Multiple-Output DC Supplies Combine Flexibility and Power Density

AMETEK Programmable Power's two new series of multiple-output DC programmable power supplies are designed to address the needs of a wide range of applications, such as military and aerospace test, printed circuit board assembly (PCBA) test, automotive test, telecommunications test, semiconductor test, and process-control applications. The new products include the Sorensen™ Asterion® DC ASA and Sorensen™ Asterion® DC ASM Series, which fit in a 1U-high chassis and provide as many as three independent isolated outputs. The 1U form factor saves space in ATE applications, while the multiple voltages support applications such as functional PCBA test as well as burn-in and environmental test.

The Asterion DC ASA Series features autoranging outputs in which maximum output voltage varies inversely with maximum output current to maintain a constant-power characteristic. The autoranging feature provides maximum flexibility for ATE systems, in which your required maximum voltage and current ratings may change with successive types of devices under test. The five available output channels in the ASA Series follow a 600W I-V curve, with maximum ratings per channel of 60V at 42A, 80V at 22A, 200V at 17A, 400V at 6A, or 600V at 2.8A, with the three-output supply offering 1,800W total output power (Figure 1).

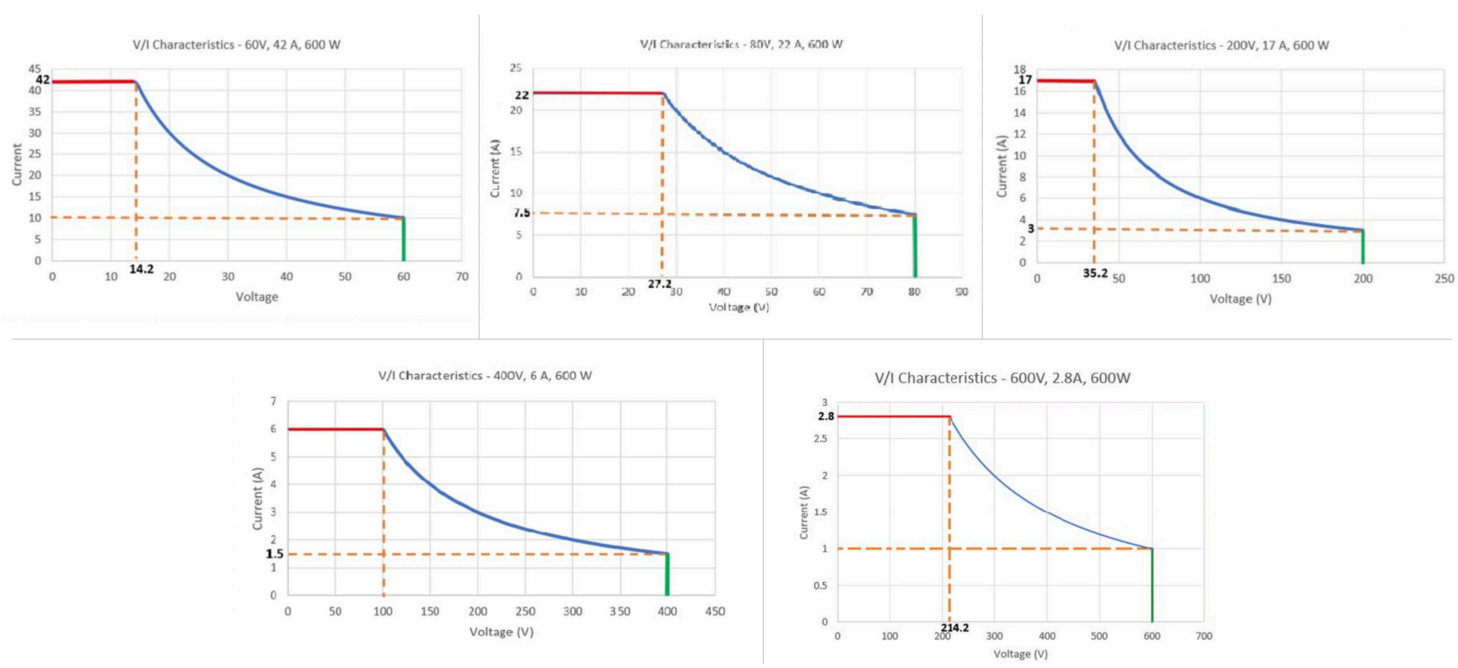

Figure 1. The ASA Series includes five models that follow a 600W I-V curve per channel.

In contrast, the Asterion DC ASM Series features three independent, isolated rectangular output channels. However, the ASM Series does offer higher power ratings at 1,700W per channel for a total output of 5,100W for a three-channel supply in a 1U chassis. The ASM Series has nine channel configurations offering fixed voltage and current ratings ranging from 40V at 42A to 600V at 2.8A (Figure 2).

Voltage (V)	Current (A)	Power (W)
40	42	1680
60	28	1680
80	22	1700
100	17	1700
150	12	1700
200	9	1700
300	6	1700
400	4.3	1700
600	2.8	1700

Figure 2. ASM Series are available in nine configurations offering fixed voltage and current ratings.

Specific Applications

Specific customers using the new supplies include a prime contractor who was awarded an Air Force engineering and manufacturing development contract for a new long-range missile system. Over the course of the multi-year, billion-dollar-plus contract, the customer will require a variety of AC and DC Asterion programmable power supplies. The customer has already purchased several Asterion supplies, including models in the ASA Series. Key selling points included the ability to combine two ASA units to provide six isolated supplies in a 2U rack height, providing considerable space savings in its test systems. In addition, the customer cited AMETEK Programmable Power's reputation for long-term support. The customer also noted that the Asterion line is in the early stages of its lifecycle, whereas competitors are offering legacy models that are nearing end of life. The customer plans to purchase more Asterion supplies over the life of its Air Force contract.

Another customer in the aerospace industry purchased several ASA models after evaluating a demonstration unit and close consultation with AMETEK Programmable Power's sales and applications teams. The customer will use the supplies in new automated test systems. The customer cited the ability to fit the six supply channels required for each test system into a 2U rack height. This customer also noted that the ASA is at the early stages of its lifecycle and that AMETEK Programmable Power has a history of years of comprehensive support. The customer has also added the ASA Series to their common acquisition list to support global locations.

Local and Remote Control

Customers can take advantage of many features of the ASA and ASM Series to optimize their applications for either local or remote control. For local operation, a front-panel touchscreen and an encoder selector button allow users to control output parameters, measurements, configurations, and system settings (Figure 3).

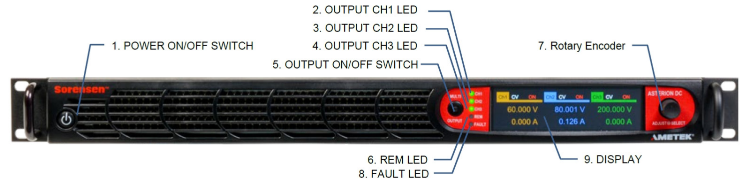

Figure 3. The ASA (pictured) and ASM Series include a touchscreen, rotary encoder, and LEDs.

From the home screen, you can navigate to several top-level menus. Dashboard, for example, allows you to change output parameters and view output measurements for each channel (Figure 4).

Figure 4. This Dashboard top-level menu shows parameters for each channel with channel 1 highlighted.

The Output Program menu provides for the setting of voltage, current, power, regulation mode, output state, and overvoltage-protection (OVP) level for each channel, while the Measurement menu provides the current values of those parameters, states, and modes for each channel. Other top-level menus include Configuration, which provides for the setup of power-on states and user V/I limits; and System Settings, which displays firmware versions and last calibration date and controls display brightness and timeout. The front panel also includes LEDs that indicate each channel's on/off status and signal internal fault conditions that result in supply output shutdown.

Yet another front-panel LED indicates when the supply is under analog or digital remote control via rear-panel connections (Figure 5). You can set up the remote interfaces using the Control Interface top-level menu, which lets you choose which interface to use and allows you to enter relevant settings.

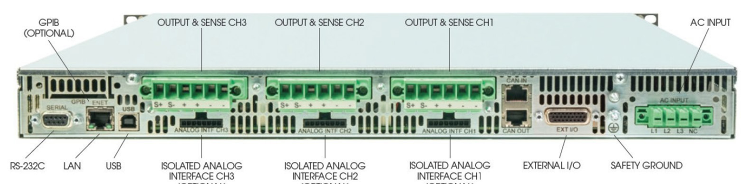

Figure 5. The ASA (pictured) and ASM Series rear panel provides access to analog and digital interfaces.

If you are using the optional isolated analog programming interfaces, the Control Interface menu allows you to specify whether you are using a voltage or resistance source, and you can choose full-scale voltage from 5V to 10V or full-scale resistance from 5kΩ to 10kΩ. The analog interface also provides monitor signals, with the default values of 0V to 10V corresponding to 0% to 100% of full-scale output voltage and current.

Digital interfaces include LAN, RS-232C, and USB 2.0 with an IEEE-488 interface optional. For RS-232C, for example, you can use the Control Interface menu to set baud rate, number of bits, number of stop bits, and parity. If you choose LAN, you can access settings such as IP address and gateway address and specify whether to enable Dynamic Host Configuration Protocol (DHCP) using the Control Interface menu (Figure 6).

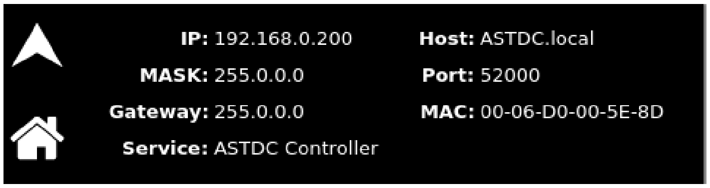

Figure 6. The Control Interface provides access to LAN settings.

For USB, you can use the Control Interface menu view the configured baud rate, and for GPIB, you can set the IEEE-488 address and specify whether the supply should send a power-on service request to the host computer. Once a digital interface is set up, users can control outputs and settings remotely on a computer screen via the Asterion DC Virtual Panels™ GUI.

Programmable functions for the ASA and ASM Series include on/off delays, voltage and current ramps, and sequencing. On/off delays are useful for devices under test such as PCBAs that require multiple voltage sources that turn on and off at different times. ASA and ASM models support delays from 0.1s to 100s, which are programmable via the Configure Delay top-level menu or by remote control.

Voltage and current ramps are programmable with dwell times from 1ms to 9,999s. You can program them via the Ramp top-level menu or remotely. The Virtual Panel segment shown in Figure 7 shows channel 1 programmed to ramp from 0V to 32V in 12s in response to a hardware trigger and channel 2 programmed to ramp from 0V to 180V in 15s in response to a software trigger.

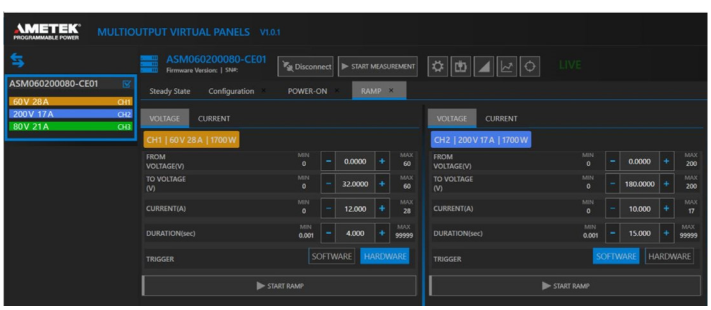

Figure 7. This segment of a Virtual Panels display shows ramp programming for channels 1 and 2.

Sequencing

If you are using a remote digital interface, you have access to sequencing, which is not supported from the front panel. The ASA and ASM Series can store 50 sequences of up to 20 commands each. Sequences can be made up of an extensive list of step and ramp functions as well as looping and go-to commands. One sequence may call another as a subroutine.

Consider this SCPI code segment for a sequence named SEQ1 (other necessary commands such as reset and memory allocation are omitted here for brevity):

```
PROG<n>:DEF 1, VIMODE,3,4,11,10      //go to 3V, 4A with 11V OVP for 10s
PROG<n>:DEF 2, RAMPTOV,3,5,4,11,10  //ramp from 3V to 5V in 10s.
PROG<n>:DEF 3, VIMODE,5,4,11,10      //hold 5V for 10s
PROG<n>:DEF 4, RAMPTOV,5,3,4,11,10  //ramp from 5V to 3V in 10s
PROG<n>:DEF 5, VIMODE,3,4,11,10      //hold 3V for 10s
PROG<n>:DEF 6, STOP                  //stop running the sequence
```

Figure 8 shows the output characteristic resulting from this sequence. After the STOP command, the unit remains at the state set by the last command within the sequence.

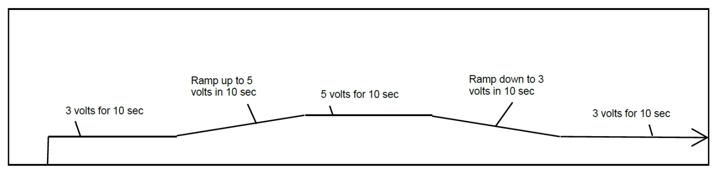

Figure 8. The sample code segment named SEQ1 generates this response.

Now consider this segment of a second sequence named SEQ2:

```
PROG<n>:DEF 1, VIMODE,10,4,11,5     //go to 10V, 4A, 11V ovp, for 5s
PROG<n>:DEF 2, RAMPTOV,10,2,4,11,9  //ramp from 10V to 2V in 10s
PROG<n>:DEF 3, RETURN
```

Figure 9 shows the output characteristic resulting from this sequence. Note that this segment ends with a RETURN command instead of STOP. If SEQ2 runs directly, RETURN acts as a STOP command. However, if SEQ2 runs as a subroutine, the RETURN command returns control to the calling sequence.

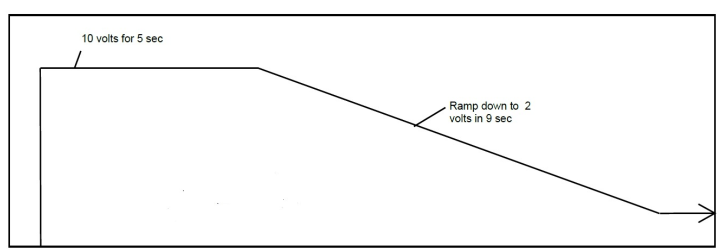

Figure 9. The code segment named SEQ1 generates this response.

To demonstrate how subroutine calls work, we can delete sequence 1 and rewrite it as follows, noting the line with the SUBCALL command:

```
PROG<n>:DEF 1, VIMODE,3,4,11,10     //go to 3V, 4A with 11V OVP for 10s
PROG<n>:DEF 2, RAMPTOV,3,5,4,11,10  //ramp from 3V to 5V in 10s.
PROG<n>:DEF 3, VIMODE,5,4,11,10     //hold 5V for 10s
PROG<n>:DEF 4, RAMPTOV,5,3,4,11,10  //ramp from 5V to 3V in 10s
PROG<n>:DEF 5, VIMODE,3,4,11,10     //hold 3V for 10s
PROG<n>:DEF 6, SUBCALL, "SEQ2"      //call SEQ2 as a subsequence
PROG<n>:DEF 7, VIMODE,4,5,11,6      //go to 4V, 5A, 11V OVP, for 6s
PROG<n>:DEF 6, STOP                 //stop running the sequence
```

Running SEQ1 with this change results in the output characteristic shown in Figure 10. Note that if a PAUSE command preceded the STOP command in this new SEQ1, the supply channel would maintain its 4V level after the sequence stops.

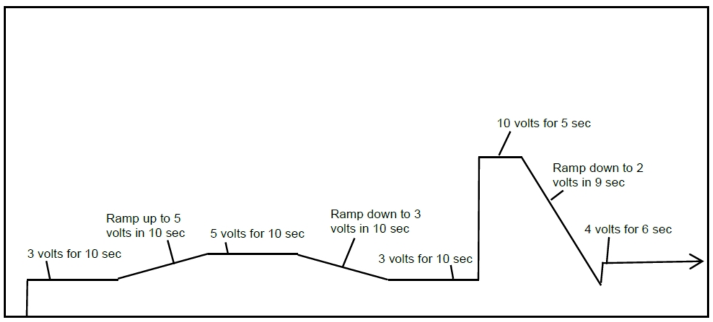

Figure 10. SEQ1 calling SEQ2 as a subroutine generates this response.

Although a single sequence is limited to 20 steps, the SUBCALL command effectively enables longer sequences: one 20-step sequence can call another. In addition, the GOTO command enables an infinite loop of repeating functions. Consider this code segment:

```
PROG<n>:NAME "Square Wave"
PROG<n>:MALL DEFAULT
PROG<n>:DEF 1, VIMODE,0,5,15,0.5    //go to 0V, 5A, 15V OVP, for 0.5s
PROG<n>:DEF 2, VIMODE,10,5,15,0.5   //go to 10V, 5A, 15V OVP, for 0.5s
PROG<n>:DEF 3, GOTO, "Square Wave"  //go to top of this sequence
```

This segment generates a square wave that loops indefinitely. The Sorensen Asterion Multioutput Series Programming Manual provides full details on all available commands and their use.

Conclusion

The Asterion DC ASA and ASM Series represent a new generation of programmable DC power supplies that customers are already integrating into their applications. The supplies offer unprecedented benefits with respect to power density and options for front-panel and remote control. You can exploit the new supplies' flexibility and power density to serve the gamut of your applications extending from process-control applications to military and aerospace test.

For more information, visit the respective product pages of the Sorensen™ Asterion® DC ASA Series and the Sorensen™ Asterion® DC ASM Series.