

AC-DC Converters

**POWER
SOLVE**

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MHP Series 40W-100W

Features

- Compact Size - High Power Density
- Industrial & Medical Approvals
- Low Leakage Current
- Level B Conducted Emissions
- EN61000-3-2, -3 Compliant
- Convection Cooled
- Class II Approved 40-60 W Models



Electrical Specification

INPUT

Input Voltage	90-264 VAC (120-370 VDC)
Input Frequency	47-63 Hz; 440 Hz
Input Current	40 W: 0.4 A max at 230 VAC, 60 W: 0.6 A max at 230 VAC, 100 W: 0.9 A max at 230 VAC
Inrush Current	40 A max at 230 VAC
Earth Leakage Current	<100 μ A at 115 VAC, <200 μ A at 230 VAC
Input Protection	Internal 3.15 A fuse in line and neutral

OUTPUT

Output Voltage	See tables
Output Voltage Trim	$\pm 5\%$ on 3.3 V & 5 V versions, $\pm 10\%$ on other single output models and V1 of multi-output models. See note 1 for MHP40/60 models
Initial Set Accuracy	$\pm 1.0\%$ V1, $\pm 5\%$ V2, V3 & V4
Minimum Load	See tables
Start Up Delay	2 s max
Start Up Rise Time	50 ms
Hold Up Time	16/75 ms min at 115/230 VAC
Line Regulation	$\pm 0.5\%$
Load Regulation	$\pm 1\%$ single output models; $\pm 3\%$ V1, $\pm 5\%$ V2 & V3 MHP40/60 multi-output models. $\pm 1\%$ V1 & V2, $\pm 5\%$ V3 & V4 MHP100
Cross Regulation	2% on MHP40/60 only
Over/Undershoot	None at turn on/off
Transient Response	4% max. deviation, recovery to within 1% in 500 μ s for a 25% load change
Ripple & Noise	1% pk-pk, 20 MHz bandwidth
Overvoltage Protection	115-135% Vnom, recycle input to reset
Overload Protection	110-150% on primary power limit, auto recovery
Short Circuit Protection	Trip and restart (Hiccup mode)
Temperature Coefficient	0.05%/ $^{\circ}$ C

GENERAL

Efficiency	80-85% depending on model
Isolation	4000 VAC Input to Output, 1500 VAC Input to Ground, 500 VAC Output to Ground
Switching Frequency	70 kHz typical
Power Density	60 W: 6.25 W/In ³ , 100 W: 7.40 W/In ³
MTBF	250 kHrs per MIL-HDBK-217F

ENVIRONMENTAL

Operating Temperature	0 $^{\circ}$ C to +70 $^{\circ}$ C. Refer to derating curves for specific operating limitations.
Cooling	Convection & fan cooled ratings (see derating curves)
Operating Humidity	95% RH, non-condensing
Storage Temperature	-20 $^{\circ}$ C to +85 $^{\circ}$ C
Operating Altitude	3000 m
Shock	30 g pk, half sine, 6 axis
Vibration	2 g rms, 5 Hz to 500 kHz, 3 axis

EMC & SAFETY

Emissions	EN60601-1-2, EN61204-3, FCC 20780, EN55022 & EN55011, level B conducted
Harmonic Currents	EN61000-3-2
Voltage Flicker	EN61000-3-3
ESD Immunity	EN61000-4-2, level 2 Perf Criteria A
Radiated Immunity	EN61000-4-3, 10 V/m Perf Criteria A
EFT/Burst	EN61000-4-4, level 3 Perf Criteria A
Surge	EN61000-4-5, level 3 Perf Criteria A
Conducted Immunity	EN61000-4-6, 10 V Perf Criteria A
Dips & Interruptions	EN61000-4-11, 30% 10 ms, 60% 100 ms, 100% 5000 ms Perf Criteria A, B, B
Safety Approvals	EN60950, UL60950, CSA 22.2 601.1, EN60601-1, UL60601-1, CCC pending, contact sales

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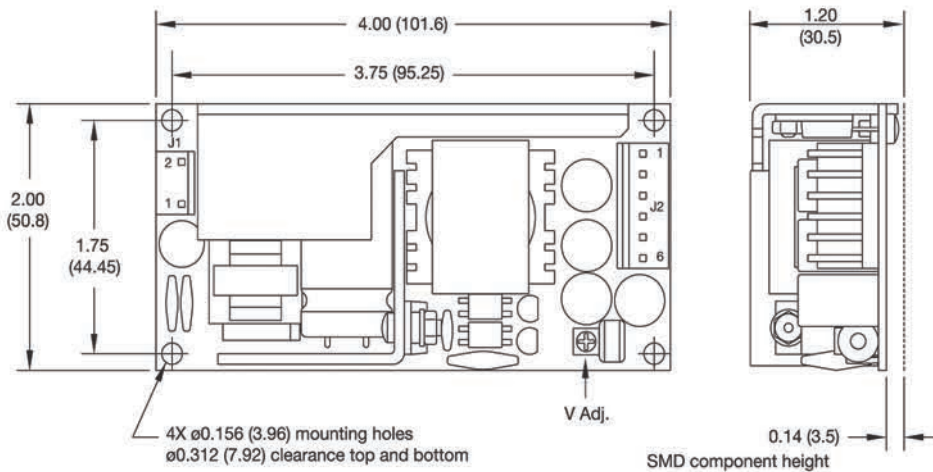
MODELS AND RATINGS

MODEL NUMBER	OUTPUT 1		OUTPUT 2		OUTPUT 3		OUTPUT POWER
	VOLTAGE	CURRENT MIN/MAX ⁽³⁾	VOLTAGE	CURRENT MIN/MAX	VOLTAGE	CURRENT MIN/MAX	
MHP40-05(C)	+5.0 V	0.0 A/8.0 A					40W
MHP40-07(C)	+7.0 V	0.0 A/5.7 A					40W
MHP40-09(C)	+9.0 V	0.0 A/4.4 A					40W
MHP40-12(C)	+12.0 V	0.0 A/3.5 A					40W
MHP40-15(C)	+15.0 V	0.0 A/2.7 A					40W
MHP40-18(C)	+18.0 V	0.0 A/2.2 A					40W
MHP40-24(C)	+24.0 V	0.0 A/1.7 A					40W
MHP40-33(C)	+33.0 V	0.0 A/1.2 A					40W
MHP40-48(C)	+48.0 V	0.0 A/0.9 A					40W
MHP40-512(C)	+5.0 V	0.5 A/6.0 A	+12.0 V	0.1 A/2.0 A			40W
MHP40-515(C)	+5.0 V	0.5 A/6.0 A	+15.0 V	0.1 A/1.5 A			40W
MHP40-51212(C)	+5.0 V	0.5 A/6.0 A	+12.0 V	0.1 A/2.0 A	-12.0 V	0.0 A/0.5 A	40W
MHP40-52412(C)	+5.0 V	0.5 A/6.0 A	+24.0 V	0.1 A/1.0 A	-12.0 V	0.0 A/0.5 A	40W
MHP40-51515(C)	+5.0 V	0.5 A/6.0 A	+15.0 V	0.1 A/1.5 A	-15.0 V	0.0 A/0.5 A	40W
MHP40-33512(C)	+3.3 V	0.5 A/6.0 A	+5.0 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	40W
MHP40-53312(C)	+5.0 V	0.5 A/6.0 A	+3.3 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	40W

Notes:

- V2 will track a change in V1 by the same percentage change in voltage as V1 is trimmed.
- To receive unit with cover fitted, add suffix (-C) to model number. For Class I operation only.
- A 120% peak load can be taken for up to 100 ms with a 25% duty cycle. Average load not to exceed 40 W.

MECHANICAL DETAILS



Notes:

- All dimensions in inches (mm). Tolerance .xx = ±0.02 (0.50); .xxx = ±0.01 (0.25)
- Cover dimensions are 4.49 x 2.52 x 1.52 (114 x 64 x 38.5)

Input Connector J1

Pin 1	Line
Pin 2	Neutral

J1 mates with
Molex housing 43061-0003 &
Molex series 5194 crimp terminals

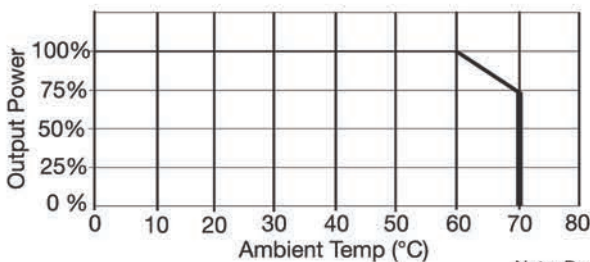
Output Connector J1

Pin	Single	Multi
1	+V1	+V1
2	+V1	+V1
3	RTN	RTN
4	RTN	RTN
5	NC	-V3
6	NC	+V2

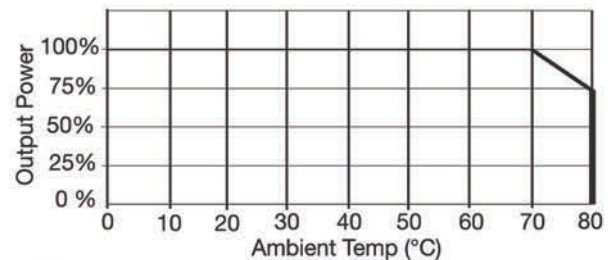
J2 mates with
Molex housing 43061-0006 &
Molex series 5194 crimp terminals
Weight: approx. 0.33 lb (150 g)

DERATING CURVES

All MHP40 models convection-cooled



All MHP40 models with 5 CFM



Note: Derate by 10% if cover is fitted

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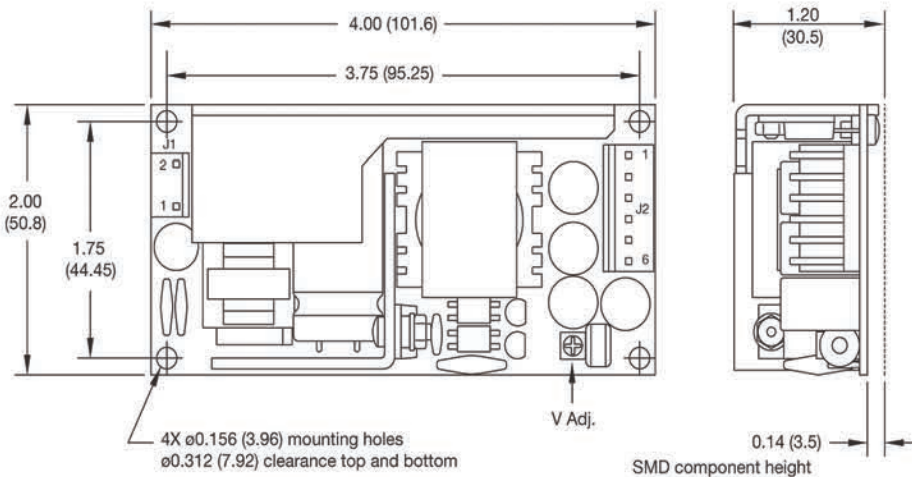
MODELS AND RATINGS

MODEL NUMBER	OUTPUT 1		OUTPUT 2		OUTPUT 3		OUTPUT POWER
	VOLTAGE	CURRENT MIN/MAX ⁽³⁾	VOLTAGE	CURRENT MIN/MAX	VOLTAGE	CURRENT MIN/MAX	
MHP60-05(C)	+5.0 V	0.0 A/12.00 A					60W
MHP60-07(C)	+7.0 V	0.0 A/8.60 A					60W
MHP60-09(C)	+9.0 V	0.0 A/6.70 A					60W
MHP60-12(C)	+12.0 V	0.0 A/5.00 A					60W
MHP60-15(C)	+15.0 V	0.0 A/4.00 A					60W
MHP60-18(C)	+18.0 V	0.0 A/3.30 A					60W
MHP60-20(C)	+20.0 V	0.0 A/3.00 A					60W
MHP60-24(C)	+24.0 V	0.0 A/2.50 A					60W
MHP60-33(C)	+33.0 V	0.0 A/1.80 A					60W
MHP60-48(C)	+48.0 V	0.0 A/1.25 A					60W
MHP60-512(C)	+5.0 V	0.5 A/8.00 A	+12.0 V	0.1 A/3.0 A			60W
MHP60-515(C)	+5.0 V	0.5 A/8.00 A	+15.0 V	0.1 A/2.5 A			60W
MHP60-51212(C)	+5.0 V	0.5 A/8.00 A	+12.0 V	0.1 A/3.0 A	-12.0 V	0.0 A/0.5 A	60W
MHP60-52412(C)	+5.0 V	0.5 A/8.00 A	+24.0 V	0.1 A/1.5 A	-12.0 V	0.0 A/0.5 A	60W
MHP60-51515(C)	+5.0 V	0.5 A/8.00 A	+15.0 V	0.1 A/2.5 A	-15.0 V	0.0 A/0.5 A	60W
MHP60-33512(C)	+3.3 V	0.5 A/8.00 A	+5.0 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	60W
MHP60-53312(C)	+5.0 V	0.5 A/8.00 A	+3.3 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	60W

Notes:

- V2 will track a change in V1 by the same percentage change in voltage as V1 is trimmed.
- To receive unit with cover fitted, add suffix (-C) to model number. For Class I operation only.
- A 120% peak load can be taken for up to 100 ms with a 25% duty cycle. Average load not to exceed 60 W.

MECHANICAL DETAILS



Notes:

- All dimensions in inches (mm). Tolerance .xx = ±0.02 (0.50); .xxx = ±0.01 (0.25)
- Cover dimensions are 4.49 x 2.52 x 1.52 (114 x 64 x 38.5)

Input Connector J1

Pin 1	Line
Pin 2	Neutral

J1 mates with Molex housing 43061-0003 & Molex series 5194 crimp terminals. Optional ground (0.25 faston) tab available, contact sales.

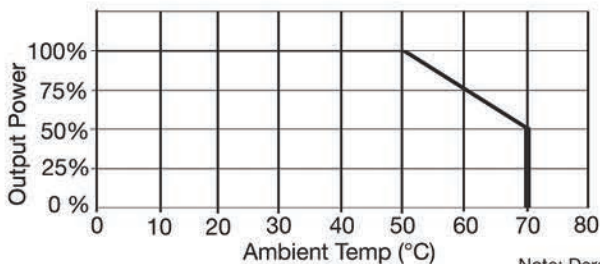
Output Connector J1

Pin	Single	Multi
1	+V1	+V1
2	+V1	+V1
3	RTN	RTN
4	RTN	RTN
5	NC	-V3
6	NC	+V2

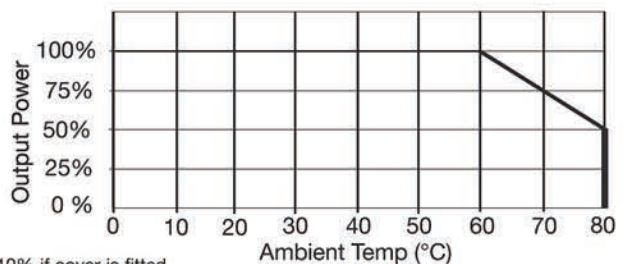
J2 mates with Molex housing 43061-0006 & Molex series 5194 crimp terminals. Weight: approx. 0.33 lb (150 g)

DERATING CURVES

All MHP60 models convection-cooled



All MHP60 models with 5 CFM



Note: Derate by 10% if cover is fitted

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MODELS AND RATINGS

Single Output Models

MODEL NUMBER	OUTPUT VOLTAGE	MINIMUM	OUTPUT CURRENT MAXIMUM	WITH 5 CFM COOLING
MHP100-3V3(C)	+3.3 V	0.0 A	15.0 A	20.0 A
MHP100-05(C)	+5.0 V	0.0 A	15.0 A	20.0 A
MHP100-07(C)	+7.0 V	0.0 A	11.4 A	14.3 A
MHP100-09(C)	+9.0 V	0.0 A	8.8 A	11.1 A
MHP100-12(C)	+12.0 V	0.0 A	7.5 A	8.3 A
MHP100-15(C)	+15.0 V	0.0 A	6.0 A	6.6 A
MHP100-18(C)	+18.0 V	0.0 A	5.0 A	5.5 A
MHP100-24(C)	+24.0 V	0.0 A	4.1 A	4.1 A
MHP100-33(C)	+33.0 V	0.0 A	3.0 A	3.0 A
MHP100-48(C)	+48.0 V	0.0 A	2.1 A	2.1 A

Multi Output Models

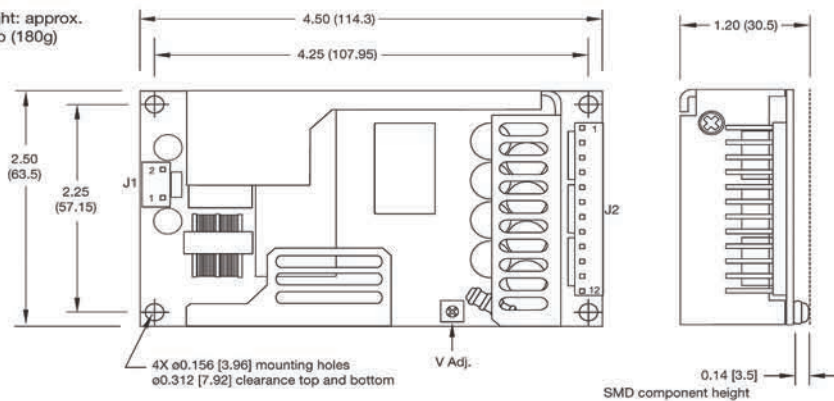
MODEL NUMBER	OUTPUT POWER		OUTPUT 1		OUTPUT 2		OUTPUT 3		OUTPUT 4	
	CONVECTION COOLED	FORCED AIR 5CFM	VOLTAGE	CURRENT MIN/MAX	VOLTAGE	CURRENT MIN/MAX	VOLTAGE	CURRENT MIN/MAX	VOLTAGE	CURRENT MIN/MAX
MHP100-512(C)	80 W	100 W	+5.0 V	0.0 A/12.0 A	+12.0 V	0.0 A/3.0 A				
MHP100-515(C)	80 W	100 W	+5.0 V	0.0 A/12.0 A	+15.0 V	0.0 A/3.0 A				
MHP100-51212(C)	75 W	100 W	+5.0 V	0.5 A/10.0 A	+12.0 V	0.0 A/3.0 A	-12.0 V	0.0 A/0.8 A		
MHP100-52412(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+24.0 V	0.0 A/2.0 A	-12.0 V	0.0 A/0.8 A		
MHP100-51515(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+15.0 V	0.0 A/3.0 A	-15.0 V	0.0 A/0.8 A		
MHP100-33512(C)	65 W	100 W	+3.3 V	0.5 A/10.0 A	+5.0 V	0.0 A/5.0 A	+12.0 V	0.0 A/0.8 A		
MHP100-53312(C)	70 W	100 W	+5.0 V	0.5 A/10.0 A	+3.3 V	0.0 A/5.0 A	+12.0 V	0.0 A/0.8 A		
MHP100-5125(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+12.0 V	0.0 A/3.0 A	-5.0 V	0.0 A/0.8 A		
MHP100-5155(C)	70 W	100 W	+5.0 V	0.5 A/10.0 A	+15.0 V	0.0 A/3.0 A	-5.0 V	0.0 A/0.8 A		
MHP100-53312D(C)	65 W	100 W	+5.0 V	0.5 A/10.0 A	+3.3 V	0.1 A/5.0 A	+12.0 V	0.0 A/0.8 A	-12.0 V	0.0 A/0.5 A
MHP100-33512D(C)	60 W	100 W	+3.3 V	0.5 A/10.0 A	+5.0 V	0.1 A/5.0 A	+12.0 V	0.0 A/0.8 A	-12.0 V	0.0 A/0.5 A
MHP100-52412D(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+24.0 V	0.1 A/2.0 A	+12.0 V	0.0 A/0.8 A	-12.0 V	0.0 A/0.5 A
MHP100-52415D(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+24.0 V	0.1 A/2.0 A	+15.0 V	0.0 A/0.8 A	-15.0 V	0.0 A/0.5 A
MHP100-512D5(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+12.0 V	0.1 A/3.0 A	-12.0 V	0.0 A/0.8 A	-5.0 V	0.0 A/0.5 A
MHP100-515D5(C)	80 W	100 W	+5.0 V	0.5 A/10.0 A	+15.0 V	0.1 A/3.0 A	-15.0 V	0.0 A/0.8 A	-5.0 V	0.0 A/0.5 A

Notes:

- To receive unit with cover fitted, add suffix (-C) to model number.
- Output 3 available with opposite polarity for OEM quantities.
- MHP100 models are class I only, contact sales for class II.

MECHANICAL DETAILS

Weight: approx.
0.4 lb (180g)

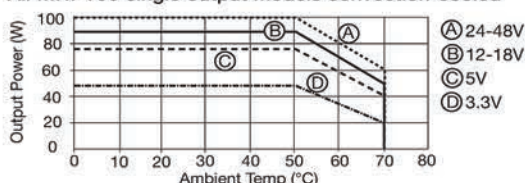


Notes:

- All dimensions in inches (mm). Tolerance .xx = ± 0.02 (0.50); .xxx = ± 0.01 (0.25)
- Cover dimensions are 4.96 x 3.05 x 1.52 (126 x 77.5 x 38.5)

DERATING CURVES

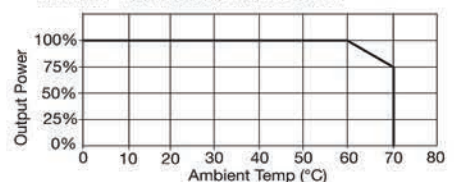
All MHP100 single output models convection-cooled



Note:

- Derate by 10% if cover is fitted.
- For multi output convection-cooled operation above +50 °C derate linearly to 50% at +70 °C.

All MHP100 models with 5 CFM



Input Connector J1

Pin	Line
Pin 1	Line
Pin 2	Neutral

J1 mates with Molex housing 43061-0003 and Molex series 5194 crimp terminals. Optional ground (0.25 faston) tab available.

Output Connector J1

Pin	Single	Multi
1	+V1	+V1
2	+V1	+V1
3	+V1	+V1
4	+V1	+V1
5	V1 RTN	RTN
6	V1 RTN	RTN
7	V1 RTN	RTN
8	V1 RTN	RTN
9	NOT USED	+V2
10	NOT USED	+V2
11	NOT USED	+V3
12	NOT USED	-V4

J2 mates with Molex housing 43061-0012 and Molex series 5194 crimp terminals.

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