

3A SERIES MODULAR AC&DC LOADS

Key features:

- Max. Power 300VA per Module
- Available Voltage Ranges: 60V, 150V and 300 V AC or DC
- Max. Current Range 20 A AC or DC
- Choice of Three Modules
- Up to 4 Load Inputs per Mainframe
- Parallel Modules to 1200VA for Higher Power Applications
- Synchronized Operation of Multiple Loads
- Operating Modes: Constant Current, Linear CC and Constant Resistance
- Programmable Crest Factor
- Programmable Leading or Lagging Power Factor
- Built-in Power Supply Over Current Protection Test Mode
- Built-in Power Supply Over Power Protection Test Mode
- Internal or External SYNC modes
- 1 or 4 slot Mainframes
- RS232 Interface standard, GPIB Optional



OVERVIEW

The ADAPTIVE POWER 3A Series of Programmable AC and DC Electronic Load Modules are ideally suited for testing both AC and DC power supplies, providing greater test flexibility compared to DC loads only.

Target applications for these loads are research & development, production test, incoming inspection, quality control and service.

The high power density of the 3A Series allows up to 4 loads to be installed in a single 19" wide rack-mount mainframe. For lower load input count demands, a single slot mainframe is available as well.

The 3A Series consists of a total of three different modules types providing a choice of voltage, current and power ranges. All modules support 300 Watt or 300VA of loading and offer a high and low current range for optimal accuracy and resolution. Voltage ranges are either 60V, 150V or 300V, either AC or DC.

All 3A Series modules provide protection against over-voltage (OV), over-current, (OC), over-power (OP) and over-temperature (OT) to safeguard the loads from any damage.

AC MODE LOAD TESTING

In AC load mode of operation, the 3A Series supports various crest factor and power factor settings to simulate real world AC load conditions. This includes simulated bridge rectified AC input load simulation. In addition to supporting common sinusoidal AC voltage waveform inputs, the high bandwidth control loops of the 3A Series also support Square wave AC input and Stepped sine wave AC input as found on DC/AC inverters and UPS products.

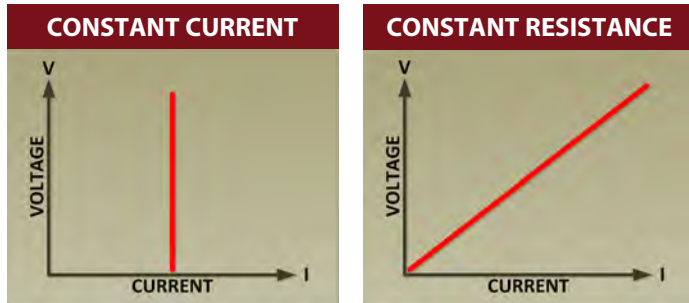
For split or three phase AC load applications, synchronized operation of multiple AC loads is provided. Multiphase mode allows phase and voltage imbalance testing of multi-phase AC sources or transformers.

3A SERIES MODULAR AC & DC LOADS

OPERATING MODES

All 3A Series load modules support several modes of operation to accommodate different test requirements. Voltage sources like AC or DC power supplies are best tested using Constant Current (CC) or Constant Resistance mode.

The available operating modes are Constant Current, Linear Constant Current and Constant Resistance. A graphical representation of these modes of operation is shown here.



LINEAR CONSTANT CURRENT MODE

The Linear Constant Current mode differs from conventional CC load mode in that it uses a high bandwidth automatic gain control circuit to track changes in peak input voltage and provides near instantaneous load response. This mode of operation is particularly useful when working with voltage square waves, step waveforms or pulse shaped DC waveforms or with distorted AC sine waves resulting from high current crest factor load settings. The Linear CC mode greatly improves AC load current control compared to typical AC loads that lack this capability.

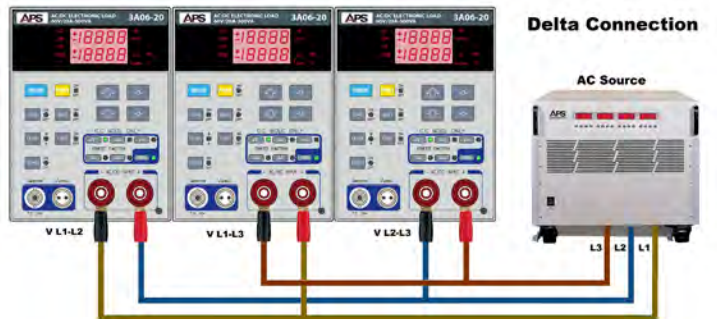
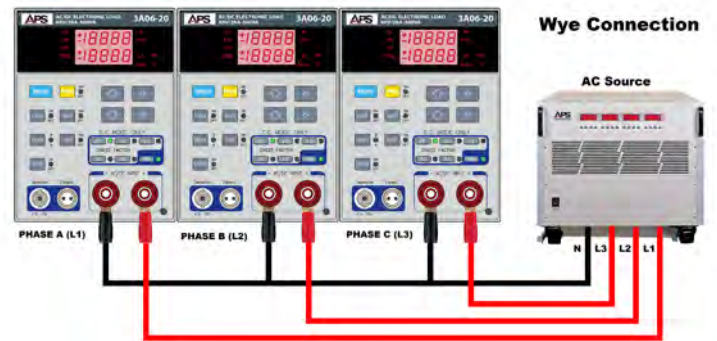
WIDE OPERATING RANGE

3A Series load modules are designed to accommodate a wide range of voltage and current input combinations within their maximum power capability. This allows the same load modules to be used for higher voltage and low current requirements as well as low voltage higher current applications. The V-I operating curve for the 3A Series load modules is shown on the right.

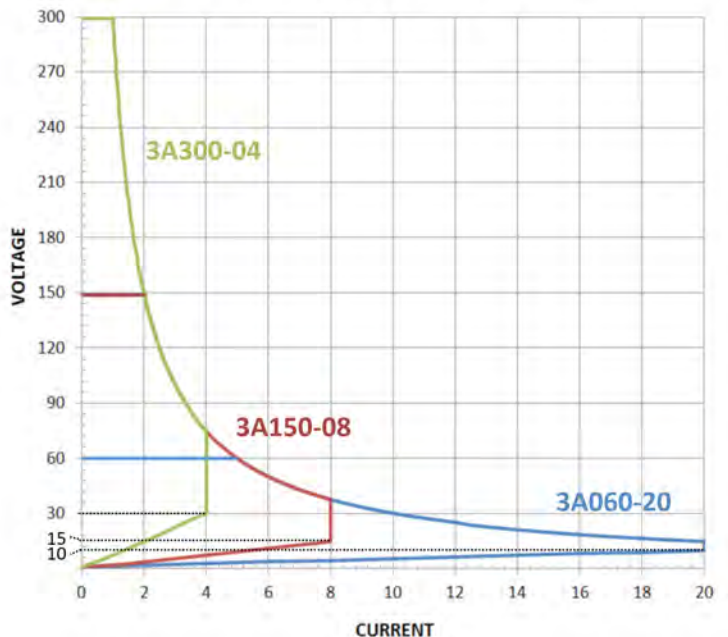
Each load module continuously tracks its input voltage current and power and safeguards against any operation outside of its operating limits. This flexible operating range allows the same load module to be used for a wide range of EUTs and provides great flexibility in configuring high channel count load test systems.

MULTI-PHASE APPLICATIONS

For multi-phase applications such as split-phase or three-phase AC power source testing, two or three AC load modules may be used to create a Split, Delta or Wye AC load. Each phase is individually programmable and synchronized to its respective input voltage and the load current will be zero phase referenced. Note that for Delta load applications, the load modules are sensing line-to-line voltage so sufficiently high-voltage input range load modules are required.

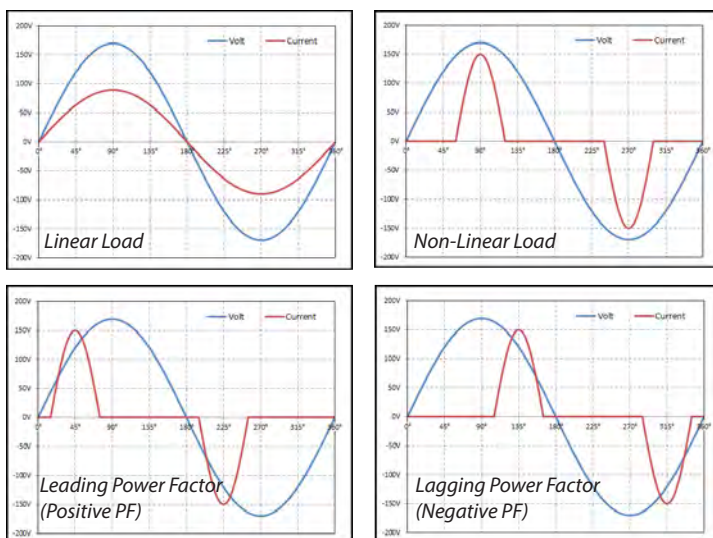


3A SERIES VI-CURVES



NON LINEAR AC LOAD SIMULATION

Many real world AC loads draw non-sinusoidal load currents. Typical examples are bridge rectified input circuits that convert AC voltage into DC. These are called non-linear load and the AC current resulting from these circuits has a crest factor higher than that of a pure sinusoidal current. The 3A Series load modules can simulate these load conditions using a non-sinusoidal current waveform in CC mode. The phase angle between voltage and current in this mode of operation can be shifted to simulate leading or lagging displacement power factor conditions. The higher the crest factor of the current waveform selected, the wider the power factor can be varied. The waveforms on the right illustrate these load conditions.



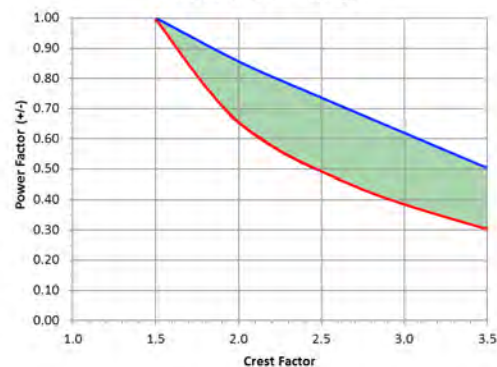
Linear and Non Linear Loads

STORED CF AND PF SETTINGS

Current crest factor and displacement power factor can be selected easily from the front panel or over bus by recalling pre-set combinations of CF and PF as function of waveform type. The table below shows these available settings.

Waveform	Setting	A	B	C	D	E	Phase Shift	
Sine wave	0	$\sqrt{2}$	2.0	2.5	3.0	3.5	Lagging PF	
	1	1.5	1.6	1.7	1.8	1.9		
	2	3.0	3.1	3.2	3.3	3.4		
C.F. = 2	3	P.F. = -0.85	P.F. = -0.80	P.F. = -0.75	P.F. = -0.70	P.F. = -0.65		Leading PF
C.F. = 2.5	4	P.F. = -0.75	P.F. = -0.70	P.F. = -0.65	P.F. = -0.50	P.F. = -0.40		
C.F. = 3.5	5	P.F. = -0.50	P.F. = -0.45	P.F. = -0.40	P.F. = -0.35	P.F. = -0.30		
C.F. = 2	6	P.F. = +0.85	P.F. = +0.80	P.F. = +0.75	P.F. = +0.70	P.F. = +0.65		Leading PF
C.F. = 2.5	7	P.F. = +0.75	P.F. = +0.70	P.F. = +0.65	P.F. = +0.50	P.F. = +0.40		
C.F. = 3.5	8	P.F. = +0.50	P.F. = +0.45	P.F. = +0.40	P.F. = +0.35	P.F. = +0.30		
Square	9	1.0	1.1	1.2	1.3	1.4	DC	
DC	10	$\sqrt{2}$ dc	2 dc	2.5 dc	3.0 dc	3.5 dc		

Available CF Range



MAINFRAMES



34M04 Mainframe

The 34M04 mainframe provides the necessary bias supplies and forced air cooling to the load modules installed. It also isolates modules from each other so each load is floating and can be used to test multi-output or multi-phase power supplies.

Mainframes are available with either one or four slot positions accommodating up to 4 independent AC and DC load channels and 1200 VA/W of power dissipation. Common controls on the mainframe allow synchronous operation of 2 or more loads and store 5 setting configurations.

Mainframe	34M01	34M04
No. of Slots	1	4
Supports	3A060-20, 3A150-08, 3A300-04	
Max. Power	300 VA	1200 VA
AC Input	100-115Vac \pm 10% or 200-230Vac \pm 10%	
Frequency	50 / 60 Hz \pm 3Hz	
Power (max.)	40W	100W
Dimensions (W x H x D)	150 x 177 x 445 mm 5.9 x 7.0 x 17.5"	440 x 177 x 445 mm 17.3 x 7.0 x 17.5"
Weight	5.5 kg / 12.1 lbs	9.3 kg / 20.5 lbs
Shipping - size	12x13x24"	22x13x24"
- weight	26 lbs incl. one 3A Load	54 lbs incl. four 3A Loads

The single slot 34M01 mainframe is well suited for bench operation while the 34M04 four slot mainframe can be used on the bench or installed in a 19" cabinet. Rack ears and handles are including for rack mount use. The 34M01 mainframe has tilt stands for an optimal viewing angle during bench use.

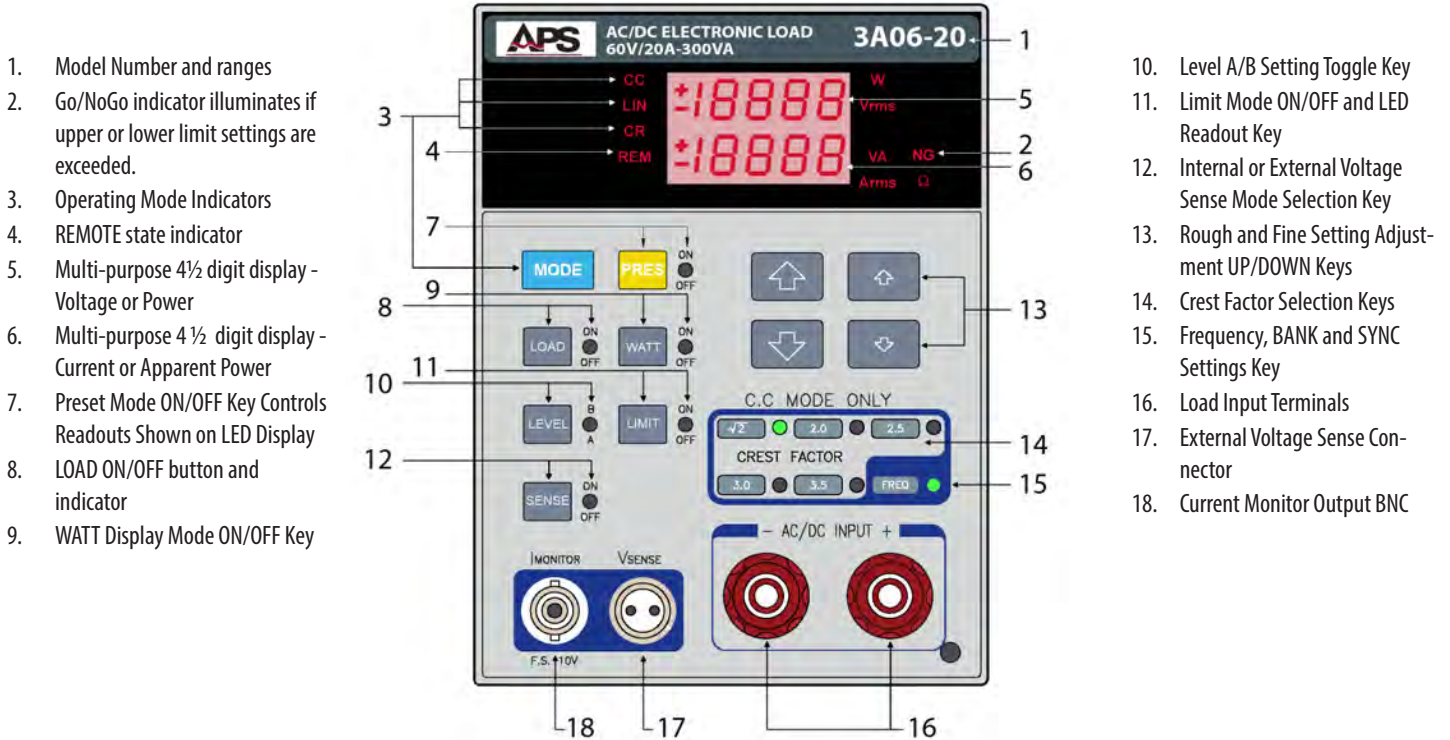


34M01 Mainframe

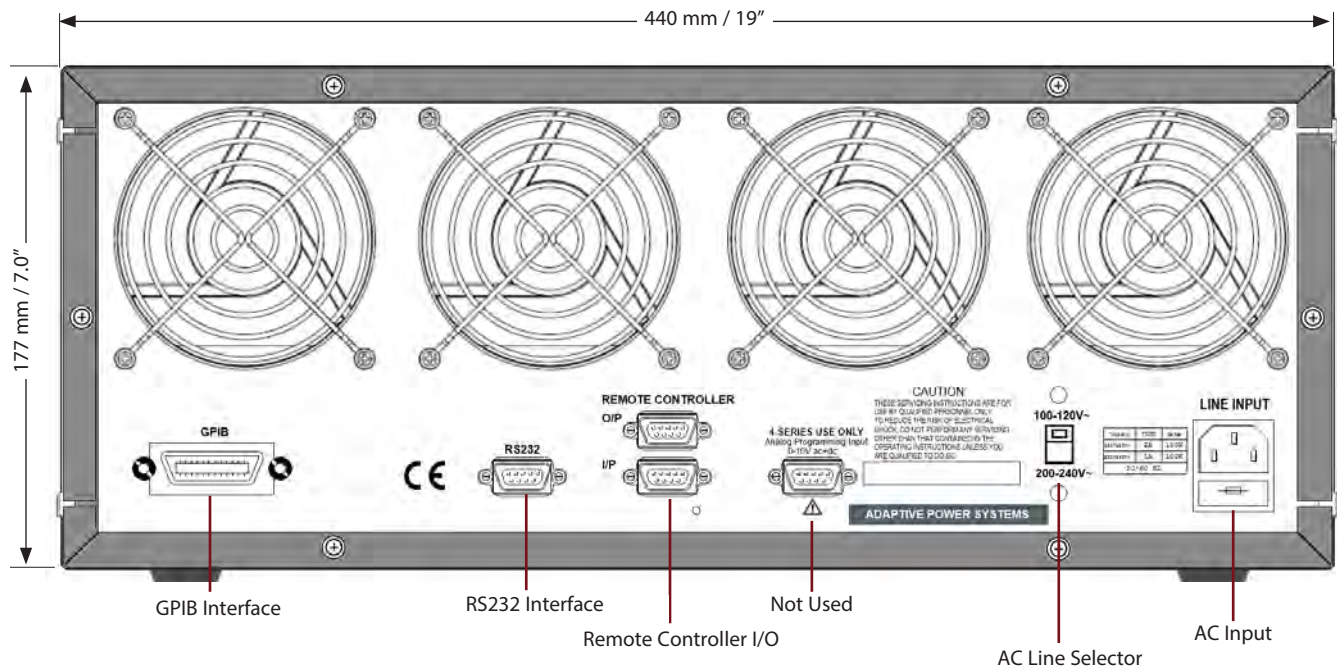
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LOAD MODULE FRONT PANEL OPERATION

Each load module has its own front panel keypad and bright red LED displays for easy of operation. Keys are clearly marked and settings are shown using LED indicators right next to their corresponding keys.



REAR PANEL



3A SERIES MODULAR AC & DC LOADS

SPECIFICATIONS

MODEL	3A060-20		3A150-08		3A300-04	
OPERATING RANGES						
Power Ranges	0 - 300 VA		0 - 300 VA		0 - 300 VA	
Current Ranges	0 -10 Arms/Adc	10 -20 Arms /Adc	0 - 4 Arms /Adc	4 - 8 Arms /Adc	0 - 2 Arms /Adc	2 - 4 Arms /Adc
Voltage Range	10 - 60 Vrms/Vdc		15 - 150 Vrms/Vdc		30 - 300 Vrms/Vdc	
Frequency	DC, 40 - 400Hz (CC Mode) / DC - 400Hz (LIN,CR Mode)					
AC Waveforms	Sine, Square, Step, DC					
OPERATING MODES						
CC Mode - High Range	0 -10 A	10 -20 A	0 - 4 A	4 - 8 A	0 - 2 A	2 - 4 A
Resolution	2.5 mA	5 mA	1 mA	2 mA	0.5 mA	1 mA
Accuracy	50Hz & 60Hz: $\pm 0.5\%$ OF (SETTING + RANGE) / > 60 Hz: $\pm(0.5\%$ OF SETTING + 1% OF RANGE)					
CC Mode - Low Range	0.000- 1.000 A		0.000- 0.400 A		0.000- 0.200 A	
Accuracy	$\pm 2\%$ OF (SETTING + RANGE)					
CC Linear Mode	Refer to CC Mode data					
Crest Factor Mode Range	$\sqrt{2} - 3.5 / 1.5 - 1.9 / 3.0 - 3.4$					
Resolution	0.5 / 0.1 / 0.1					
Lagging	-0.30 to -0.85 for CF 2.0 to 3.5					
Leading	+0.30 to +0.85 for CF 2.0 to 3.5					
CR Mode Range	0.3 - 1.2 K Ω	12.3 - 4.8 K Ω	1.875 - 7.5 K Ω	7.5 - 30 K Ω	7.5 - 30 K Ω	30 - 120 K Ω
Resolution ⁽¹⁾	0.83 mS	0.2083 mS	0.13 mS	0.033 mS	0.033 mS	0.0083 mS
Accuracy	50Hz & 60Hz: $\pm 0.5\%$ OF (SETTING + RANGE) / > 60 Hz: $\pm(0.5\%$ OF SETTING + 2% OF RANGE)					
PROTECTION						
Over Power (OP)	315 VA		315 VA		315 VA	
Over Current (OC)	10.5 A	21 A	4.2 A	8.4 A	2.1 A	4.2 A
Over Voltage (OV)	63 V		157.5 V		315 V	
Over Temperature (OT)	+85° C / +185° F					
POWER FACTOR RANGE						
Lagging PF	CF: $\sqrt{2}$ to 3.5 . PF: - 0.30 to -0.85					
Leading PF	CF: $\sqrt{2}$ to 3.5 . PF: + 0.30 to +0.85 or 1.00					
METERING						
Voltage Range	0 - 60 V		0 - 150 V		0 - 300 V	
Resolution	0.01 V		0.01 V		0.1 V	
Accuracy	$\pm(0.5\%$ OF SETTING + 0.2% OF RANGE)					
Current Range	0 - 20 A		0 - 8 A		0 - 4 A	
Resolution	0.01 A		0.001 A		0.001 A	
Accuracy	50Hz & 60Hz: $\pm 0.5\%$ OF (READING + RANGE) / > 60 Hz: $\pm(0.5\%$ OF READING + 2% OF RANGE)					
Power Range	0 - 300 W					
Resolution	0.1 W					
Accuracy	50Hz & 60Hz: $\pm 0.5\%$ OF (READING + RANGE) / > 60 Hz: $\pm(0.5\%$ OF READING + 2% OF RANGE)					
Apparent Power Range	0 - 300 VA					
Resolutions	0.1 VA					
Accuracy	Derived from Volt and Current Measurement					
ANALOG I/O						
Current Monitor Out	5 A/V		2 A/V		1 A/V	
Accuracy	$\pm 0.5\%$ OF (SETTING + RANGE)					
GENERAL						
Power & Cooling	Supplied by 34M00 Mainframe					
Dimensions (H x W x D)	143 x 108 x 405 mm / 5.6" x 4.25" x 15.9					
Module Weight (Net)	3.5 kg / 7.7 lbs		3.5 kg / 7.7 lbs		3.5 kg / 7.7 lbs	
Operating Temperature Range	0 - 40° C / 32 - 104° F		0 - 40° C / 32 - 104° F		0 - 40° C / 32 - 104° F	
EMC & Safety	CE Mark					

Note 1: S = Siemens or mho, unit of conductance. 1S = 1/ Ω = A/V.

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ORDERING INFORMATION:

Line 1: Specify Mainframe Model and Interface:

Model	No. of Slots	Interface
34M01	1	RS232
34M01-01	1	GPIO & RS232
34M04	4	RS232
34M04-01	4	GPIO & RS232

Line 2: Specify up to four Load Modules:

AC & DC Load	Power	Voltage	Current
3A060-20	300 VA	60 V	20 A
3A150-08	300 VA	150 V	8 A
3A300-04	300 VA	300 V	4 A

AC Input Voltage

Please specify AC Line input voltage at the ship to location on the order as either 120Vac or 230Vac.

Included in Mainframe Ship kit:

- User Manuals in PDF Format on CD ROM
- AC Line Cord.
- Certificate of Conformance

Included with each 3A Series Load Module:

- 1 Monitor BNC Cable (1 meter/39.4")
- Voltage Sense alligator clip lead cable, Red/Black (1 meter, 39.4")
- M6 Mounting screw (qty 2)

Service and Support

Adaptive Power Systems' customer support is second to none. Our Customer Support Program provides the training, repair, calibration, and technical support services that our customers value. So, in addition to receiving the right test equipment, our customers can also count on excellent support before, during and after the sale. With company owned support and service centers around the world, support is never far away.

Complete calibration and repair services are offered at our US, European and Chinese manufacturing facilities (see contact info below). Calibrations are to original factory specifications and are traceable to NIST (National Institute of Standards and Technology).

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