## Multi-Range Programmable DC Power Supplies 9115 Series



supporting SCPI commands. Alternatively, users

provided PC software application. This software

Windows 8 compatible tablets or smart phones

The 9115-AT provides automotive power test

waveforms compliant to DIN 40839 and ISO

16750-2 standards that can simulate common

test conditions for electrical and electronic

devices installed in automobiles.

can control the power supply, execute test

sequences or log measurements using the

also integrates with Data Dashboard for

LabVIEW apps enabling iOS, Android or

to remotely monitor select measurement

indicators.

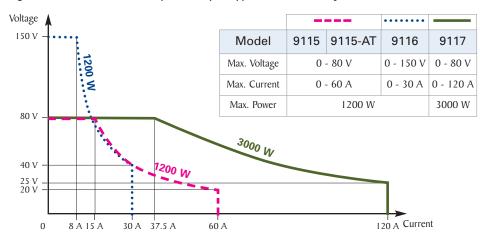
### 1200 W / 3000 W Multi-Range DC Power Supplies

Any 9115 Series model can replace several supplies on your bench or in your rack. Unlike conventional supplies with fixed output ratings, these multi-range power supplies automatically recalculate voltage and current limits for each setting, providing full output power in any Volt/Amp combination within the rated voltage and current limits.

For benchtop applications, this series provides a numerical keypad for direct data entry along with convenient cursors and analog style knobs to quickly make incremental voltage or current changes. System integrators benefit from the standard USB (USBTMC-compliant), RS-232, GPIB, RS-485, and LAN (9117 only) interfaces

### **Multi-Range Operation**

The multi-ranging feature of the 9115 Series offers exceptional flexibility by providing any combination of the rated voltage and current up to the maximum output power of the supply. These wide ranges of voltage and current allow users to replace multiple supplies on a bench or system rack.



### Features & Benefits

- Multi-ranging operation (output up to max power rating within maximum voltage and current rating)
- Compact, high density, 1U rackmount form factor (2U for 9117)
- High programming and readback resolution
- Adjustable voltage slope (rise and fall time)
- Sequence programming (internal list mode for models 9115, 9115-AT, and 9116)
- Save and recall up to 100 instrument settings
- Standard USB (USBTMC-compliant), RS-232, GPIB, RS-485, and LAN (9117 only) interfaces supporting SCPI commands for remote control
- Analog interface with control and monitoring functions
- Master/Slave mode for parallel and series operation
- Remote sense
- Overvoltage/overpower/overtemperature protection, and key-lock function
- Test functions compliant to automotive standards (9115-AT only)
- Softpanel for remote control, test sequence generation and data logging

### **Distributed By:**

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www.bkprecision.com

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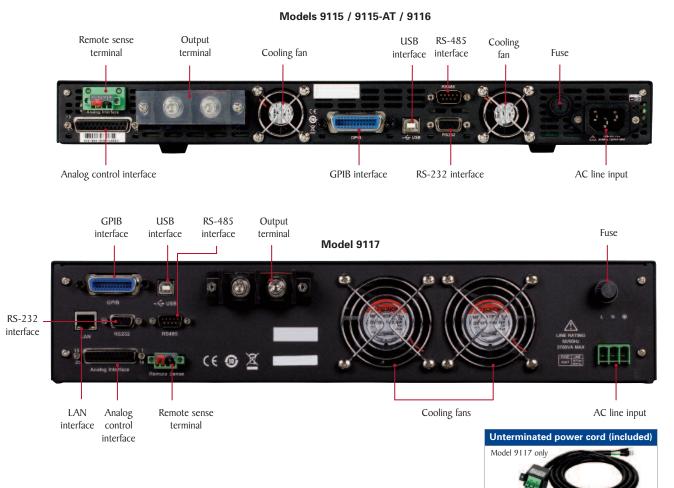
### **Front panel**



Models 9115 / 9115-AT / 9116

Model 9117

### **Rear panel**



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## **Flexible operation**

### Easy-to-use interface

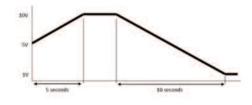
The numeric keypad, rotary knobs, and cursors provide an easy way to set output levels quickly and precisely. With a push of a button, the display can be conveniently toggled between set and measured voltage and current values. Additionally, the power supplies provide internal memory for storage of up to 100 different instrument settings that can be set and recalled via both the front panel and remote interfaces.

# Test sequence execution in list mode (models 9115, 9115-AT, and 9116 only)

The list mode feature lets users store, recall, and run program sequences in the power supply's internal memory. A total of 10 steps can be configured for each sequence (up to 10). These sequences can then be saved into a program configuration that can run one sequence after another, which allows for a maximum of 100 steps in one program configuration.

### Programmable voltage rise/fall times

The power supply is capable of programming the slope of the output voltage during changes between voltage settings by allowing users to set the rising and falling edge times of the voltage.

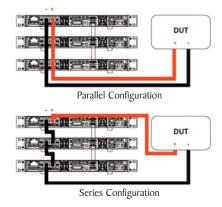


### External analog control interface

The power supply output voltage and current can be controlled from zero to full range by either external DC voltage sources (0-5 V or 0-10 V) or resistances (0-5 k $\Omega$  or 0-10 k $\Omega$ ). The DB25 analog control interface also provides a source for monitoring the voltage and current output.

#### Master/Slave operation

More than one unit of the same power supply model can be connected in parallel or series connection to increase the overall current or voltage output respectively. Using the RS-485 interface, the power supplies can operate in master/slave mode. In this mode, the master unit can control all other power supplies connected in parallel or series. Additionally, the RS-485 interface can be used for multi-unit control of up to 31 daisy chained units.



### Application software

PC software is provided for front panel emulation, generating and executing test sequences or logging measurement data without the need to write source code. Additionally, this application software integrates with NI Data Dashboard for LabVIEW apps which allows users to create a custom dashboard on a tablet computer or smart phone to remotely monitor 9115 Series power supplies via this PC software.

- Remote monitoring on iOS, Android or Windows 8 compatible tablets or smart phones via NI Data Dashboard for LabVIEW apps. Quickly develop a custom dashboard consisting of one (smart phone) or several (tablet) indicators, charts or gauges to monitor your power supply.
- Log voltage, current and power values as well as time stamp, CV/CC and output status.
- Save and load list files to/from the power supply's internal memory.
- Create an unlimited number of external list files to be executed from PC memory. Save and recall list files to/from the PC.



## **Model 9115-AT Automotive Test Functions**



In order to ensure electronic systems used in a vehicle are able to function in an automotive environment, automotive component manufacturers test electronic modules to industry standards. The 9115-AT provides built-in simulations compliant to these automotive test standards to help automate and speed up development time.

### DIN 40839 (ISO 7637)

This standard insures EMC (electromagnetic compatibility) in road vehicles by injection of supply line transients. The 9115-AT can output a 12 V or 24 V system voltage sequence, which simulates the behavior in supply voltage reduction caused by an engine starter motor circuits (Fig. 1).

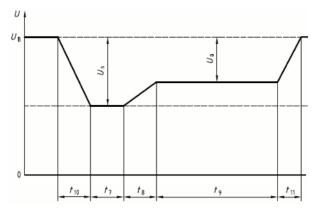


Fig. 1 - Motor startup curve

### ISO 16750-2

This standard applies to electric and electronic systems/components for vehicles. It describes the potential environmental conditions and specifies tests and requirements recommended for the specific mounting location on/in the vehicle. These test simulations include measurement of discontinuities in supply voltage, voltage drops, tests applicable to equipment with reset functions, and tests to insure modules do not malfunction during an engine start routine with cranking.

Simulate the effect when a conventional fuse element melts in another circuit.

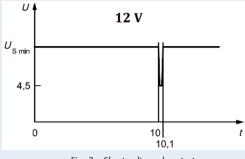
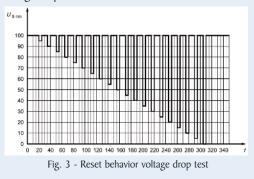
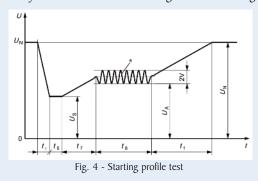


Fig. 2 - Short voltage drop test

Verify the reset behavior of your DUT at various voltage drops.



Verify the behavior of a DUT during and after cranking.



Multi-Range Programmable DC Power Supplies 9115 Series

## **Specifications**

Power Factor (full load) $7.5\%$ (220 VAC) $80\%$ (220 VAC) $10\%$ (220 VAC)Power Factor (full load) $0.99$ $0.99$ $0.99$ Standard InterfaceUSB, GPIB, RS-232, RS-485USB, GPIB, RS-232, RS-485AC Input $115/230$ VAC $\pm 10\%$ , 47 Hz – 63 Hz $220$ VAC $\pm 10\%$ , 47 HzInput Current (nominal) $13.8$ A (120 VAC) $13.3$ A (120 VAC) $7.3$ A (220 VAC) $6.9$ A (220 VAC) $17.1$ A (220 VACOperating Temperature $32^\circ$ F – 104 $^\circ$ F ( $0^\circ$ C – 40 $^\circ$ C)Storage Temperature $-4^\circ$ F – 158 $^\circ$ F ( $-20^\circ$ C – 70 $^\circ$ C)SafetyEN61010-1:2001, EU Low Voltage Directive $2006/95/EC$ Meets EMC Directive $2004/108/EC$ , EN 61000-3-2:2006, EN 61000-3-2:2006, EN 61000-3-2:2006, EN 61000-3-3:1995 + A1:2001 + A2:2005Electromagnetic Compatibility $16.32^\circ$ x $1.75^\circ$ x $19.02^\circ$ ( $414.5$ x $4.5$ x $483.2$ mm) $17.19^\circ$ x $3.52^\circ$ x $20$ ( $436.5$ x $89.3$ x $532$ Dimensions (W x H x D) $18.74$ lbs (8.5 kg) $37.48$ lbs (17 kg	Model	9115 & 9115-AT	9116	9117	
Current $0-60 A$ $0-30 A$ $0-120 A$ Max Output Power         I </td <td>Output Rating</td> <td></td> <td></td> <td></td>	Output Rating				
Max Output Power         1200 W         3000 W           Load Regulation <sup>1021</sup> 0.01 % + 5 mV         0.05 % + 30 mV           Voltage         0.01 % + 10 mA         0.1 % + 30 mA           Line Regulation <sup>20</sup> 0.02 % + 1 mV         0.02 % + 20 mV           Voltage         0.02 % + 1 mV         0.02 % + 20 mV           Current         0.02 % + 1 mA         0.02 % + 10 mA           Programming/Readback Resolution         1 mA         0.02 % + 10 mA           Voltage         1 mV         3 mV         2 mV           Current         0.1 % + 60 mA         0.2 % + 30 mV         0.2 % + 120 mA           Programming/Readback Resolution         0.1 % + 60 mA         0.2 % + 30 mA         0.2 % + 120 mA           Woltage         0.02 % + 30 mV         0.05 % + 30 mV         0.2 % + 120 mA/ms           Ripple (20 Hz - 20 MHz)         = 80 mVpp         ≤ 80 mVpp           Current         100 mArms         40 mArms         120 mA/ms           Temperature Coefficient 0* C - 40*C PP         < 80 mVpp	Voltage	0 – 80 V	0 – 150 V	0 – 80 V	
Load Regulation         Unit	Current	0 – 60 A	0 – 30 A	0 – 120 A	
Load Regulation         Units	Max Output Power	120	0 W 3000 W		
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Current $0.1 \ \% + 10 \ mA$ $0.1 \ \% + 30 \ mA$ Line Regulation <sup>12</sup>	-	0.01 % + 5 mV	0.05 % + 30 mV		
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Notinge $\leq 80$ mVpCurrent100 mArms40 mArms120 mArmsTemperature Coefficient 0°C - 40°C)Voltage $\sim 0.25 \% + 30$ mV $\sim 0.25 \% + 10$ mAReadback Temperature Coefficient 0°C - 40°C/2Readback Temperature Coefficient 0°C - 40°C/2Old S% + 30 mVOld S% (120 VAC)7.3% (120 VAC)7.5% (120 VAC)A Clip WOld S% (120 VAC)1.38 A (120 VAC) <td col<="" td=""><td></td><td>0.170 1 00 107</td><td>0.2 /0 1 50 11/1</td><td>0.270 + 120 11/4</td></td>	<td></td> <td>0.170 1 00 107</td> <td>0.2 /0 1 50 11/1</td> <td>0.270 + 120 11/4</td>		0.170 1 00 107	0.2 /0 1 50 11/1	0.270 + 120 11/4
Current         100 mArms         40 mArms         120 mArms           Temperature Coefficient (0 °C - 40 °C) <sup>[2]</sup> $0.02 \% + 30 \text{ mV}$ $0.02 \% + 30 \text{ mV}$ Current $0.05 \% + 10 \text{ mA}$ Readback Temperature Coefficient (0 °C - 40 °C) <sup>[2]</sup> Voltage $0.02 \% + 30 \text{ mV}$ $0.05 \% + 10 \text{ mA}$ Readback Temperature Coefficient (0 °C - 40 °C) <sup>[2]</sup> $0.05 \% + 5 \text{ mA}$ $0.05 \% + 5 \text{ mA}$ General $0.05 \% + 5 \text{ mA}$ $0.05 \% + 5 \text{ mA}$ $0.05 \% + 5 \text{ mA}$ General $73\% (120 \text{ VAC})$ $80\% (220 \text{ VAC})$ $80\% (220 \text{ VAC})$ Power Factor (full load) $0.99$ $0.99$ $0.99$ $0.99$ Standard Interface         USB, GPIB, RS-232, RS-48         USB, GPIB, RS-232, RS-48         USB, GPIB, RS-232, RS-48           Input Current (nominal) $13.8 \wedge (120 \text{ VAC})$ $13.3 \wedge (120 \text{ VAC})$ $13.3 \wedge (120 \text{ VAC})$ $17.1 \wedge (220 \text{ VAC}$ Storage Temperature $32 ° F - 104 ° F (0 °C - 40 °C)$ $17.1 \wedge (220 \text{ VAC}$ $17.1 \wedge (220 \text{ VAC}$ Storage Temperature $-4 ° F - 158 ° F (-20 °C - 70 °C)$ $17.1 \wedge (220 \text{ VAC}$ $17.1 \wedge (220 \text{ VAC}$ Storage Temperature $-4 ° F - 158 ° F (-20 °C - 70 $		< 60	mVpp	< 80 m\/nn	
Temperature Coefficient (0 °C - 40 °C)(2')         0.02 % + 30 mV           Current         0.02 % + 30 mV           Readback Temperature Coefficient (0 °C - 40 °C)(2')         0.05 % + 10 mA           Readback Temperature Coefficient (0 °C - 40 °C)(2')         0.02 % + 30 mV           Current         0.02 % + 30 mV           Current         0.02 % + 5 mA           General         0.02 % + 5 mA           Efficiency         73% (120 VAC) 75% (220 VAC)         80% (220 VAC)           Power Factor (full load)         0.99         0.99           Operating Temperature         USB, GPIB, RS-232, RS-483         USB, GPIB, RS-232, RS-484           AC Input         115/230 VAC ± 10 %, 47 Hz         220 VAC ± 10 %, 47 Hz           Input Current (nominal)         1.3.8 A (120 VAC) 7.3 A (220 VAC)         1.3.3 A (120 VAC) 6.9 A (220 VAC)         17.1 A (220 VAC           Operating Temperature         32 ° F - 104 ° F (0 °C - 40 °C)         17.1 A (220 VAC         17.1 A (220 VAC           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         17.1 A (220 VAC         17.1 A (220 VAC           Safety         ENG100-1-1:2001, EUI Low Voltage Directive 2006/95/EC         ENG 1000-3-2:2005, ENG 1000-4-2/3/-4/-5/-6/-11, EN 61326-1:2005	-		••		
Voltage $0.02 \ \% + 30 \ mV$ Current $0.05 \ \% + 10 \ mA$ Readback Temperature Coefficient (0 °C - 40 °C)(2)         Readback Temperature Coefficient (0 °C - 40 °C)(2)         Voltage $0.02 \ \% + 30 \ mV$ Quitage $0.02 \ \% + 30 \ mV$ Current $0.02 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ $0.02 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ $0.02 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ $0.02 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ $0.02 \ \% + 5 \ mA$ Seneral $0.05 \ \% + 5 \ mA$ $0.02 \ \% + 5 \ mA$ $80\% (220 \ VAC)$ Power Factor (full load) $0.99 \ 0.99$ $0.99 \ 0.99$ $0.99 \ 0.99$ Standard Interface       USB, GPIB, RS-232, RS-48 \ MC Input Current (nominal) $13.8 \ A (120 \ VAC) \ 7.3 \ A (220 \ VAC) \ 7.3 \ A (220 \ VAC) \ 7.3 \ A (220 \ VAC) \ 6.9 \ A (20 \ VAC) \ 6.9 \ A (20 \ VAC) \ 6.9 \ A (20 \ VAC) \ 7.3 \ A (220 \ VAC) $			40 IIIAIIIS		
Current         0.05 % + 10 mA           Readback Temperature Coefficient (0 °C - 40 °C) <sup>[2]</sup> Voltage         0.02 % + 30 mV           Current         0.02 % + 30 mV           Current         0.05 % + 5 mA           General         73% (120 VAC)         75% (120 VAC)         80% (220 VAC)           Efficiency         73% (120 VAC)         75% (120 VAC)         80% (220 VAC)           Power Factor (full load)         0.99         0.99         0.99           Standard Interface         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485           AC Input         115/230 VAC ± 10 %, 47 Hz - 63 Hz         220 VAC ± 10 %, 47 Hz           Input Current (nominal)         13.8 A (120 VAC) 7.3 A (220 VAC)         13.3 A (120 VAC) 6.9 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature			0.02% + 30 mV		
Readback Temperature Coefficient (0 °C - 40 °C)(2)           Voltage $0.02 \% + 30 \text{ mV}$ Current $0.05 \% + 5 \text{ mA}$ General $0.05 \% + 5 \text{ mA}$ General $73\% (120 \text{ VAC})$ $75\% (120 \text{ VAC})$ $80\% (220 \text{ VAC})$ Power Factor (full load) $0.99$ $0.99$ $0.99$ $0.99$ Standard Interface         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485 $220 \text{ VAC} \pm 10 \%, 47 \text{ Hz}$ Input Current (nominal) $115/230 \text{ VAC} \pm 10 \%, 47 \text{ Hz} - 63 \text{ Hz}$ $220 \text{ VAC} \pm 10 \%, 47 \text{ Hz}$ Operating Temperature $115/230 \text{ VAC}$ $13.3 \text{ A} (120 \text{ VAC})$ $13.3 \text{ A} (120 \text{ VAC})$ $17.1 \text{ A} (220 \text{ VAC})$ Storage Temperature $115/230 \text{ VAC}$ $13.3 \text{ A} (120 \text{ VAC})$ $13.3 \text{ A} (120 \text{ VAC})$ $17.1 \text{ A} (220 \text{ VAC})$ Storage Temperature $22 \degree F - 104 \degree F (0 \degree C - 40 \degree C)$ $17.1 \text{ A} (220 \text{ VAC})$ $17.1 \text{ A} (220 \text{ VAC})$ Safety         EN6100-1:2001, EU Low Voltage Directive $2006/9/F/C$ $16.32^\circ x 1.75^\circ x 19.02^\circ$ $17.19^\circ x 3.52^\circ x 20$ Dimensions (W x H x D) $16.32^\circ x 1.75^\circ x 19.02^\circ$ $17.19^\circ x 3.52^\circ x 20$ $(414.5 x \text{ 44.5 x 483.2 \text{ mm})$					
Voltage $0.02 \% + 30 mV$ Current $0.05 \% + 5 mA$ General $0.05 \% + 5 mA$ Efficiency $73\% (120 VAC)$ $75\% (220 VAC)$ $80\% (220 VAC)$ $80\% (220 VAC)$ Power Factor (full load) $0.99$ $0.99$ $0.99$ $0.99$ Standard Interface         USB, GPIB, RS-232, RS-48         USB, GPIB, RS-232, RS-48 $220 VAC \pm 10 \%, 47 Hz$ AC Input $115/230 VAC \pm 10 \%, 47 Hz - 63 Hz$ $220 VAC \pm 10 \%, 47 Hz$ $10\%, 47 Hz$ Input Current (nominal) $13.8 A (120 VAC)$ 7.3 A (220 VAC) $13.3 A (120 VAC)6.9 A (220 VAC)$ $17.1 A (220 VAC)$ Operating Temperature $32 ° F - 104 ° F (0 °C - 40 °C)$ $4 ° F - 158 ° F (-20 °C - 70 °C)$ $4 ° F - 158 ° F (-20 °C - 70 °C)$ Storage Temperature $-4 ° F - 158 ° F (-20 °C - 70 °C)$ $4 ° F - 158 ° F (-20 °C - 70 °C)$ $4 ° F - 158 ° F (-20 °C - 70 °C)$ $5 F (1000 - 3-21995 + A1:2001 + A2:2005 - EN 61000 - 3-21995 + A1:2001 + A2:2005 - EN 61000 - 3-21995 + A1:2001 + A2:2005 - EN 61000 - 3-21995 + A1:2001 + A2:2005 - EN 61000 - 42/-3/-4/-5/-6/-11, EN 61326-1:2006           Dimensions (W x H x D)         16.32° x 1.75° x 19.02° - F (414.5 x 44.5 x 483.2 mm) 17.19° x 3.52° x 20 (436.5 x 89.3 x 532)           Weight         18.74 bs (8.5 kg)         <$					
Current $0.05 \% + 5 mA$ General         Conspan="2">Conspan="2"           Efficiency         73% (120 VAC) 75% (220 VAC)         75% (120 VAC) 80% (220 VAC)         80% (220 VAC)           Power Factor (full load)         0.99         0.99         0.99         0.99           Standard Interface         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485           AC Input         115/230 VAC ± 10 %, 47 Hz – 63 Hz         220 VAC ± 10 %, 47 Hz         10%, 47 Hz           Input Current (nominal)         13.8 A (120 VAC) 7.3 A (220 VAC)         13.3 A (120 VAC) 6.9 A (220 VAC)         17.1 A (220 VAC)           Operating Temperature         32 ° F – 104 ° F (0 °C – 40 °C)         17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature         22 ° F – 158 ° F (-20 °C – 70 °C)         Conspan="2">Conspan="2">Conspan="2">Conspan="2">Conspan="2">Conspan="2">Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan="2">Conspan= Conspan= Conspan="2">Conspan= Conspan= Conspan= Conspan="2">Conspan= Conspan= Conspan="2">Conspan			0.02% + 30 mV		
General           Efficiency $73\%$ (120 VAC) 75% (220 VAC) $75%$ (120 VAC) $80\%$ (220 VAC) $80\%$ (220 VAC)           Power Factor (full load)         0.99         0.99         0.99         0.99           Standard Interface         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485           AC Input         115/230 VAC $\pm 10\%$ , 47 Hz – 63 Hz         220 VAC $\pm 10\%$ , 47 Hz         13.3 A (120 VAC)           Input Current (nominal)         13.8 A (120 VAC) 7.3 A (220 VAC)         13.3 A (120 VAC)         17.1 A (220 VAC)           Operating Temperature $32 \degree F - 104 \degree F (0 \degree C - 40 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Safety         EN61010-1-12001, EU Low Voltage Directive 2006/95/EC         18.6 (1000-3-3:1995 + A1:2001 + A2:2005/25/2000)         17.1 A (220 VAC)           Electromagnetic Compatibility         Meets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-2:2006, EN 61000-3-2:4/5/-6/-11, EN 61326-1:2006         17.1 9" x 3.52" x 20 (436.5 x 89.3 x 532)           Dimensions (W x H x D) $16.32" x 1.75" x 19.02" (414.5 x 443.5 x 483.2 mm)$ 17.19" x 3.52" x 20 (436.5 x 89.3 x 532)           Weight         18.74 lbs (8.5 kg)         37.48 lbs (17 kg </td <td></td> <td colspan="3"></td>					
Efficiency $73\% (120 VAC)$ $75\% (220 VAC)$ $75\% (120 VAC)$ $80\% (220 VAC)$ $80\% (220 VAC)$ Power Factor (full load)0.990.990.99Standard InterfaceUSB, GPIB, RS-232, RS-48USB, GPIB, RS-232, RS-48AC Input115/230 VAC ± 10 %, 47 Hz - 63 Hz220 VAC ± 10 %, 47 HzInput Current (nominal)13.8 A (120 VAC) 7.3 A (220 VAC)13.3 A (120 VAC) 6.9 A (220 VAC)17.1 A (220 VAC)Operating Temperature $32 ° F - 104 ° F (0 °C - 40 °C)$ 17.1 A (220 VAC)Storage Temperature $-4 ° F - 158 ° F (-20 °C - 70 °C)$ 17.1 A (220 VAC)SafetyEN61010-1:2001, EU Low Voltage Directive 2006/95/EC17.1 A (220 VAC)Electromagnetic CompatibilityMeets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-4-2:/3/-4/-5/-6/-11, EN 61326-1:20017.1 9" x 3.52" x 20 (414.5 x x 4.5 x x 483.2 mm)Dimensions (W x H x D) $16.32" x 1.75" x 19.02" (414.5 x 44.5 x 483.2 mm)$ 17.1 9" x 3.52" x 20 (436.5 x 89.3 x 532Weight18.74 lbs (8.5 kg)37.48 lbs (17 kg		0.03 % + 3 MA			
Efficiency75% (220 VAC)80% (220 VAC)80% (220 VAC)Power Factor (full load)0.990.990.99Standard InterfaceUSB, GPIB, RS-232, RS-485USB, GPIB, RS-232, RS-485AC InputI15/230 VAC $\pm 10^{\circ}$ , 47 Hz – 63 Hz220 VAC $\pm 10^{\circ}$ , 47 HzInput Current (nominal)13.8 A (120 VAC) 7.3 A (220 VAC)13.3 A (120 VAC) 6.9 A (220 VAC)17.1 A (220 VAC)Operating Temperature $32^{\circ}$ F – 104 $^{\circ}$ F (0 $^{\circ}$ C – 40 $^{\circ}$ C)17.1 A (220 VAC)17.1 A (220 VAC)Storage Temperature $-4^{\circ}$ F – 158 $^{\circ}$ F (-20 $^{\circ}$ C – 70 $^{\circ}$ C)17.1 A (220 VAC)17.1 A (220 VAC)Storage Temperature $-4^{\circ}$ F – 158 $^{\circ}$ F (-20 $^{\circ}$ C – 70 $^{\circ}$ C)17.1 A (220 VAC)17.1 A (220 VAC)Electromagnetic Compatibility $-4^{\circ}$ F – 158 $^{\circ}$ F (-20 $^{\circ}$ C – 70 $^{\circ}$ C)17.1 A (220 VAC)17.1 A (220 VAC)Dimensions (W x H x D) $16.32^{\circ}$ x 1.75 $^{\circ}$ x 19.02" (414.5 x 443.2 mm)17.19" x 3.52" x 20 (436.5 x 89.3 x 532Weight18.74 lbs (8.5 kg)37.48 lbs (17 kg		720( (120 )/AC)	75% (120.)/AC)		
Power Factor (full load)         0.99         0.99           Standard Interface         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485           AC Input         I15/230 VAC $\pm 10^\circ$ , 47 Hz – 63 Hz         220 VAC $\pm 10^\circ$ , 47 Hz           Input Current (nominal)         13.8 A (120 VAC) 7.3 A (220 VAC)         13.3 A (120 VAC) 6.9 A (220 VAC)         17.1 A (220 VAC)           Operating Temperature $32^\circ$ F – 104 ° F (0 °C – 40 °C)         17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $4^\circ$ F – 158 ° F (-20 °C – 70 °C)         Storage Temperature         Storage Temperature $4^\circ$ F – 158 ° F (-20 °C – 70 °C)         Storage Temperature         Storage Temperature $4^\circ$ F – 158 ° F (-20 °C – 70 °C)         Storage Temperature $16.32^\circ$ x 1.75° x 19.02° $17.19^\circ$ x 3.52° x 20           Electromagnetic Compatibility         I6.32° x 1.75° x 19.02° $17.19^\circ$ x 3.52° x 20 $(414.5 \times 44.5 \times 483.2 \text{ mm})$ $17.19^\circ$ x 3.52° x 20 $(436.5 \times 89.3 \times 532$ Dimensions (W x H x D)         I6.32° x 1.75° x 19.02° $17.19^\circ$ x 3.52° x 20 $(414.5 \times 48.5 \times 483.2 \text{ mm})$ $37.48 \text{ Bs} (17 \text{ Bs}$	Efficiency	· · · · · · · · · · · · · · · · · · ·		80% (220 VAC)	
Standard Interface         USB, GPIB, RS-232, RS-485         USB, GPIB, RS-232, RS-485           AC Input         115/230 VAC $\pm$ 10 %, 47 Hz - 63 Hz         220 VAC $\pm$ 10 %, 47 Hz           Input Current (nominal)         13.8 A (120 VAC) 7.3 A (220 VAC)         13.3 A (120 VAC) 6.9 A (220 VAC)         17.1 A (220 VAC)           Operating Temperature $32 \degree F - 104 \degree F (0 \degree C - 40 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ 17.1 A (220 VAC)         17.1 A (220 VAC)           Storage Temperature $-16.1010-1:2001, EU Low Voltage Directive 2006/95/EC         18.6 1000-3-2:2006, EN 61000-3-2:2006, EN 61000-3-2:2006, EN 61000-3-2:2006         17.1 P (3.5 X 2) (43.6 S X 8) 3 X 532           Dimensions (W x H x $			. ,	0.00	
AC Input       115/230 VAC $\pm$ 10 %, 47 Hz - 63 Hz       220 VAC $\pm$ 10 %, 47 Hz         Input Current (nominal)       13.8 A (120 VAC)       13.3 A (120 VAC)       17.1 A (220 VAC)         Operating Temperature       32 ° F - 104 ° F (0 °C - 40 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 A (220 VAC)       17.1 A (220 VAC)         Storage Temperature       -4 ° F - 158 ° F (-20 °C - 70 °C)       17.1 P (20 °C - 70 °C)       17.1 P (20 °C - 70 °C)         Electromagnetic Compatibility       Electromagnetic Compatibility       Electromagnetic Compatibility       116.32 ° x 1.75 ° x 19.02 ° (414.5 x 443.2 mm)       17.19 ° x 3.52 ° x 20 (436.5 x 89.3 x 532)         Dimensions (W x H x D)       18.74 lbs (8.5 kg)       37.48 lbs (17 kg)					
Input Current (nominal)13.8 A (120 VAC) 7.3 A (220 VAC)13.3 A (120 VAC) 6.9 A (220 VAC)17.1 A (220 VAC)Operating Temperature $32 \degree F - 104 \degree F (0 \degree C - 40 \degree C)$ $32 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ $32 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ Storage Temperature $-4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ $4 \degree F - 158 \degree F (-20 \degree C - 70 \degree C)$ $16.000 - 3.21995 + A1:2001 + A2:2005 / 5/EC$ Electromagnetic CompatibilityMeets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-3:1995 + A1:2001 + A2:2005 / EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006 $17.19 \degree x 3.52 \degree x 20 (436.5 \times 89.3 \times 532)$ Dimensions (W x H x D) $16.32 \degree x 1.75 \degree x 19.02 \degree (414.5 x 44.5 x 483.2 mm)$ $17.19 \degree x 3.52 \degree x 20 (436.5 \times 89.3 \times 532)$ Weight18.74 lbs (8.5 kg) $37.48$ lbs (17 kg)				USB, GPIB, RS-232, RS-485, Etherne	
Input Current (nominal)         7.3 A (220 VAC)         6.9 A (220 VAC)         17.1 A (220 VAC)           Operating Temperature         32 ° F - 104 ° F (0 °C - 40 °C)         32 ° F - 104 ° F (0 °C - 70 °C)         532 ° F - 104 ° F (0 °C - 70 °C)           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)           Storage Temperature         -4 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 150 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 °C)         54 ° F - 158 ° F (-20 °C - 70 ° C)         54 ° F - 158 ° F (-20 °C - 70 ° C)         54 ° F - 158 ° F (-20 °C - 70 ° C)         54 ° F - 158 ° F (-20 °C - 70 ° C)         54 ° F - 158 ° F (-20 °C - 70 ° C)         54 ° F - 158 ° F (-20 °F - 11, EN 61326-1:200 · F - 118 ° F - 158 ° F (-20 °F - 118 ° F - 158 ° F (-20 °F - 118	AC Input	115/230 VAC ± 10	) %, 47 Hz – 63 Hz	220 VAC ± 10 %, 47 Hz – 63 Hz	
Storage Temperature       -4 ° F – 158 ° F (-20 °C – 70 °C)         Safety       EN61010-1:2001, EU Low Voltage Directive 2006/95/EC         Meets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-2:2006, EN 61000-3-3:1995 + A1:2001 + A2:2005         Electromagnetic Compatibility       EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006         Dimensions (W x H x D)       16.32" x 1.75" x 19.02" (414.5 x 44.5 x 483.2 mm)         Weight       18.74 lbs (8.5 kg)	Input Current (nominal)	. ,		17.1 A (220 VAC)	
Storage Temperature       -4 ° F – 158 ° F (-20 °C – 70 °C)         Safety       EN61010-1:2001, EU Low Voltage Directive 2006/95/EC         Meets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-3:1995 + A1:2001 + A2:2005         Electromagnetic Compatibility       EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006         Dimensions (W x H x D)       16.32" x 1.75" x 19.02" (414.5 x 44.5 x 483.2 mm)       17.19" x 3.52" x 20 (436.5 x 89.3 x 532         Weight       18.74 lbs (8.5 kg)       37.48 lbs (17 kg	Operating Temperature	32 ° F – 104 ° F (0 °C – 40 °C)			
Safety         EN61010-1:2001, EU Low Voltage Directive 2006/95/EC           Meets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-3:1995 + A1:2001 + A2:2005 EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006           Dimensions (W x H x D)         16.32" x 1.75" x 19.02" (414.5 x 44.5 x 483.2 mm)         17.19" x 3.52" x 20 (436.5 x 89.3 x 532)           Weight         18.74 lbs (8.5 kg)         37.48 lbs (17 kg					
Belectromagnetic Compatibility         Meets EMC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-3:1995+A1:2001+A2:2005 EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006           Dimensions (W x H x D)         16.32" x 1.75" x 19.02" (414.5 x 44.5 x 483.2 mm)         17.19" x 3.52" x 20 (436.5 x 89.3 x 532)           Weight         18.74 lbs (8.5 kg)         37.48 lbs (17 kg)					
Electromagnetic Compatibility         EN 61000-3-3:1995+A1:2001+A2:2005           EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006         17.19" x 3.52" x 20           Dimensions (W x H x D)         16.32" x 1.75" x 19.02" (414.5 x 44.5 x 483.2 mm)         17.19" x 3.52" x 20           Weight         18.74 lbs (8.5 kg)         37.48 lbs (17 kg	Safety				
Dimensions (W x H x D)         (414.5 x 44.5 x 483.2 mm)         (436.5 x 89.3 x 532           Weight         18.74 lbs (8.5 kg)         37.48 lbs (17 kg	Electromagnetic Compatibility	EN 61000-3-3:1995+A1:2001+A2:2005			
Weight         18.74 lbs (8.5 kg)         37.48 lbs (17 kg	Dimensions (W x H x D)			17.19" x 3.52" x 20.95"	
One-Vear V	Weight	18.74 lbs	s (8.5 kg)	-	
				One-Year Warrant	

(1) With remote sense connected

 $^{(2)}$  Accuracy specified as  $\pm$  (% of output + offset) after a temperature stabilization time of 15 minutes over an ambient temperature range of 23 °C  $\pm$ 5 °C