



WHITE PAPER

iX2™ Current Doubling Technology Overcomes Limitations of Conventional Power Supply Design

Most conventional power sources have a serious limitation—they cannot supply full output power over a wide output voltage range. They can only supply full output power at one or two specific voltage and current combination point(s). The reason for this is that they are current limited to a maximum output current value that allows for full power only at the maximum output voltage. This maximum current limit is the result of a fundamental design implemented by the manufacturer(s) of such sources. These supplies may have a single voltage range, in which case there is only a single point where the supply can deliver full power (the maximum voltage output point of the single range), or two voltage ranges, in which case there are two points where the supply can deliver full power (the maximum voltage output point of each of the two ranges). See figure 1 for an example. The inherent current limitation due to the specific design of the source will not allow for higher current at lower voltage and, therefore, as you select any output voltage value below the range maximum the source will no longer be able to deliver full power.

In an effort to expand the full power range some manufacturers have designed their sources with an overcurrent capability often referred to as “constant power” range. In most cases the overcurrent capability is limited to between 10% and 25% above the nominal max current resulting in 110% to 125% maximum overcurrent. This allows for full power operation over 10% to 25% of the sources voltage output range(s).



The iX2 technology developed by AMETEK Programmable Power, and incorporated into its California Instruments Asterion AC power sources, allows overcurrent capability up to double its nominal max current resulting in a full 200% overcurrent capability. This allows for full power operation over 75% of the source’s voltage output ranges. This is the widest full power (constant power) on the market today.

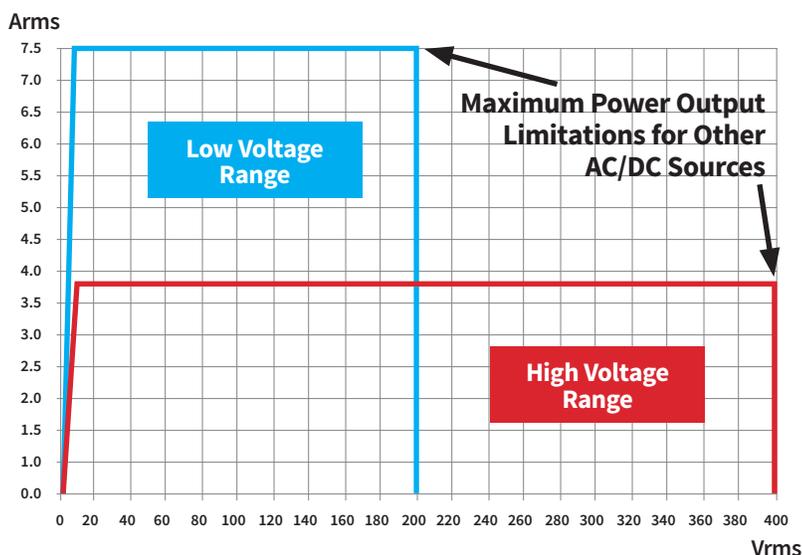


Figure 1

Let’s look at an example. On the 400 VAC range, a 1,500 VA source can supply up to 3.75 A. At 230 VAC, that source can still only supply 3.75A, meaning that the maximum output power at that voltage is only 230 VAC x 3.75 A, or 862.5 VA.

Consequently, users must buy power sources that can output more power than they really need. To get 1,500 VA of output power at 230 VAC, would require a user to purchase a source capable of 2,500 VA or more at 400 VAC.



iX2 Technology Overcomes These Limitations.

To overcome this limitation, AMETEK Programmable Power has developed iX2 current-doubling technology, which is incorporated into the company's new Asterion High Performance Programmable AC and DC Power Sources. Power sources that use iX2 current-doubling technology deliver full-power output over the widest voltage range. Figure 2 shows how this technology allows the Asterion to deliver full output power over a wider voltage range than conventional power sources.

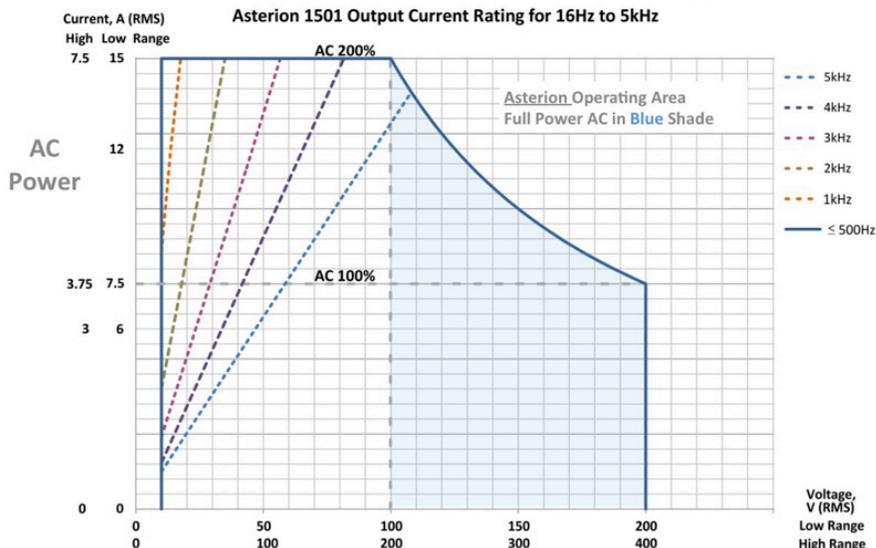


Figure 2. iX2 technology allows AMETEK Programmable Power's Asterion power sources to deliver full power over a wider voltage range than conventional power sources.

iX2 current-doubling technology enables AMETEK Programmable Power sources to output current up to two times the full voltage current as the voltage decreases from the maximum output voltage to one-half that value. As a result, iX2 current-doubling technology results in a source that delivers full power over the widest voltage range.

All of AMETEK Programmable Power's new Asterion sources employ iX2 current-doubling technology. They supply full power on low range from 100 VAC RMS – 200 VAC RMS and 125 VDC to 250 VDC. Full power is available on the high range from 200 VAC RMS – 400 VAC RMS and 250 VDC to 500 VDC.

Case Study: Sound System Manufacturer, Input AC Power

To show how this works in an actual application, let's take a look at some real world applications. In this first case study, consider the test requirements of a high-end manufacturer of sound systems. To thoroughly test these systems, the power source must supply 90 VAC – 264 VAC at 1300 W across the entire voltage range. In addition, the power source must be able to simulate common voltage transients.

AMETEK Programmable Power's Asterion Model 1501 can supply up to 1500VA/W in just a 1U package.

Other AC sources can also supply 1500 VA/W, but neither are as compact as the Asterion 1501, nor can they supply the required output power over the entire voltage range. One competitive supply, for example, comes in a 3U enclosure and cannot supply 1300 VA/W between 90 VAC – 108 VAC and 151 VAC – 217 VAC. At 90 VAC, this source can only supply 1080 VA/W, and at 160 VAC, the source is limited to 960 VA/W.

Another competitive unit comes in a 2U enclosure and cannot provide 1300 VA between 151 VAC – 162 VAC. At 151 VAC, the output power available is only 1200 VA/W.

In either case, the only solution is to purchase a more expensive 2000 VA/W power source.

Case study: Avionics Component Manufacturer, Input DC Power

A second application example looks at the requirements of an avionics component manufacturer. To test its products, this manufacturer requires a 28 VDC output, supplying up to 10 A. In addition, the supply must also simulate common DC voltage transients.

The competitive supply can only output 6 A max or 750W DC. To satisfy this test requirement with this unit, the customer would be required to purchase a 3U, 4000VA/W supply. Another competitive 1500 VA/W supply doesn't have DC output capability. To satisfy this test requirement with a power source from this second company, the customer would be forced to purchase a very expensive 4U, 9000 VA/W source.

Conclusion

When coupled with the FRC option and the ability to change ranges in less than 6 ms—which means little or no disruption to the device under test—

AMETEK Programmable Power's iX2 current doubling technology allows its Asterion power sources to provide full power over 75% of the V range (100 VAC – 400 VAC / 125 VDC – 500 VDC) enabling more testing than competitive models.