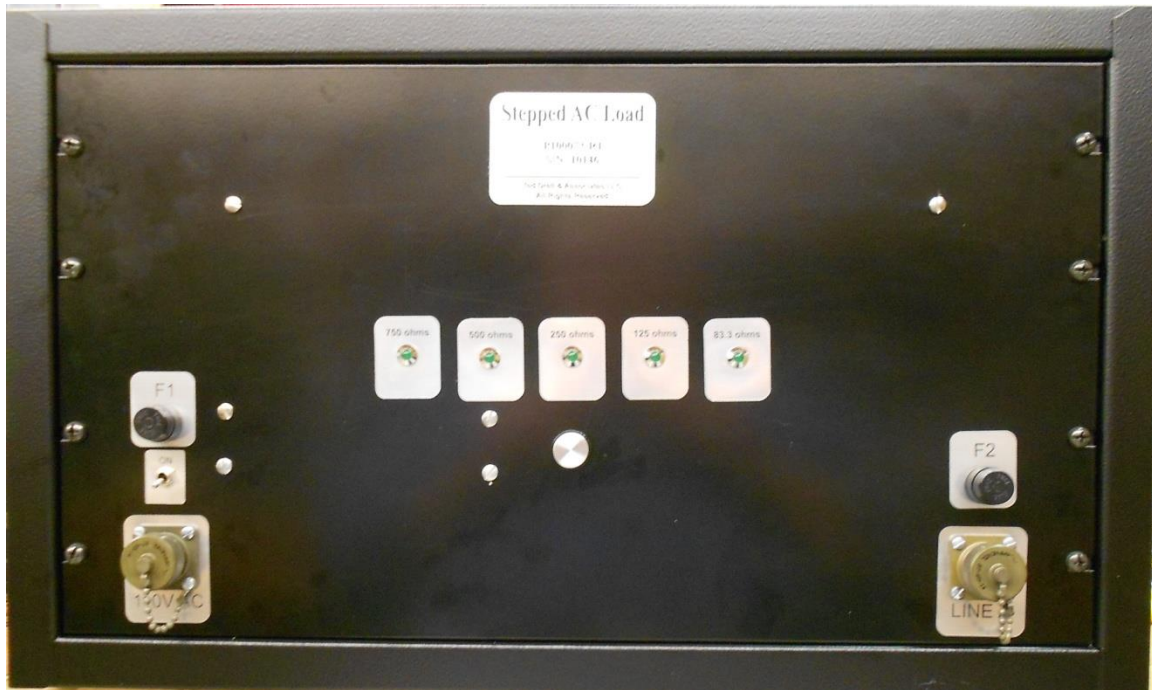


Stepped AC Load



Description:

This document describes the Stepped AC Load.

Warranty

This equipment is warranted for a period of 90 days for workmanship and subject to sub-supplier's warranty period for parts. The equipment manufacturer is not responsible for damage due to misuse or physical abuse of the equipment. This equipment is manufactured to quality standards and every effort has been made to ensure the safety of the user. However, the manufacturer is not responsible for misuse or use by unqualified personal resulting in shock or personal injury.

Please direct all inquires to:

Ted Drell & Associates, LLC
893 Ridgeview Dr
Pineville, La 71360
318 640 2615

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Table 1 Power vs Resistance and Voltage 4

Terms used in this document

Ma (ma)	Milliamps
VDC	Volts DC
A	Amperes
VAC	Volts AC

General

Testing Subsea control systems during development or prior to delivery has presented challenges when the sub sea control module (with all external sensors) has not been available. Various types of loads have been fabricated utilizing resistive components to provide the desired test load. This type of load has presented issues due to size and heat dissipation and the ability to vary the load.

The basic load consist of a series of three high power resistors that are switched in series and parallel to provide 5 fixed loads ranging from 73watts to 611 watts. The load calculations are based on “standard” value resistors. Table 1 shows the load currents and power based on an input voltage of 220VAC. The resistors are 800 watt heat sink mounted units. Due to the switching arrangement, no single resistor will carry more than 323 watts.

All components are mounted in a table top rack cabinet with heat sinks mounted on the rear panel of the cabinet. In use, there must be adequate space at the rear and top of the cabinet to provide air flow for cooling. There is space in the middle of the cabinet for customer furnished components such as matching transformers.

Front panel LEDs indicate the selected power load. All of the control components are mounted on the inside of the front panel while the resistor loads are mounted on the inside of the rear panel.

Table 1 Power vs Resistance and Voltage

Resistance	Voltage	Current	VA	Power	Heat Sink Temp
667Ω	220VAC	0.391AAC	73	73W	82.1°F
445Ω	219.6VAC	0.49AAC	107	107W	82.4°F
148.5Ω	208.4VAC	1.415AAC	296	296W	90.3°F
113.5Ω	219.4VAC	1.945AAC	426	426W	94.3°F
74.4Ω	211.9VAC	2.880AAC	611	611W	99.9°F

A load fuse (F2) is provided to prevent overload of the power resistors and is rated for 5A

Technical

Size	21" X 12.5" X 22.3"
Case Weight	39lbs
Power	110VAC for fans and relay power supply

Installation

The unit as furnished can be used with AC input voltage from 0 to 220VAC. Higher voltages can be used but the load ranges will be reduced. It is recommended that the maximum load be 650watts or less (based on 220VAC). However, there is adequate space inside of the cabinet to install a step down transformer to handle higher voltages. The maximum power load remains unchanged. To facilitate the use of a step down transformer, terminal blocks are installed to connect the transformer. The unit is furnished with jumpers in place of the transformer. See figures 1 & 2.

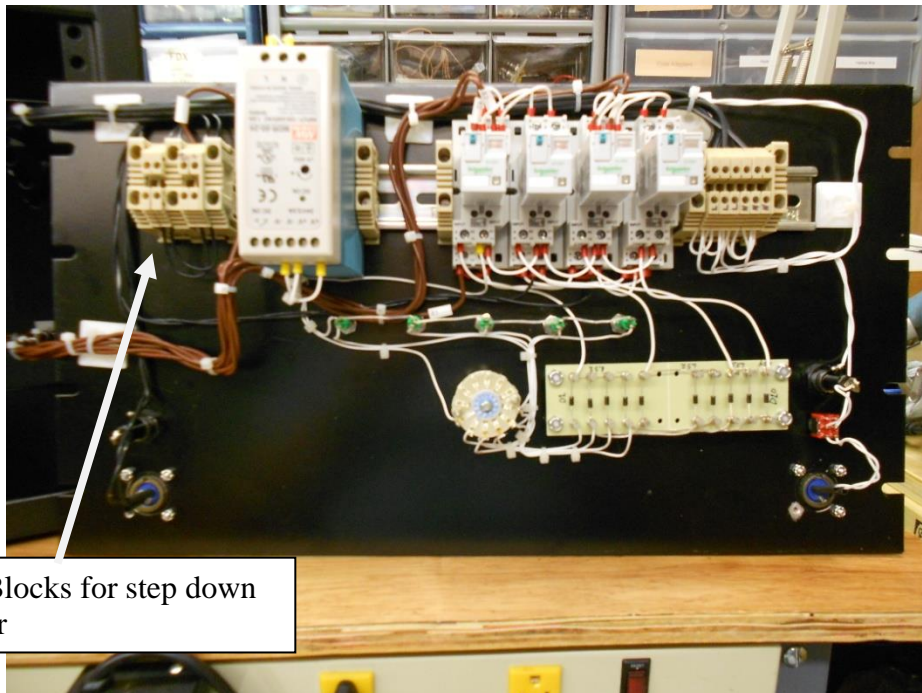


Figure 1 Inside Front Panel

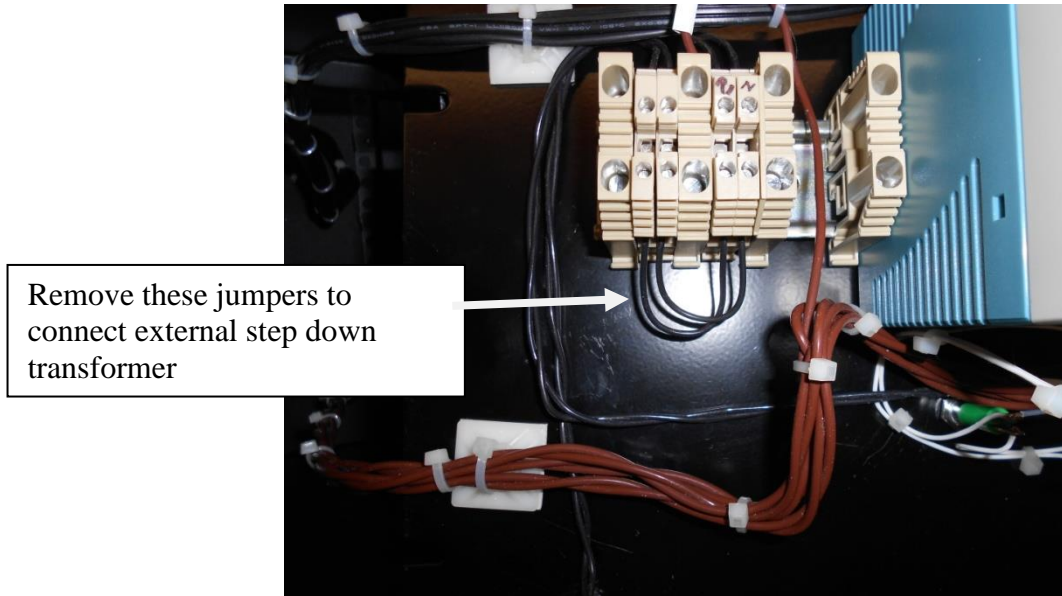
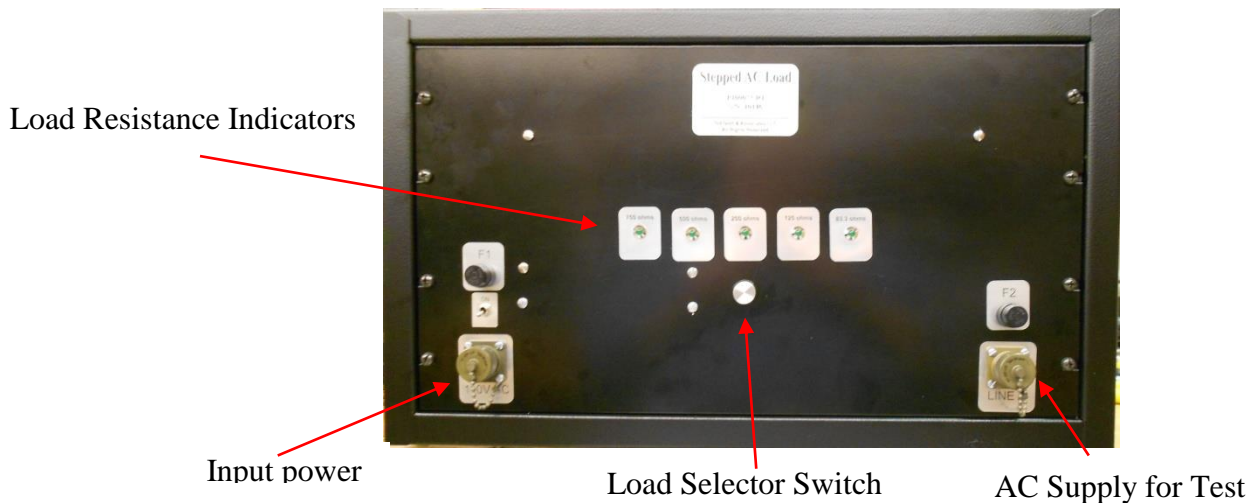


Figure 2 Terminal Block Closup

Operation

Figure 3 Front Panel Controls



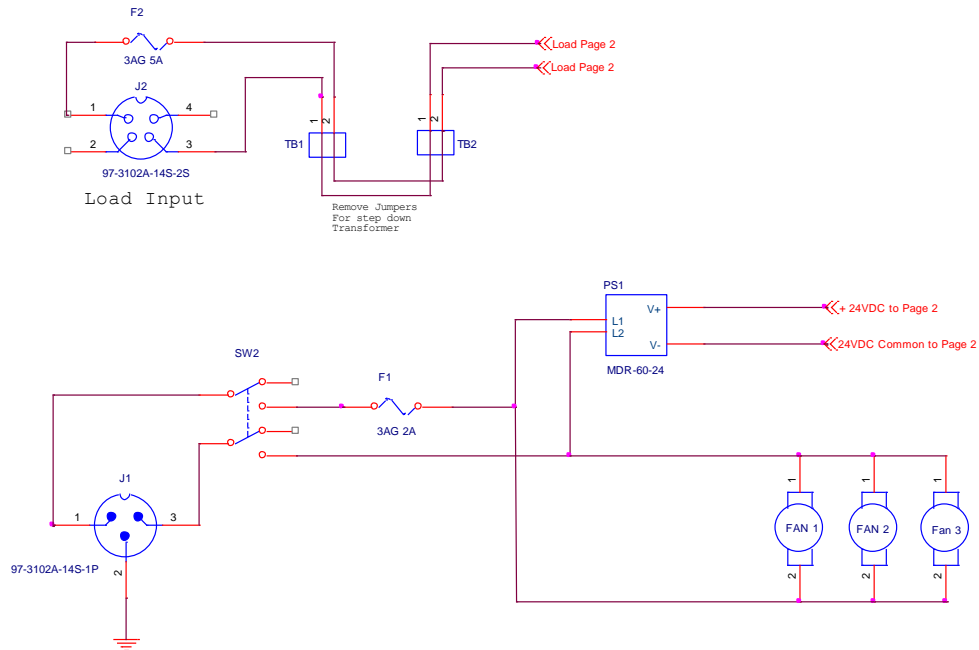
Connect the load AC power to a 110VAC power source using the P100032 power cable.

Connect the AC source to be tested to the Load input.

Turn the power switch to on and select the desired load resistance**.

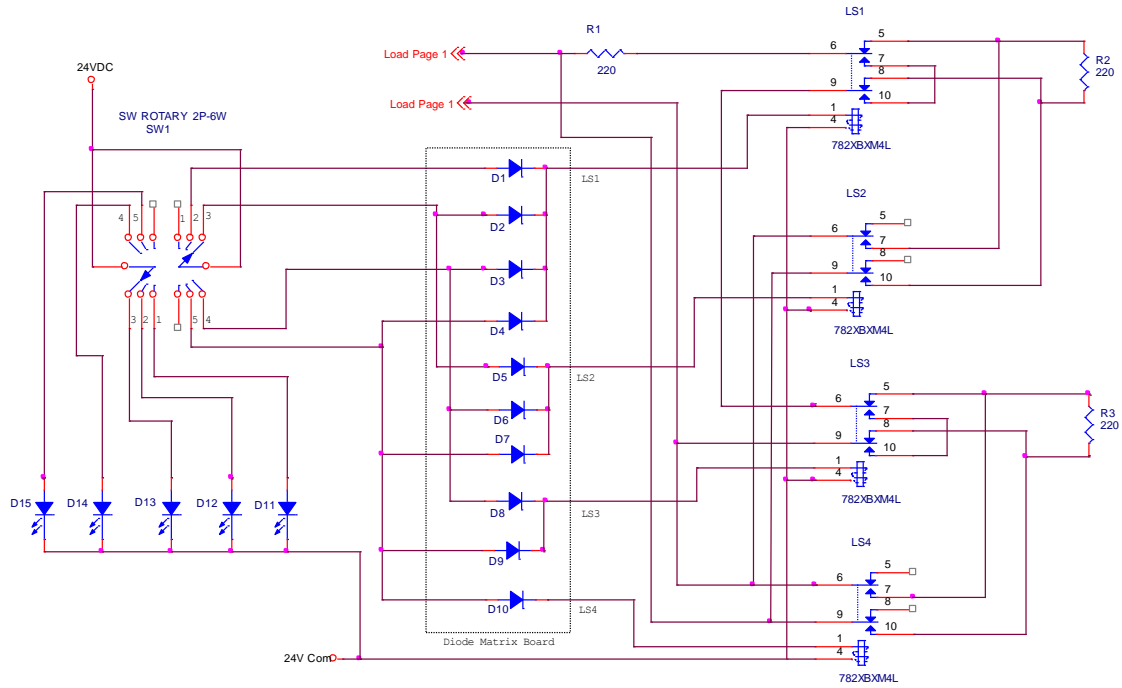
Turn the AC source to on. Current and power can be determined using an external DVM and clamp on Ampmeter.

Schematics



Title		
Stepped AC Load		
Size A	Document Number	Rev
	SD100073	R1
Date:	Saturday, December 07, 2013	Sheet 1 of 3

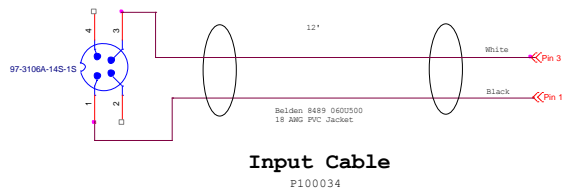
Figure 4 Power and input interfaces



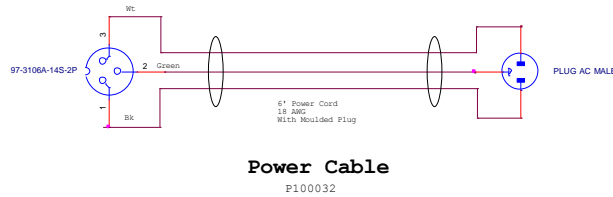
Switch Position
 1 = 750 ohm
 2 = 520 ohm
 3 = 250ohm
 4 = 125 ohm
 5 = 83.3 ohm

Title Stepped AC Load		
Size A	Document Number SD100073	Rev R1
Date: Saturday, December 07, 2013 Sheet 2 of 3		

Figure 5 Relay and Diode Matrix



Input Cable
P100034



Power Cable
P100032

Title Stepped AC Load		
Size A	Document Number SD100073	Rev R1
Date: Saturday, December 07, 2013 Sheet 3 of 3		

Figure 6 Accessory Cables

Bill of Materials

P100073 R1 BOM Ref: SD100073 R1						
Stepped AC Load						
Item	Quantity	Reference	Part #	Description	Mfg	Supplier
1	10	D1 - D10	1N4007	1KV 1A Diode 24VDC Green		Newark
2	5	D11 - D15	WL-19040351	LED		Newark
3	1	F1	3AG 2AP	Fuse with HKP Fuseholder	Littlefuse	Newark
4	1	F2	3AG 5A	Fuse with HKP Fuseholder	Littlefuse	Newark
13	3	Fan 1 - 3	4715FS-12T-B50- D00	4" Fan		Newark
14	3	Fan 1 - 3	55015	Fan Grill		Newark
15	3	Fan 1 - 3	432002	Fan Power Cord Power		Newark
6	1	J1	97-3102A-14S-1P	Connector	Amphenol	Newark
5	1	J2	97-3102A-14S-2S	Input Connector	Amphenol	Newark
11	4	LS1 - LS4	782XBXM4L	DPDT 10A Relay	Magnecraft	Newark
12	4	LS1 - LS4	70-782D8-14	Relay Socket 24VDC, 2.2A	Magnecraft	Newark
7	1	PS1	MDR-60-24 588-	Power Supply	Meanwell	B&B Electronics
10	3	R1 - R3	TAP800K220E	800W Resistors Load selector	Ohmite	Mouser
8	1	SW1	451-1098-ND	switch Miniture Toggle	Electroswitch	Digi-Key
9	1	SW2	1MD1T1B5M1QE	Switch Din Rail		Newark
16	10	TB1-2-3	ER2.5	Terminal Blocks 10.5" Rack		B&B Electronics
17	2		PA-1106BT	Panels Table top rack		
18	1		RCBS190103BK1	cabinet	Hammond	Newark
19	1		P100032	Power Cable	Ted Drell & Assoc	
20	1		P100034	Input Cable	Ted Drell & Assoc	
21	3			Fan Brackets	Ted Drell & Assoc	
22	3		173AB2000B	Heat Sinks Lot of crimp furrels		Newark
23	1			Teflon Wire		
24	100'			Lot Panel Labels		
25	1			17" Din Rail		
26	1					

Test Report

The following is the report of testing of the AC load. A 120VAC to 220VAC step up transformer was used along with a variac to set the input voltage. Voltage, current and power was measured using a Fluke Power Analyzer.

Equipment Under Test: Stepped AC Load
P100073-R1
S/N: 10146

Ambient Temp: 80° F

Load Test:

Resistance	Voltage	Current	VA	Power	Heat Sink Temp
667Ω	220VAC	0.391AAC	73	73W	82.1°F
445Ω	219.6VAC	0.49AAC	107	107W	82.4°F
148.5Ω	208.4VAC	1.415AAC	296	296W	90.3°F
113.5Ω	219.4VAC	1.945AAC	426	426W	94.3°F
74.4Ω	211.9VAC	2.880AAC	611	611W	99.9°F

Power Factor = 1.0

Instrument	Model	Serial	Date Cal
Fluke Thermometer	54 II	87710021	2/2/13
Fluke DMM	189	2805-1006	09/12/12
Fluke Power Quality Analyzer	43B	16070026	09/12/12