

3D SERIES AC & DC LOADS

Key features:

- Power Rating 1875W / 1875VA (3700VA with Option -EPF)
- Current up to 18.75 A
- Operating Modes: CC, Linear CC, CV CP, CR and AC Rectifier
- RLC and LC Modes Simulate Inductors and Capacitors
- Turbo mode doubles Current and Power ratings for Fuse, Short, OPC and OPP functions
- Voltage Range: 50 - 280Vac / 50-400 Vdc
- Frequency range: DC, 40 Hz to 75Hz
- Programmable Current Crest Factor from 1.414 to 5.0
- Inductive / Capacitive Load Power Factor Programming
- Power Factor (PF) range 0 ~ 1 (lead) or -1 ~ 0 (lag)
- High-Speed 4 Digit Precision Metering Capability
- Single or Three Phase Load Delta or Wye Configuration support
- Fast Current Slew Rates
- Short Circuit Test Modes
- Fuse Test Modes
- Inrush and Surge Current Simulation
- 4U / 7" Bench or Rack-mount use
- LAN, USB, RS232 or GPIB Interface options



OVERVIEW

The ADAPTIVE POWER 3D Series Programmable AC and DC Electronic Loads are ideally suited for testing AC power supplies, frequency converters, DC/AC inverters, Uninterruptable Power Supplies (UPS) and transformers. With their ability to support sinusoidal and non-sinusoidal AC voltage waveforms alike, the 3D Series loads can support a wide variety of AC test requirements.

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

The 3D Series loads offer a range of unique features and functions allowing load currents that are either leading or lagging the AC input voltage. This includes RLC and LC modes that allow combinations of inductive and capacitive loads to be applied to the unit under test. The RLC mode also supports anti-islanding tests for grid-tied PV inverters, bidirectional EV Chargers and energy storage devices. Required real power and virtual inductive power and capacitive power can be programmed independently

Up to eight 3D Series Loads can be connected in parallel for higher power requirements. All loads are controlled from the master unit. For three phase applications, both Delta and Wye configurations are supported.

AC & DC MODES

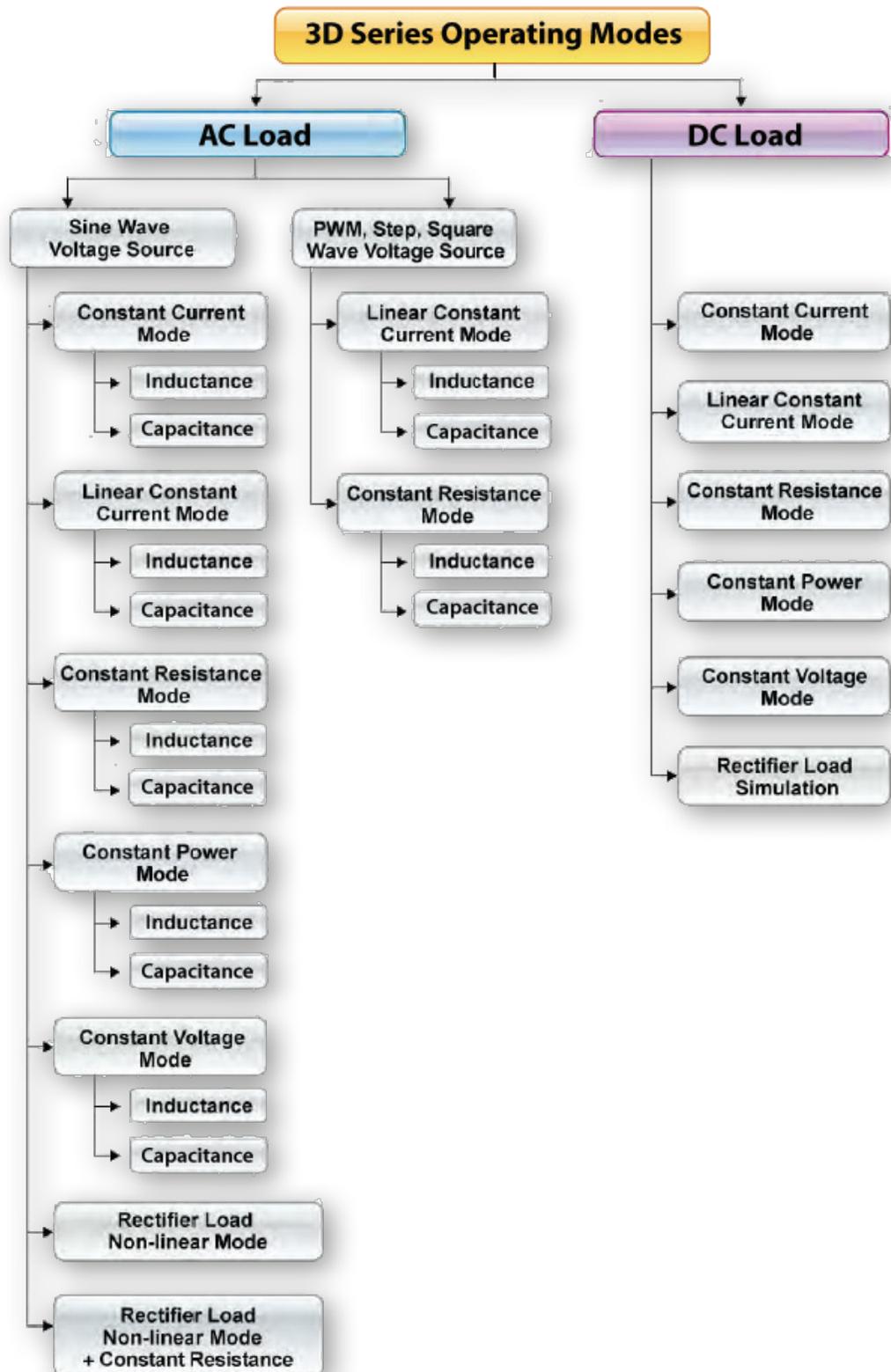
The 3D Series is primarily intended for AC applications but does offer a fully capable DC load mode as well for maximum versatility. In DC mode, input voltage is up to 400Vdc. Battery discharge functions are built-in to the 3D Series loads for convenient testing of rechargeable batteries.



3D SERIES POWER FACTOR RLC AC & DC LOADS

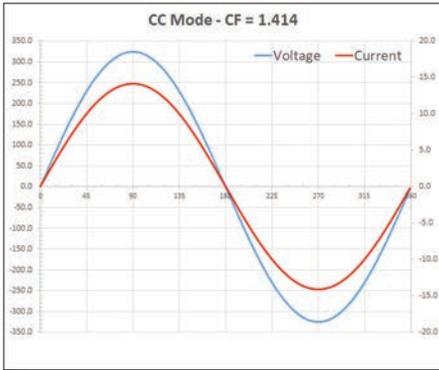
EXTENSIVE CHOICE OF AC AND DC LOAD OPERATING MODES

3D Series AC & DC Loads offer an extensive array of available AC or DC Operating modes in order to support a large number of programmable load applications. AC operating modes are shown on the left while DC modes are shown on the right in the diagram below.

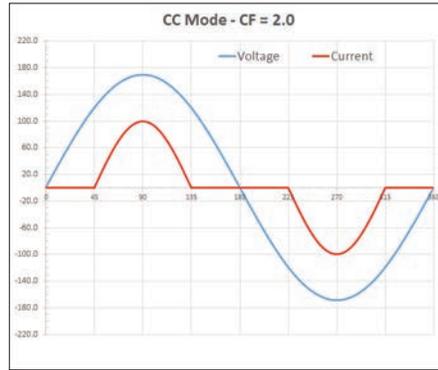


3D SERIES POWER FACTOR RLC AC & DC LOADS

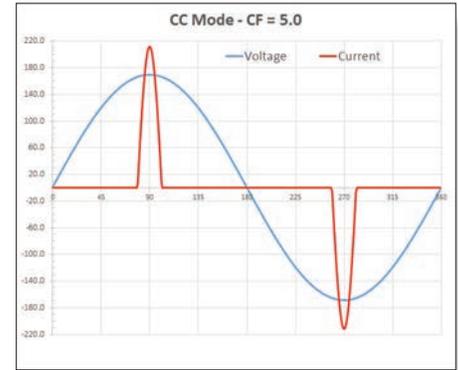
CONSTANT CURRENT MODE POWER FACTOR & CREST FACTOR CONTROL



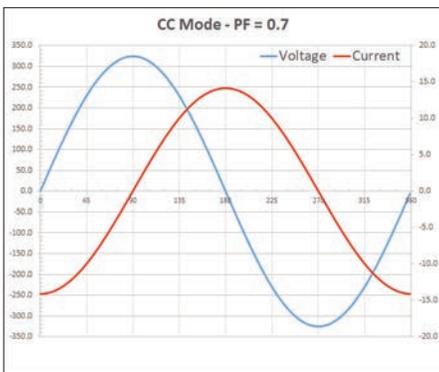
CC Mode with CF = 1.414



CC Mode with CF = 2.0

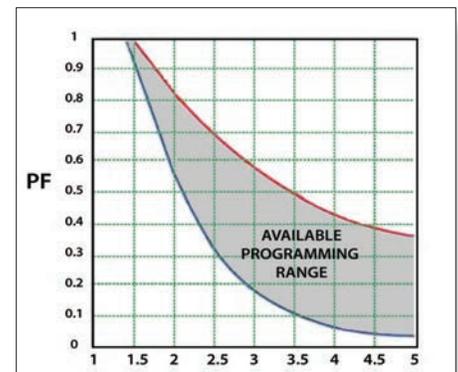


CC Mode with CF = 5.0



CC Mode with CF = 1.414 and PF = 0.7 Lead

Programmable control of AC RMS Current, Crest Factor and Power Factor allows a wide range of real world AC loads to be simulated to allow rigorous testing of your AC Power Supply or UPS designs.

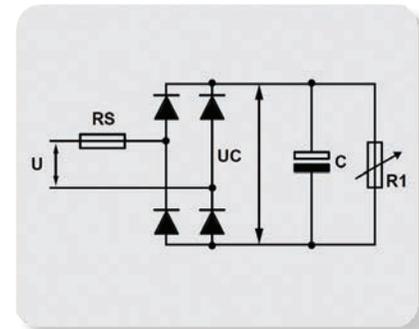


Available PF versus CF Programming Range

AC RECTIFIER + CR LOAD MODES

The 3D Series also offers an AC Rectifier mode of operation that combines CC and CR modes to maintain AC current THD at exactly 80%. This mode is fully compliant with IEC62040-3 - UPS Efficiency Measurement under non-linear loads - and IEC61683 - Resistive plus non-Linear Mode. In this mode of operation, the 3D load simulates the actual impedance of a non-linear rectifier capacitor AC input stage as found in many products.

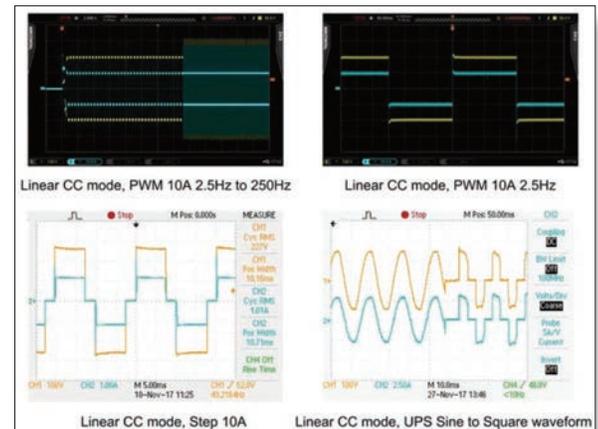
- IEC62040-3 Compliance
- IEC61683 Compliance



LINEAR CC MODE (LIN)

The Linear Constant Current Mode (LIN) is intended for testing of AC sources that do not produce an AC Sinewave output. Typical examples are PWM inverters, Six pulse or twelve pulse waves or UPS products that switch to square wave output during power outages.

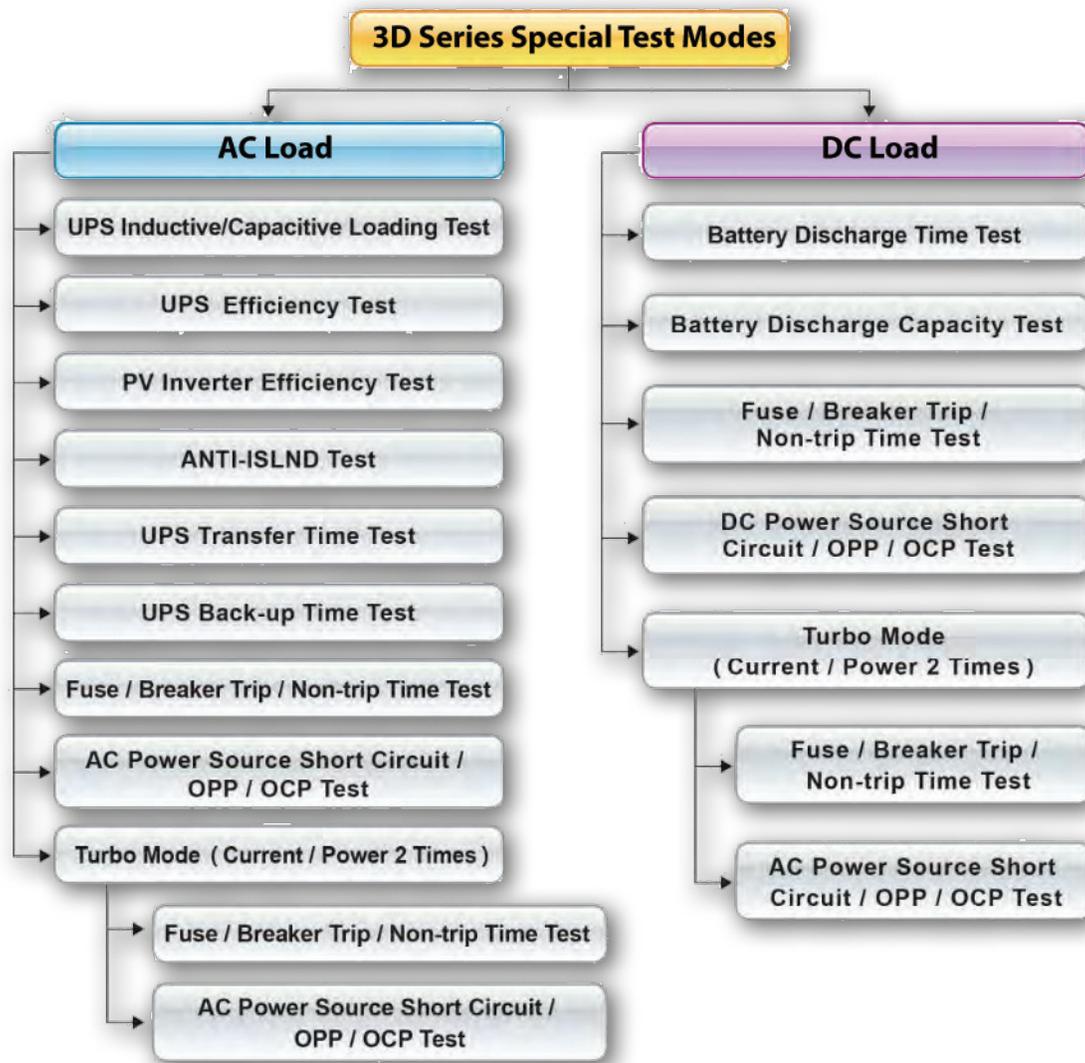
Some typical examples are shown to the right.



3D SERIES POWER FACTOR RLC AC & DC LOADS

SPECIAL TEST FUNCTIONS

3D Series AC & DC Loads offer an extensive array of AC or DC Operating modes in order to support a large number of programmable load applications. AC operating modes are shown on the left while DC modes are shown on the right in the diagram below.

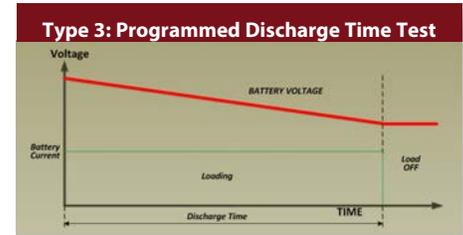
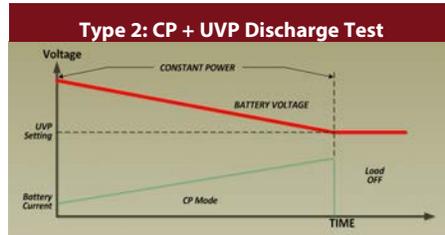
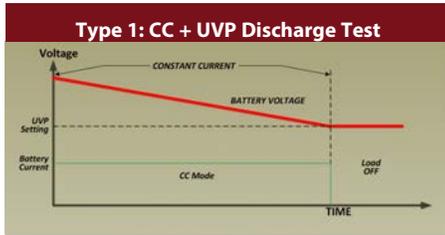


3D SERIES POWER FACTOR RLC AC & DC LOADS

BATTERY TEST FUNCTIONS

For discharge testing of large electric vehicle (EV) battery packs, the 3D Series offers built in Battery discharge profiles (BATT modes). This eliminates the need to develop special software for battery test applications. The three available battery test modes are shown in the table to the right.

BATT#	Test Type	Description
1	Discharge to state of charge and stop	Discharges battery in CC mode using set current level till preset battery end voltage is reached and then load is turned off.
2	Discharge to state of charge and hold	Discharges battery in CP mode using set current level till preset battery end voltage is reached and then switches to CV mode at set voltage.
3	Timed discharge test	Discharges battery in CC mode using set current level for the period of time specified. At end of test time, the load turns off and displays battery voltage.



UNIQUE TURBO MODE

The 3D Series loads offer a number of advanced features and functions, including **TURBO** boost mode. TURBO mode allows twice the maximum rated load current to be absorbed by the load for short periods of time.

This mode is perfect for testing protection functions of power

supplies such as over-current and over power protection. The same TURBO mode supports testing of current protection devices like Fuses and PTC's without having to use an over-sided load.

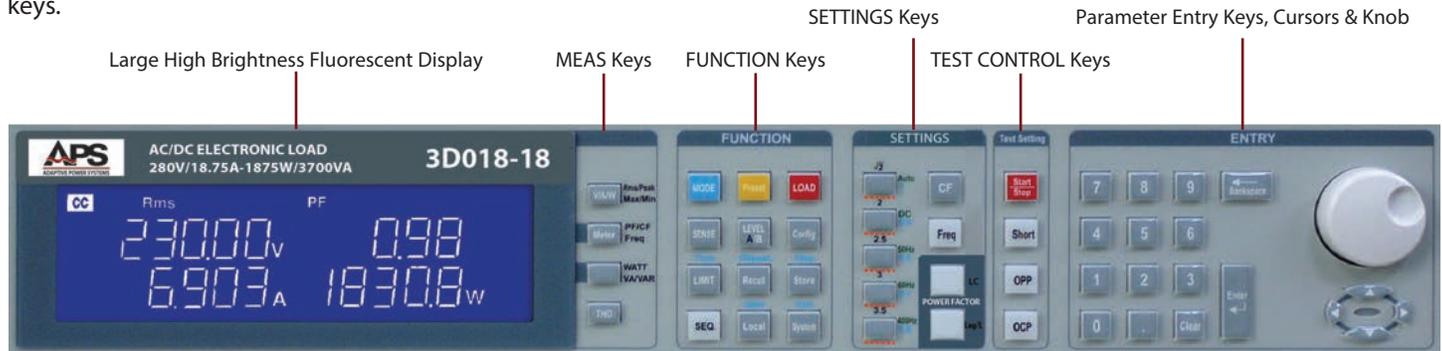
An example of an AC burst current without TURBO mode and one using TURBO mode is shown in the image below.

<p>APS AC/DC ELECTRONIC LOAD 3D018-18 280V/18.75A-1875W/3700VA CC Rms 99.35V PASS 0000A 37.000A</p>	<p>37.5A 0A 100mS</p>	<p>Acq Complete M Pos: 50.00ms CH2 Coupling DC BW Limit 0Hz 100MHz Volts/Div 5.00V Probe 50A/V Current Invert OFF CH2 50.0A M 25.0ms 27-Nov-17 13:04 CH2 / 3.00A <10Hz</p>
<p>Turbo OFF, Short 100ms 37.5A Test result screen</p>	<p>Turbo OFF, Short 100ms 37.5A Setting</p>	<p>Turbo OFF, Short 100ms 37.5A The actual test waveform</p>
<p>APS AC/DC ELECTRONIC LOAD 3D018-18 280V/18.75A-1875W/3700VA CC Rms 99.35V PASS 0000A 75.000A</p>	<p>75.0A 0A 100mS</p>	<p>Acq Complete M Pos: 50.00ms CH2 Coupling DC BW Limit 0Hz 100MHz Volts/Div 5.00V Probe 50A/V Current Invert OFF CH2 50.0A M 25.0ms 27-Nov-17 13:05 CH2 / 3.00A <10Hz</p>
<p>Turbo ON, Short 100ms 75.0A Test result screen</p>	<p>Turbo ON, Short 100ms 75.0A Setting</p>	<p>Turbo ON, Short 100ms 75.0A The actual test waveform</p>

3D SERIES POWER FACTOR RLC AC & DC LOADS

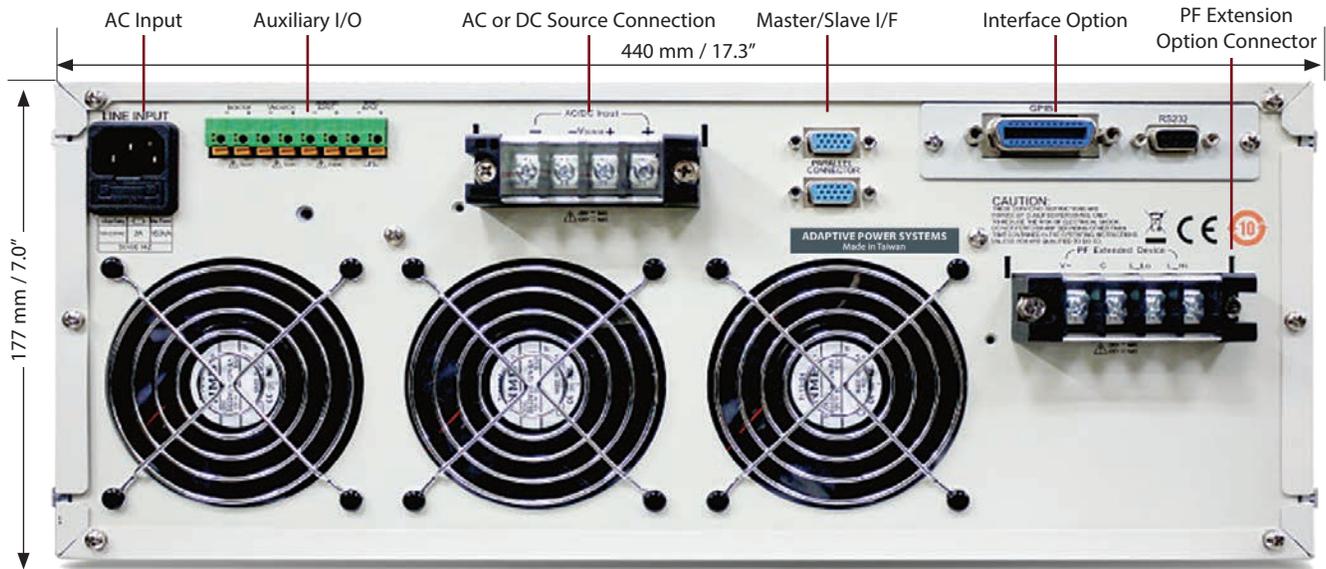
EASY FRONT PANEL OPERATION

3D Series AC & DC Loads are easily operated using the front panel keypad and large, bright fluorescent displays for ease viewing of settings and measurements. Keys are clearly marked and setting are shown using LED indicators right next to their corresponding keys.



REAR PANEL

All load and control connections are made on the rear panel of the load. Rear panel connectors are called out below.



PARALLEL & 3 PHASE MODE AC LOADS

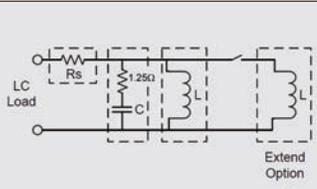
3D Series AC+DC Loads can be configured as either MASTER or SLAVE units. In this mode, up to three loads can be paralleled for higher power load applications. Models with different power ratings can be mixed in parallel systems.

For three phase AC load requirements, three 3C loads can also be configured in a Delta or Wye configuration. Only the master unit (Phase A) has to be programmed by the user. The phase B and C units automatically adopt the same set values as the master unit.



3D SERIES POWER FACTOR RLC AC & DC LOADS

SPECIFICATIONS

MODEL		3D018-18
OPERATING RANGES		
Power		0 - 1875 W / 0 - 3700 VA (Note 6)
Reactive Power (with Extended PF Option - Note 5)		C: 900 VARmax @110V / 60Hz C: 3785 VARmax @ 220V / 60Hz L: 400 (1200) VARmax @110V / 60Hz L: 800 (3200) VARmax @ 220V / 60Hz
Current		18.75 Arms / 46.875 Apeak
Reactive Current (with Extended PF Option - Note 5)		C: 8.6Amax @110V/60Hz C: 17.2Amax @ 220V/60Hz L: 3.6 (10.8) Amax @110V / 60Hz L: 3.6 (14.4) Amax @ 220V / 60Hz
Voltage		50 - 280 Vrms / 50 - 400 Vdc
Frequency		DC, 40 - 70 Hz (CC, CP Modes) DC - 70 Hz (LIN, CR, CV Modes)
OPERATING MODES		
Constant Current Mode - Sinewave		
	Range	0 - 18.75 A
	Resolution	0.3125 mA / 16 bits
	Accuracy	± (0.1% SETTING + 0.2% RANGE)
Linear Constant Current Mode - Sinewave, Square Wave, Quasi-Square Wave, PWM Wave		
	Range	0 - 18.75 A
	Resolution	0.3125 mA / 16 bits
	Accuracy	± (0.1% SETTING+ 0.2% RANGE)
Constant Resistance Mode		
	Range	3.2 Ohm - 64 KOhm
	Resolution (Note 1)	0.010416 mS / 16 bits
	Accuracy	± 0.2% (SETTING+ RANGE)
Constant Voltage Mode		
	Range	50 - 280 Vrms/ 400.0 Vdc
	Resolution (Note 1)	0.1 V
	Accuracy	± (0.1% SETTING + 0.1% RANGE)
Constant Power Mode		
	Range	1875 W
	Resolution	0.1 W
	Accuracy	± (0.1% SETTING + 0.1% RANGE)
RECTIFIER LOAD CREST FACTOR (CC & CP Mode only)		
	Range	√2 to 5.0
	Resolution	0.1
	Accuracy	CF: (0.5% / Irms) + 1.0% F.S.
RECTIFIER LOAD POWER FACTOR (CC & CP Mode only)		
	Range (Note 4)	0 - 1 Lag or Lead
	Resolution	0.01
	Accuracy	1.0% F.S.
PLUS LC Mode		
	Rs	0 Ω / 4.5 Ω / 9 Ω
	Accuracy	±5% of setting
	Capacitance	0, 0.1μF ~ 207.55μF (0.1μF, 0.22μF / 0.47μF / 0.82μF / 1.64μF / 3.3μF / 6.6μF / 12.8μF / 25.6μF / 52μF / 104μF)
	Accuracy	±20% of setting
	Inductance	0, 40H ~ 0.156H (32H / 16H / 8H / 4H / 2H / 1H / 0.5H / 0.25H / 52 mH) With -EPF Option: 0, 40H ~ 0.039H (156 mH / 78mH)
	Accuracy	±20% of setting

Notes:

1. ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω
5. Extend PF Range to 3700VA Option (Inductance: 52 mH)
4. The power factor range is limited on programmed current
6. Specifications apply for 220V/60Hz and option inductance

3D SERIES POWER FACTOR RLC AC & DC LOADS

SPECIFICATIONS - Continued

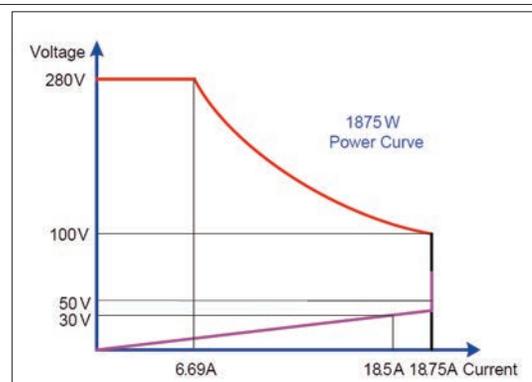
MODEL	3D018-18	
TEST MODES		
RLC Load Sinewave Power Factor (CF = $\sqrt{2}$)		
Current Range	0 - 18.75 A	
Resolution	0.3125 mA / 16 bits	
P.F. Range	± 0.000 - 1.000	
UPS Efficiency Measurement (Non-linear Mode)		
Operating Frequency	Auto / 40 - 70 Hz	
Current Range	0 - 18.75 A	
P.F. Range	0.00 - 1.00	
Measuring Efficiency for PV Systems and Power Conditioners for THD 80% (Resistive + Non Linear CC Mode)		
Operating Frequency	Auto / 40 - 70 Hz	
Current Range	0 - 18.75 A	
Resistive Range	3.2 Ohm - 64 KOhm	
UPS Back-up Function (CC, LIN, CR, CP Modes)		
UVP (V_{TH})	50 - 280 Vrms / 400 Vdc	
UPS Back-up Time	1 - 99999 Sec. (> 27 Hours)	
Battery Discharge Function (CC, LIN, CR, CP Modes)		
UVP (V_{TH})	50 - 280 Vrms / 400 Vdc	
Battery Discharge Time	1 - 99999 Sec. (> 27 Hours)	
UPS Transfer Time		
Current Range	0 - 18.75 A	
UVP (V_{TH})	2.5V	
Time Range	0.15 mSec - 999.99 msec	
Fuse Test Mode		
Max. Current (Turbo OFF/ON)	18.75A / 37.5A (Note 3)	
Trip Time	0.1 - 9999,9 sec w Turbo mode OFF / 0.1 - 1.0 sec w Turbo mode ON	
Accuracy	± 0.003 Sec	
Repeat Cycles	0 - 255	
Programmable Inrush Current Simulation: Istart - Istop / Tsep		
Istart, Inrush Start Current	0 - 37.5A	
Inrush Step time	0.1 ms - 100 ms	
Istop, Inrush stop current	0 - 18.75A	
Programmable Surge current simulation: S1/T1 - S2/T2 - S3/T3		
S1 and S2 Current	0 - 37.5A	
T1 and T2 Time	0.1mS - 0.5 Sec	
S3 Current	0 - 18.75A	
T3 Time	0.01 Sec - 9.99 Sec Or Cont.	
PROTECTION MODES		
Over Power Protection	1968.75Wrms or Programmable	
Over Current Protection	19.687 Arms or Programmable	
Over Voltage Protection	294 Vrms / 420Vdc	
Over Temp. Protection	Yes, 90° \pm 5°	

Notes:

1. ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/ Ω
2. Operating temperature range is 0~40° C, all specification apply for 25°C \pm 5°C, Except as noted
3. Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function
4. The power factor range is limited on programmed current

All specifications apply for 50/60Hz.

All specifications subject to change without notice.



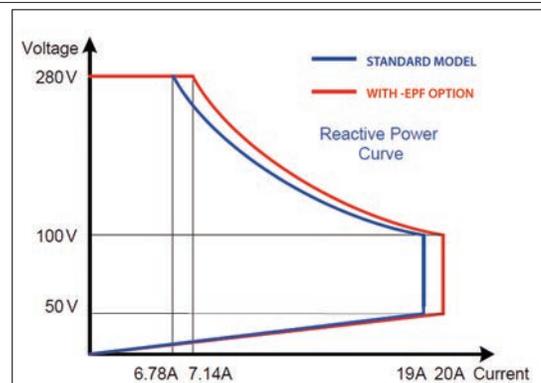
3D SERIES POWER FACTOR RLC AC & DC LOADS

SPECIFICATIONS - CABINET SYSTEMS

MODEL	3D018-18	
MEASUREMENTS		
Voltage Readback		
	Range	400 V
	Resolution	0.01 V
	Accuracy	± 0.05% (READING + RANGE)
	Parameter	Vrms, V Max/Min, +/-Vpk
Current Readback		
	Ranges	9.375 Arms / 18.75 Arms
	Resolution	0.2 mA / 0.4 mA
	Accuracy	± 0.05% (READING + RANGE)
	Parameter	Irms, I Max / Min, ± Ipk
Power Readback		
	Range	1875 W
	Resolution	0.03125 W
	Accuracy	± 0.1% (READING + RANGE)
	VA Apparent Power	VrmsxArms (Corresponds to Vrms and Arms)
Power Factor Metering		
	Range	± 0.000 - 1.000
	Resolution	± (0.002 ± (0.001/PF) * F)
Frequency Metering		
	Range	DC, 40 - 70 Hz
	Accuracy	0.1 %
Other Measurements		
		VA, VAR, CF_I, Ipeak, Imax., Imin. Vmax., Vmin., IHD , VHD , ITHD , VTHD
MISCELLANEOUS SPECIFICATIONS		
	Start up loading	Yes , Power on loading during Inverter / UPS start up
	Load ON / OFF Phase Angle	0 - 359 degrees can be programmed for the angle of load ON and load OFF loading
	Half cycle and SCR / TRIAC loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed
	Master / Slave (3 phase or Parallel application)	Yes, 1 master and up to 7 slave units
	External programming input (OPTION)	F.S / 10Vdc, Resolution 0.1V
	External SYNC input	TTL
	V monitor (Isolated)	± 500V / ±10V
	I monitor (Isolated)	± 56.25Apk / ±10Vpk
	Interface Options	GPIOB / RS-232 / LAN / USB (only one can be installed at any time)
	Max. Bias Supply Power Consumption	150 VA
	Operating Temperature Range (Note 2)	0 - 40° C / 32 - 104° F
	Current of input impedance (mA)	~V x 0.3
	Dimensions (H x W x D)	177 mm x 440mm x 558 mm / 7" x 17.3" x 22"
	Weight	42 Kg / 92.6 lbs.
OPTIONS		
	Extended PF Inductance to 3700 VA	52 mH Inductance
	Dimensions (H x W x D)	141 mm x 440 mm x 250 mm / 5.55" x 17.3" x 9.8"
	Weight	34 Kg / 75 lbs.

Notes:

1. ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω
 2. Operating temperature range is 0~40° C, all specification apply for 25°C ±5°C, Except as noted
 3. Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function
 4. The power factor range is limited on programmed current
- All specifications apply for 50/60Hz.
All specifications subject to change without notice.



3D SERIES POWER FACTOR RLC AC & DC LOADS

ORDERING INFORMATION:

Model	Description
3D018-18	AC+DC Load, 280Vac/400Vdc, 18.75A, 1875W/3700VA

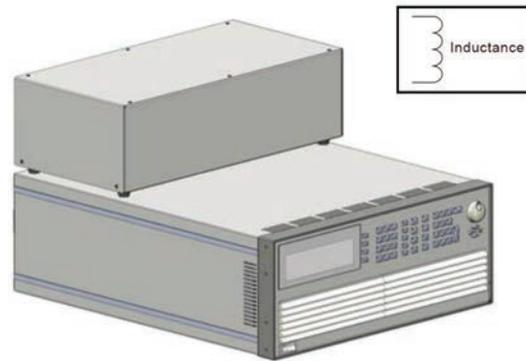
Note 1: Up to eight 3D018-18 Loads can be paralleled for higher power and current or three phase applications.

Included in Mainframe Ship kit:

- AC Line Cord.
- Rack Handles (4U bench units only, detachable).
- Certificate of Conformance.
- PDF User Manual (download at <https://tr.adaptivepower.com/>).

Option	Description
-EPF	Extended PF Option (Extends to 3700VA)
-USB ¹	USB Interface
-RS232 ¹	RS232 Serial Interface
-GPIB ¹	GPIB Interface
-GPIB/RS232 ¹	Combination GPIB & RS232 Interface
-LAN ¹	LAN (Ethernet) Interface
-MODE4	Mode Switch Fixture, 4U. Switches AC Load input between 3P4W, 3P3W or 1P2W (up to 5625W / 11100VA). Requires 19" Rack
RACK-xxU	19" Instrument Rack. Consult factory for required rack height.

Note 1: Only one interface module can be installed per unit at a time.



AC Load with Extended PF Option

NEED HELP?

sales@adaptivepower.com
OR CALL
Toll Free: +1 (866) 517-8400
Intl: +1 (949) 752-8400



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).

NORTH & SOUTH AMERICA

PPST Solutions, Inc.
Irvine, USA
Phone: +1(888) 239-1619
Email: sales@ppstsolutions.com

EUROPE

Caltest Instruments GmbH.
Kappelrodeck, Germany
Phone: +49(0)7842-99722-00
Email: info@caltest.de

CHINA

PPST Shanghai Co. Ltd.
Shanghai, China
Phone: +86-21-6763-9223
Email: info@ppst.com.cn



ADAPTIVE POWER SYSTEMS

17711 Mitchell North
Irvine, CA 92614
United States
Toll Free: 1.888.239-1619
Tel: +1.949.752-8400
Email: sales@adaptivepower.com

