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mPower[™] DC Power Supplies

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Programmable Autoranging DC Power Supplies

Marway's lab quality mPower DC power supplies expand on our commitment to provide power solutions specializing in the optimization of space and features to meet the unique needs of our customer's development and test applications.

Convenience

- Complete configuration, control, and monitoring from graphical control panel.
- Touchscreen interface (310/311) or navigation keys (300) with multi-function rotary controls simplify operation, and speed up test settings entry.
- Easy locking of controls to prevent unintended changes.
- Master-Slave bus (310/311/320) shares data among parallel units providing a true single-point master for control and monitoring. 300 Series share bus is similar.

Control

- Constant voltage, constant current, constant power, and (for 310/311) constant resistance modes.
- Protection circuits and alarms for over voltage, current, power, and temperature.
- Output Voltage Sense Bus monitors voltage at the load, instead of the output terminals, to compensate for minor losses in output cables.
- USB, RS232, Ethernet, CAN, CANopen, Profibus, Profinet, ModbusTCP, EtherCAT, GPIB, and analog interfaces. ModBus and SCPI command protocols. Windows[®] application, LabView[®] VIs, and your own custom scripts for remote control.

Power

- Autoranging power output delivers 100% power over a wide range of voltage and current allowing wider test range or a wider set of devices to be tested with the same unit.
- 1, 1.5, 3, 5, 10,15, 30 kW capacities.
- Up to 2000 Vdc and up to 1000 amps.
- Parallel capacity and control up to 64 units (311), 16 units (310), or 10 units (300).
- Discharge circuit reaches safe Vdc in ≤ 10 seconds.
- Active power factor correction of input power.









3U • 80 to 1500 Volts • 20 to 510 Amps • 5 kW, 10 kW, 15 kW



3U • 80 to 1500 Volts • 30 to 510 Amps • 15 kW



4U • 80 to 2000 Volts • 40 to 1000 Amps • 30 kW



Talk to a power specialist: info@marway.com • 800-462-7929

Autoranging Output Power

Autoranging enables mPower to dynamically alter its output configuration over a wider range compared to traditional power supplies. Traditional "rectangular envelope" power supplies can provide peak power (watts) at only one specific voltage and current configuration. mPower's autoranging power envelope can deliver peak power along many voltage and current configuration points.

You'll notice that any given mPower model's maximum DC output voltage multiplied by it's maximum current is much higher than the power rating of the system. When a system is able to run at a lower than maximum current, the voltage can be adjusted higher to still yield the maximum power of the system. Likewise, when running the system at a lower voltage, the current can be increased—again, up to the limit of the full power rating. In fact, running in constant power mode, both voltage and current can change while the unit holds a steady power output. The autoranging envelope maintains a high quality output signal with voltages down to about 30% of the rating, but can be operated as low as 10%.



Let's look at an example involving multiple test points to be conducted with a consistent 2500 watts total load. It can take multiple power supplies to meet this example 80 Vdc and 100 amp test range—and some test points may not fall within the system ranges. Another option is to use one large 8 kW system which can be an inefficient option for cost and power.

For that same test suite, a single 3 kW mPower DC with autoranging can serve all tests. Autoranging enables a greater range of voltage and current in lower kW power packages while being able to deliver 100% of a power supply's capacity. This efficiency means fewer, smaller power supplies—saving space, cost, and power consumption.

Function Generator

The built-in function generator of the 310 and 311 Series creates various signal forms, and applies them to the ouput voltage or current. The predefined functions are configured on the control screen through menu selection and data entry of parameters specific to that function such as offsets, time, frequency, amplitude, etc. An Arbitrary generator enables creating a customized complex function with up to 99 steps. Additionally, the XY generator allows the creation of UI or IU tables.

All custom sequences and tables can be saved to and loaded from a USB thumb drive using the front USB port. This makes it easy to change between different test sequences. Functions can be remotely programmed over the remote interfaces.





Controls & Locking

- Menu driven, multi-parameter display.
- Rotary pushbutton controls for quick data entry.
- Up to 5 profiles to quickly swap settings.
- Control panel locking prevents accidental changes.
- Remote control lockout protects operators working on the equipment setup between tests.

All system configuration, test parameters, and even function generator details (in applicable models) are adjustable from the control panel. To avoid accidental changes, the control panel can be quickly locked. For models with a touchscreen, a simple press of the lock status button initiates locking. For the 300 Series, it takes three button pushes. The control lock mode can include or not include the DC output on/off button. Optionally, a 4-digit PIN can be required to unlock the controls. For safety, remote control can be locked out for when an operator must make setup or wiring adjustments.



In all series, the control panels include a graphical display with a menudriven interface. Power output, settings, and status indicators are visible during operation. The control panel can be locked to prevent accidental changes. All system configuration, test parameters, and even function generator details (where available) are adjustable from the control panels.

Protective Features

- Over-voltage, over-current, over-power, and over-temperature shutdown and alerts.
- Alerts available on digital and analog interfaces.

For protecting connected equipment, there are adjustable settings for overvoltage, overcurrent, and overpower. There is also an overtemperature protection for the power supply itself. As soon as one of these thresholds is reached, the DC output is switched off, and a status signal is generated on the display and remote interfaces.



mPower control and configuration, including defining signal function profiles can be done through the on-board control panel, and through a Windows® application. Function definitions can be imported from and exported to the on-board USB port.

Remote Control

- ModBus and SCPI command protocols.
- Scriptable control of power and function generator.
- LabView[®] VIs for power and function generator.
- Windows[®] application for desktop control.
- USB, Ethernet, CAN, CANopen, Profibus, Profinet, ModbusTCP, EtherCAT, GPIB, RS232, and analog interfaces available—not all on all models.

All series can be remotely controlled by scripting, by LabView, or with a Windows application.

The 300 Series include as standard a USB, Ethernet, and analog port for remote control. There are no other options for the 300 Series units.

The 310 Series systems include as standard a USB port, and the analog port. They can then be fitted with either a fixed GPIB port, or the AnyBus port. The AnyBus port facilitates a number of connector modules to support CAN, CANopen, Profibus, Profinet, ModbusTCP, EtherCAT, RS232, or Ethernet. These modules are field exchangeable.

The 320 Series includes only the USB port. As these models are expected to be used slaves connected to a 310 master, they generally do not need a range of port options. The USB port can be used to pre-configure them.

The 311 Series systems include as standard a USB, Ethernet, AnyBus, and analog ports. GPIB is not available on the 311 Series. The AnyBus modules are the same for the 310 and 311 series systems.



LabView VIs provide control for power settings and function generators.



Parallel / Slave Expansion

- 300 Series up to 10 units in parallel (30 kW total)
- 310 Series up to 16 units in parallel (240 kW total)
- 311 Series up to 64 units in parallel (1,920 kW total)

All series include and utilize a Share Bus, and all series except the 300 also have a Master/Slave Bus.

The Share Bus is used to automatically regulate DC voltage and current to maintain balanced loading of all units.

With the 300 Series, each unit is individually configured, monitored for status, and controlled. To provide unified control of dc output on/off, the analog interface can be wired in parallel to a common switch. Remote control can be used to unify other capabilities behind a common user interface.

The 310/320, and 311 Series models all include a more full featured master/slave bus. This bus allows one unit to be configured as a master, while other units are configured as slaves. The master unit can communicate with the slave units over the master/slave bus to relay settings changes, and to monitor status. With this bus, the total capacity of the whole system is displayed, and all settings are relative to that capacity (e.g. with six 10 kW systems in parallel, the power setting value can be adjusted from 0–60 kW).

For all parallel setups, each unit in the system must be the same model—same series, voltage, current, and power rating. The exception to this is with the 310 Series, 3U, 15 kW models which have a unique companion product with the 320 Series.

The mPower 320 Series is a slave-only design. It is available in 15 kW models matching the exact configurations of the 310 Series 15 kW models. It has simpler controls and remote interface options to reduce cost. This enables high-power setups using one 310 master unit with up to 15 cost-optimized, 320 Series slave unit connected together to increase the total capacity up to 240 kW.

Voltage Drop Compensation

• Up to 5% of the rated voltage in compensation for voltage drops at the load (e.g. 4 V for an 80 Vdc unit).

For more accurate constant-voltage operation at the load, the system can compensate for some voltage loss in the DC cables. A voltage Sense Bus connects remote voltage sensing to the load. The system recognizes the remote sensing mode automatically, and regulates the output voltage at the load rather than at its own DC terminals.







The voltage sense bus connects to the load terminals and adjusts the power supply output to compensate for voltage drops of up to 5% of the rated voltage.



Series General Configuration

| | 300 Series | | 310 Series | | 320 Series | 311 Series |
|--|---|---|--|--|---|--|
| Chassis Size | 1U | 2U | ЗU | 3U | 30 | 40 |
| Power Range ^[1] | 1.5, 3.0 kW | 1.0, 1.5, 3.0 kW | 5, 10, 15 kW | 5, 10, 15 kW | 15 kW | 30 kW |
| Input Voltages ^[2] | 100-240 Vac 200-240 Vac 1-phase | 100–240 Vac 200–240 Vac 1-phase | 208 Vac 1-phase 3-phase Δ | 380–480 Vac 1-phase 3-phase ∆ | ^[3] 208 Vac and 380–480 Vac versions | 380–480 Vac 1-phase 3-phase ∆ |
| Available DC Output Voltages ^[1] | 80, 200, 360, 500, 750 | 40, 80, 200, 360, 500, 750 | 80, 200, 360, 500, 750, 1000, 1500 | 80, 200, 360, 500, 750, 1000, 1500 | ^[3] 80, 200, 360, 500, 750, 1000, 1500 | 80, 200, 360, 500, 750, 1000, 1500, 2000 |
| Available DC Output Currents ^[1] | 10 models ranging from 100A to 6A | 18 models ranging from 120A to 4A | 18 models ranging from 510A to 20A | 17 models ranging from 510A to 20A | ^[3] 14 models ranging from 510A to 30A | 8 models ranging from 1000A to 40A |
| Autoranging | Yes | Yes | | Yes | Yes | |
| Expansion for High Power | ShareBus 10x | Master / Slave 16x | | Master / Slave 16x | Master / Slave 64x | |
| Function Generator | — | Yes | | — | Yes | |
| Programmable Impedence | _ | Yes | | Yes | Yes | |
| Analog | Standard | Standard | | _ | Standard | |
| USB | Standard | Standard | | Standard | Standard | |
| Ethernet | Standard | (via AnyBus) | | _ | Standard | |
| AnyBus | _ | Standard | | _ | Standard | |
| GPIB | _ | Optional in lieu of AnyBus | | _ | _ | |
| Operating conditions | | 0-50°C, < 8 | 80% R.H., < 200 | 0 m altitude | | |

[1] There are multiple models each with a maximum voltage and current limit determined by the overall power capacity (kW). Not every model is capable of the range of voltages and currents listed. These are intended to indicate the range covered by the entire product line. See the Catalog for exact models.

[2] The 1.0, 1.5, and 3.0 kW units have some input voltage flexibilities with automatic derating of output capacity. Refer to the mPower DC Product Catalog or the Operating Guides for details as to which models are available with specific input voltages.

[3] The 320 Series is available in 3U 15 kW only with ac input / dc output options matching the 310 3U 15 kW models.



300 Series Specification Highlights

| 1.5 kW | | 3.0 kW | |
|---------------|---------|---------------|----------|
| 80 Vdc | 50 Amps | 80 Vdc | 100 Amps |
| 200 Vdc | 25 Amps | 200 Vdc | 50 Amps |
| 360 Vdc | 15 Amps | 360 Vdc | 30 Amps |
| 500 Vdc | 10 Amps | 500 Vdc | 20 Amps |
| 750 Vdc | 6 Amps | 750 Vdc | 12 Amps |

Nominal input power of 220–240 Vac single phase needed to reach output maximum. Automatic 500 W derating for lower voltages down to 100 Vac for 1.5 kW units, and 180 Vac for 3.0 kW units (see details in Operating Guide).

Power Specs

| 1 () () () () () () () () () (| |
|--|------------------------|
| Over-voltage range | 110% of rating |
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 1% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.05% of rating |
| Load regulation (at 0–100% load) | \leq 0.75% of rating |
| Efficiency @ 100% V (model dependent) | ≈ 91% - 95% |
| Efficiency @ 100% I (model dependent) | ≈ 89% – 94% |

Layout of 300 Series 1U models



Chassis depth is approximately 19.7" with 1.6" front protrusion and 1.3" rear protrusion not including cable bends.

[1] Range shown for examples. Please check the model-specific spec sheets in the Operating Guide for details.

Voltage Specs

| Over-voltage range | 110% of rating |
|--|--|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 0.1% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.02% of rating |
| Load regulation (at 0-100% load) | \leq 0.05% of rating |
| Rise time 10–90% ΔU | 15 ms maximum |
| Load step transient time | \leq 2.2 ms |
| Ripple P-P ^[1] (model dependent) | from < 76 mV to < 293 mV |
| Ripple RMS ^[1] (model dependent) | \leq 5.2 mV for 80V; from \leq 33 mV to \leq 63 mV for other models |
| Load sense compensation | up to 5% of rating |

Current Specs

| Over-current range | 110% of rating |
|--|--|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 0.2% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.05% of rating |
| Load regulation (at 0-100% load) | \leq 0.15% of rating |
| Ripple P-P ^[1] (model dependent) | from \leq 4.1 mV to \leq 114 mV |



310 Series 2U Specification Highlights

| 1.0 kw | | 1.5 kw | |
|---------------|---------|---------------|---------|
| 40 Vdc | 40 Amps | 40 Vdc | 60 Amps |
| 80 Vdc | 40 Amps | 80 Vdc | 60 Amps |
| 200 Vdc | 15 Amps | 200 Vdc | 25 Amps |
| 360 Vdc | 10 Amps | 360 Vdc | 15 Amps |
| 500 Vdc | 6 Amps | 500 Vdc | 10 Amps |
| 750 Vdc | 4 Amps | 750 Vdc | 6 Amps |
| | | | |

3.0 kW

| 40 Vdc 80 Vdc 200 Vdc 360 Vdc 500 Vdc | 120 Amps 120 Amps 50 Amps 30 Amps 20 Amps | Nominal input power of 220–240 Vac single phase needed to reach output maximum for 1.5 kW and 3.0 kW models. Automatic 500 W derating for lower voltages down to 100 Vac for 1.5 kW units, and 180 Vac for 3.0 kW units (see details in Operating Guide). |
|---|---|--|
| 750 Vdc | 12 Amps | details in Operating Guide). |

Power Specs

| Over-voltage range | 110% of rating |
|-------------------------------------|-------------------------|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 1% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.05% of rating |
| Load regulation (at 0–100% load) | $\leq 0.75\%$ of rating |
| Efficiency | ≈ 92% – 95% |

Layout of 310 Series 2U models





Chassis depth is approximately 18.2" with 1.6" front protrusion and 1.8" rear protrusion not including cable bends.

Voltage Specs

| Over-voltage range | 110% of rating |
|--|---|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 0.1% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.02% of rating |
| Load regulation (at 0–100% load) | $\leq 0.05\%$ of rating |
| Rise time 10–90% ΔU | 30 ms maximum |
| Load step transient time | ≤ 1.5 ms |
| Ripple P-P (model dependent) ^[1] | $\begin{array}{l} 1 \text{ kW 80 V} = \leq 114 \text{ mV} \\ 1 \text{ kW 500 V} = \leq 190 \text{ mV} \\ 3 \text{ kW 80 V} = \leq 114 \text{ mV} \\ 3 \text{ kW 500 V} = \leq 190 \text{ mV} \end{array}$ |
| Ripple RMS (model dependent) ^[1] | 1 kW 80 V = \leq 8 mV 1 kW 500 V = \leq 48 mV 3 kW 80 V = \leq 8 mV 3 kW 500 V = \leq 190 mV |
| Load sense compensation | up to 5% of rating |

Current Specs

| Over-current range | 110% of rating |
|--|---|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 0.2% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.05% of rating |
| Load regulation (at 0–100% load) | \leq 0.15% of rating |
| Ripple P-P (model dependent) ^[1] | 1 kW 80 V = \leq 3.7 mA RMS 1 kW 500 V = \leq 0.5 mA RMS 3 kW 80 V = \leq 11 mA RMS 3 kW 500 V = \leq 1.5 mA RMS |



310/320 Series 3U Specification Highlights

5_{kW}

| 80 Vdc | 170 Amps |
|---------|----------|
| 200 Vdc | 70 Amps |
| 360 Vdc | 40 Amps |
| 500 Vdc | 30 Amps |
| 750 Vdc | 20 Amps |
| | |

10kW

| 80 Vdc | 340 Amps |
|---------|----------|
| 200 Vdc | 140 Amps |
| 360 Vdc | 80 Amps |
| 500 Vdc | 60 Amps |
| 750 Vdc | 40 Amps |
| | |

15kw

| 80 Vdc | 510 Amps |
|----------|----------|
| 200 Vdc | 210 Amps |
| 360 Vdc | 120 Amps |
| 500 Vdc | 90 Amps |
| 750 Vdc | 60 Amps |
| 1000 Vdc | 40 Amps |
| 1500 Vdc | 30 Amps |
| | |

All models are available in two Vac inputs: 208 Vac 3-phase, or 380–480 Vac 3-phase.

320 Series is available in 15 kW configurations only.

Voltage Specs

| Over-voltage range | 110% of rating | |
|--|--|--|
| Target setting range | 102% of rating | |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 0.1% of rating | |
| Line regulation (at ±10% ΔUAC) | \leq 0.02% of rating | |
| Load regulation (at 0-100% load) | \leq 0.05% of rating | |
| Rise time 10−90% ∆U | 30 ms maximum | |
| Load step transient time | \leq 1.5 ms | |
| Ripple P-P (model dependent) ^[1] | $5 \text{ kW } 80 \text{ V} = \le 200 \text{ mV}$ $5 \text{ kW } 750 \text{ V} = \le 800 \text{ mV}$ $15 \text{ kW } 80 \text{ V} = \le 320 \text{ mV}$ $15 \text{ kW } 750 \text{ V} = \le 800 \text{ mV}$ | |
| Ripple RMS (model dependent) ^[1] | $5 \text{ kW } 80 \text{ V} = \le 16 \text{ mV}$ $5 \text{ kW } 750 \text{ V} = \le 200 \text{ mV}$ $15 \text{ kW } 80 \text{ V} = \le 25 \text{ mV}$ $15 \text{ kW } 750 \text{ V} = \le 200 \text{ mV}$ | |
| Load sense compensation | up to 5% of rating | |

Current Specs

| Over-current range | 110% of rating |
|--|---|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | $\leq 0.2\%$ of rating |
| Line regulation (at ±10% ΔUAC) | $\leq 0.05\%$ of rating |
| Load regulation (at 0-100% load) | $\leq 0.15\%$ of rating |
| Ripple P-P (model dependent) ^[1] | $\begin{array}{l} 5 \text{ kW 80 V} = \le 80 \text{ mA RMS} \\ 5 \text{ kW 750 V} = \le 16 \text{mA RMS} \\ 15 \text{ kW 80 V} = \le 240 \text{ mA RMS} \\ 15 \text{ kW 750 V} = \le 48 \text{ mA RMS} \end{array}$ |

Power SpecsOver-voltage range110% of ratingTarget setting range102% of ratingAccuracy
(at $23 \pm 5 \circ C / 73 \pm 9 \circ F$) $\leq 1\%$ of ratingLine regulation
(at $\pm 10\% \Delta UAC$) $\leq 0.05\%$ of ratingLoad regulation
(ct 0, 100\% load) $\leq 0.75\%$ of rating

≈ 92% - 95%

Layout of 310 Series 3U models

(at 0-100% load)

Efficiency



Chassis depth is approximately 26.8" max. with 1.6" front protrusion and 2.5" rear protrusion not including cable bends.

[1] Selected units shown for examples. Please check the model-specific spec sheets in the Operating Guide for details.



311 Series Specification Highlights

30kW

| 80 Vdc | 1000 Amps | 750 Vdc | 120 Amps |
|---------|-----------|----------|----------|
| 200 Vdc | 420 Amps | 1000 Vdc | 80 Amps |
| 360 Vdc | 240 Amps | 1500 Vdc | 60 Amps |
| 500 Vdc | 180 Amps | 2000 Vdc | 40 Amps |

All model ratings are available with ac input of 380–480 Vac 3-phase only.

Power Specs

Accuracy

Efficiency

Line regulation

(at $\pm 10\% \Delta UAC$) Load regulation

(at 0-100% load)

Over-voltage range

Target setting range

(at 23 ±5°C / 73 ±9°F)

| of rating |
|--|
| of rating |
| 5% of rating |
| 2% of rating |
| 5% of rating |
| s maximum |
| ms |
| = ≤ 320 mV / = ≤ 320 mV / = ≤ 800 mV) V = ≤ 2400 mV |
| $= \le 25 \text{ mV}$ $V = \le 55 \text{ mV}$ $V = \le 200 \text{ mV}$ $V = \le 400 \text{ mV}$ |
| 5% of rating |
| |

Layout of 311 Series 4U models



110% of rating

102% of rating

 \leq 0.3% of rating

 \leq 0.05% of rating

 \leq 0.75% of rating

≈ 92% - 95%

Chassis depth is approximately 26.3° with 1.7° front protrusion and 3.4° rear protrusion not including cable bends.

Current Specs

| Over-current range | 110% of rating |
|-------------------------------------|------------------------|
| Target setting range | 102% of rating |
| Accuracy (at 23 ±5°C / 73 ±9°F) | \leq 0.1% of rating |
| Line regulation (at ±10% ΔUAC) | \leq 0.05% of rating |
| Load regulation (at 0–100% load) | \leq 0.15% of rating |

[1] Selected units shown for examples. Please check the model-specific spec sheets in the Operating Guide for details.(Preliminary numbers as of this writing.)

