Elektro-Automatik

TECHNICAL NOTE

Auto-Ranging Adds Flexibility and Value to Programmable DC Power Sources

Programmable DC power sources are an essential tool in product development and production testing of a wide range of electronic devices and systems. In many instances, the proper testing requires submitting the device-under-test (DUT) to a wide range of operating conditions. In some cases, the DUT will try to draw constant power under variable input conditions. Common examples are DC motor drives and regulated DC/DC supplies. In such circumstances, the ability of the programmable DC source to provide increased current at reduced output voltage is very beneficial. This ability is known as auto-ranging. Without this feature, multiple power supplies could be required to test the DUT under varying input voltage conditions.

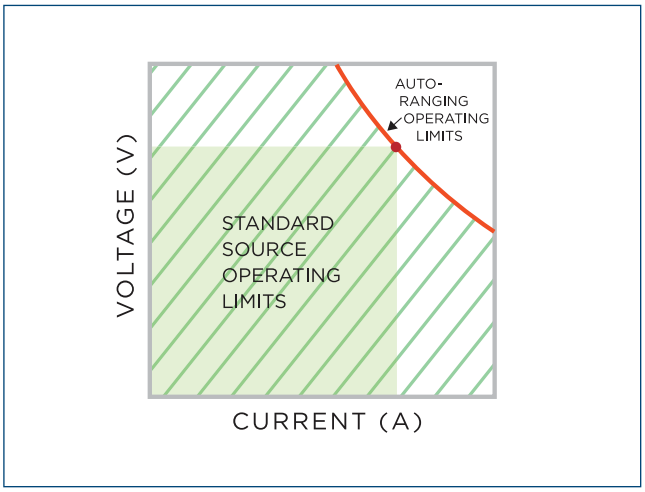

Figure 1. An auto-ranging power source can deliver full power over an extended range of voltage/current output conditions. A standard source can only deliver full rated power at max voltage and current.

Figure 1 compares the performance of a true auto-ranging programmable DC power source with a conventional power supply that can only deliver the maximum power at one combination of voltage and current. Auto-ranging essentially extends the operating envelope of the instrument. All EA Programmable DC sources feature an auto-ranging output.

Application Example –DC/DC Converter Production Test

For the purposes of this example, the DC/DC converter (DUT) will be assumed to have the following specifications:

Maximum power output: 2,500 kW
Input voltage range: 260 VDC – 410 VDC
Efficiency: 90%

In order to accurately measure the performance, testing must be performed at the operational limits.

At low input voltage (260 VDC): The input current required is:

$$I_{(in)} = 2500\ W \div 260\ V \div 0.9 = 10.7\ A$$

At the high input voltage (410 VDC), the input current is:

$$I_{(in)} = 2500\ W \div 410\ V \div 0.9 = 6.8\ A$$

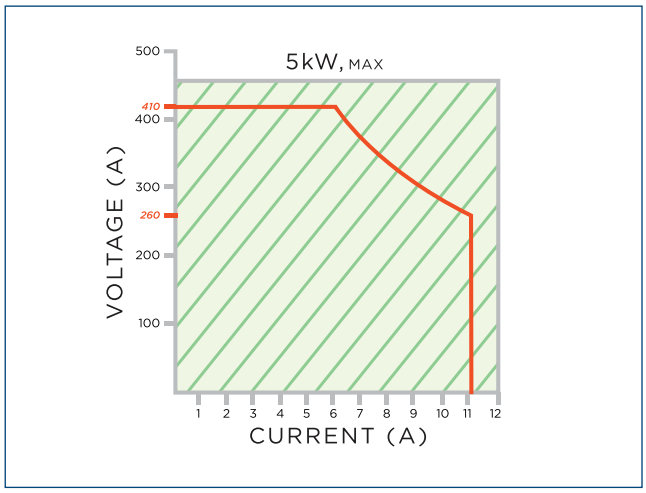

Figure 2. Since a standard power source can only deliver power bounded at max voltage and current, a higher rated unit is required to meet all test conditions.

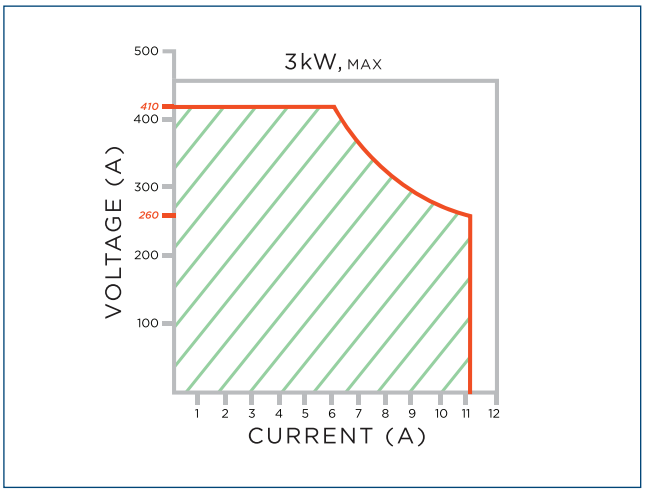

Figure 3. An auto-ranging power source can deliver full power to the device-under-test over a range of operating conditions.

For a single, conventional power supply to meet both of these operating conditions, it would need to have a rating of at least 410 V x 10.7 A = 4.4 kW. Allowing for some engineering margin, a 5 kW power source would be required. See figure 2.

Utilizing an EA Auto-Ranging Programmable DC Source, these same test conditions could be met with a single 3 kW unit. See figure 3.

Benefits of Auto-Ranging

Auto-ranging sources are typically a bit more costly than conventional supplies with the same power rating because the output stages must be designed to operate reliably over a wider range of output voltages and currents. But the real cost is lower because one unit can be used to replace multiple conventional units.

- ***Fewer units***
- ***Less rack space***
- ***Lower energy use***
- ***Simplified test set up***

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