary resistor network, avoiding control bandwidth constraints typically experienced with resistance control modes.

The WRx series MagnaLOAD, 15 kW to 120 kW+, also uses the company's new Active Resistance Technology in combination with the company's newly developed internally manufactured microchannel water-cooled heatsinks. Designed for high-power applications where heat-flow control is essential, the WRx series greatly increases power density compared with air-cooled alternatives. An integrated solenoid controls the flow of water to avoid condensation. Full power can be achieved using conventional water with water inlet temperatures up to 25°C.

Adam Pitel, vice president of operations at Magna-Power, explains the motivation for creating such a wide power range for its dc electronic loads.

"Magna-Power has established its reputation designing and manufacturing high-power programmable dc power products; in many cases at power levels for standardized products far beyond the competition. In addition to our own need, customers have been asking Magna-Power for years to develop high-power dc loads for their growing power needs," says Pitel.

He goes on to explain why new technologies were required to extend the power range to higher levels.

"It was clear to us that the existing topology for electronic loads—using banks of MOSFETs driven into the linear region—was not an economical path for the high-power market, as the primary competition at 30 kW+ are banks of low-cost grid-resistors switched with contactors."

In response to these customer requirements, Magna-Power developed a new type of dissipative technology, the Active Resistance Technology, which uses a hybrid matrix of resistors series coupled with linear devices, with simultaneous digital control of both elements. With resistors providing 90% of the power dissipation and MOSFETs only used to "fill-in" the gaps, the MagnaLOAD products achieve what Pitel describes as an unprecedented price point, attracting customers using grid resistors, but offering programmability, wide operating range and protection capabilities.

He also notes that rheostat control mode is a very attractive new feature of this technology, available in the ARx and WRx series, which provides direct control of the product's internal resistor network, bypassing our control: resistance control without battling control loops or oscillations with regulated sources.

With the WRx series MagnaLOAD, the power range is specified as being up to 120 kW+. As Pitel explains, this actually extends into the megawatt range, which can be justified by several applications.

"There were many new emerging high-power dc power applications, which drove Magna-Power's to scale the MagnaLOAD product line into the megawatts, such as high-performance electric powertrains, energy storage systems, ac-dc and dc-dc converters, renewable energy sources, and non-volatile electric weapons systems," says Pitel adding that "with Magna-Power's new MagnaLINK digital architecture, expanding to a higher power megawatt scale system is plug & play."

MagnaLINK, Magna-Power's next generation control architecture, provides a distributed network of DSPs across the major assemblies in its programmable dc products. Beyond Magna-Power's standard fast transient response and high accuracy programming and measurement, MagnaLINK adds fully digital control loops, adjustable control gains, programmable slew rates, arbitrary waveform generation, among many new advanced control technologies.

Expandability is at the forefront with MagnaLINK, providing buffered digital master-slaving MagnaLINK ports, allowing many units to be added in parallel or series with uncompromised performance and aggregated dc input measurements.

All MagnaLOAD products come standard with front and rear full control (host) USB ports, RS485, dual MagnaLINK ports for digital master-slaving, and a 25-pin D-Sub external user I/O connector with configurable pin mappings; LXI TCP/IP Ethernet and IEEE-488 GPIB interfaces are also available. Many different programming environments are supported via Standard Commands for Programmable Instrumentation (SCPI), and provided National Instruments LabVIEW and IVI drivers.

Some features may not be available at launch, but will be available at a future date through a firmware update. Consult a local Magna-Power sales partner for more information. All Magna-Power products are designed and manufactured at the company's vertically integrated headquarters in Flemington, New Jersey U.S.A. For more information, see www.magna-power.com.

Figure. Consisting of three product series (the ALx, ARx, and WRx series), the MagnaLOAD line of dc electronic loads spans 1.25 kW to 120 kW+, encompassing 39 air- and water-cooled models with voltage ranges up to 0 to 1,000 Vdc and current ranges up to 0 to 1,200 Adc.