AMREL™

ePOWER

PROGRAMMABLE DC POWER SUPPLIES

Low Noise Linear Power Supplies

Mid-Power Switch Mode Rackmount

High-Power Switch Mode Cabinet Configuration

AMETEK®
PROGRAMMABLE POWER

ABOUT AMREL™ POWER

AMREL Power, acquired by AMETEK, Inc. in 2010, now joins AMETEK's San Diego-based Programmable Power Division. The AMREL brand boasts the award winning eLOAD line of Air and Water-cooled Electronic Loads up to 200kW+, 5000Adc and 1200Vdc ratings, an array of Fuel Cell Testing Solutions (0-Volt & ultra-low voltage eLOADs and Frequency Response Analyzer), and the ePOWER line of Programmable switching mode & Linear Power Supplies from 15W-150kW+ and up to 2500Adc and 1000Vdc.

AMETEK Programmable Power is the new global leader in the design and manufacture of precision, programmable power supplies and electronic loads for R&D, test and measurement, process control, power bus simulation and power conditioning applications across diverse industrial segments. Broad product and solutions offerings and depth of expertise make AMETEK Programmable Power your trusted power partner.

AMETEK Programmable Power is a division of AMETEK, Inc, a multi-billion dollar company and leading global manufacturer of electronic instruments and electromechanical devices.

FEATURES GUIDE

Please Note: Specifications contained in this catalog are subject to change without notification.

ePOWER APPLICATIONS

APPLICATIONS

SAMPLING OF APPLICATIONS USING AMREL'S ePOWER SUPPLIES

PRODUCT		Military/ATE Test Systems	Burn-in	Manufacturing	R&D/Lab Test	General ATE	Test and Measurement	Medical	Magnetic Coils	dc Motors	RF Amplifiers	Electrodeposition	Laser Diode	Automotive Electronics	Power Supply/Battery Testing	Semiconductor/Component
SPS (1.2/1.6KW)		X	X	X	X	X	X		X	X			X	X	X	X
SPD		X	X	X	X	X	X		X	X		X	X	X	X	X
SPS (4KW+)		X	X	X	X	X	X		X	X		X	X			
HPS		X	X			X		X	X		X	X				
PD/BPD		X	X	X	X	X	X	X			X	X		X	X	X

MILITARY ATE TEST SYSTEMS

The ePower programmable switch mode power supplies (SPS/HOS) are utilized extensively in military applications such as the Joint Strike Fighter (JSF) Program. Our power supply features allow easy integration and operation in ATE Systems, ranging from Avionics Testing to Maintenance Depot Stations. With its compact size, as low as 1U-high, and wide range of available interfaces, GPIB, RS-232, USB, Ethernet, and RS-485, the SPS Series has become our most popular ATE power supply. Each model within the SPS Series is ready for rack and stack environments, right out of the box. There is no need for rack mount hardware as each unit comes in a standard 19" rack width including front panel integrated mounting ears. For simple ATE integration, SCPI commands and LabVIEW / LabWindows Drivers are available.

BURN-IN TEST

Whether your requirement is for Static or Dynamic Burn-in, the AMREL brand ePower switch mode power supplies have the reliability and robustness to run 24/7 at full power. Programming the voltages and currents for your burn-in power supply is as simple as turning a knob, providing an analog trigger signal or sending software command via one of the available Interfaces: GPIB, RS-232, USB, or Ethernet. For bulk power requirements, AMETEK Programmable Power has ePower units ranging from 4kW up to 150kW. The SPS/HOS series offers the necessary flexibility required for a wide range of burn-in applications.

MANUFACTURING TEST

The ePower line has the widest range of voltage, current, and power level options to meet your circuit board and component testing requirements. For production line automation, many AMREL brand power supplies provide output sequencing programming, allowing you to quickly program your power supply to different types of test routines. Combined with a number of available control interfaces,each power supply can easily adapt to different programming environments within your manufacturing test setups. Automated tests can also be realized utilizing ePower supplies SCPI commands, as well as LabVIEW and LabWindows drivers.

R&D/LAB TEST

The PD Series of programmable dc linear power supplies are designed for both bench-top and rack and stack environments. The PD model has a very clean output for demanding product design tests and product validation. With an Output Ripple and Noise of typically 1-3mVpp and a load regulation of 1mV and 1mA, the PD series is ideal for any low noise application. In addition to the above applications, the ePower line of programmable linear (PD)and switch mode (SPS/HPS)power supplies are used in the following applications: General ATE, Test and Measurement,Medical, Magnetic Coils, DC Motors, RF Amplifiers, Electrodeposition, Laser Diode, and Automotive Electronics.

ePOWER FEATURES GUIDE

	Voltage Ranges	Current Ranges	Power Ranges	Front Panel Keypad	Front Panel Control Knob(s)	RS-232	GPIB	Ethernet	USB	RS-485	External Analog Control	120Vac 50/60Hz, Single Phase	240Vac 50/60Hz, Single Phase	208Vac 50Hz, Single Phase	3-Phase Input
SPS Legacy	8V-800V	1.5A-150A	1200W	N/A	S	O	O	N/A	N/A	O	S	S	S	N/A	N/A
SPS Bonafide	8V-1000V	1.5A-150A	1600W	S	S	S	S	S	S	N/A	S	S	S	N/A	N/A
SPD Switch Mode (Dual Channels)	8V-300V	1A-40A	300W	S	S	S	S	O	N/A	S	N/A	S	S	O	N/A
SPS Switch Mode (K-Panel 4kW and Up)	10V-800V	3A-1200A	4kW-30kW	S	S	S	S	O	O	N/A	S	N/A	N/A	N/A	S
HPS High Power Switch Mode	10V-800V	20A-2500A	45kW-150W	S	S	S	S	O	O	N/A	S	N/A	N/A	N/A	S
PD Linear	5V-350V	0.2A-50A	20W-2000W	O	N/A	S	S	O	O	O	O	S	O	N/A	N/A

S=Standard
O=Optional
N/A=Not Available

FEATURES GUIDE

ePOWER BPD PROGRAMMABLE BENCHTOP LINEAR POWER SUPPLIES

The BPD models represent the newest addition to AMREL's PD Series of power supplies. Designed with the benchtop technician in mind, the BPD measures only 15.6" deep. Even though the BPD is shorter than the existing PD Series, it shares the same outstanding specifications. There are currently nine models available from 8 to 350Vdc, in single channel (200W). Dual channel available upon request.

BPD Model Features

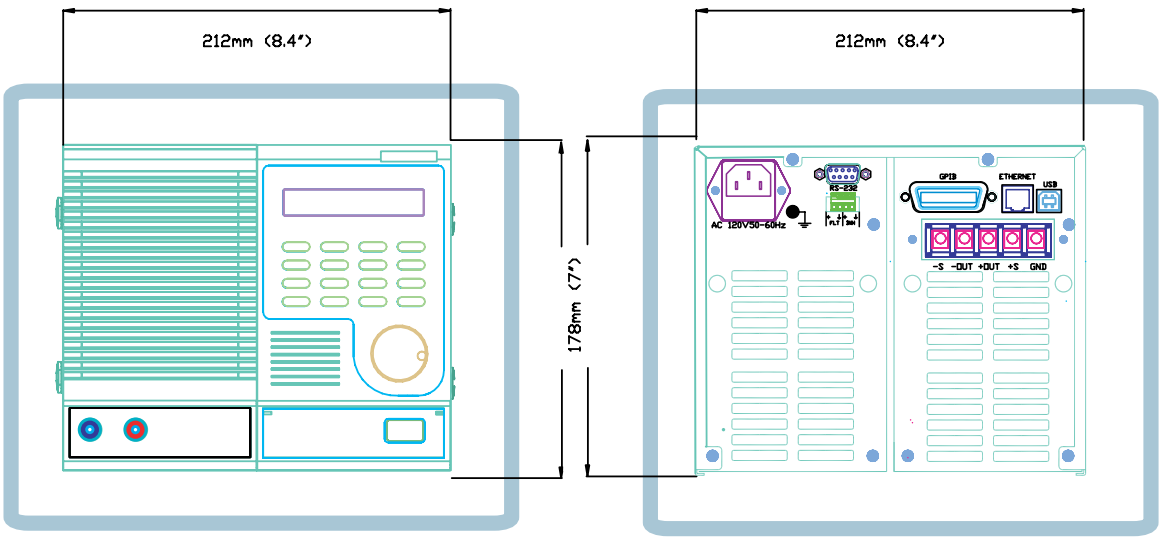
- Designed with Benchtop requirements in mind, the linear supply BPD Series measures only 15.6" deep.
- Convenient front panel output connection. Rear panel connection is also included.
- Nine models available ranging from 8-250Vdc and 0.3-20Adc
- Four 20-step VLIST or ILIST auto-sequencing profiles to automate tests
- LCD display for 16-bit 4-digit voltage & current read back replaces DMM
- RS232, GPIB, USB and Ethernet (optional) remote interfaces

BPD SERIES

Selector Guide for BDP Bench Top Linear Power Supplies

BPDXXX-XXX-X

- Input Voltage: **0** = 120Vac Single Phase
  1 = 240Vac Single Phase
- Remote Computer Interface: **A** = GPIB and RS-232
  E = Ethernet, USB, GPIB and RS-232
- **Maximum Current**
- **Maximum Voltage**
- External Analog (0-10Vdc) Control Interface: **A** = Included
  = leave blank if not included



AMETEK® PROGRAMMABLE POWER

Model	Output Voltage 0-Vdc Max.	Output Current 0- Adc max	Programming Resolution[2] Voltage (mV)	Resolution[2] Current (mA)	Accuracy[10] Voltage (mV)	Accuracy[10] Current (mA)	Over-Voltage Protection Voltage (V)[10]	Readback Resolution[2] Voltage (mV)	Readback Resolution[2] Current (mA)
BPD 8-20	2	20	1mV	1mA	0.05% + 4	0.15% + 20	5%~110%	1.0	1.0
BPD 20-10	20	10	1mV	1mA	0.05% + 10	0.15% + 10	5%~110%	1.0	1.0
BPD 30-5	30	5	1mV	1mA	0.05% + 15	0.15% + 5	5%~110%	1.0	1.0
BPD 40-5	40	5	1mV	1mA	0.05% + 20	0.15% + 5	5%~110%	1.0	1.0
BPD 60-3	60	3	1mV	1mA	0.05% + 30	0.15% + 3	5%~110%	1.0	1.0
BPD 80-2.5	80	2.5	10mV	1mA	0.05% + 40	0.15% + 2.5	5%~110%	10.0	1.0
BPD 120-1	120	1	10mV	0.1mA	0.05% + 60	0.15% + 1	5%~110%	10.0	0.10
BPD 250-0.4	250	0.4	10mV	0.1mA	0.05% + 125	0.15% + 1	5%~110%	10.0	0.10
BPD 350-0.3	350	0.3	10mV	0.1mA	0.05% + 175	0.15% + 1	5%~110%	10.0	0.10
Temperature Coefficient[8]			Constant Voltage - 100ppm/ºC		Constant Current - 100ppm/ºC				
Output Isolation:			±500Vdc						
AC Input[9]:			Nominal 120Vac or 240Vac; ±10% @ 50/60Hz. Please specify at time of order 0 = 120V; 1 = 240V						
Load Transient Response Time. <50µsec									

**1: All electronic specifications are represented at the full operating temperature range for all models.*
**2: The programming and readback resolutions are based on 16 bit resolution design.*
**3: Load regulation specifications are for 10-90% load changes.*
**4: Line regulation specifications are for input voltage variation over the AC input voltage range with constant rated load.*
**5: Ripple and Noise (PARD) specifications are for 10-100% output voltage and full output current.*

Model	Readback Accuracy[10] Voltage (mV)	Readback Accuracy[10] Current (mA)	Load[3] (mV)	Regulation CV CC (mA)	Line[4] CV/CC	PARD[5] CV/CC $mVrms/mV_{PK-PK}$	Drift (Stability)[10] CV (mV)	Drift (Stability)[10] CC (mA)	Program[7] T_{UP} / T_{ON}
BPD 8-20	0.1% + 8	0.2% + 40	1.08	3.00	1.08 / 3.00	0.3 / 3	100ppm/ºC	100ppm/ºC	
BPD 20-10	0.1% + 20	0.2% + 20	1.20	2.00	1.20 / 2.00	0.3 / 3	100ppm/ºC	100ppm/ºC	
BPD 30-5	0.1% + 30	0.2% + 10	1.30	1.50	1.30 / 1.50	0.3 / 3	100ppm/ºC	100ppm/ºC	
BPD 40-5	0.1% + 40	0.2% + 10	1.40	1.50	1.40 / 1.50	0.4 / 4	100ppm/ºC	100ppm/ºC	
BPD 60-3	0.1% + 60	0.2% + 6	1.60	1.30	1.60 / 1.30	0.6 / 6	100ppm/ºC	100ppm/ºC	10/10msec
BPD 80-2.5	0.1% + 80	0.2% + 5	1.80	1.25	1.80 / 1.25	0.8 / 7	100ppm/ºC	100ppm/ºC	
BPD 120-1	0.1% + 120	0.2% + 2	2.20	1.10	2.20 / 1.10	1 / 9	100ppm/ºC	100ppm/ºC	
BPD 250-0.4	0.1% + 250	0.2% + 2	3.50	1.04	3.50 / 1.04	5 / 15	100ppm/ºC	100ppm/ºC	
BPD 350-0.3	0.1% + 350	0.2% + 2	4.50	1.03	4.50 / 1.03	5 / 20	100ppm/ºC	100ppm/ºC	150/170msec

**6: Time for output voltage to within +/- 0.5% of VFULL-SCALE following 10% ~ 60% load current change.*
**7: Programming speed specifications are for 50% of full current loading.*
**8: Temperature coefficient specifies output change per ºC in ambient temp. rise following 30 min. warm up, w/ constant line & load.*
**9: AC Input is fixed and factory configured to either 103.5 ~ 126.5Vac or 207 ~ 253Vac @ 50/60 Hz.*
**10: Over-voltage Protection, Readback & Programming Accuracy, Load/Line Regulation and CV/CC Drift are specified as Reading/Setting + Full Scale.*

SELECTOR GUIDE

Contact the Sales Department at 1-858-458-0223 or e-mail us at sales.ppd@ametek.com

ePOWER SPS 1.2kW & 1.6kW PROGRAMMABLE SWITCH MODE

Common Features for ALL SPS 1.2kW and 1.6kW Models

- Automatic Constant Voltage/Constant Current Mode Crossover
- Multiple units can be connected in parallel or in series to provide increased current or voltage
- Output Voltage Ratings up to 800Vdc/1.2kW and 1000Vdc/1.6kW and Current Ratings up to 150Adc
- Standard 19" Width for ATE and System rackmount integration
- High Power Density - 1.2kW/1.6kW in a 1U package
- Fan-speed Control to reduce acoustic noise
- Remote Sensing to compensate for measurement errors due to large line drops
- High-resolution 16 bit ADC & DAC Design
- Active Down Programming Control for fast down programming speed
- Remote Programming Control with Standardized SCPI Commands for integrated ATE testing available
- Polarity Reversal & Isolation Output Relays available
- LabVIEW/LabWindows Drivers
- Modified & Customized Solutions

K- Panel Version (Keypad and Encoder)

- Standard Embedded RS-232, IEEE488.2 SCPI/GPIB, USB, and Ethernet Interfaces
- User-friendly Keypad and Real-time Encoder allows flexible control
- 16 bit Digital Design for high-resolution accurate measurements via a 2X20 VFD display or remote interfaces without the need for a DMM
- The VLIST (voltage) and ILIST (current) Stepping Modes generate user-defined sequence of output level up to 20 steps (points), with dwell times from 10ms to 1 minute stored in 4 profiles (This sequence can be cycled once or to a user-defined number of cycles)
- Designed with durability, reliability and DUT protection in mind – Programmable OVP (Over-voltage Protection), OCP (Over-current Protection), Redundant OTP (Over-temperature Protection), UVP (Under-voltage Protection), Remote Lockout (for ILIST, VLIST and ATE), Remote Inhibit (RI) & TTL Fault Output Signal for system level protection

SPS SERIES

Contact the Sales Department at 1-858-458-0223 or e-mail us at sales.ppd@ametek.com

1.2kW Legacy Series 0-Panel Version (Voltage/ Current Potentiometer)

- Simultaneous digital display of both current and voltage, and dual Ten-turn potentiometer for high resolution setting of the output voltage and current from zero to the rated output
- Front panel trim adjustment for OVP set points. Front panel (LED) indicators for constant voltage and constant current mode operation, OVP, thermal, and TTL shutdown (S/D)
- 0 ~ 5Vdc Remote voltage and current monitor, 0 ~ 5Vdc/0 ~ 10Vdc remote voltage/current programming
- Embedded RS-232, IEEE488.2 SCPI/GPIB, & RS-485 Remote Interfaces Available for simple and flexible ATE Integration
- Control multiple units as a single block and master/slave parallel the power supplies with built-in active current sharing via RS-485 to achieve simple and economical system expansion
- Analog-Only, control models available

1.6kW Bonafide Series 1.6kW Version (Highest Power Density)

- Includes all features of the V-version SPS
- Up to 1.6kW power output in a single 1U box with 240Vac input
- RS-485 Controlled 1.6kW Modules with active current sharing provides flexible & simple system expansion to fulfill future test requirements by adding to existing systems instead of purchasing expensive new systems
- 60/400Hz Input
- 1000V output

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1.2kW SINGLE CHANNEL SWITCH MODE

SPS 0-PANEL

Specifications[1]	SPS8-150	SPS20-60	SPS35-35	SPS40-30	SPS60-20	SPS80-15	SPS150-8	SPS300-4	SPS400-3	SPS450-2.5	SPS600-2	SPS800-1.5
Number of Outputs	1	1	1	1	1	1	1	1	1	1	1	1
Output Ratings												
Output Voltage 0-Vdc Max[2]	8.0	20.0	35.0	40.0	60.0	80.0	150.0	300.0	400.0	450.0	600.0	800.0
Output Current 0-Adc Max[3]	150.0	60.0	35.0	30.0	20.0	15.0	8.0	4.0	3.0	2.5	2.0	1.5
Maximum Output Power (W)	1200.0	1200.0	1225.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1125.0	1200.0	1200.0
Remote Programming Accuracy[4]												
Voltage(0.2% Vmax+10mV)(mV)	26	50	80	90	130	170	310	610	810	910	1210	1610
Current (0.3% Imax+10mA)(mA)	460	190	115	100	70	55	34	22	19	17.5	16	14.5
OVP (5% + 100mV)(V)	0.5	1.0	1.85	2.1	3.1	4.1	7.6	15.1	20.1	22.6	30.1	40.1
Remote Programming Resolution[5]												
Voltage (1.1*Vmax/65535mV)(mV)	0.13	0.34	0.59	0.67	1.01	1.34	2.52	5.04	6.71	7.55	10.07	13.43
Current (1.1*Imax/65535mA) (mA)	2.52	1.01	0.59	0.50	0.34	0.25	0.13	0.07	0.05	0.04	0.03	0.03
OVP (1.1*Vmax/65535) (mV)	0.13	0.34	0.59	0.67	1.01	1.34	2.52	5.04	6.71	7.55	10.07	13.43
Remote Readback Accuracy[4]												
Voltage (0.2%*Vmax/+20 mV)(mV)	36	60	90	100	140	180	320	620	820	920	1220	1620
Current (0.3% Imax+20mA)(mA)	470	200	125	110	80	65	44	32	29	27.5	26	24.5
Remote Readback Resolution[5]												
Voltage (1.1*Vmax/65535)(mV)	0.13	0.34	0.59	0.67	1.01	1.34	2.52	5.04	6.71	7.55	10.07	13.43
Current (1.1*Imax/65535)(mA)	2.52	1.01	0.59	0.50	0.34	0.25	0.13	0.07	0.05	0.04	0.03	0.03
Local Meter Accuracy												
Voltage (0.5%*Vmax+ 1 count)(mV)	48	120	210	240	360	480	900	1800	2400	2700	3600	4800
Current (0.5%*Vmax+1 count)(mA)	900	360	210	180	120	90	48	24	18	15	12	9
Load Regulation[6]												
Voltage (0.02%*Vmax+5mV)(mV)	6.6	9	12	13	17	21	35	65	85	95	125	165
Current (0.03%*Imax+5mA)(mA)	50	23	15.5	14	11	9.5	7.4	6.2	5.9	5.75	5.6	5.45
Line Regulation[7]												
Voltage (0.01%*Vmax+2mV)(mV)	2.8	4	5.5	6	8	10	17	32	42	47	62	82
Current (0.01%*Imax+2mA)(mA)	17	8	5.5	5	4	3.5	2.8	2.4	2.3	2.25	2.20	2.15
Ripple and Noise (20Hz-20MHz)[8]												
Voltage RMS (mV)	12	10	10	10	10	10	15.0	25.0	30	40	40	40
Voltage P-P (0-20MHz, p-p)(mV)	75.0	70.0	50.0	50.0	50.0	75.0	150.0	300.0	350.0	350.0	400.0	400.0
Transient Response Time (ms)[9]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.1	3.0	3.0	3.0	3.0
OVP Adjustment Range 5% - 110% of Vmax (V)	0.4 ~ 8.8	1 ~ 22	1.8 ~ 38.5	2 ~ 44	3 ~ 66	4 ~ 88	7.5 ~ 165	15 ~ 330	20 ~ 440	22 ~ 495	30 ~ 660	40 ~ 880
Program Speed (Tup/Tdn)(ms)[10]	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100
Drift (8 Hours)[11]												
CV Mode (0.5%*Vmax)(mV)	40	100	175	200	300	400	750	1500	2000	2250	3000	4000
CC Mode (0.5%*Imax)(mA)	750	300	175	150	100	75	40	20	15	12.5	10	7.5
Temperature Coefficient[12]												
CV (PPM/°C)	1.6	4	7	8	12	16	30	60	80	90	120	160
CC (PPM/°C)	45	18	10.5	9	6	4.5	2.4	1.2	0.9	0.75	0.6	0.45
AC Input (Factory Configured AC Range)	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
DC Output Isolation	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 800 V

**1: All electronic specifications are represented at the full operating temperature range for all models.*
**2: Minimum voltage is guaranteed to maximum 0.15% of the rated output voltage.*
**3: Minimum current is guaranteed to maximum 0.5% of the rated output current.*
**4: The remote programming/readback accuracy specifications are guaranteed within 0.2% of max rated voltage and 0.3% of max rated current plus offset.*
**5: The remote programming and readback resolutions are based on 16 bit resolution.*
**6: Load regulation specifications are for 10 - 90% load changes.*
**7: Line regulation specifications are for input voltage variation over the ac input voltage range with constant rated load.*
**8: Ripple and Noise specifications are for 10 - 100% output voltage and full output current.*
**9: Time for output voltage to recover to within +/- 0.5% of V FULL-SCALE following a 10% ~ 60% load current change.*
**10: Programming speed specifications are for 50% of full current loading.*
**11: Drift specifications are maximum drift over 8 hours with constant line, load, and temperature after 30 minutes of warm-up.*
**12: Temperature coefficient specifications are for changes in output per °C change in ambient temperature with constant line and load.*

1.6kW SINGLE CHANNEL SWITCH MODE

Specifications[1]	SPS10-150	SPS16-100	SPS20-80	SPS26-62	SPS32-50
Number of Outputs	1	1	1	1	1
Output Ratings					
Output Voltage 0-Vdc Max	10.0	16.0	20.0	26.0	32.0
Output Current 0-Adc Max	150.0	100.0	80.0	62.0	50.0
Maximum Output Power (W)	1500.0	1600.0	1600.0	1600.0	1600.0
Programming Accuracy					
Voltage	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Current	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Over-Voltage Protection	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS
Programming Resolution[2] **Measurement Resolution[2]**					
Voltage (mV)	1.20mV	2.00mV	6.00mV	15.00mV	60.00mV
Current (mA)	12.50mA	7.50mA	2.50mA	1.00mA	0.205A
OVP (mV)	3.00mV	5.00mV	15.00mV	37.50mV	150.00mV
Measurement Accuracy					
Voltage	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS
Current	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS
Front Panel Display Accuracy					
Voltage (4 digits)	4 Digits / 0.1% of Rdg + 20mV	4 Digits / 0.1% of Rdg + 20mV	4 Digits / 0.1% of Rdg + 60mV	4 Digits / 0.1% of Rdg + 200mV	4 Digits / 0.1% of Rdg + 600mV
Current (4 digits)	4 Digits / 0.1% of Rdg + 300mA	4 Digits / 0.1% of Rdg + 150mA	4 Digits / 0.1% of Rdg + 50mA	4 Digits / 0.1% of Rdg + 20mA	4 Digits / 0.1% of Rdg + 5mA
Front Panel Resolution[2]					
Voltage	10mV	10mV	10mV	100mV	100mV
Current	100mA	10mA	10mA	10mA	10mA
Load Regulation[3]					
Voltage (0.01%*Vmax+2mV)(mV)	3.2	4	8	17	62
Current (0.01%*Imax+2mA)(mA)	14.5	9.5	4.5	3	2.25
Line Regulation[4]					
Voltage (0.001%*Vmax+2mV)(mV)	2.12	2.2	2.6	3.5	8
Current (0.001%*Imax+2mA)(mA)	3.25	2.75	2.25	2.1	2.025
Ripple and Noise (20Hz-20MHz)[5]					
Voltage RMS (ms)(mV)	8	8	8	10	30
Voltage P-P (0-20MHz, p-p)(mV)	50.0	50.0	50.0	100.0	250.0
Transient Response Time (ms)[6]	3.0	3.0	3.0	3.0	3.0
OVP Adjustment Range	0.6 ~ 13.2	1 ~ 22	3 ~ 66	7.5 ~ 165	30 ~ 660
Program Speed (Tup/Tdn)(ms)[7]	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100
Temperature Coefficient[8]					
CV (PPM/°C)	100	100	100	100	100
CC (PPM/°C)	100	100	100	100	100
AC Input[9]	187 ~ 229Vac or 207 ~ 253Vac	187 ~ 229Vac or 207 ~ 253Vac	187 ~ 229Vac or 207 ~ 253Vac	187 ~ 229Vac or 207 ~ 253Vac	187 ~ 229Vac or 207 ~ 253Vac
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
DC Output Isolation	+ 600 V	+ 600 V	+ 600 V	+ 600 V	+ 600 V

**1: All electronic specifications are represented at the full operating temperature range for all models and subject to change without notice.*
**2: The programming and measurement resolution is based on 16 bit resolution design*
**3: Load regulation specifications are for 10 - 90% load changes.*
**4: Line regulation specifications are for input voltage variation over the ac input voltage range with constant rated load*
**5: Ripple and Noise specifications are for 10 - 100% output voltage and full output current.*
**6: Time for output voltage to recover to within +/- 0.5% of VFULL-SCALE following a 10% ~ 60% load current change.*
**7: Programming speed specifications are for 50% of full current loading.*
**8: Temperature coefficient specifies output change per °C in ambient temperature rise following 30 minute warm up with constant line and load.*
**9: AC Input is fixed and factory configured to either 208Vac: 187.5 ~ 229Vac or 240Vac: 207 ~ 253Vac @ 50/60Hz.*

FOR SPS 1.2kW & 1.6kW SWITCH MODE POWER SUPPLIES

SELECTOR GUIDES

Selector Guide for SPS 1.2kW Models (0-Panel Version)

SPS XXX-XXX-0XXX

- AC Input: 0 = 120Vac, 1 = 240Vac
- Computer Interfaces: 0 = None, 2 = GPIB, RS-232, and RS-485
- Output Isolation/Polarity Reversal Relays: 0 = None, 1 = Included
- Front Panel Version: 0 = Voltage/Current Control Potentiometer
- **Maximum Current Rating**
- **Maximum Voltage Rating**

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SPD DUAL CHANNEL PROGRAMMABLE SWITCH MODE POWER SUPPLIES

Common Features for ALL SPD Models

- High-resolution 16 bit ADC/DAC Design provides accurate and precise voltage and current measurements simultaneously without the need for an external DMM
- Independent Dual-channel Voltage/Current Programming and Readback
- Simple & Flexible ATE Integration - embedded RS-232, USB, IEEE488.2, SCPI/GPIB, RS-485, and Ethernet interfaces available
- Automatic Constant Current or Constant Voltage Mode Crossover
- Master/Slave Parallel Capability via RS-485 for simple multi-channel configuration and control
- Multiple units can be connected in parallel or in series to provide increased voltage or current
- Remote Inhibit (RI) and Fault Monitoring (FLT) Functions can be performed via a simple connector
- Economical and Expandable Dual Channel 360W Per Output in a Single 1U Chassis fills the power gap between available 200W and 600W outputs
- Remote Sensing to compensate for measurement errors due to large line drops
- Electronic Remote/Local Closed-cased Calibration
- Active Down Programming Control for fast down programming speed
- Low Ripple and Noise (PARD)
- LabVIEW/LabWindows Drivers

0 - Panel Version

- Independent 4 digit LED Voltage and Current Display for each channel and monitoring indicators
- A single SPD Master Unit can control up to a total of 64 channels via a single USB, IEEE488.2, SCPI/GPIB, RS-232, RS-485 or Ethernet computer connection, eliminating the increased costs of purchasing multiple systems with built-in controllers
- VLIST (voltage) and ILIST (current) Stepping Modes Accessible via Remote Programming

K - Panel Version (Keypad and Encoder)

- Standard Embedded RS-232, IEEE488.2 SCPI/GPIB, USB and Ethernet Interfaces for flexible connectivity
- Precise Voltage/Current Measurements, Programmable OVP, OCP, VLIST, ILIST, and other system indicators are conveniently presented on a 2X20 VFD display
- Designed with durability, reliability and DUT protection in mind – Programmable OVP (Over-voltage Protection), and OCP (Over-current Protection), Redundant OTP (Over-temperature Protection), UVP (Under-voltage Protection), Remote Lockout (for ILIST, VLIST and ATE), Fan-speed Control, External Power Supply Output Shut Down & TTL Fault Output Signal for system level protection
- Auto-tracking Feature
- The VLIST(voltage) and ILIST (current) Stepping Modes Generate User-defined sequences of output levels up to a 20 steps (points), with dwell times from 10ms to 1 minute stored in 4 profiles (These sequences can be cycled once or to a user-defined number of cycles)
- Master/Slave Parallel Capability available

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DUAL CHANNEL SWITCH MODE

Specifications[1]	SPD8-40	SPD20-18	SPD30-10	SPD40-8
Number of Outputs	2	2	2	2
Each Output Ratings				
Output Voltage 0-Vdc Max	8.00	20.00	30.00	40.00
Output Current 0-Adc Max	40.0	18.0	10.0	8.0
Maximum Output Power (W)	320.0	360.0	300.0	320.0
Programming Accuracy				
Voltage	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Current	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Over-Voltage Protection	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS
Programming Resolution[2] **Measurement Resolution[2]**				
Voltage (mV)	0.80mV	2.00mV	3.00mV	4.00mV
Current (mA)	4.00mA	1.80mA	1.00mA	0.80mA
OVP (mV)	2.00mV	5.00mV	7.50mV	10.00mV
Measurement Accuracy				
Voltage	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS
Current	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS
Front Panel Display Accuracy				
Voltage	4 Digits/0.1% of Rdg + 10mV	4 Digits/0.1% of Rdg + 20mV	4 Digits/0.1% of Rdg + 30mV	4 Digits/0.1% of Rdg + 40mV
Current	4 Digits/0.1% of Rdg + 80mA	4 Digits/0.1% of Rdg + 40mA	4 Digits/0.1% of Rdg + 20mA	4 Digits/0.1% of Rdg + 20mA
Front Panel Resolution[2]				
Voltage	1mV	10mV	10mV	10mV
Current	10mA	10mA	10mA	10mA
Load Regulation[3]				
Voltage (0.01%*Vmax+2mV)(mV)	2.8	4	5	6
Current (0.01%*Imax+2mA)(mA)	6	3.8	3	2.8
Line Regulation[4]				
Voltage (0.001%*Vmax+2mV)(mV)	2.08	2.2	2.3	2.4
Current (0.001%*Imax+2mA)(mA)	2.4	2.18	2.1	2.08
Ripple and Noise (20Hz-20MHz)[5]				
Voltage RMS (mV)	1	1	1	1
Voltage P-P (0-20MHz, p-p)(mV)	15.0	15.0	15.0	15.0
Transient Response Time (ms)[6]	3.0	3.0	3.0	3.0
OVP Adjustment Range	0.4 ~ 8.8	1 ~ 22	1.5 ~ 33	2 ~ 44
Program Speed (Tup/Tdn)(ms)[7]	100 / 100	100 / 100	100 / 100	100 / 100
Temperature Coefficient[8]				
CV (PPM/°C)	100	100	100	100
CC (PPM/°C)	100	100	100	100
AC Input[9]	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
DC Output Isolation	+ 600 V	+ 600 V	+ 600 V	+ 600 V

**1: All electronic specifications are represented at the full operating temperature range for all models.*
**2: The programming and readback resolution is based on 16 bit resolution design.*
**3: Load regulation specifications are for 10 - 90% load changes.*
**4: Line regulation specifications are for input voltage variation over the ac input voltage range with constant rated load.*
**5: Ripple and Noise specifications are for 10 - 100% output voltage and full output current.*
**6: Time for output voltage to recover within +/- 0.5% of VFULL-SCALE following a 10% ~ 60% load current change.*

SPD-PANEL

Specifications[1]	SPD60-6	SPD80-4	SPD120-3	SPD300-1
Number of Outputs	2	2	2	2
Each Output Ratings				
Output Voltage 0-Vdc Max	60.0	80.0	120.0	300.0
Output Current 0-Adc Max	6.0	4.0	3.0	1.0
Maximum Output Power (W)	360.0	320.0	360.0	300.0
Programming Accuracy				
Voltage	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Current	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Over-Voltage Protection	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS
Programming Resolution[2] **Measurement Resolution[2]**				
Voltage (mV)	6.00mV	8.00mV	12.00mV	30.00mV
Current (mA)	0.60mA	0.40mA	0.30mA	0.10mA
OVP (mV)	15.00mV	20.00mV	30.00mV	75.00mV
Measurement Accuracy				
Voltage	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS
Current	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS
Front Panel Display Accuracy				
Voltage	4 Digits/0.1% of Rdg + 60mV	4 Digits/0.1% of Rdg + 80mV	4 Digits/0.1% of Rdg + 120mV	4 Digits/0.1% of Rdg + 300mV
Current	4 Digits/0.1% of Rdg + 10mA	4 Digits/0.1% of Rdg +1mA	4 Digits/0.1% of Rdg + 1mA	4 Digits/0.1% of Rdg + 1mA
Front Panel Resolution[2]				
Voltage	10mV	10mV	100mV	100mV
Current	1mA	1mA	1mA	1mA
Load Regulation[3]				
Voltage (0.01%*Vmax+2mV)(mV)	8	10	14	32
Current (0.01%*Imax+2mA)(mA)	2.6	2.4	2.3	2.1
Line Regulation[4]				
Voltage (0.001%*Vmax+2mV)(mV)	2.6	2.8	3.2	5
Current (0.001%*Imax+2mA)(mA)	2.06	2.04	2.03	2.0 1
Ripple and Noise (20Hz-20MHz)[5]				
Voltage RMS (mV)	2	2	2	5
Voltage P-P (0-20MHz, p-p)(mV)	30.0	30.0	30.0	50.0
Transient Response Time (ms)[6]	3.0	3.0	3.0	3.0
OVP Adjustment Range	3 ~ 66	4 ~ 88	6 ~ 132	15 ~ 330
Program Speed (Tup/Tdn)(ms)[7]	100 / 100	100 / 180	100 / 180	100 / 180
Temperature Coefficient[8]				
CV (PPM/°C)	100	100	100	100
CC (PPM/°C)	100	100	100	100
AC Input[9]	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
DC Output Isolation	+ 600 V	+ 600 V	+ 600 V	+ 600 V

**7: Programming speed specifications are for 50% of full current loading.*
**8: Temperature coefficent specifies output change per °C in ambient temperature rise following 30 minute warm up, w/ constant line and load.*
**9: AC Input is fixed and factory configured to either 120Vac: 103.5 ~ 126.5Vac or 208Vac: 187 ~ 229Vac or 230Vac: 207 ~ 253Vac @ 50/60Hz.*

DUAL CHANNEL SWITCH MODE

Specifications[1]	SPD8-40	SPD20-18	SPD30-10	SPD40-8
Number of Outputs	2	2	2	2
Each Output Ratings				
Output Voltage 0-Vdc Max	8.00	20.00	30.00	40.00
Output Current 0-Adc Max	40.0	18.0	10.0	8.0
Maximum Output Power (W)	320.0	360.0	300.0	320.0
Programming Accuracy				
Voltage	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Current	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Over-Voltage Protection	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS
Programming Resolution[2] **Measurement Resolution[2]**				
Voltage (mV)	0.80mV	2.00mV	3.00mV	4.00mV
Current (mA)	4.00mA	1.80mA	1.00mA	0.80mA
OVP (mV)	2.00mV	5.00mV	7.50mV	10.00mV
Measurement Accuracy				
Voltage	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS
Current	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS
Front Panel Display Accuracy				
Voltage	4 Digits/0.1% of Rdg +0.1% of FS	4 Digits/0.1% of Rdg +0.1% of FS	4 Digits/0.1% of Rdg +0.1% of FS	4 Digits/0.1% of Rdg +0.1% of FS
Current	4 Digits/0.1% of Rdg +0.2% of FS	4 Digits/0.1% of Rdg +0.2% of FS	4 Digits/0.1% of Rdg +0.2% of FS	4 Digits/0.1% of Rdg +0.2% of FS
Front Panel Resolution[2]				
Voltage	0.80mV	2.00mV	3.00mV	4.00mV
Current	4.00mA	1.80mA	1.00mA	0.80mA
Load Regulation[3]				
Voltage (0.01%*Vmax+2mV)(mV)	2.8	4	5	6
Current (0.01%*Imax+2mA)(mA)	6	3.8	3	2.8
Line Regulation[4]				
Voltage (0.001%*Vmax+2mV)(mV)	2.08	2.2	2.3	2.4
Current (0.001%*Imax+2mA)(mA)	2.4	2.18	2.1	2.08
Ripple and Noise (20Hz-20MHz)[5]				
Voltage RMS (mV)	1	1	1	1
Voltage P-P (0-20MHz, p-p)(mV)	15.0	15.0	15.0	15.0
Transient Response Time (ms)[6]	3.0	3.0	3.0	3.0
OVP Adjustment Range	0.4 ~ 8.8	1 ~ 22	1.5 ~ 33	2 ~ 44
Program Speed (Tup/Tdn)(ms)[7]	100 / 100	100 / 100	100 / 100	100 / 100
Temperature Coefficient[8]				
CV (PPM/°C)	100	100	100	100
CC (PPM/°C)	100	100	100	100
AC Input[9]	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
DC Output Isolation	+ 600 V	+ 600 V	+ 600 V	+ 600 V

**1: All electronic specifications are represented at the full operating temperature range for all models.*
**2: The programming and readback resolution is based on 16 bit resolution design.*
**3: Load regulation specifications are for 10 - 90% load changes.*
**4: Line regulation specifications are for input voltage variation over the ac input voltage range with constant rated load.*
**5: Ripple and Noise specifications are for 10 - 100% output voltage and full output current.*
**6: Time for output voltage to recover within +/- 0.5% of VFULL-SCALE following a 10% ~ 60% load current change..*

SPD K-PANEL

Specifications[1]	SPD60-6	SPD80-4	SPD120-3	SPD300-1
Number of Outputs	2	2	2	2
Each Output Ratings				
Output Voltage 0-Vdc Max	60.0	80.0	120.0	300.0
Output Current 0-Adc Max	6.0	4.0	3.0	1.0
Maximum Output Power (W)	360.0	320.0	360.0	300.0
Programming Accuracy				
Voltage	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Current	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS	0.05% of Setting +0.05% of FS
Over-Voltage Protection	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS	0.2% of Vout +0.3% of FS
Programming Resolution[2] **Measurement Resolution[2]**				
Voltage (mV)	6.00mV	8.00mV	12.00mV	30.00mV
Current (mA)	0.60mA	0.40mA	0.30mA	0.10mA
OVP (mV)	15.00mV	20.00mV	30.00mV	75.00mV
Measurement Accuracy				
Voltage	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS	0.1% of Rdg +0.1% of FS
Current	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS	0.1% of Rdg +0.2% of FS
Front Panel Display Accuracy				
Voltage	4 Digits/0.1% of Rdg +0.1% of FS	4 Digits/0.1% of Rdg +0.1% of FS	4 Digits/0.1% of Rdg +0.1% of FS	4 Digits/0.1% of Rdg +0.1% of FS
Current	4 Digits/0.1% of Rdg +0.2% of FS	4 Digits/0.1% of Rdg +0.2% of FS	4 Digits/0.1% of Rdg +0.2% of FS	4 Digits/0.1% of Rdg +0.2% of FS
Front Panel Resolution[2]				
Voltage	6.00mV	8.00mV	12.00mV	30.00mV
Current	0.60mA	0.40mA	0.30mA	0.10mA
Load Regulation[3]				
Voltage (0.01%*Vmax+2mV)(mV)	8	10	14	32
Current (0.01%*Imax+2mA)(mA)	2.6	2.4	2.3	2.1
Line Regulation[4]				
Voltage (0.001%*Vmax+2mV)(mV)	2.6	2.8	3.2	5
Current (0.001%*Imax+2mA)(mA)	2.06	2.04	2.03	2.01
Ripple and Noise (20Hz-20MHz)[5]				
Voltage RMS (mV)	2	2	2	5
Voltage P-P (0-20MHz, p-p)(mV)	30.0	30.0	30.0	50.0
Transient Response Time (ms)[6]	3.0	3.0	3.0	3.0
OVP Adjustment Range	3 ~ 66	4 ~ 88	6 ~ 132	15 ~ 330
Program Speed (Tup/Tdn)(ms)[7]	100 / 100	100 / 180	100 / 180	100 / 180
Temperature Coefficient[8]				
CV (PPM/°C)	100	100	100	100
CC (PPM/°C)	100	100	100	100
AC Input[9]	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V	103.5 ~ 126.5V or 207 ~ 253V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
DC Output Isolation	+ 600 V	+ 600 V	+ 600 V	+ 600 V

**7: Programming speed specifications are for 50% of full current loading.*
**8: Temperature coefficent specifies output change per °C in ambient temperature rise following 30 minute warm up, w/ constant line and load.*
**9: AC Input is fixed and factory configured to either 120Vac: 103.5 ~ 126.5Vac or 208Vac: 187 ~ 229Vac or 230Vac: 207 ~ 253Vac @ 50/60Hz.*

FOR SPD SWITCH MODE POWER SUPPLIES

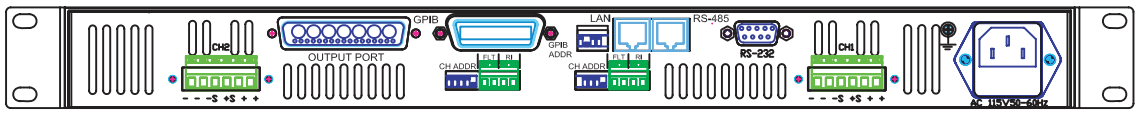
SELECTOR GUIDE

Selector Guide for SPD 1.2kW Models

SPD XXX-XXX-X0XX

- AC Input: **0** = 120Vac
  1 = 240Vac
- Computer Interfaces: **2** = GPIB, RS-485, RS-232
  E = Ethernet, RS-485, USB, GPIB and RS-232
- Reserved for future options: **0** = None
- Front Panel Versions: **K** = Keypad and Encoder Knob
  0 = No Front Panel Control
- **Maximum Voltage**
- **Maximum Current**

FRONT VIEW OF 0-PANEL VERSION



REAR VIEW

Contact the Sales Department at 1-858-458-0223 or e-mail us at sales.ppd@ametek.com

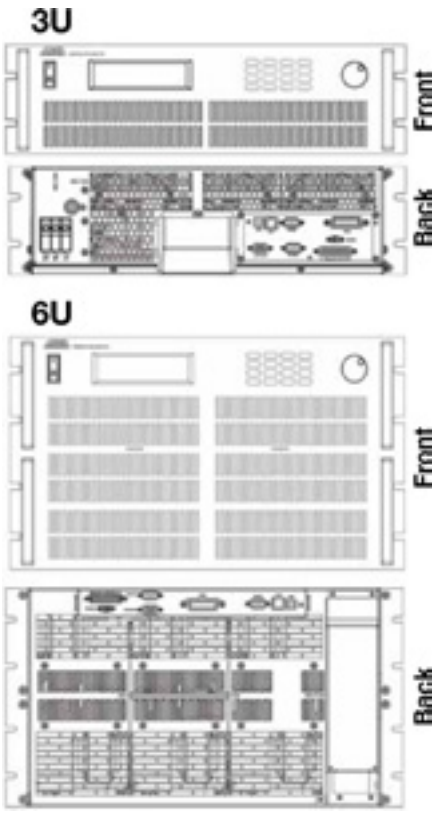
AMETEK® PROGRAMMABLE POWER

MID-POWER SWITCH MODE DC POWER SUPPLIES 4kW-30kW

AMREL™ ePower's SPS Medium Power Switching DC Power Supply Series 4kW - 30kW, delivers unsurpassed quality & reliable low-noise performance, fast & precise programmability, and premium features at an affordable value, all in a compact power-dense package.

Markets and Appplications

- Telecommunications & IT
- Industrial Automation & Process Control
- Magnets, RF Amplifiers & Beam Steering
- Heater Supplies
- Battery, Ultracapacitor & Energy Storage Validation Testing
- Material Research
- Electroplating, Sputtering & Coating
- Electrical Component Validation
- Burn-in & Lights-out Testing
- Laser Diode Validation & Testing
- PV Inverter, Fuel Cell & Renewable Energy R&D Testing
- Aerospace & Satellite Testing
- Test & Measurement
- Water Treatment & Purification
- Semiconductor Processing
- Industrial Automation
- Gas, Chemical, Petroleum & Utility Plants
- EOL Test, QC and Inspection
- Defense, Military & Aerospace ATE
- Automotive Component, ECU & HIL Testing
- Compliance Testing



Features and Benefits

- High Power Density: Up to 15 kW in a 3U / 30 kW in a 6U chassis
- Fast Load Transient Response: Protection from undesired voltage excursions
- Fast Slew Rate: Industry-leading rise/fall times for speed-critical applications
- Low RMS and P-P Noise: Suitable for the most sensitive applications
- Parallel up to 150 kW: Expandable as your requirement grows
- Low Audible Noise: Temperature controlled variable speed fans
- Ultra-precision accuracy: Voltage and current measurements without external DMMs
- Exclusive A Panel: The perfect balance between performance and value. The AMREL A panel offers 3 ½ digit LED readouts, 10-turn potentiometers for setting voltage and current, front panel over-voltage protection preview/ adjustment and reset and external analog programming.
- Exclusive K Panel: Sophisticated performance and premium features. AMREL's K panel offers advanced voltage and current sequencing, keypad and encoder for simple navigation, vacuum florescent display providing vibrant readback of settings & measurements, and a wide array of interfaces such as external analog programming, GPIB & RS-232, and field-enabled USB & Ethernet option.

Standard Features

- Two Modes in One: Automatic constant voltage and constant current mode crossover
- Protection Against Hazardous Faults: Remote Shutdown (S/D) and Interlock provides various external output shutdown capability – in case of hazardous faults
- Advanced External Analog Programming: Increased control and convenience in external programming applications achieved through various external voltage current and control methods
- Protection Against Voltage Drops: Remote Sense corrects for errors from line voltage drops
- Sophisticated Power Conversion Technology: State-of-the-art FET-based high frequency switching technology provides accuracy, exceptional load transient response & low noise

Exclusive K Panel Features

- VFD (Vacuum Florescent Display) provides easy-to-read settings and accurate measurements
- Digital OVP, OCP, ILIST and VLIST display for easy function recognition
- Real-time encoder provides precise and on-the-fly voltage and current control
- Multi-functional front panel keypad for high resolution and precise digital OVP, OCP, ILIST & VLIST, current and voltage control
- Remote programming control with standardized SCPI commands, LabVIEW & LabWindows for advanced and integrated ATE Testing
- Embedded Ethernet and USB interface option without the need for interface converters
- Remote/Front Panel Lockout to ensure protection for remote ATE systems
- In-field GPIB, RS232, USB, Ethernet and Firmware Upgrades to prevent down-time, satisfy new and dynamic system applications and provide up-to-date software maintenance
- 16 bit Readback and Programming DAC for high resolution and accuracy for standalone or burn-in testing without the need for external measuring equipment
- 4 memory locations to store & recall frequently-used settings simplifies testing processes
- Convenient and robust voltage & current sequencing – 4 sequencing profiles; 20 points per profile

SPS SERIES

Technical Specifications

Environmental Characteristics	
PARAMETER	**SPECIFICATION**
TEMPERATURE COEFFICIENT	0.02% /°C of maximum output voltage rating for voltage set point. 0.03% /°C of maximum output current rating for current set point.
AMBIENT TEMPERATURES	
Operating	0 to 50°C
Storage	-25° to 65°C
COOLING	Internal fans; vents on sides and rear. (Units may be stacked without clearance above or below).
HUMIDITY	95% maximum, non-condensing, 0 to 50°C; 45°C maximum wet-bulb temperature
ALTITUDE	Operating full power available up to 5,000 feet (1, 524m), derate 10% of full power for every 1,000 feet higher; non-operating to 40,000 feet (12, 192m)
REGULATORY	Certified to UL/CSA 61010 and IEC/EN 61010-1 by a NRTL, CE Compliant, Semi-F47 Compliant. LVD Categories: Installation Category II: Pollution Degree 2; Class II Equipment for Indoor Use Only. EMC Directive, EN 61326:1998

Electrical Characteristics	
PARAMETER	**SPECIFICATION**
INPUT POWER	
Voltage (Standard)	208/220 VAC±10% (allowed range 187-242 VAC)
Voltage (Options)	380/400 VAC±10% (allowed range 342-440 VAC) 440/480 VAC±10% (allowed range 396-528 VAC)
Frequency	47 to 63 Hz, 400 Hz 3U models, 47 to 63 Hz 6U models
Phases	3-phase, 3-wire plus ground. Not phase rotation sensitive. Neutral not used.
Power Factor	>0.9 typical for 208/220 VAC input (10V - 800V) >0.78 typical for 380/400 VAC input (40V - 800V) >0.9 typical for 380/480 VAC input (10V - 30V) >0.7 typical for 440/480 VAC input (40V - 800V) >0.9 typical for 440/480 VAC input (10V - 30V)
Efficiency	87% typical at full load, nominal line
FRONT PANEL METER ACCURACY	
Voltage	A-Panel: ±0.5% of full-scale + 1 Digit; K-Panel: ±0.15% of full-scale
Current	A-Panel: ±0.5% of full-scale + 1 Digit; K-Panel: ±0.4% of full-scale
LOAD REGULATION	(Specified at no load to full load, nominal AC input, with sense wires used)
Voltage	±0.02% (40-800V output) ±0.5% (10-30V output) of maximum output voltage
Current	±0.1% of maximum output current
LINE REGULATION	(Specified ±10% of nominal AC input, constant load), with sense wires used
Voltage	±0.01% of maximum output voltage (40-800V output), ±0.05% (10-30V output)
Current	±0.05% of maximum output current
TRANSIENT RESPONSE	A 50% step load will recover to within 0.75% of original value within 1 ms.
DOWN PROGRAMMING	With no load the output will program from 100 to 10% in less than 1.5 seconds
STABILITY	±0.05% of set point after 30 minute warm-up and over 8 hour line, load and temperature.

Remote Control/Monitor	On/Off control via contact closure, 6-120 VDC or 12-240 VAC, and TTL or CMOS switch, output voltage and current monitor, OVP limit set, summary fault status		
PARAMETER	**SPECIFICATION**		
FRONT PANEL AND REMOTE DIGITAL PROGRAMMING			
Voltage	A-Panel: ±0.5% of full-scale + 1 Digit K-Panel: ±0.1% of full-scale		
Current	A-Panel: ±0.5% of full-scale + 1 Digit K-Panel: ±0.4% of full-scale		
Overvoltage Protection (OVP)	±1% of full-scale output		
REMOTE DIGITAL READBACK			
Voltage	±0.15% of full-scale		
Current	±0.4% of full-scale		
REMOTE ANALOG PROGRAMMING			
Constant Voltage	±0.25% of full-scale output for 0-5V range (±0.5% 0-10V range)		
Constant Current	±0.8% (40-800V output), ±1.0% (10-30V output) of full-scale output		
Overvoltage Protection (OVP)	±1% of full-scale output		
REMOTE ANALOG READBACK			
Voltage	±1% (40-800V output), ±0.5% (10-30V output) of full-scale output		
Current	±1% (40-800V output), ±0.5% (10-30V output) of full-scale output		
RESISTIVE ANALOG PROGRAMMING			
Constant Voltage (0-100%)	0-5 kΩ		
Constant Current (0-100%)	0-5 kΩ		
VOLTAGE ANALOG PROGRAMMING			
Constant Voltage (0-100%)	0-5 VDC or 0-10 VDC		
Constant Current (0-100%)	0-5 VDC or 0-10 VDC		
Overvoltage Protection (OVP)	0.25-5.5 VDC		
REMOTE SENSING	Terminals are provided to sense output voltage at point of load. Maximum line drop 5% of rated voltage per line 40-100V models, line drop 1V of rated voltage per line for 10-20V models, 1.5V for 30V models, 2% of rated voltage per line for models 160V and greater (Greater line drop is allowed, but output regulation specifications no longer apply).		
REMOTE ANALOG CONTROL			
Input to Output Isolation	The control signal return for Non-Isolated Analog programming is connected to the negative output terminal. Under no condition should the negative terminal exceed 300V to earth ground. The maximum voltage from control signal return of the Remote Isolated Analog programming (option) to the negative output terminal is 600V.		
PHYSICAL	3U Models (10V-30V)	3U Models (40V-800V)	6U Models
WIDTH	19.00 in (48.3 cm)	19.00 in (48.3 cm)	19.00 in (48.3 cm)
DEPTH	25.65 in (65.15 cm)	25.46 in (64.7 cm)	27.06 in (63.8 cm)
HEIGHT	5.25 in (13.3 cm)	5.25 in (13.3 cm)	10.5 in (26.7 cm)
SHIPPING WEIGHT	(4kW, 10V 15V) ≈ <65 lbs (29 kg) (5kW, 20V 30V) ≈ <65 lbs (29 kg) (8kW, 10V 15V) ≈ <85 lbs (39 kg) (10kW, 20V 30V) ≈ <85 lbs (39 kg) (12kW, 10V 15V) ≈ <110 lbs (50 kg) (15kW, 20V 30V) ≈ <110 lbs (50 kg)	(5kW) ≈ <40 lbs (18 kg) (10kW) ≈ <60 lbs (27 kg) (15kW) ≈ <80 lbs (36 kg)	(20 KW) ≈ 120 lbs (54 kg) (25 kW) ≈ 140 lbs (64 kg) (30 kW) ≈ 160 lbs (73 kg)

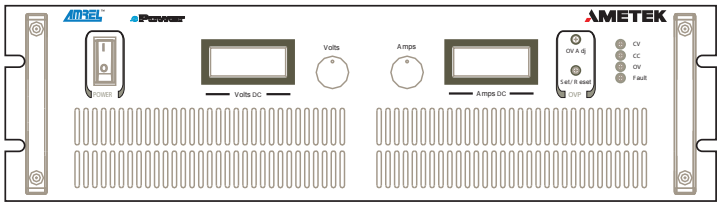
Important Notes:
1) Specifications are subject to change without notice
2) The SPS Series power supplies are intended for indoor use only.

Note: AMREL is the registered trademark of AMERICAN RELIANCE, INC. and is being used by permission.

SPS SERIES

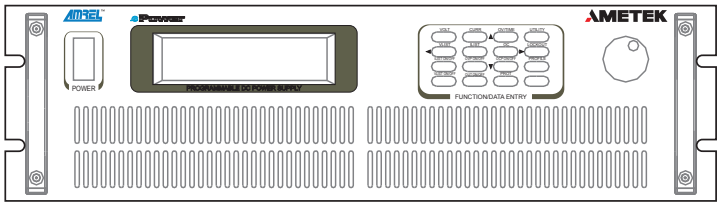
SPS UUU x VVV - A0OZ (A-panel) | SPS UUU X VVV - K0YZ (K-panel)

A-Panel



Ordering Example (A-panel): SPS200X50-A0OC
Description: 200Vdc, 50Adc and 208/220Vac 3-ph AC Input

K-Panel



Ordering Example (K-panel): SPS200X50-K02C
Description: 200Vdc, 50Adc, GPIB & RS232 Interface and 208/220Vac 3-ph AC Input

General Specifications

UUU - Voltage Rating	O - Options	Y - Interface (K-panel only)	Z - AC Input Voltage
VVV - Current Rating	0 - None	2 - GPIB & RS-232	C - 208/220Vac 3-ph
	1 - Isolated Analog Interface	E - GPIB, RS-232, USB & Ethernet	D - 380/400Vac 3-ph
			E - 440/480Vac 3-ph

Output: Voltage amd Current Ranges								
	3U			6U			Ripple & Noise	
Power	4/5 kW	8/10 kW	12/15 kW	16/20 kW	20/25 kw	24/30 KW	rms (20 Hz-300 kHz)	p-p (20 Hz-20 MHz)
Voltage	Current							
10	400	800	1200	1600*	2000*	2400*	20 mV	50 mV
15	267	534	801	1068*	1335*	1602*	20 mV	50 mV
20	250	500	750	1000*	1250*	1500*	20 mV	60 mV
30	167	334	501	668*	835*	1002*	20 mV	60 mV
40	125	250	375	500*	625*	750*	20 mV	75 mV
60	83	167	250	333	417	500	20 mV	75 mV
80	63	125	188	250	313	375	20 mV	100 mV
100	50	100	150	200	250	300	20 mV	100 mV
160	31	63	94	125	156	188	25 mV	150 mV
200	25	50	75	100	125	150	25 mV	175 mV
250	20	40	60	80	100	120	30 mV	200 mV
330	15	30	45	61	76	91	30 mV	200 mV
400	12	25	38	50	63	75	40 mV	300 mV
600	8	17	25	33	42	50	60 mV	350 mV
800	6.2	12.5	18.7	25*	31.2*	37.5*	80 mV	500 mV

* By way of paralleling 3U supplies

HIGH POWER SWITCH MODE DC POWER SUPPLIES 36kW-150kW+

AMREL Power's HPS High Power Switching DC Power Supply Series from 36kW ~ 150kW+, delivers unsurpassed quality & reliable low-noise performance, fast & precise programmability, and premium features at an affordable value, all in a convenient rack-mount cabinet with casters

Markets and Applications

- Telecommunications & IT
- Industrial Automation & Process Control
- Magnets, RF Amplifiers & Beam Steering
- Heater Supplies
- Battery, Ultracapacitor & Energy Storage Validation/Testing
- Material Research
- Electroplating, Sputtering & Coating
- Electrical Component Validation
- Burn-in & Lights-out Testing
- Laser Diode Validation & Testing
- PV Inverter, Fuel Cell & Renewable Energy R&D/Testing
- Aerospace & Satellite Testing
- Test & Measurement
- Water Treatment & Purification
- Semiconductor Processing
- Industrial Automation
- Gas, Chemical, Petroleum & Utility Plants
- EOL Test, QC and Inspection
- Defense, Military & Aerospace ATE
- Automotive Component, ECU & HIL Testing
- Compliance Testing

Features and Benefits

- High Power Density: Up to 150+kW in 19" Rack-mount Cabinets with casters
- Fast Load Transient Response: Protection from undesired voltage excursions
- Fast Slew Rate: Industry-leading rise/fall times for speed-critical applications
- Low Ripple: Suitable for the most sensitive applications
- Expandable as your requirement grows
- Low Audible Noise: Temperature controlled variable speed fans
- High accuracy: Voltage and current measurements without external DMMs

Exclusive K Panel Features On Master Control Supply

- VFD (Vacuum Florescent Display) provides easy-to-read settings and accurate measurements
- Digital OVP, OCP, ILIST and VLIST display for easy function recognition
- Real-time encoder provides precise and on-the-fly voltage and current control
- Multi-functional front panel keypad for high resolution and precise digital OVP, OCP, ILIST & VLIST, current and voltage control
- Remote programming control with standardized SCPI commands, LabVIEW & LabWindow for advanced and integrated ATE Testing
- Embedded Ethernet and USB interface option without the need for interface converters
- Remote/Front Panel Lockout to ensure protection for remote ATE systems
- In-field GPIB, RS232, USB, Ethernet and Firmware Upgrades to prevent down-time, satisfy new and dynamic system applications and provide up-to-date software maintenance
- 16 bit Readback and Programming DAC for high resolution and accuracy for standalone or burn-in testing without the need for external measuring equipment
- 4 memory locations to store & recall frequently-used settings simplifies testing processes
- Convenient and robust voltage & current sequencing – 4 sequencing profiles; 20 points per profile

Exclusive A Panel Slave Supplies Only

- The perfect balance between performance and value. The AMREL A panel offers 3 ½ digit LED readouts, 10-turn potentiometers for setting voltage and current, front panel over-voltage protection preview/adjustment and reset and external analog programming.

Standard Features

- Two Modes in One: Automatic constant voltage and constant current mode crossover
- Protection Against Hazardous Faults: Remote Shutdown (S/D) and Interlock provides various external output shutdown capability – in case of hazardous faults
- Advanced External Analog Programming: Increased control and convenience in external programming applications achieved through various external voltage current and control methods
- Protection Against Voltage Drops: Remote Sense corrects for errors from line voltage drops
- Sophisticated Power Conversion Technology: State-of-the-art FET-based high frequency switching technology provides accuracy, exceptional load transient response & low noise

HPS SERIES

Technical Specifications

Environmental Characteristics	
Parameter	**Specification**
Temperature Coefficient	0.02%/°C of maximum output voltage rating for voltage set point. 0.03%/°C of maximum output current rating for current set point.
Ambient Temperatures	
Operating	0 to 50°C
Storage	-25° to 65°C
Cooling	Internal fans in all power supplies. Fans in racks above 60kW; vents on sides and rear.
Humidity	95% maximum, non-condensing, 0 to 50°C; 45°C maximum wet-bulb temperature
Altitude	Operating full power available up to 5,000 feet (1,524m), derate 10% of full power for every 1,000 feet higher; non-operating to 40,000 feet (12, 192m)

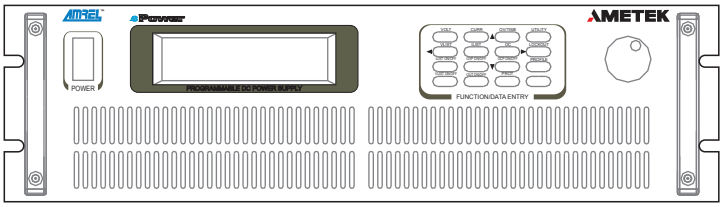
Electrical Characteristics	
Parameter	**Specification**
Input Power	
Voltage (Standard)	208/220 VAC±10% (allowed range 187-242 VAC)
Voltage (Options)	380/400 VAC±10% (allowed range 342-440 VAC) or 440/480 VAC±10% (allowed range 396-528 VAC)
Frequency	47 to 63 Hz
Phases	3–phase, 3–wire plus ground. Not phase rotation sensitive. Neutral not used.
Power Factor	>0.9 typical for 208/220 VAC input (10V - 800V) >0.78 typical for 380/400 VAC input (40V - 800V) >0.9 typical for 380/480 VAC input (10V - 30V) >0.7 typical for 440/480 VAC input (40V - 800V) >0.9 typical for 440/480 VAC input (10V - 30V)
Efficiency	87% typical at full load, nominal line - 40-800v. 85% for 10-30VDC K Panel; A Panel
Front Panel Meter Accuracy	
Voltage	K-Panel: ±0.1% of full-scale; A-Panel: ±0.5% of full-scale + 1 Digit
Current	K-Panel: ±0.4% of full-scale; A-Panel: ±0.5% of full-scale + 1 Digit
Load Regulation	(Specified at no load to full load, nominal AC input)
Voltage	0.02% of maximum output voltage
Current	0.1% of maximum output current
Line Regulation	(Specified ±10% of nominal AC input, constant load)
Voltage	0.01% of maximum output voltage
Current	0.05% of maximum output current
Transient Response	Step load will recover to within 0.75% of original value within 1 ms. 50% to 100% or 100% to 50%
Down Programming	With no load the output will program from 100 to 10% in less than 1.5 seconds
Stability	±0.05% of set point after 30 minute warm-up over 8 hours at fixed line, load, and temperature.

Remote Control/Monitor			
Parameter	**On/Off control via contact closure, 6-120 VDC or 12-240 VAC, and TTL or CMOS switch, output voltage and current monitor, OVP limit set, summary fault status**		
Front Panel and Remote Digital Programming			
Voltage	K-Panel: ±0.1% of full-scale		
Current	K-Panel: ±0.4% of full-scale		
Overvoltage Protection (OVP)	±1% of full-scale output		
Remote Digital Readback			
Voltage	±0.15% of full-scale		
Current	±0.4% of full-scale		
Remote Analog Programming			
Constant Voltage	±0.25% of full-scale output for 0-5V range (±0.5% 0-10V range)		
Constant Current	±0.8% of full-scale output		
Overvoltage Protection (OVP)	±1% of full-scale output		
Remote Analog Readback			
Voltage	±1% of full-scale output, 0-10V range		
Current	±1% of full-scale output, 0-10V range		
Resistive Programming			
Constant Voltage (0-100%)	0-5 kΩ		
Constant Current (0-100%)	0-5 kΩ		
Voltage Programming			
Constant Voltage (0-100%)	0-5 VDC or 0-10 VDC		
Constant Current (0-100%)	0-5 VDC or 0-10 VDC		
Overvoltage Protection (OVP)	0.25-5.5 VDC		
Remote Sensing	Terminals are provided to regulate output voltage at point of load. Maximum line drop 5% of rated output voltage per line for 40-100V models, 2% of rated output voltage per line for >100V models, 1V for 10-20V, 1.5V for 30V		
Remote Analog Control			
Input to Output Isolation	The control signal return for Non-Isolated Analog programming is connected to the negative output terminal. Under no condition should the negative terminal exceed 300V to earth ground. The maximum voltage from control signal return of the Remote Isolated Analog programming (option) to the negative output terminal is 600V.		
Dimension	45 & 60kW Model	75 & 100kW Model	150kW Model
Width	22.00 in (55.9 cm)	22.00 in (55.9 cm)	44.00 in (111.76 cm)
Depth	38.00 in (96.52 cm)	38.00 in (96.52 cm)	38.00 in (96.52 cm)
Height	49.5 in (129.73 cm)	73.00 in (185.42cm)	73.00 in (185.42cm)
Shipping Weight	(45kW) ≈ 610 lbs (277 kg)	(75kW) ≈ 1055 lbs (480 kg)	(150kW) ≈ 2110 lbs (960 kg)
	(60kW) ≈ 690 lbs (313 kg)	(100kW) ≈ 1211 lbs (550 kg)	

Important Notes:
1) Specifications are subject to change without notice
2) The HPS Series power supplies are intended for indoor use only.
3) Regulatory: CE Mark compliant to EN61010-1 and EMC to 61326, Group1, Class A

HPS SERIES

HPS UUU X VVV - K0YZ (K-panel)



V/I VFD Display, Keypad & Encoder, External Analog Programming, RS-232 and GPIB
Ordering Example (K-panel): HPS200X300-K02C
Description: 200Vdc, 300Adc, GPIB & RS232 Interface and 208/220Vac 3-ph AC Input

General Specifications

UUU - Voltage Rating	O - Options	Y - Interface (K-panel only)	Z - AC Input Voltage
VVV - Current Rating	0 - None	2 - GPIB & RS-232	C - 208/220Vac 3-ph
	1 - Isolated Analog Interface	E - GPIB, RS-232, USB & Ethernet	D - 380/400Vac 3-ph
			E - 440/480Vac 3-ph

Rack Size	24U	24U	35U	35U	2x35U
Power 10-15V	**36KW**	**48KW**	**60KW**	**80KW**	**120KW**
Power 20-800V	45KW	60KW	75KW	100KW	150KW
Voltage	AMPERAGE				
10	**3600**				
15	**2403**	**3204**			
20	2250	3000	3750	N/A	N/A
30	1503	2004	2505	3507	N/A
40	1125	1500	1875	2625	3750
60	750	1000	1250	1750	2500
80	564	752	940	1316	1880
100	450	600	750	1050	1500
160	282	376	470	658	940
200	225	300	375	525	750
250	180	240	300	420	600
330	135	180	225	315	450
400	114	152	190	266	380
600	75	100	125	175	250
800	56	75	93	131	187

PROGRAMMABLE LINEAR POWER SUPPLIES

Common Features for ALL PD Models

- Fast Transient Response – 50us
- Low Ripple and Noise (PARD)
- 16 bit Digital Design Displays both voltage and current measurements, OVP, OCP, VLIST, ILIST, and other system indicator on an LCD display simultaneously without the need for external DMM or monitoring
- Front Panel Keypad for precise and easy-to-operate setting of the output voltage, current and other system functions
- Automatic Crossover of Constant Current or Constant Voltage Mode.
- Embedded RS-232 and IEEE488.2 SCPI/GPIB Standard and Optional Ethernet or USB-only/Control for flexible remote digital programming and read back
- Optional RS-485 for Master/Slave Paralleling & to control multiple blocks of identically rated power supplies with a single PC interface connection
- VLIST and ILIST in Stepping Mode, PD Series to generate customized sequence of different output levelup to maximum of 20 steps (points), with dwell times from 10ms to 1 minute stored in 4 profiles (This sequence can be cycled once or to a user-defined number of cycles)
- High-speed and Ultra-precision Design with 0.04% measurement accuracy and 0.1mA/0.5mV resolution (not applicable to all models)
- Programmable OVP (Over-voltage Protection) & OCP (Over-current Protection), Redundant OTP (Over-temperature Protection), UVP (Under-voltage Protection), Remote Lockout (for ILIST, VLIST and ATE), Fan-speed Control
- Remote Sensing to compensate for measurement errors due to large line drops
- Local Closed-cased Calibration
- Active Down Programming Control for fast down programming speed
- Polarity Reversal & Isolation Output Relays available
- LabVIEW/LabWindows Drivers
- Local/Remote Voltage and Current Limit Programming with selectable programming ranges (Optional)
- TTL Function to enable/disable the power supply output. (Optional)
- External Analog Voltage (0 to +10Vdc) Input for the programming voltage/current output (Optional)
- Multi-channel systems available, up to 8 channels per chassis. (PDS Models)
- Modified & Customized Solutions such as higher voltage/ current ratings

E– Option Model Features (Keypad, Encoder, Ethernet)

- Digital Encoder & Full Functional Keypad for real-time programmatic control
- Ethernet and RS-485 available for system-level expansion & integration
- Standard Tracking Feature for multi-channel synchronized control
- USB-only Interface available

PDS Model Features (Multi-channel)

- More Choices - the only linear supply providing up to 350Vdc, 50Adc @ maximum power of up to 1.75 ~ 2kW in a single 4U 19" inch rackmount box
- More Flexibility - customize the voltage/power/current rating of numerous single supplies and combine them into a single system with up to 8 channels per 4U box
- More Expandability - Master/Slave Parallel multiple identically-rated systems & control up to 32 channels as a single unit via one GPIB, RS-232, or RS-485 address

PD FEATURES

Contact the Sales Department at 1-858-458-0223 or e-mail us at sales.ppd@ametek.com

PD SINGLE CHANNEL LINEAR

PD SINGLE CHANNEL

Model	Output Voltage 0-Vdc Max.	Output Current 0-Adc Max	Programming				Over-Voltage Protection Voltage(V)[10]	Readback	
			Resolution[2]		Accuracy[10]			Resolution[2]	
			Voltage (mV)	Current (mA)	Voltage (mV)	Current (mA)		Voltage (mV)	Current (mA)
PD5-3	5	3	0.5	0.3	0.02% + 1.5	0.03% + 0.9	0.2%+0.3%	0.5	0.3
PD5-10	5	10	0.5	1	0.02% + 1.5	0.03% + 3.0	0.2%+0.3%	0.5	1
PD5-12	5	12	0.5	1.2	0.02% + 1.5	0.03% + 3.6	0.2%+0.3%	0.5	1.2
PD5-20	5	20	0.5	2	0.02% + 1.5	0.03% + 6.0	0.2%+0.3%	0.5	2
PD5-24	5	24	0.5	2.4	0.02% + 1.5	0.03% + 7.2	0.2%+0.3%	0.5	2.4
PD5-30	5	30	0.5	3	0.02% + 1.5	0.03% + 9.0	0.2%+0.3%	0.5	3
PD5-40	5	40	0.5	4	0.02% + 1.5	0.03% + 12	0.2%+0.3%	0.5	4
PD8-2	8	2	0.8	0.2	0.02% + 2.4	0.03% + 0.6	0.2%+0.3%	0.8	0.2
PD8-4	8	4	0.8	0.4	0.02% + 2.4	0.03% + 1.2	0.2%+0.3%	0.8	0.4
PD8-10	8	10	0.8	1	0.02% + 2.4	0.03% + 3.0	0.2%+0.3%	0.8	1
PD8-20	8	20	0.8	2	0.02% + 2.4	0.03% + 6.0	0.2%+0.3%	0.8	2
PD8-40	8	40	0.8	4	0.02% + 2.4	0.03% + 12	0.2%+0.3%	0.8	4
PD20-1	20	1	2	0.1	0.02% + 6.0	0.03% + 0.3	0.2%+0.3%	2	0.1
PD20-2	20	2	2	0.2	0.02% + 6.0	0.03% + 0.6	0.2%+0.3%	2	0.2
PD20-3	20	3	2	0.3	0.02% + 6.0	0.03% + 0.9	0.2%+0.3%	2	0.3
PD20-4	20	4	2	0.4	0.02% + 6.0	0.03% + 1.2	0.2%+0.3%	2	0.4
PD20-5	20	5	2	0.5	0.02% + 6.0	0.03% + 1.5	0.2%+0.3%	2	0.5
PD20-10	20	10	2	1	0.02% + 6.0	0.03% + 3.0	0.2%+0.3%	2	1
PD20-30	20	30	2	3	0.02% + 6.0	0.03% + 9.0	0.2%+0.3%	2	3
PD20-50	20	50	2	5	0.02% + 6.0	0.03% + 15	0.2%+0.3%	2	5
PD30-0.6	30	0.6	0.1	0.1	0.02% + 9.0	0.03% + 0.2	0.2%+0.3%	0.1	0.1
PD30-1.2	30	1.2	0.2	0.2	0.02% + 9.0	0.03% + 0.4	0.2%+0.3%	0.2	0.2
PD30-2	30	2	0.2	0.2	0.02% + 9.0	0.03% + 0.6	0.2%+0.3%	0.2	0.2
PS30-2.5	30	2.5	0.3	0.3	0.02% + 9.0	0.03% + 0.8	0.2%+0.3%	0.3	0.3
PD30-5	30	5	0.5	0.5	0.02% + 9.0	0.03% + 1.5	0.2%+0.3%	0.5	0.5
PD30-10	30	10	1	1	0.02% + 9.0	0.03% + 3.0	0.2%+0.3%	1	1
PD35-2.0	35	2.0	0.2	0.2	0.02% + 10.5	0.03% + 0.6	0.2%+0.3%	0.2	0.2
PD40-0.5	40	0.5	0.1	0.1	0.02% + 12.0	0.03% + 0.2	0.2%+0.3%	0.1	0.1
PD40-1	40	1	0.1	0.1	0.02% + 12.0	0.03% + 0.3	0.2%+0.3%	0.1	0.1
PD40-1.5	40	1.5	0.2	0.2	0.02% + 12.0	0.03% + 0.5	0.2%+0.3%	0.2	0.2

PF40-2	40	2	0.2	0.2	0.02% + 12.0	0.03% + 0.6	0.2%+0.3%	0.2	0.2
PD40-3.5	40	3.5	0.4	0.4	0.02% + 12.0	0.03% + 1.1	0.2%+0.3%	0.4	0.4
PD40-7	40	7	0.7	0.7	0.02% + 12.0	0.03% + 2.1	0.2%+0.3%	0.7	0.7
PD40-6	40	6	0.6	0.6	0.02% + 12.0	0.03% + 1.8	0.2%+0.3%	0.6	0.6
PD60-0.3	60	0.3	0.1	0.1	0.02% + 18.0	0.03% + 0.1	0.2%+0.3%	0.1	0.1
PD60-1	60	1	0.1	0.1	0.02% + 18.0	0.03% + 0.3	0.2%+0.3%	0.1	0.1
PD60-3	60	3	0.3	0.3	0.02% + 18.0	0.03% + 0.9	0.2%+0.3%	0.3	0.3
PD60-6	60	6	0.6	0.6	0.02% + 18.0	0.03% + 1.8	0.2%+0.3%	0.6	0.6
PD60-10	60	10	1	1	0.02% + 18.0	0.03% + 3.0	0.2%+0.3%	1	1
PD60-20	60	20	2	2	0.02% + 18.0	0.03% + 6.0	0.2%+0.3%	2	2
PD80-0.25	80	0.25	0.1	0.1	0.02% + 24.0	0.03% + 0.1	0.2%+0.3%	0.1	0.1
PD80-2.5	80	2.5	0.3	0.3	0.02% + 24.0	0.03% + 0.8	0.2%+0.3%	0.3	0.3
PD80-3.5	80	3.5	0.4	0.4	0.02% + 24.0	0.03% + 1.1	0.2%+0.3%	0.4	0.4
PD120-0.3	120	0.3	0.1	0.1	0.02% + 36.0	0.03% + 0.1	0.2%+0.3%	0.1	0.1
PD120-0.5	120	0.5	0.1	0.1	0.02% + 36.0	0.03% + 0.2	0.2%+0.3%	0.1	0.1
PD120-0.5	120	0.5	0.1	0.1	0.02% + 36.0	0.03% + 0.2	0.2%+0.3%	0.1	0.1
PD120-1	120	1	0.1	0.1	0.02% + 36.0	0.03% + 0.3	0.2%+0.3%	0.1	0.1
PD120-2	120	2	0.2	0.2	0.02% + 36.0	0.03% + 0.6	0.2%+0.3%	0.2	0.2
PD250-0.2	250	0.2	0.1	0.1	0.03% + 100.0	0.03% + 0.1	0.2%+0.3%	0.1	0.1
PD250-0.4	250	0.4	0.1	0.1	0.03% + 100.0	0.03% + 0.1	0.2%+0.3%	0.1	0.1
PD250-0.6	250	0.6	0.1	0.1	0.03% + 100.0	0.03% + 0.2	0.2%+0.3%	0.1	0.1
Temperature Coefficient[8]:			Constant Voltage - 100 ppm/˚C *Constant Current - 200 ppm/˚C*						
Output Isolation:			Vout < 350Vdc: ± 500Vdc / Vout < 120Vdc: ± 240Vdc						
AC Input[9]:			103.5 ~ 126.5Vac or 207 ~ 253Vac @ 50/60Hz						
Load Transient Response Time[6]: 50 µs									

**1: All electronic specifications are represented at the full operating temperature range for all models.*
**2: The programming and readback resolutions are based on 16 bit resolution design.*
**3: Load regulation specifications are for 10 - 90% load changes.*
**4: Line regulation specifications are for input voltage variation over the AC input voltage range with constant rated load.*
**5: Ripple and Noise (PARD) specifications are for 10 - 100% output voltage and full output current.*

Readback		Regulation			PARD[5]	Drift (Stability)[10]		Program[7]
Accuracy[10]		Load[3]		Line[4]	CV/CC			
Voltage (mV)	Current (mA)	CV (mV)	CC (mA)	CV/CC	mVrms/ mV_{PK-PK}	CV (mV)	CC (mA)	T_{UP}/T_{DN}
0.02% + 1.5	0.02% + 0.9	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 0.20	10/10ms
0.02% + 1.5	0.02% +3.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 0.50	10/10ms
0.02% + 1.5	0.02% + 3.6	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 0.60	10/10ms
0.02% + 1.5	0.02% + 6.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 1.00	10/10ms
0.02% + 1.5	0.02% + 7.2	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 1.20	10/10ms
0.02% + 1.5	0.02% + 9.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 1.50	10/10ms
0.02% + 1.5	0.02% + 12.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.3	0.1% + 2.00	10/10ms
0.02% + 2.4	0.02% + 0.6	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.4	0.1% + 0.10	10/10ms
0.02% + 2.4	0.02% + 1.2	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.4	0.1% + 0.20	10/10ms
0.02% + 2.4	0.02% + 3.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.4	0.1% + 0.50	10/10ms
0.02% + 2.4	0.02% + 6.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.4	0.1% + 1.00	10/10ms
0.02% + 2.4	0.02% + 12.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 0.4	0.1% + 2.00	10/10ms
0.02% + 6.0	0.02% + 0.3	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 0.10	30/40ms
0.02% + 6.0	0.02% + 0.6	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 0.10	30/40ms
0.02% + 6.0	0.02% + 0.9	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 0.20	30/40ms
0.02% + 6.0	0.02% + 1.2	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 0.20	30/40ms
0.02% + 6.0	0.02% + 1.5	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 0.30	30/40ms
0.02% + 6.0	0.02% + 3.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 0.50	30/40ms
0.02% + 6.0	0.02% + 9.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 1.50	30/40ms
0.02% + 6.0	0.02% + 15.0	0.001% + 1	0.001% + 1	1mV/1mA	0.3/3	0.01% + 1	0.1% + 2.50	30/40ms
0.02% + 9.0	0.02% +0.2	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.5	0.1% + 0.10	30/40ms
0.02% + 9.0	0.02% + 0.4	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.5	0.1% + 0.10	30/40ms
0.02% + 9.0	0.02% + 0.6	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.5	0.1% + 0.10	30/40ms
0.02% + 9.0	0.02% + 0.8	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.5	0.1% + 0.20	30/40ms
0.02% + 9.0	0.02% + 1.5	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.5	0.1% + 0.30	30/40ms
0.02% + 9.0	0.02% + 3.0	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.5	0.1% + 0.50	30/40ms
0.02% + 10.5	0.02% + 0.6	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 1.8	0.1% + 0.10	30/40ms
0.02% + 12.0	0.02% + 0.2	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.10	30/40ms
0.02% + 12.0	0.02% + 0.3	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.10	30/40ms
0.02% + 12.0	0.02% + 0.5	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.10	30/40ms
0.02% + 12.0	0.02% + 0.6	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.10	30/40ms
0.02% + 12.0	0.02% +1.1	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.20	30/40ms
0.02% + 12.0	0.02% + 2.1	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.40	30/40ms

0.02% + 12.0	0.02% + 1.8	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 2	0.1% + 0.30	30/40ms
0.02% + 18.0	0.02% + 0.1	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 3	0.1% + 0.10	30/40ms
0.02% + 18.0	0.02% + 0.3	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 3	0.1% + 0.10	30/40ms
0.02% + 18.0	0.02% + 0.9	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 3	0.1% + 0.20	30/40ms
0.02% + 18.0	0.02% + 1.8	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 3	0.1% + 0.30	30/40ms
0.02% + 18.0	0.02% + 3.0	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 3	0.1% + 0.50	30/40ms
0.02% + 18.0	0.02% + 6.0	0.001% + 1	0.001% + 1	1mV/1mA	0.6/3	0.01% + 3	0.1% + 1.00	30/40ms
0.02% + 24.0	0.02% + 0.1	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 4	0.1% + 0.10	30/40ms
0.02% + 24.0	0.02% + 0.8	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 4	0.1% + 0.20	30/40ms
0.02% + 24.0	0.02% + 1.1	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 4	0.1% + 0.20	30/40ms
0.02% + 36.0	0.02% + 0.1	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 6	0.1% + 0.10	30/40ms
0.02% + 36.0	0.02% + 0.2	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 6	0.1% + 0.10	30/40ms
0.02% + 36.0	0.02% + 0.2	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 6	0.1% + 0.10	30/40ms
0.02% + 36.0	0.02% + 0.2	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 6	0.1% + 0.10	30/40ms
0.02% + 36.0	0.02% + 0.3	0.001% + 1	0.001% + 1	1mV/1mA	1/6	0.01% + 6	0.1% + 0.10	30/40ms
0.02% + 75.0	0.03% + 0.1	0.001% + 1	0.001% + 1	1mV/1mA	2/15	0.01% + 13	0.1% + 0.10	150/170ms
0.02% + 75.0	0.03% + 0.1	0.001% + 1	0.001% + 1	1mV/1mA	2/15	0.01% + 13	0.1% + 0.10	150/170ms
0.02% + 75.0	0.03% + 0.2	0.001% + 1	0.001% + 1	1mV/1mA	2/15	0.01% + 13	0.1% + 0.10	150/170ms

**6: Time for output voltage to recover to within +/- 0.5% of VFULL-SCALEfollowing a 10% ~ 60% load current change.*
**7: Programming speed specifications are for 50% of full current loading.*
**8: Temperature coefficient specifies output change per °C in ambient temp. rise following 30 min. warm up, w/ constant line & load.*
**9: AC Input is fixed and factory configured to either 103.5 ~ 126.5Vac or 207 ~ 253Vac @ 50/60Hz.*
**10: Over-voltage Protection, Readback&Programming Accuracy, Load/Line Regulation andCV/CCDrift are specified as Reading/Setting + FullScale.*
**11: Dual Channel PD Models are also available.*

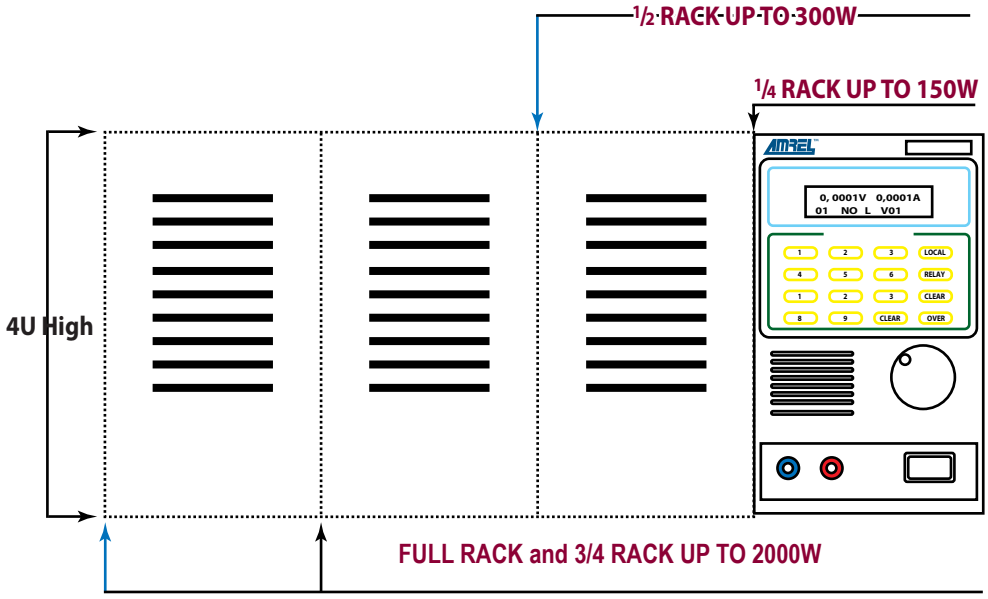
FOR PD LINEAR POWER SUPPLIES

SELECTOR GUIDES

Selector Guide for PD Linear Power Supplies

PDX XXX-XX X X X X

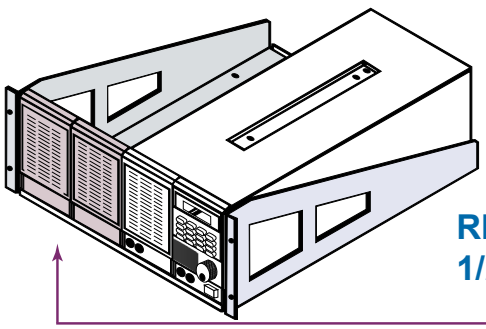
- Input Voltage 0 = Normal 120Vac
  1 = Nominal 240Vac
- Output Isolation/Polarity Reversal Relays; **R** = Included
  = Leave blank if not included
- Remote Computer Interfaces: **A** = GPIB and RS-232
  E = Ethernet, GPIB, and RS-232
- Number of Outputs: **D** = Dual Outputs
  = Leave blank for single output
- **Maximum Current**
- **Maximum Voltage**
- External Analog (0-10V) Control Interface: **A** = Included
  = Leave blank if not included



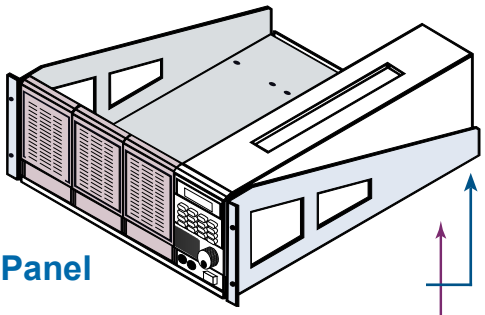
Contact the Sales Department at 1-858-458-0223 or e-mail us at sales.ppd@ametek.com

AMETEK® PROGRAMMABLE POWER

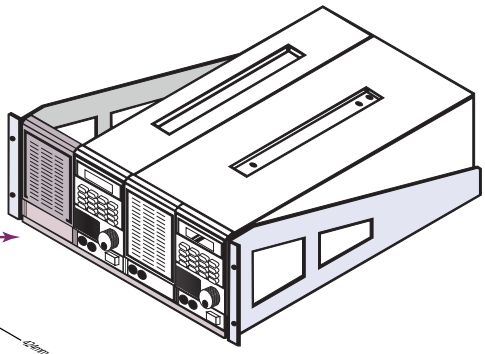
PD SERIES RACKMOUNT



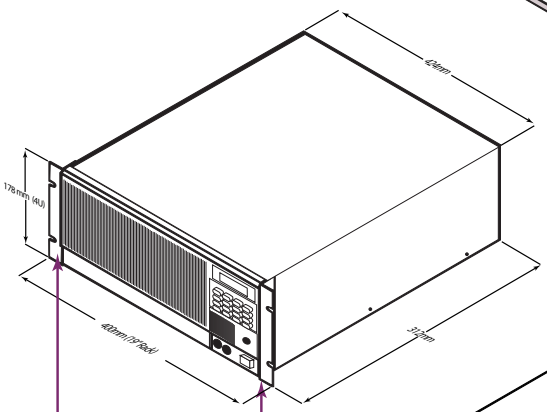
RMP-02A
1/2 Rack Filler Panel



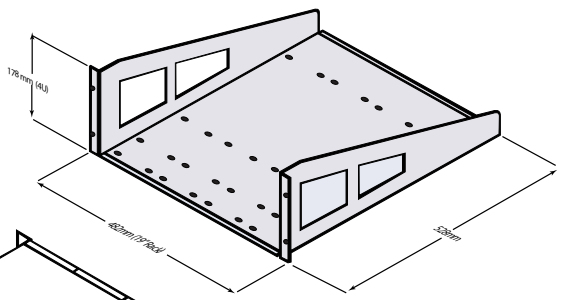
RMP-03A
3/4 Rack Filler Panel



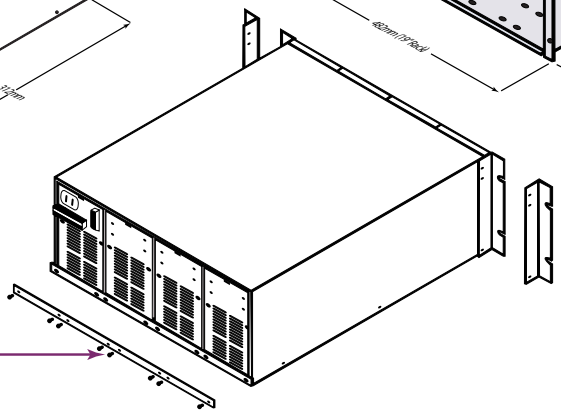
RMP-01A
1/4 Rack Filler Panel



**RMP-04 Full Rack
Ear and
Rear Mount



*RM-03 19”
Rackmount Shelf



CONFIGURATIONS

Please Note: All full rack units come standard with rack mounting ears.
*When assembled the RM-03 rack shelf adds approximately 3mm to the 4U height, resulting in 5U of required rack space. If space is limited to 4U, use the RMP-04.
**The RMP-04 must be factory assembled and requires a full rack width for mounting.

REQUESTING A QUOTE OR ORDERING A PRODUCT

AMETEK Programmable Power is committed to providing superior service and technical support to our customers.

REQUESTING A QUOTE:
By Phone
Call 1-800- 733-5427 within the U.S., between 8am-5pm Pacific time M-F or 1-858- 458-0223 for International calls.

By Email
Send your request for a quote to sales.ppd@ametek.com.

If you are visiting the AMRELPower website at www.amrelpower.com and would like a quote,
Go to any product and click on "Request Information" located in the right margin and complete the Request Form.

Would you like to speak with a representative in your area?
Go to www.amrelpower.com and click on the Contact Us link at the top, then select the "Mfr's Representative Contact Info" tab to locate the appropriate AMREL product representative.

CUSTOM/SPECIAL PRODUCT REQUESTS:
The same options for "Requesting a Quote" apply to "Custom/Special Product Requests."

ORDER PLACEMENT:
Once you have received your quote, placing an order is simple.
There are two easy methods to choose from in placing an order:

1) **Call AMETEK Programmable Power direct** at 1-800- 733-5427 within the U.S., or 1-858- 458-0223 for International.

2) **Submit your Purchase Order** to AMETEK by Faxing to 1-858-458-0267 (U.S. or International)
   By E-mail:
   Send all US Domestic POs to domorders.sd@ametek.com
   Send all International POs to intlorders.sd@ametek.com

***** *AMETEK Programmable Power will provide an acknowledgement once your order has been verified* *****

ADDITIONAL INFORMATION:
Payment Terms: On approved credit, AMETEK Programmable Power accepts Master Card, Visa Card, American Express, or NET 30 Terms for domestic purchases. For international purchases, items must be paid for in advance via wire transfer or a Letter of Credit, unless other terms are approved in advance.

Product Service and Support:
To speak with a service representative, or check status of your repair order, contact the AMETEK Programmable Power Service Department at 1-800-733-5427 (press 2 once message starts) or email us at service.ppd@ametek.com.

Outside the USA, contact your local representative or contact the nearest Authorized Service Center.

Ordering Spare Parts: To order spare parts, or determine the correct replacement part for your AMREL power supply or electronic load, contact the AMETEK Programmable Power Customer Care Department at 1-800-733-5427, or email service.ppd@ametek.com.

All Other Requests: For any other information regarding AMETEK Programmable Power products or service contact the Sales Department at 1-858-458-0223 or e-mail us at: sales.ppd@ametek.com.

DC PROGRAMMABLE ELECTRONIC LOADS

AMREL™

AMREL's eLoad line includes five series' of programmable electronic loads:

PLA Series of Air-Cooled Loads
- Wide Selection of Available Models: 800W, 1.5kW, 2kW, 2.5kW,3kW, 4kW, 5kW, 7.5kW, 10kW, 20kW (up to100kW+available upon request), up to 1000V and 2000A - Ultra-low Range Availabl
- Low-voltage Operation
- Closed-case Calibration
- Individual FET Protection
- Co-resident GPIB IEEE-488/RS-232 (Standard)
- USB and Embedded Ethernet Interfaces Available
- Oscillation Protection
- Five Operating Modes: CC, CR, CV, CP and Pulse
- Programmable Protection: OV/UV/OC/UC/OP/UP
- Dynamic Power Profiling (store up to 4 profiles)

PLW Series of Water-Cooled Loads
- Wide Selection of Available Models: 6kW/9kW/12kW/18kW(2U) 4kW/36kW(4U) (up to 100kW+ available upon request), up to 1200V and 3000A (5000A Upon Request) Ultra-low Range Availal
- Low-voltage Operation
- Closed-case Calibration
- Individual FET Protection
- Co-resident GPIB IEEE-488/RS-232 (Standard)
- USB and Embedded Ethernet Available
- Oscillation Protection
- Condensation Protection
- Highest Power Dissipation Density
- Five Operating Modes: CC, CR, CV, CP & Pulse
- Programmable Protection: OV/UV/OC/UC/OP/UP
- Dynamic Power Profiling (store up to 4 profiles)

LPL Series of Low-Profile Air-Cooled Loads
- Available 600W Models: 60V, 120V, 400V, 600V (all 1U high and Zero Stackable)
- Ultra-compact Design (1U)
- Low-voltage Operation
- Closed-case Calibration
- Individual FET Protection
- Full Front Panel Control
- GPIB IEEE-488/RS-232 (Standard)
- USB and Embedded Ethernet Available
- Oscillation Protection
- Dynamic Power Profiling (store up to 4 profiles)
- Programmable Protection: OV/UV/OC/UC/OP/UP

PEL Series of Low-Power Air-Cooled Loads
- Available Models: 60W, 150W, 300W, 600W
- Wide Range of Models
- Low-voltage Operation
- Closed-case Calibration
- GPIB IEEE-488 and RS-232 (Standard)
- Dynamic Power Profile (99 Points)
- Five Modes of Operation: CC, CR, CV, CP and Pulse
- Programmable Protection: OV/UV/OC/UC/OP/UP

FEL Series of Low-Voltage Air-Cooled Loads
- Available Models: 60W, 150W, 300W
- Ultra-low Voltage Operation
- Closed-case Calibration
- Co-resident GPIB IEEE-488/RS-232 (Standard)
- Dynamic Power Profile (99 Points)
- Full Front Panel Control
- Five Modes of Operation: CC, CR, CV, CP and Pulse
- Programmable Protection: OV/UV/OC/UC/OP/UP

Please Note: Specifications subject to change without notification.

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