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Energy-regenerative DC Electronic Load: Cool, quiet, commodious and green

For many global companies, how to meet production ramps, quality goals and reduce the cost of test is the path to enhance competitiveness. The primary consideration is the cost of equipment, calibration and maintenance. Although the initial investments always command our attention, operating expenses can play a more critical role in total cost of ownership. Managing the total cost can provide a competitive advantage for your business.

Various power supply products, such as regulated voltage supply, UPS, EPS, DC power supply, charger, generators, etc., all of which need aging test by electronic loads before delivery. The traditional way is to use the resistor for energy consumption, which consumes a lot of energy. On the other hand, the increased heat will increase the burden of air conditioning, which in return consumes extra energy.

In general, the load negatively impact efficiency, which affects the quality of working environment and energy expense. The most obvious issue is the energy consumption. For example, a typical 10KW load will consume over 10KW of power to provide that function.

High energy consumption leads to cooling concerns due to the heat generated from the load. Small loads may simply need air conditioning, most loads are fan cooled, which further increases energy consumption, while increasing the ambient noise level. For loads that need water cooling, energy consumption and installation expenses can be incurred.

Because of the energy consumption and cooling requirements of many loads, the unit can be relatively large, bulky, and sometimes cannot be moved.

Can most of the wasted energy generated by the loads be captured? The answer is yes. By redirecting the power back to the utility by using a micro-inverter inside IT8300, synchronized to the input power grid. As shown in Figure 1, energy absorbed from the utility, and be sent back to the grid to form a closed loop.

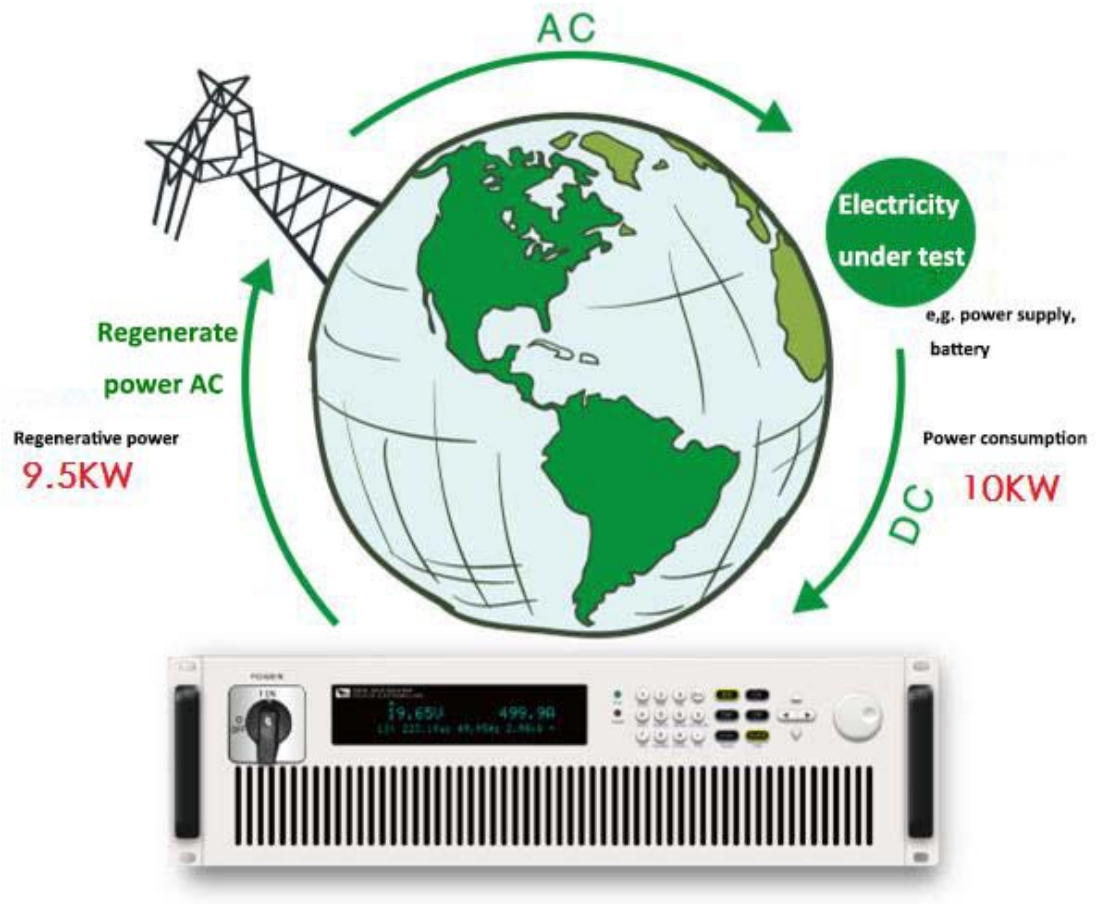

Figure 1, Energy recovery system closed loop

The results of the IT8300 approach are quite remarkable – with total energy consumption being reduced by up to 95% and a significant reduction of unit's size, cooling requirements and audible noise. A 10.5kW IT8331/ IT8332 only dissipates 500W of heat, which is even smaller than a typical hair dryer or a rice cooker. And this power-regenerative way does not need additional wiring, a simple plug connection to standard utility line is enough.

Dissipating only 500W of heat means smaller cooling fans, which reduce audible noise to whisper-quiet operation. Regenerative loads are also 2-3 times higher in power density compared to typical air-cooled loads, which results in less rack or bench space.

The secret to the implementation of a regenerative load is a back-end conversion system. As shown in Fig. 2, DC energy flows into a DC-DC converter, which adopts PWM boost / buck,

and isolates current, and then tied into DC-AC inverter, and which then synchronizes with the utility grid to recycle the energy. This technology is similar to grid-tied PV inverters.

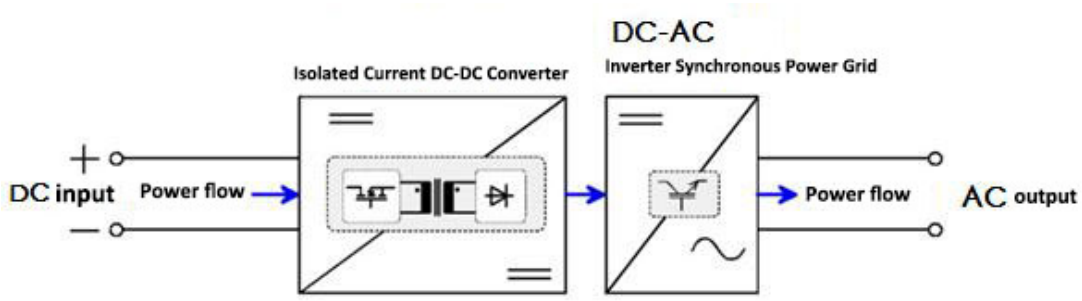

Figure 2: stages from IT8300 DC input to grid-tied inverter