4760 Series
600 Volt DC Electronic Loads

NH Research, Inc.

Features

- Eight (8) 600V Models between 1kW/50A and 36kW/1800A
- Automated test station or stand-alone, bench-top use
- 7” Touch-Panel with Graphic User Interface (GUI)
- Micro-second transient load profile simulation
- Precision Voltage, Current, Power & Timing Measurements
- Air-cooled, linear design

***4760 Series** DC Electronic Load*

Applications

The 4760 Series Electronic Loads are designed for a wide variety of electronic loading from either within an automatic test station or as a stand-alone, bench-top set-up. The Loads are particularly well suited for testing applications that require fast-transient simulation capability and comprehensive internal measurements. The 4760 can be operated manually through the large, touch-panel-enabled GUI or automatically through a remote controller and any number of standard test programming languages. Typical applications include the testing of power conversion/storage products such as DC power supplies, telecom rectifiers and battery packs.

Complex and Fast-Transient Load Profiles

4760 Loads are capable of creating a wide variety of complex dynamic load profiles including micro-second pulses, multiple pulses of varying width, stepped responses, variable slew rates and even an AC component on the DC waveform (Fig. 1). The key to this capability is called a Macro, each of which contains up to 100-steps and is executed directly by the Load to achieve the fastest possible transition speed. Once created, Macros can be stored in the system controller for downloading to the Load when execution is required.

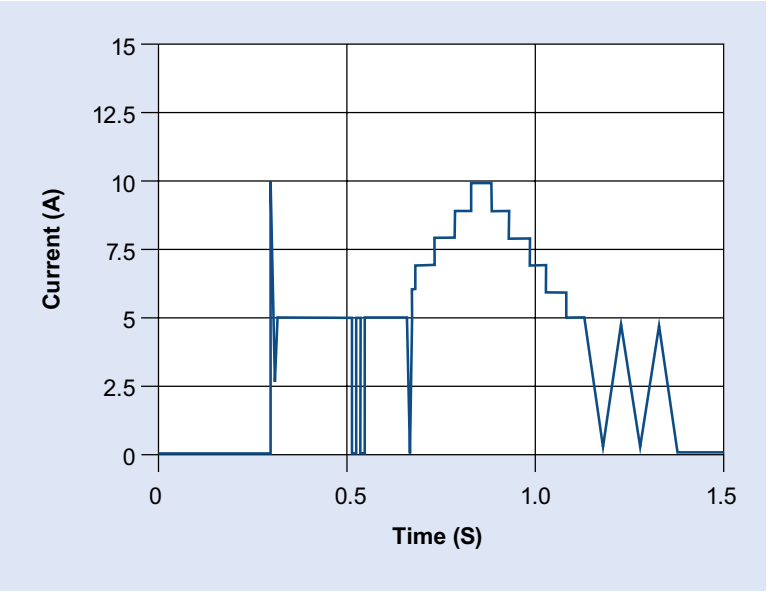


***Figure 1** - Various Fast Transient Load Profiles*

A Next Generation User Interface

The touch-panel-based GUI on the 4760 Series Loads is the ideal solution to the more extensive information and control needed in today's power-stimulus/measurement test instruments. The Load interface is organized through 6 tabs, each providing a full screen for a function with complete display and control of related information. For instance, the Monitor Tab (Fig. 2) displays continuous actual measurements of voltage, current, power and resistance even when the 4760 is being controlled remotely. The Control Tab (Fig. 3) allows manual settings of CC, CV, CR and CP operating modes and limits. A Scope Tab (Fig. 4) provides a graphical view of the voltage/current relationships along with markers where measurements are needed. This interface is particularly useful for engineering characterization and Unit-Under-Test (UUT) troubleshooting as well as test program development.

Figure 2 *- Monitor Tab*

Figure 3 *- Control Tab*

Precision Internal Measurements

The 4760 Loads frequently eliminate the need for separate external instruments such as a DMM, Power Meter or DSO to make precision measurements and display waveforms. Especially valuable are dynamic timing measurements such as Rise-Time, Turn-On-Time, Settle-Time and Overshoot. Built-in measurements provide faster testing throughput in addition to the initial cost savings gained by eliminating external measurement instruments.

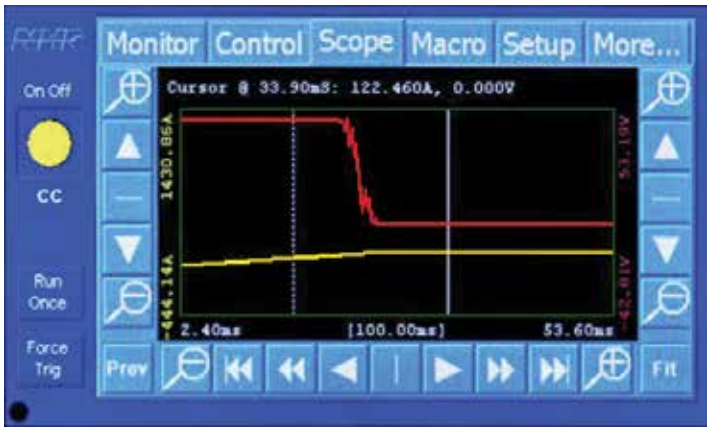


Figure 4 *- Scope Tab*

Advanced Safety Features

In addition to the basic UUT OV, OT, OC and OP protections, 4760 Loads provide programmable safety limits to prevent damage that could occur due to operator error, programming errors, external and internal faults. When a safety limit is triggered, the load automatically disables the output, generates an error message and prevents further operation until the fault is cleared. Safety limits may be set using any of the control options.

Field Expandable

4760 Series Loads are modular and allow for expansion with other like-modules in the field. Future addition of auxiliary modules creates a virtual larger load with all the same functionality, only more current and power. Through this capability, the test engineer can select a load that meets current requirements without concerns that future higher loading demands will require an entirely new, higher power load.

Wide Constant-Power Operating Envelopes

The 4760 Series Loads have a broad constant-power operating envelope (Fig. 5) to provide rated power anywhere between 7V and 120V volts. Below 7V the load linearly reduces current down to 1V.

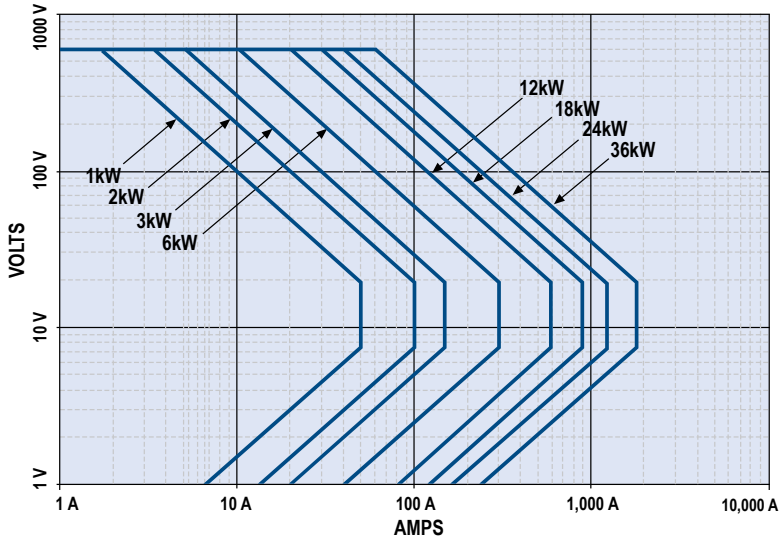
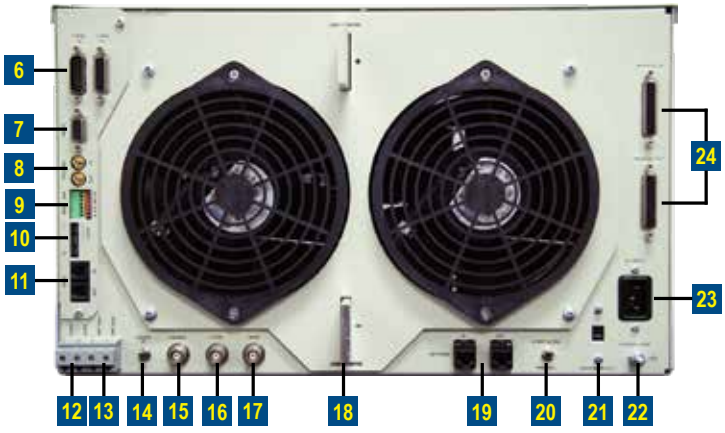


***Figure 5** - Constant Power Operating Envelopes*

4760 Series Panel Overview



1 Power Switch
2 Hardware error indicator
3 USB connector
4 Touch panel display
5 Status indicators
6 COMM In/Out connector
7 RS232 connector
8 Trig In/Out connectors
9 DIN/DOUT connector
10 Address switch
11 Sync In/Out connectors
12 OVPS connector
13 Remote sense connector
14 I Range switch
15 Enable indicator
16 I Control connector
17 I Monitor connector
18 Load connections
19 Network connectors
20 Parallel switch
21 Voltage select switch
22 Chassis GND stud
23 AC input connector
24 Parallel connectors

4760 Series 600V DC Electronic Load Specifications[1]

4760 Ratings	4760-1	4760-2	4760-3	4760-6	4760-12	4760-18	4760-24	4760-36
Power	1 kW	2kW	3kW	6kW	12kW	18kW	24kW	36kW
Maximum Current [2]	50 A	100A	150A	300A	600A	900A	1,200A	1,800A
Voltage Range [3]	7.0 - 600V	7.0 - 600V	7.0 - 600V	7.0 - 600V	7.0 - 600V	7.0 - 600V	7.0 - 600V	7.0 - 600V
Programmable Modes	Accuracies: % of Set + % of Range, Resolution: % of Range							
Constant Current								
Ranges [4]	5, 50A	10, 100A	15, 150A	30, 300A	60, 600A	90, 900A	120, 1200A	180, 1800A
Accuracy	0.12%+0.08%	0.12%+0.08%	0.12%+0.08%	0.12%+0.08%	0.12%+0.08%	0.12%+0.08%	0.12%+0.08%	0.12%+0.08%
Resolution	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%
Constant Voltage								
Ranges	20, 200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V
Accuracy	0.05%+0.05%	0.05%+0.05%	0.05%+0.05%	0.05%+0.05%	0.05%+0.05%	0.05%+0.05%	0.05%+0.05%	0.05%+0.05%
Resolution	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%
Constant Power								
Range	0 - 1kW	0 - 2kW	0 - 3kW	0 - 6kW	0 - 12kW	0 - 19kW	0 - 24kW	0 - 36kW
Accuracy	1% + 1%	1% + 1%	1% + 1%	1% + 1%	1% + 1%	1% + 1%	1% + 1%	1% + 1%
Resolution	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%
Constant Resistance								
Range	0.2 - 6000Ω	0.1 - 3000Ω	0.06 - 2000Ω	0.03 - 1000Ω	0.02 - 500Ω	0.01 - 333Ω	0.008 - 250Ω	0.005 - 167Ω
Accuracy [5]	2%	2%	2%	2%	2%	2%	2%	2%
Slew Rate (10 - 90%)								
Range	0.25A/s - 5A/µs	0.5A/s - 10A/µs	0.75A/s - 15A/µs	1.5A/s - 30A/µs	3A/s - 60A/µs	4.5A/s - 90A/µs	6A/s - 120A/µs	9A/s - 180A/µs
Rise Time	10 µs - 20s	10 µs - 20s	10 µs - 20s	10 µs - 20s	10 µs - 20s	10 µs - 20s	10 µs - 20s	10 µs - 20s
Resolution	< 5µs	< 5µs	< 5µs	< 5µs	< 5µs	< 5µs	< 5µs	< 5µs
Accuracy	1% +/- 5µs	1% +/- 5µs	1% +/- 5µs	1% +/- 5µs	1% +/- 5µSec	1% +/- 5µs	1% +/- 5µs	1% +/- 5µs
Short Circuit								
Resistance	2.0, 0.2Ω	1.0, 0.1Ω	670mΩ, 67mΩ	330mΩ, 33mΩ	167mΩ, 17mΩ	111mΩ, 11mΩ	83mΩ, 8.3mΩ	56mΩ, 5.6mΩ
Current Max	8, 80A	16, 160A	24, 240A	48, 480A	96, 960A	144, 1440A	192, 1920A	290, 2900A
Macro								
Modes	Any single Mode							
Repetition	Single Burst or Continuous							
Settings	100							
Period	40µs - 20s							
Delay	20µs - 20s							
Resolution	10µs							
Accuracy	1% +/- 5µs							
Measurements	Accuracies: % of Measurement + % of Range, Resolution: % of Range							
Current								
Ranges	5, 50A	10, 100A	15, 150A	30, 300A	60, 600A	90, 900A	120, 1200A	180, 1800A
Accuracy	0.12%+0.06%	0.12%+0.06%	0.12%+0.06%	0.12%+0.06%	0.12%+0.06%	0.12%+0.06%	0.12%+0.06%	0.12%+0.06%
Resolution	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%
DC Voltage								
Ranges	20, 200, 600V	20, 200, 600V	20, 200, 600V	20.200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V	20, 200, 600V
Accuracy	0.01%+0.02%	0.01%+0.02%	0.01%+0.02%	0.01%+0.02%	0.01%+0.02%	0.01%+0.02%	0.01%+0.02%	0.01%+0.02%
Resolution	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%	0.0015%
Power								
Ranges	Current Range x Voltage Range							
Accuracy	Current Accuracy + Voltage Accuracy							
Resolution	0.0015% Range							
Waveform Capture								
Bandwidth	25kHz							
Accuracy	1% R							
Channels	Voltage, Current or both MUX'd							
Digitizing Rate [6]	100 - 100K Samples/s							
Memory	256K Samples							
Timebase	10µs - 8s							
Triggering	System or External							
Waveform Analysis	Voltage, Current, Power, Overshoot, Undershoot, Rise/Fall Time, Turn-On Time, Settling Time, Hold-Up Time, AC RMS, AC+DC RMS							
Control								
User Interface	Manual control through touch panel or supplied PC-GUI							
Optional Software Tools	DC Load Sequencer, *em*Power™ Test Executive, Enerchron™ Test Management Software							
External Communication	LAN							
Supplied Drivers	IVI-C/IVI-COM, LabVIEW VIs, SCPI Command Reference Manual							
Physical								
Load Connectors	Bus bars with lugs							
Operating Temperature	0 - 40° C at full power and <75% duty cycle							
Input Power	115/230 ± 10% VAC, 47 - 63Hz							
Dimensions inches	5 1/4 x 19 x 22	5 1/4 x 19 x 22	10 1/2 x 19 x 22	10 1/2 x 19 x 22	35 x 23 x 30	43 x 23 x 30	57 x 23 x 30	78 x 23 x 30
(HxWxD) milimeters	133 x 483 x 559	133 x 483 x 559	267 x 483 x 559	267 x 483 x 559	889 x 584 x 762	1092 x 584 x 762	1448 x 584 x 762	1980 x 584 x 762
Weight	40lbs/18kg	50lbs/23kg	75lbs/34kg	100lbs/45kg	250lbs/113kg	400lbs/181kg	570lbs/259kg	815lbs/370kg
Additional Features								
Remote Sense	2 VDC maximum drop between sense & load input terminals							
Self Test	Power-up self test of all major functions including status of input, output, control and protection circuits							
Performance Monitoring	Continuous checking of performance parameters including Internal Over-Voltage, Over-Current, Over-Voltage, & Over-Temperature							
Calibration	Closed-cover, all adjustments made in software & stored in EEPROM							
Trigger Output/Input	Synchronizes external devices to programmed load step. Synchronized programmed load step to an external device.							
Analog Control/Monitor	0 - 10V external signal appropriate to 100% current for the selected range							
Fan Noise Reduction	Automatic fan speed control							

[1] Specifications apply at 23° +/- 5° C after a 10 minute warm up.

[2] Accuracies apply when Settings &/or Measurements >10% of Range.

[3] Current linearly reduced between 7 & 1V.

[4] Models 2 - 36kW also have a 5A/1KW Range.

[5] Reference users manual for additional details.

[6] Single channel capture. Simultaneous Voltage & Current captures would halve sample rate & memory available.

NH Research

16601 Hale Avenue, Irvine, California 92606
Tel: (949) 474-3900
E-mail: sales@nhresearch.com

www.nhresearch.com