

4000 HN series

Dual Output DC/DC Converter



DESCRIPTIONS

The 4000HN, dual output power modules are 30 to 40 watt DC/DC converters available in a dual output configuration providing both digital and analog outputs in a compact, industry standard 2" X 2" X 0.5" package. These converters are available in 12, 24 and 48 VDC inputs making them one of the most versatile product lines in the market with efficiencies up to 88%. Advanced surface mount construction allows these converters to achieve outstanding thermal performance eliminating the need for thermal potting compounds and thereby enhancing manufacturing efficiency to reduce costs.

OUTPUT CHARACTERISTICS

	Min	Typ	Max	Unit/Comments
Output Voltage Set Point		±1		% Output voltage at nominal line & FL
Total Band Error			±3	% Output voltage including line/load regulation setting
Line Regulation			±0.5	% Output voltage measured from min. input line to maximum
Load Regulation			±1	% Output voltage measured from FL to 10% load
Temperature Coefficient			±0.01	% per degree C
Ripple/Noise	60		100	mV p-p measured at 20 MHz bandwidth with external 1 µf capacitor
Load Transient Response			±2	% Deviation of Vout voltage for a 25% load change for 200 µS
Short Circuit Protection				Indefinite, Automatic Recovery
Output Voltage Trim Range		±10		% Output voltage. Place ext. resistor between pins 9 - 4 to trim down. Between pins 9 - 6 to trim up

Martek Power reserves the right to change specifications without notice.



FEATURES

- Up to 88% Efficiency
- Dual Output, Up To 40 watt converter
- Available in 12, 24 and 48 VDC Inputs
- Industry Standard 2" X 2" X 0.5" Package
- Output Over Voltage, Input Over Voltage and Short Circuit Protection

INPUT CHARACTERISTICS

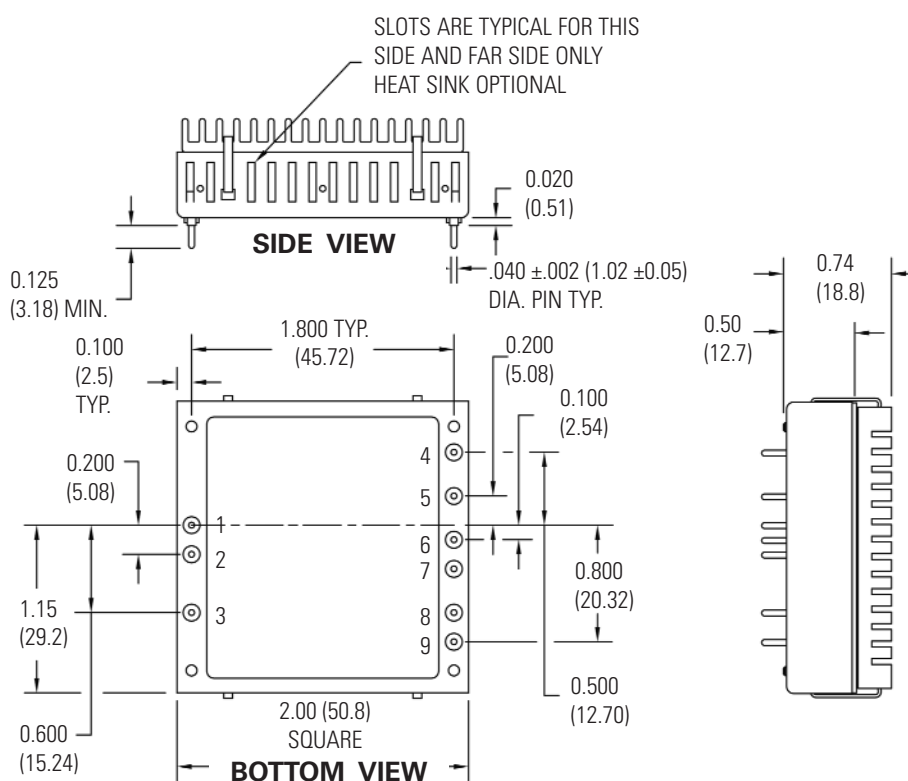
	Min	Typ	Max	Units/Comments
Switching Frequency	360	400	440	kHz; Factory set
Remote Shut Down	Off	0	0.80	VDC; Ref. to input (-)
	On	3.5		VDC or open; Ref. to input(-)
Input - Output Capacitance		1000		pF
Input Filter				LC type
Isolation Voltage				
12 VDC & 24 VDC Input Models				
Input to Output	750			VDC
Input to Baseplate	750			VDC
Output to Baseplate	750			VDC
48 VDC Input Models				
Input to Output	1100			VDC
Input to Baseplate	1100			VDC
Output to Baseplate	750			VDC
Isolation Resistance	100			MOHms



GENERAL CHARACTERISTICS

	Min	Typ	Max	Unit/Comments
Operating Temp. Range	-40		+105	°C; measured at baseplate
Storage Temp. Range	-55		+125	°C; measured at baseplate
Material Flammability				UL94V-0
Altitude: Operating			10,000	Feet
Non-Operating			40,000	Feet
Relative Humidity	5		95	% Humidity, non-condensing
MTBF	1,460,000			Per MIL-HDBK-217F, Ground Benign enviro.
Weight			34	Grams
Size				2" X 2" X 0.5"
Case Material				Black coated aluminum
Agency Approvals				UL/CUL1950

OUTLINE DRAWING



PIN OUT CHART

Pins	FUNCTION
1	+ INPUT
2	- INPUT
3	CONTROL
4	+ OUTPUT V1
5	COMMON
6	- OUTPUT V2
7	NO PIN
8	NO PIN
9	TRIM

Notes:

- Unless otherwise specified dimensions are in inches (mm).
- Controlling dimension in inch.
- Tolerances

Inches	mm
X.XX = ±0.02	X.X = ±0.5
X.XXX = ±0.010	X.XX = ±0.25

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified.
External, low ESR, 33 microfarad (minimum) capacitor across input is recommended for operation.



MODEL SELECTION CHART

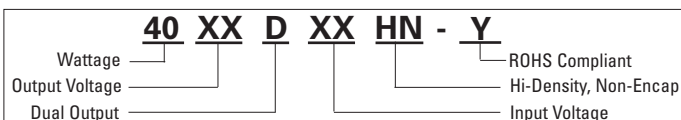
Model	Nominal Input Voltage (VDC)	Input Voltage Range (VDC)	Full Load Input Current (A)	Output Voltage (VDC)	Full Load Output Current (A)	OVP (VDC)	% Efficiency @ FL
4005D12HN	12	9 - 18	3.16	±5.0	±3.0	±6.8	81
4005D12HN-H	12	9 - 18	3.16	±5.0	±3.0	±6.8	81
4012D12HN	12	9 - 18	3.08	±12.0	±1.25	±15.0	83
4012D12HN-H	12	9 - 18	3.08	±12.0	±1.25	±15.0	83
4015D12HN	12	9 - 18	3.04	±15.0	±1.00	±18.0	84
4015D12HN-H	12	9 - 18	3.04	±15.0	±1.00	±18.0	84
4005D24HN	24	18 - 36	2.06	±5.0	±4.0	±6.8	82
4005D24HN-H	24	18 - 36	2.06	±5.0	±4.0	±6.8	82
4012D24HN	24	18 - 36	1.98	±12.0	±1.67	±15.0	86
4012D24HN-H	24	18 - 36	1.98	±12.0	±1.67	±15.0	86
4015D24HN	24	18 - 36	1.96	±15.0	±1.33	±18.0	87
4015D24HN-H	24	18 - 36	1.96	±15.0	±1.33	±18.0	87
4005D48HN	48	36 - 75	1.03	±5.0	±4.0	±6.8	83
4005D48HN-H	48	36 - 75	1.03	±5.0	±4.0	±6.8	83
4012D48HN	48	36 - 75	0.98	±12.0	±1.67	±15.0	87
4012D48HN-H	48	36 - 75	0.98	±12.0	±1.67	±15.0	87
4015D48HN	48	36 - 75	0.97	±15.0	±1.33	±18.0	88
4015D48HN-H	48	36 - 75	0.97	±15.0	±1.33	±18.0	88

Model Input Voltage (VDC)	Under Voltage Shutdown (VDC)	Over Voltage Shutdown (VDC)	Fuse (A) (Use slow blow type fuse)
12	8.0	20.0	10
24	17	40.0	7
48	33	80.0	4



How To ORDER

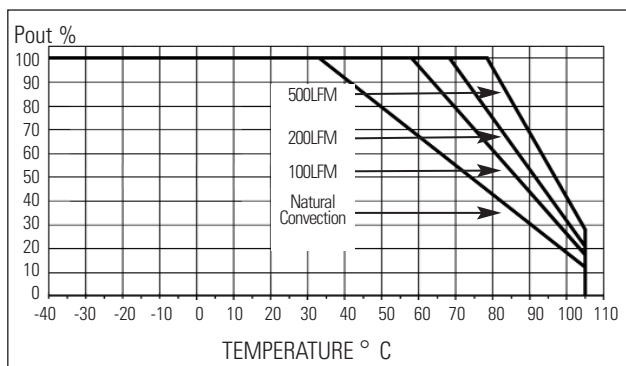
HOW TO ORDER



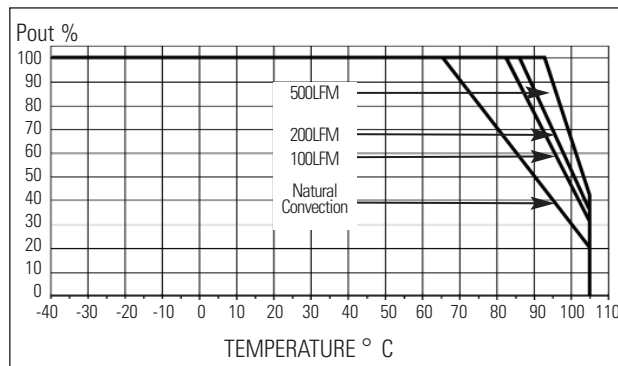
H Options: To add external heatsink mounted on the baseplate of the converter please add a "- H" at the end of the part number. Heatsink is provided to improve thermal performance (see derating curves).

DERATING CURVES

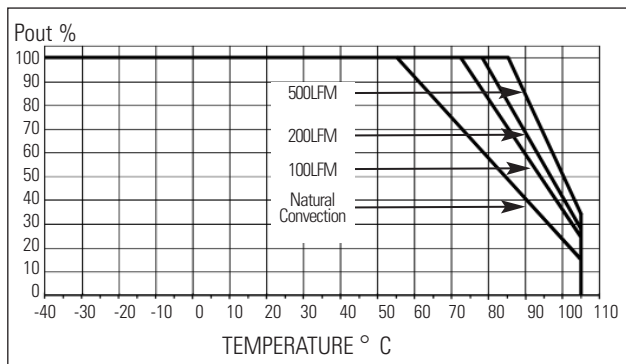
MODEL 4000HN Dual 5V (Without heatsink)



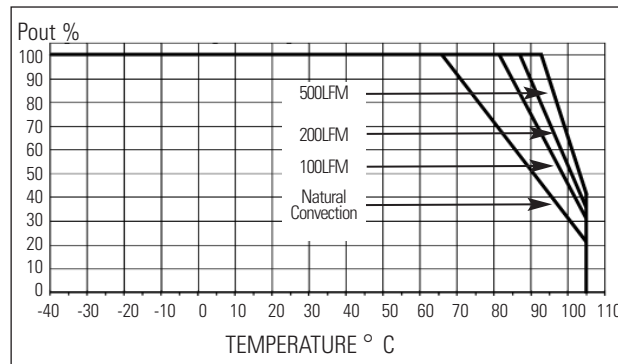
MODEL 4000HN-H Dual 5V (With heatsink)



MODEL 4000HN Dual 12 & 15V (Without heatsink)



MODEL 4000HN-H Dual 12 & 15V (With heatsink)





OUTPUT VOLTAGE ADJUSTMENT (4000HN DUAL SERIES)

The converter's output voltage may be trimmed by up to $\pm 10\%$ of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 6 and 9. Use the following equation, reference Table 1 for variable A.

$$\text{Radj-up} = \frac{A}{\Delta \%} - 16 \text{ (k}\Omega\text{)}$$

Example:

Trim 5% up for 12V Output units,
where $A = 1.79$, $\Delta \% = 0.05$

$$\text{Radj-up} = \frac{1.79}{0.05} - 16 = 19.8 \text{ k}\Omega$$

Both outputs trimmed up by 5%.

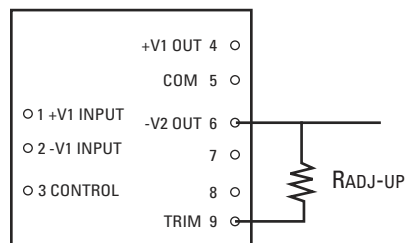


Table 1.

Output Voltage	A
$\pm 5V$	1.5
$\pm 12V$	1.79
$\pm 15V$	1.83

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 4 and 9. Use the following equation, reference Table 2 for variables C and D.

$$\text{Radj-down} = \frac{C}{\Delta \%} - D \text{ (k}\Omega\text{)}$$

Example:

Trim 5% down for 5V Output units,
where $C = 4.5$, $D = 22$, $\Delta \% = 0.05$

$$\text{Radj-down} = \frac{4.5}{0.05} - 22 = 68 \text{ k}\Omega$$

Both outputs trimmed down by 5%.

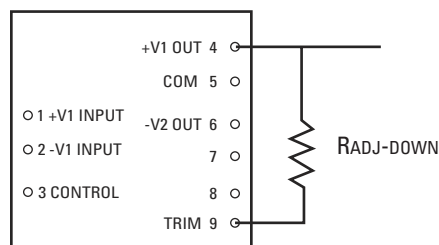


Table 2.

Output Voltage	C	D
$\pm 5V$	4.5	22
$\pm 12V$	15.4	33
$\pm 15V$	20.2	38