RHINO PRO DC To DC Converters

Overview

The RHINO PRO DC to DC Converters, designed for harsh industrial environments, feature stringent protection ratings, such as:

- High EMC immunity against surge, burst, radiated, and conducted disturbances
- High shock and vibration resistance
- High thermal shock resistance

At 100% load, the current characteristics goes from constant voltage to constant current which makes the units also suitable for battery charger applications. With protection against over-temperature, overload, short-circuit, reverse input, overvoltage and input under-voltage lock-out they are hard to destroy.

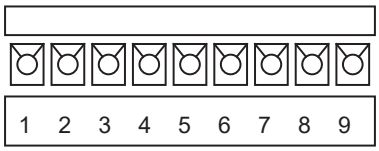
Features

- Input voltage ranges: 9 to 36 and 18 to 75 VDC
- Constant current output characteristic for battery load applications
- Wide operating temperature range: -40 to 75°C [-40 to 167°F]
- Under voltage lock-out, overtemperature & reverse input protection
- Easy chassis and wall mounting
- 3-year warranty

PSRP-15-DC24-150

RHINO PRO DC Converters								
Part Number	*Price*	*Drawing Link*	*Input Voltage Range*	*Input Current @ No Load*	*Output Voltage*	*Output Current Max*	*Output Power*	*Efficiency typ.*
PSRP-12-DC24-150	$199.00	PDF	9-36 VDC (24VDC Nom)	100mA (24VDC Nom)	12VDC	12,500 mA	150W	86%
PSRP-15-DC24-150	$199.00	PDF			15VDC	10,000 mA		
PSRP-24-DC24-150	$199.00	PDF			24VDC	6,300 mA		87%
PSRP-28-DC24-150	$199.00	PDF			28VDC	5,400 mA		
PSRP-48-DC24-150	$199.00	PDF			48VDC	3,200 mA		86%
PSRP-12-DC48-150	$215.00	PDF	18-75 VDC (48VDC Nom)	65mA (48VDC Nom)	12VDC	12,500 mA		88%
PSRP-24-DC48-150	$215.00	PDF			24VDC	6,300 mA		89%

Wiring



PINOUT		
PIN	*Function*	*Recommended Wire*
1	+Vin	14-16 AWG
2	+Vin	14-16 AWG
3	-Vin	14-16 AWG
4	-Vin	14-16 AWG
5	Remote	14-24 AWG
6	+Vout	14-16 AWG
7	-Vout	14-16 AWG
8	Trim	14-24 AWG
9	Trim	14-24 AWG

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Input Specifications	
Surge Voltage (100 sec. max.)	24 VDC models: 50VDC 48 VDC models: 100VDC
Start-Up Time	35 ms typ.
Under Voltage Lockout	24 Vin models: 7.9 - 8.5 VDC 48 Vin models: 15.6 - 16.8 VDC
Recommended Input Fuse	24 Vin models 30A (slow blow) 48 Vin models 15A (slow blow)
ESD (Electrostatic Discharge)	Air: EN 61000-4-2, ±8 kV, perf. criteria A Contact: EN 61000-4-2, ±6 kV, perf. criteria A
Radiated Emissions	EN 55032 class A (internal filter) FCC Part 15 class A (internal filter)
Reverse Voltage Protection	Parallel diode (external input fuse required)
Input Filter	Internal Pi-Type

Note: All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Output Specifications	
Voltage Set Accuracy	±1% max
Regulation	Input Variation (Vmin - Vmax) 0.2% max. - Load Variation (0 - 100%) 0.4% max.I
Minimum Load	Not required
Temperature Coefficient	±0.02 %/K
Ripple and Noise (20MHz bandwidth)	12VDC and 15VDC models: 100 mVp-p max. 24VDC and 28VDC models: 200 mVp-p max. 48V DC models: 300 mVp-p max.
Transient Response	200 µs typ. (25% Load Step)
Overvoltage Protection	125 - 140% of Vout nom
Output Current Limitation	105 - 120% of Iout max.
Short Circuit Protection	Continuous, Automatic recovery
Capacitive Load	12VDC models: 40'000 µF max. 15VDC models: 26'000 µF max. 24VDC models: 10'000 µF max. 28VDC models: 7'600 µF max. 48VDC models: 2'600 µF max.

Note: All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

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General Specifications	
Output Voltage Adjustable Range	0% to +20% (By external trim resistor)
Output Voltage Regulation*	Input variation - 0.2% max Load variation - 0.4% max
Ripple/Noise (20MHz bandwidth)	12VDC and 15VDC models: 100 mVp-p max. 24VDC and 28VDC models: 200 mVp-p max. 48VDC models: 300 mVp-p max.
Temperature: Operating ***Storage (non-operating)***	-40 to 75°C [-40 to 167°F max] -55 to 125°C, [-67 to 257°F max]
Derating	Above 50°C -> 2.0 %/K [24VDC nom.] Above 55°C -> 2.2 %/K [48VDC nom.]
Relative Humidity	95% max. (non-condensing)
Output Power Derating (natural convection)	Natural convection
Temperature Coefficient	±0.02 %/K max.
Switching Frequency	203 - 330 kHz (PWM)
Isolation Voltage (1 min.) – Input/Output	3,000 VDC
Safety Standards	EN 60950-1, EN 62368-1, IEC 60950-1,IEC 62368-1, UL 60950-1, UL 62368-1 - Railway Applications EN 50155
Electromagnetic Compatibility (EMC)	EN 61000-4-3, 10 V/m, perf. criteria A
Parallel Operation	N/A
Pollution Degree	PD 2
Environmental Air	No corrosive gases permitted
Enclosure Rating	IP 55 [IEC 60529]
Enclosure Material	Aluminum
Mounting	Chassis mount
Mounting Orientation	Vertical only
Wiring	14-24 AWG [2.5-0.25 mm²]
Weight [g]	300
Connections	Screw terminal Recommended tightening torque 0.25 Nm [2.21 in-lb]
Short Circuit Protection	Continuous, automatic recovery
Agency Approvals	CE, cURus File E198298

*** Input variation Vin min to Vin max and load variation 0 to 100%**
Note: All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.
To obtain the most current agency approval information, see the Agency Compliance & Certifications Checklist section on the specific part number's web page.

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Output Voltage Adjustment

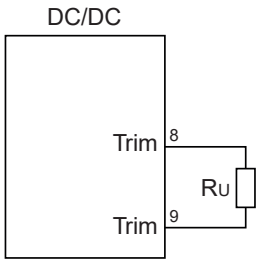
Output voltage set point adjustment allows the user to increase the output voltage set point of the module. This is accomplished by connecting an external resistor between pin 8 (Trim) and pin 9 (Trim). The external TRIM resistor needs to be at least 1/16 W of rated power.

Trim-Tables

PSRP-12-DC24-150, PSRP-24-DC48-150

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout [V]	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
R_U [kOhm]	222.64	105.09	66.35	47.06	33.51	27.83	22.34	18.23	18.23	12.48
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
Vout [V]	13.32	13.44	13.56	13.68	13.80	13.92	14.04	14.16	14.28	14.40
R_U [kOhm]	10.39	8.65	7.18	5.91	4.82	3.86	3.02	2.27	1.60	0.99

Connection of trim-up resistor



PSRP-15-DC24-150

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout [V]	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
R_U [kOhm]	238.62	113.62	71.95	51.12	38.62	30.29	24.33	19.87	16.40	13.62
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
Vout [V]	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	18.80
R_U [kOhm]	11.35	9.45	7.85	6.48	5.29	4.25	3.33	2.51	1.78	1.12

PSRP-24-DC24-150, PSRP-24-DC48-150

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout [V]	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40
R_U [kOhm]	212.47	106.69	68.79	49.30	37.43	29.44	23.70	19.37	15.99	13.28
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
Vout [V]	26.64	26.88	27.12	27.36	27.6	27.84	28.08	28.32	28.56	28.80
R_U [kOhm]	11.06	9.20	7.63	6.28	5.11	4.08	3.18	2.37	1.65	1.00

PSRP-28-DC24-150

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout [V]	28.28	28.56	28.84	29.12	29.40	29.68	29.96	30.24	30.52	30.80
R_U [kOhm]	255.65	121.72	77.08	77.08	41.36	32.44	26.06	21.28	17.56	14.58
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
Vout [V]	31.08	31.36	31.64	31.92	32.20	32.48	32.76	33.04	33.32	33.60
R_U [kOhm]	12.14	10.11	8.40	6.93	5.65	4.53	3.55	2.67	1.89	1.10

PSRP-48-DC24-150

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Vout [V]	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80
R_U [kOhm]	268.86	127.44	80.57	57.19	43.17	33.84	27.17	22.18	18.29	15.18
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
Vout [V]	53.28	53.76	54.24	54.72	55.20	55.68	56.16	56.64	57.12	57.60
R_U [kOhm]	12.64	10.52	8.73	7.20	5.87	4.70	3.67	2.76	1.94	1.21