



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 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 Intepro Programmable DC sources feature 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 W

Input voltage range: 260 VDC – 410 VDC

Efficiency: 90%

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

For Condition 1: Low input voltage (260 VDC), the input current required is:

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

For Condition 2: High input voltage (410 VDC), the input current is:

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

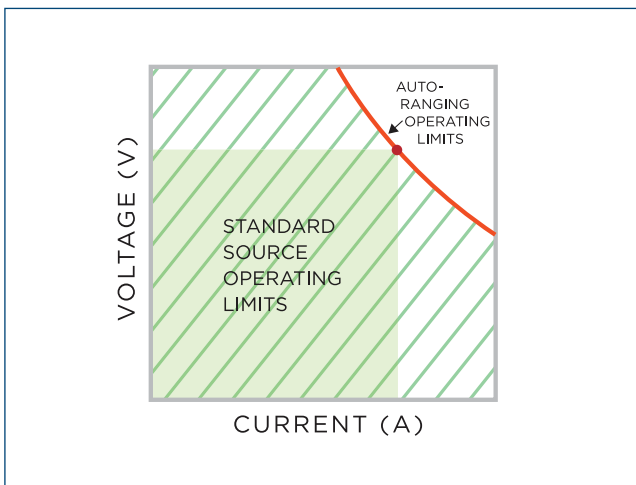


Figure 1. An auto-ranging power source can deliver full power over an extended range of voltage/current output conditions. A standard source can only deliver full rated power at max voltage and current.

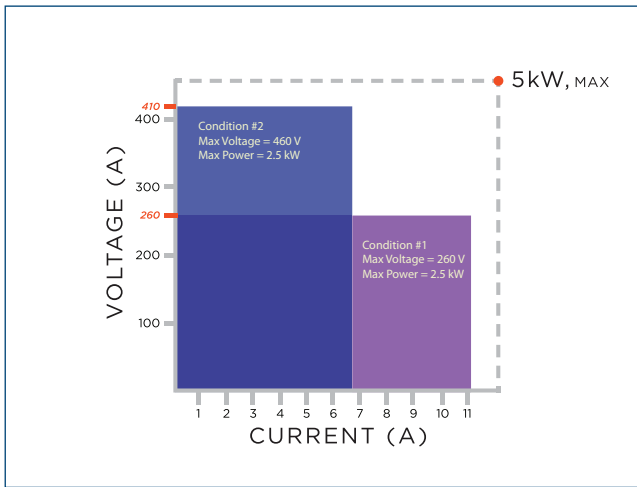


Figure 2. Since a standard power source can only deliver power bounded at max voltage and current, a higher rated unit is required to meet all both conditions.

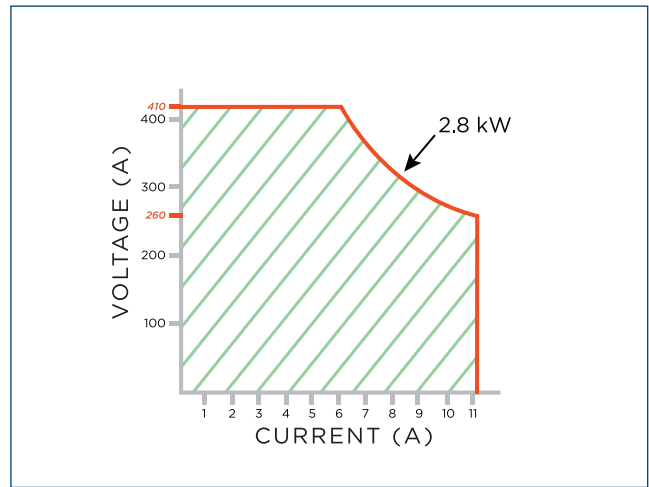


Figure 3. An auto-ranging power source can deliver full power to the device-under-test over a range of operating conditions.

For a single, conventional power supply to meet both of these operating conditions, it would need to have a rating of at least $410\text{ V} \times 10.7\text{ A} = 4.4\text{ KW}$. Allowing for some engineering margin, a 5 KW power source would be required. (See figure 2.)

Utilizing an Intepro 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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