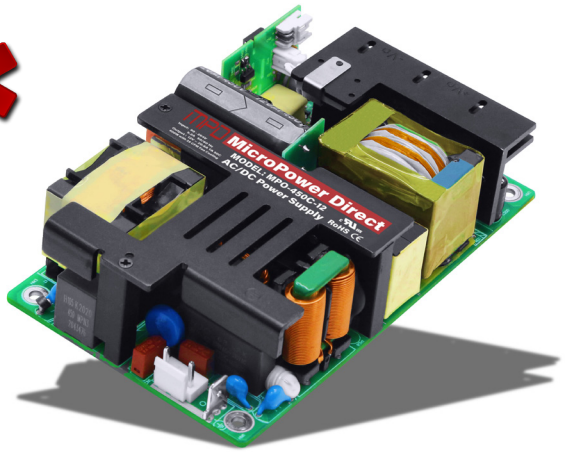
MPO-450C

Very Compact, 450W Industrial/Medical AC/DC Power Supplies



Key Features:

- 450W Output Power
- Compact 5" x 3" Size
- UL 60601 Approval
- UL 62368 Approval
- -40° to +70°C Operation
- Suitable For BF Apps
- Remote Sense Function
- 5 VDC Standby Output
- Meets EN 55032 B
- Meets EN 60335
- Meets EN 61558
- <0.1mA Leakage Current
- Active PFC

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range		90		264	VAC
		127		370	VDC
Input Frequency		47		63	Hz
Input Current	115 VAC			5.2	A
	230 VAC			3.0	
Leakage Current	264 VAC	Contact <0.1 mA; Earth <0.5 mA			
Inrush Current, Cold Start	115 VAC		40		A Pk
	230 VAC		80		
Power Factor	115 VAC	0.98			---
	230 VAC	0.95			

Output

Parameter	Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy, 0-100%	27V/36V/48V/54V Output			±1.0		%
Load	All Other Models			±2.0		
Line Regulation	At Rated Load			±0.5		%
Load Regulation	0 - 100% Load			±1.0		%
Ripple & Noise (20 MHz)	See Note 2				200	mV
Hold-Up Time	115 VAC Input		12			mSec
	230 VAC Input		16			
Temperature Coefficient				±0.03		%/°C
Temperature Derating	Air Cooling (250W)	115VAC +40 to 60°C	4.5			W/°C
		230VAC +45 to 60°C	4.0			
	25CFM	+50 to 70°C	2.0			
Input Voltage Derating	90 - 115VAC		1.0			%/°C
Standby Power Consumption	12V/24V/48V Output				0.60	W
	All Other Models				0.50	
Fan Power	12V @ 0.50A					
Over Current Protection	Self Recovery		105			%IOUT
Over Temperature Protection	See Note 3					
Short Circuit Protection, See Note 4	Continuous (Autorecovery)					

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, See Note 5	Input to Output	4,000			VAC
	Input to Ground	2,000			
	Output to Ground	1,500			
Insulation Resistance	See Note 6	100			MΩ
Isolation Level	Input to Output	2 x MOPP			
	Input to Ground	1 x MOPP			
	Output to Ground	1 x MOPP			
Switching Frequency			110		kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+70	°C
Storage Temperature Range		-40		+85	°C
Cooling	Free Air Convection (See Derating Curves)				
Humidity, RH, Non-condensing	Operating	20		90	%
	Storage	10		95	

Physical

Size	5.00 x 3.00 x 1.52 in. (See Mechanical Drawing on Page 5)
Weight	14.11 oz (400g) (See Mechanical Drawing on Page 5)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	200			kHours
Safety Standards	UL/cUL 60601-1 Recognition (UL Certificate)				
	UL/cUL 62368-1 Recognition (UL Certificate)				
	Meets IEC/EN 60335, EN 61558				
Safety Class	Class I				

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Model Selection Guide

	Model Number	Cooling Method	Output				Over Voltage Protection (VDC) See Note 7	Output Capacitive Load (μF Max)	Efficiency @ 230 VAC (%, Typ)
			Voltage (VDC)	Current (A)		Power (W)	Adj Range (VDC)			
				Rated	% Min.					
	MPO-450C-12	Air Cooling	12.0	20.80	0.00	250.0	11.40 - 12.60	15.6	6,000	91.0
		25 CFM		33.30		400.0				
	MPO-450C-15	Air Cooling	15.0	16.70	0.00	250.0	14.25 - 15.75	19.5	6,000	92.0
		25 CFM		26.70		400.0				
	MPO-450C-18	Air Cooling	18.0	13.90	0.00	250.2	17.10 - 19.90	23.4	6,000	92.5
		25 CFM		22.20		399.6				
	MPO-450C-19	Air Cooling	19.0	13.20	0.00	250.8	17.10 - 19.90	23.4	6,000	92.5
		25 CFM		21.10		400.9				
UL	MPO-450C-24	Air Cooling	24.0	10.50	0.00	250.0	22.80 - 25.20	31.2	6,000	93.0
		25 CFM		18.75		450.0				
	MPO-450C-27	Air Cooling	27.0	9.30	0.00	250.0	25.65 - 28.35	35.1	4,000	93.5
		25 CFM		16.70		450.0				
	MPO-450C-36	Air Cooling	36.0	6.95	0.00	250.0	34.20 - 37.80	46.8	3,000	93.0
		25 CFM		12.50		450.0				
	MPO-450C-48	Air Cooling	48.0	5.30	0.00	250.0	45.60 - 50.40	60.0	2,000	94.0
		25 CFM		9.40		450.0				
	MPO-450C-54	Air Cooling	54.0	4.63	0.00	250.0	51.30 - 56.70	63.0	2,000	94.0
		25 CFM		8.33		449.8				
	* MPO-450C-24 have UL/cUL 62368-1 recognition (UL certificate). Contact the factory for safety standard status of other models.									

Notes:

1. Units that are marked with the "UL" in the model selection table above are approved to UL 62368. Other models meet these specifications.
2. Output ripple is measured at 20 MHz bandwidth using a 0.1 μF ceramic capacitor, and a 47 μF electrolytic capacitor connected in parallel as close to the power supply terminals as possible.
3. After an overtemperature fault, the unit will recover automatically when the temperature drops.
4. Output short circuit protection is provided by a "hiccup mode" circuit. The unit recovers <5 seconds after the fault condition is removed, except for 12V, 24V and 48V ouput models. These models recover 10s after the fault is removed.
5. Input-output, input-ground and output-ground isolation are tested for 60 seconds with a leakage current of <5 mA.
6. Insulation resistance is tested at an ambient temperature of 25ºC ± 5ºC, at a relative humidity of <95%RH (no condensation) with a test voltage of 500 VDC. It is given for input to output, input to ground and output to ground.
7. After an overvoltage fault, the unit power must be recycled for the unit to recover.
8. The standby 5V output (CN4) has a load capacity of 06.A without a fan and 1A with a fan providing 25 CFM. The tolerance is 2% and ripple is 120 mVP-P Max.
9. All units include an on-board slow blow fuse.

The **MPO-450C** is also available with a compact metal case. Contact the factory for more information. (Example **MPO-450C-12-C**)

EMC Characteristics

Parameter	Conditions	Criteria	Level
Conducted Emissions	EN 55032		Class B
Radiated Emissions	EN 55032		Class B
Harmonic Current	EN 61000-3-2		Class A/Class D
Voltage Flicker	EN61000-3-3		
ESD	EN 61000-4-2	A	±15 kV Air
			±8 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT	EN 61000-4-4	A	±2 kV
Surge	EN 61000-4-5	A	±2 kV Line to Line
			±4 kV Line to Gnd
CS	EN 61000-4-6	A	10V rms
Dips	EN 61000-4-11	B	0%, 70%

Notes:

1. All EMC tests are conducted on a metal plate measuring 360 x 360 mm with a thickness of 1mm. Contact the factory for more information.

Operating Signals

Power On and Power Good signals are provided to help monitor power supply operation. A couple of notes are:

1. The PG signal goes high with 10 mS to 500 mS delay after the power supply start up.
2. The PG signal goes low at least 1 mS before the output voltage reaches 90% of nominal value.

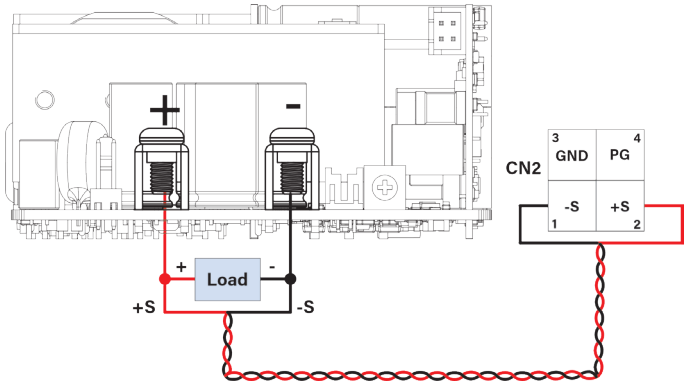
See page 5 for connection information.

Signal	Conditions		Min.	Typ.	Max.	Units
PS ON Input Signal	Power ON	PS_ON High	2.0		5.0	VDC
	Power OFF	PS_ON Low	0		0.5	
PG Signal	Power On, See Note 1		10		500	mS
	Power Off/Power Fail, See Note 2		1			mS
	High Level	High	2.0		6.0	VDC
	Low Level	Low	0		0.6	

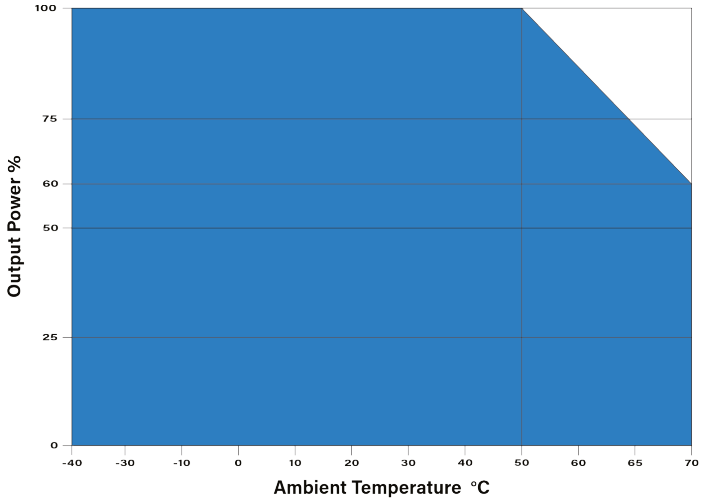
Remote Sensing

The remote sense connection may be used to compensate for a voltage drop on the output cable. If used, the connection is made as shown in the figure at right. Some precautions include:

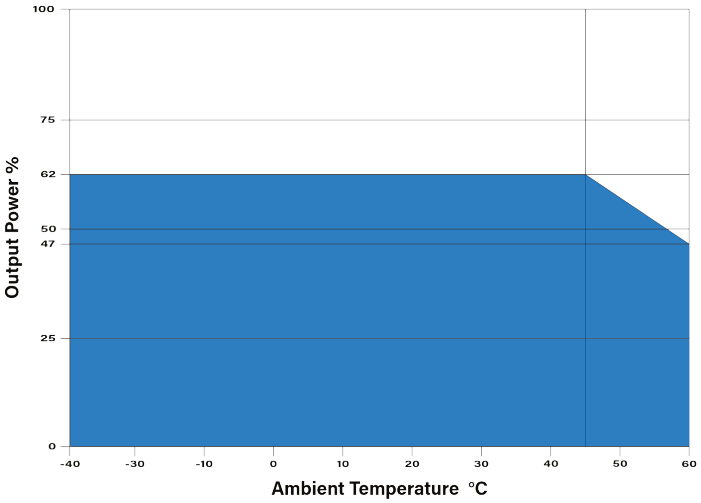
1. The +S and -S terminals cannot be reversed or shorted. The power supply would be damaged if this occurs.
2. The remote compensation connection must be made with twisted pair wires (as shown in the diagram at left). This helps to reduce signal interference.



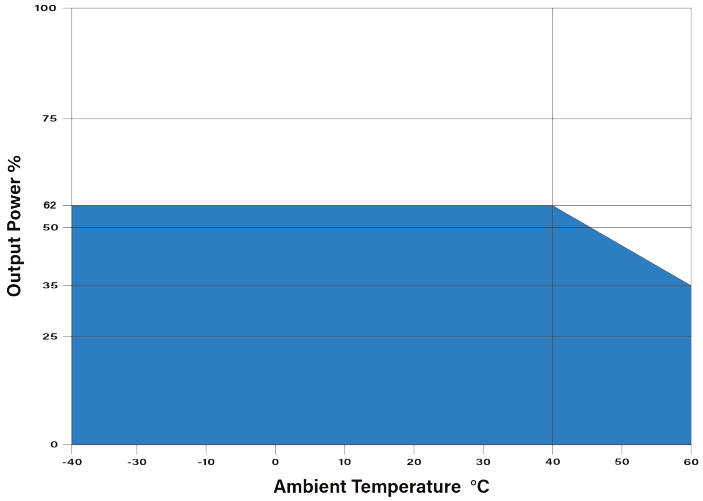
Temperature Derating, All Models, 25 CFM



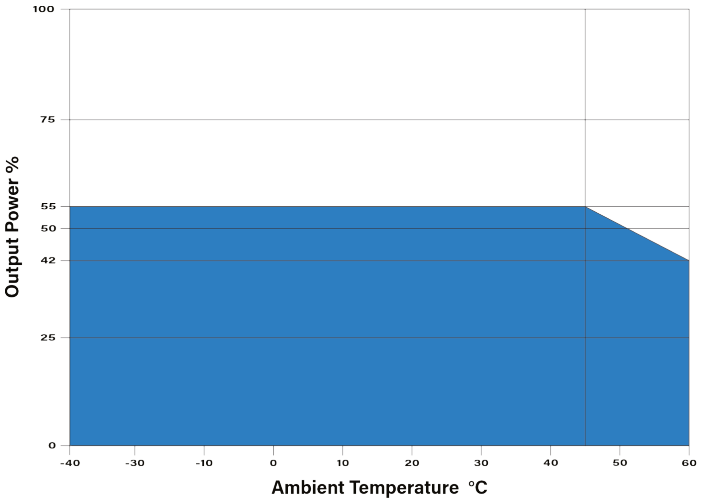
Temp Derating, 12/15/18/19 VOUT, 230 VAC, Convection



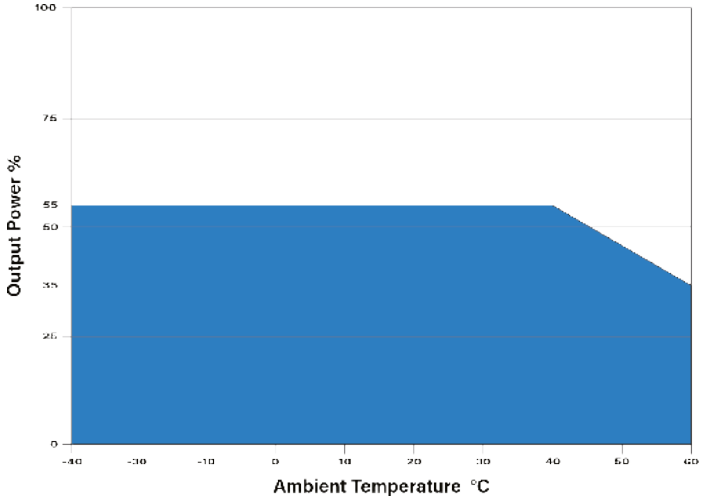
Temp Derating, 12/15/18/19 VOUT, 115 VAC, Convection



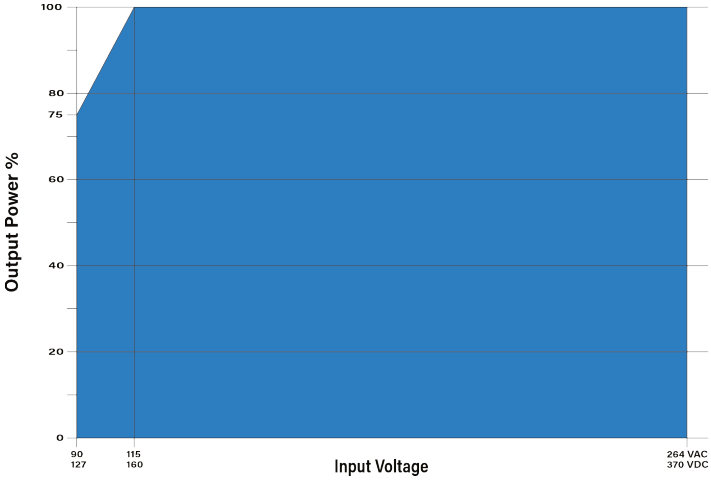
Temp Derating, All Other Models, 230 VAC, Convection



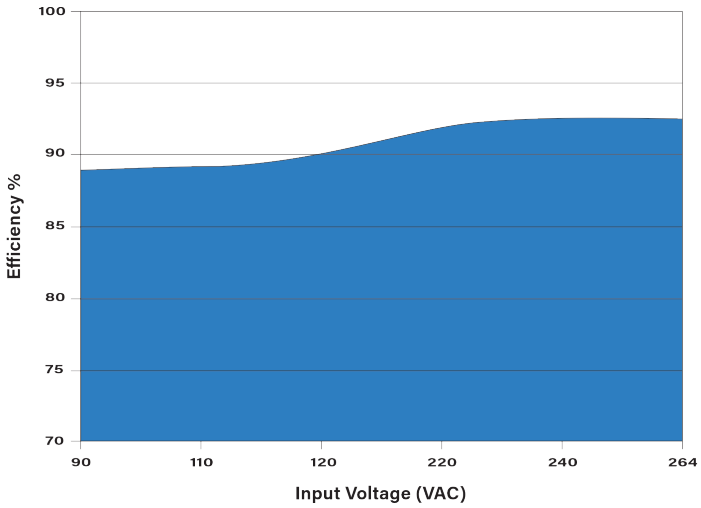
Temp Derating, All Other Models, 115 VAC, Convection



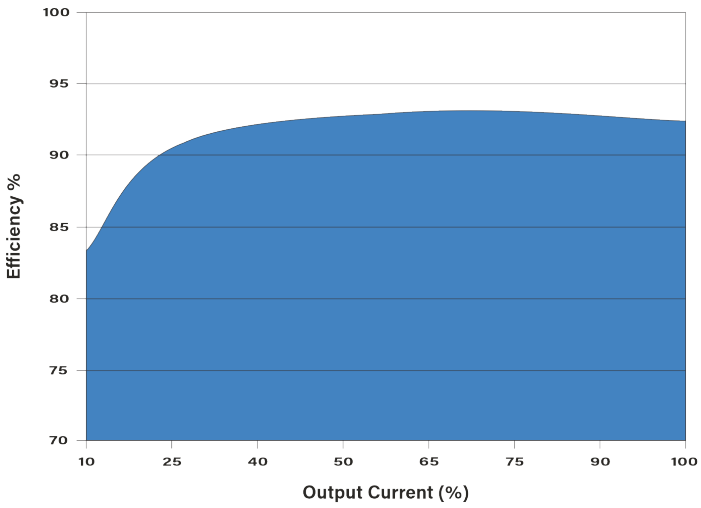
Input Voltage Derating



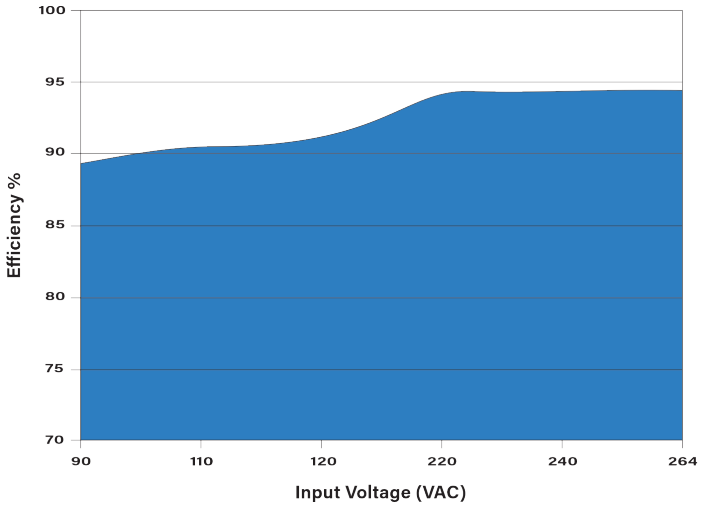
Efficiency vs Input Voltage: 12 VOUT



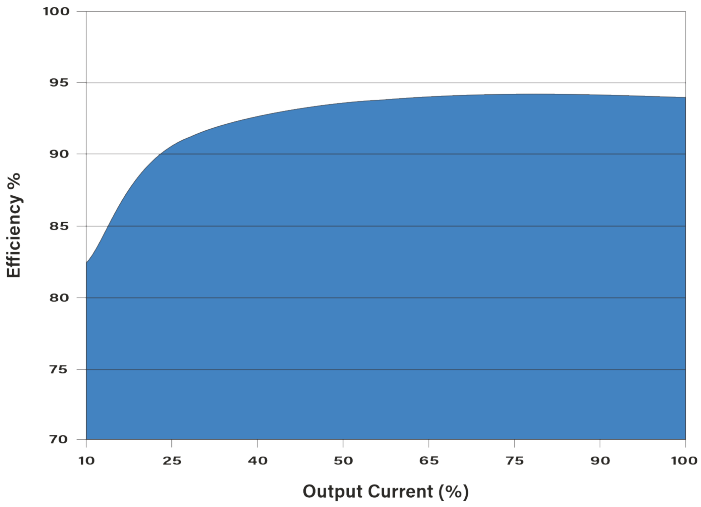
Efficiency vs Output Load: 12 VOUT



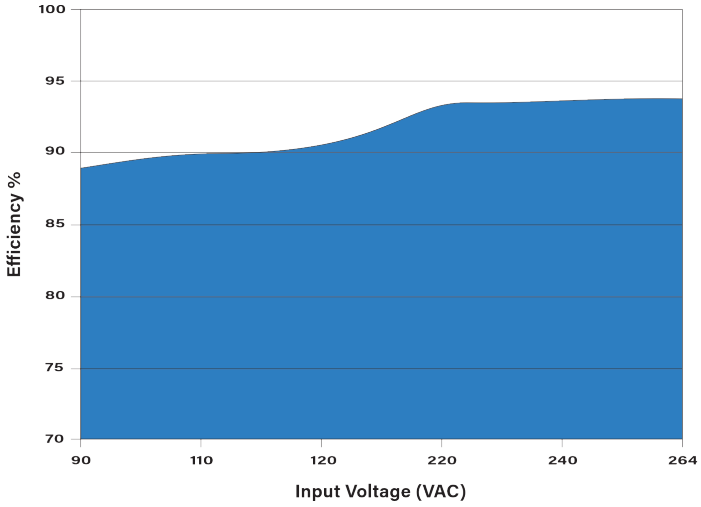
Efficiency vs Input Voltage: 24 VOUT



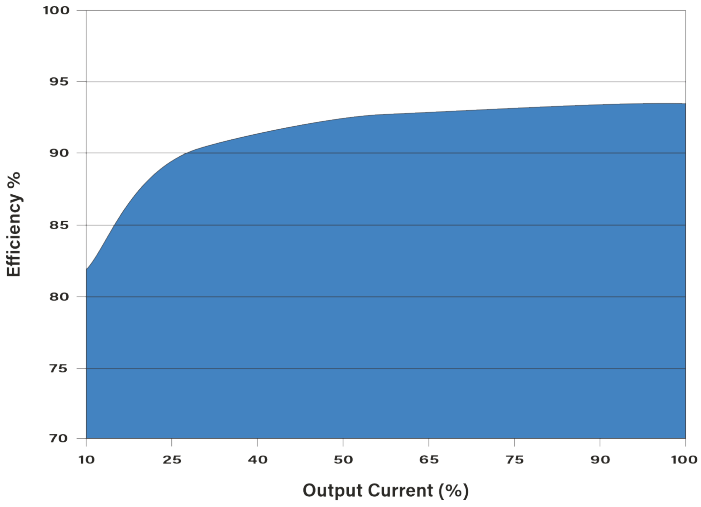
Efficiency vs Output Load: 24 VOUT



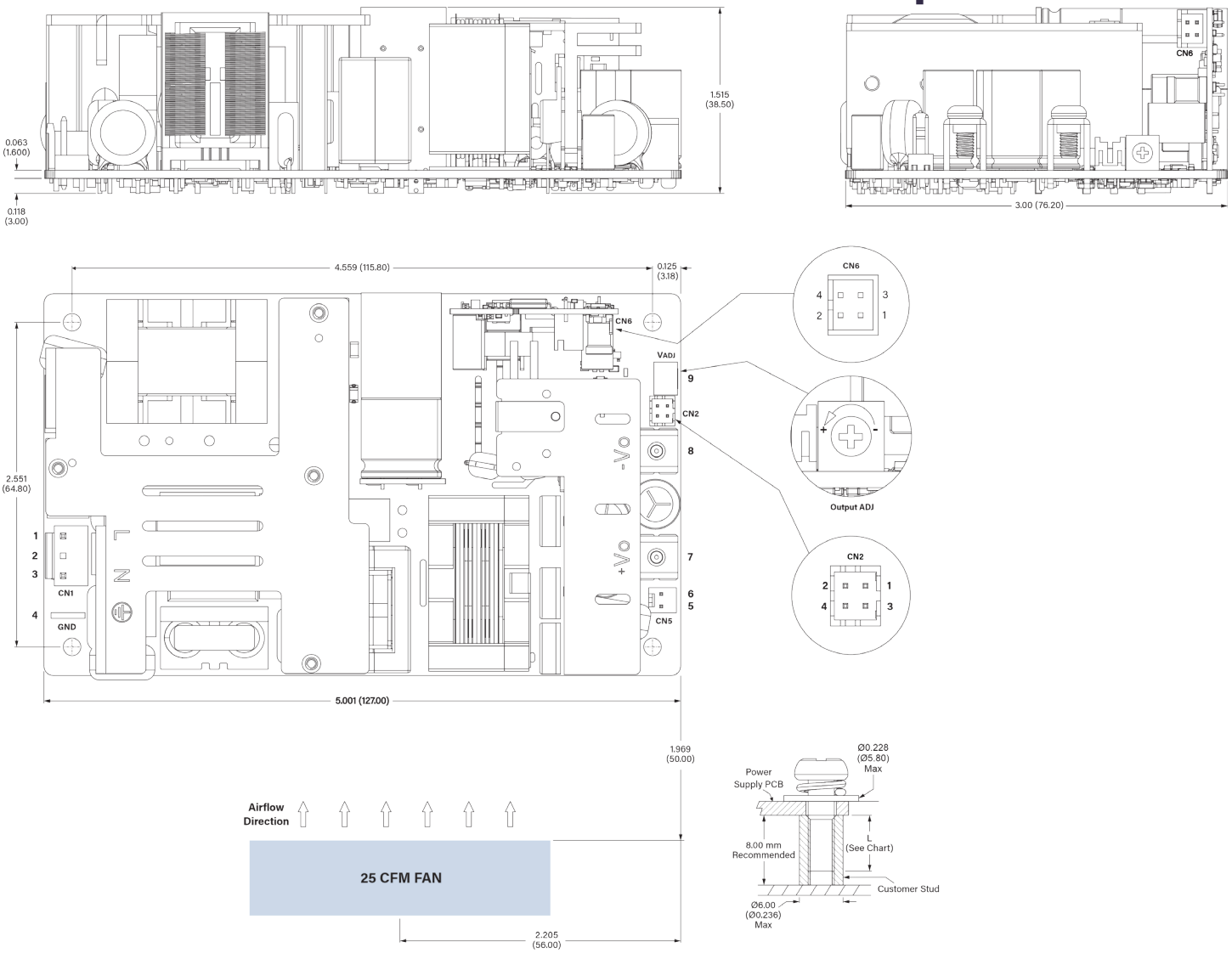
Efficiency vs Input Voltage: 48 VOUT



Efficiency vs Output Load: 48 VOUT



Mechanical Dimensions



Power Connections

Input Connector (CN1):

- Mating Terminal: JST VHR-3 or equivalent
- Contact: JST SVH-21T-P1.1

Pin	Function
1	AC-Line
2	No Connection
3	AC-Neutral

Ground Connection: Ferrule Wire

Output Connection:

- Screw Terminals (7, 8) M4
  Max Tightening Tourqe 1.2N•m
- Adjust. Resistor (9)

Pin	Function
7	+VOUT
8	-VOUT
9	VADJ

Unit Mounting Screws:

Position	Screw	L (Recommended)	Max Torque
1, 2, 3, 4	M3	6 mm	0.4N•m

1. For class I systems, points 1, 2 & 3 must be connected to earth grnd.
2. For class II systems, points 1, 2 & 3 must be connected together.

Signal Connections

CN2: Fan Connector

- Mating Terminal: TKP 2502 or equivalent
- Contact: TKP 54T

Pin	Function
5	+Fan
6	-Fan

Remote Sense (CN2):

- Mating Terminal: JST PHD-2*2Y
- Contact: JST PHD-TE

Pin	Function
1	RS -
2	RS +

See Page 2 for more Info

Power Good (CN2):

Pin	Function
3	GND
4	Power Good

See Page 2 for more Info

Standby Output (CN6):

- Mating Terminal: JST PHD-2*2Y
- Contact: JST PHD-TE

Pin	Function
1	+ 5V
2	GND

See Page 2, Note 8

Power On Signal (CN4):

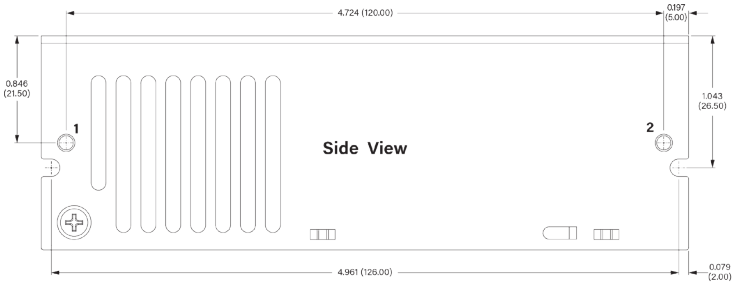
Pin	Function
3	PS-ON
4	GND

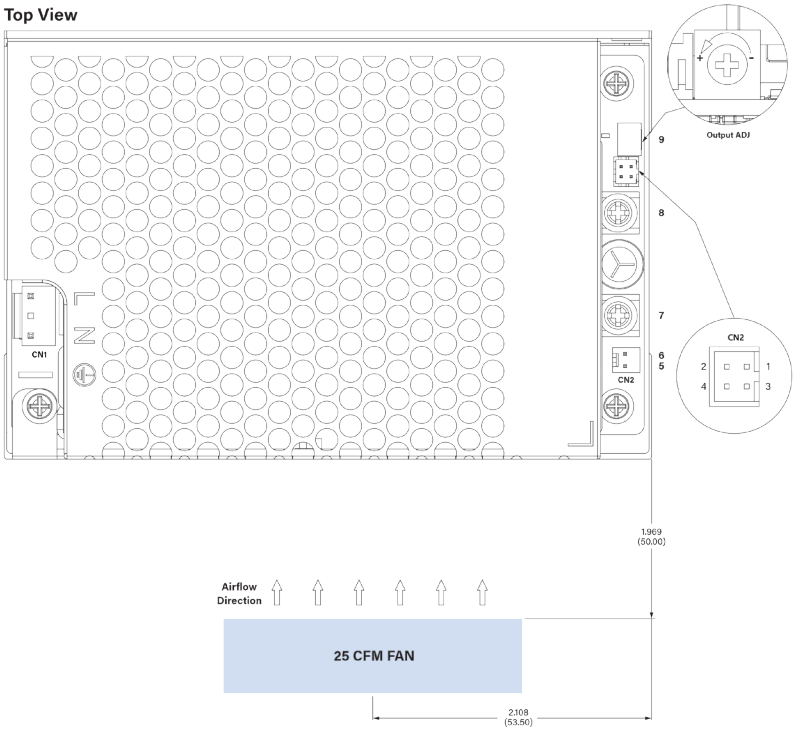
See Page 2 for more Info

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance = ±0.039 (±1.0)
- Weight (Typ) = 14.10 Oz (400g)
- The Fan Power output (CN2) should not be used to power other devices
- The unit should be connected to PE before operating. This connection can be made at any position (1 to 6) as shown on the mechanical diagram.
- A minimum of 10 mm should be maintained between the power supply and any other components
- The unit uses double pole, neutral fusing. Disconnect the mains before servicing.

Mechanical Dimensions, MPO-450C-C





Power Connections

CN1: Input Connector

- Mating Terminal: JST VHR
- Contact: JST SVH-21T-P1.1

Pin	Function
1	AC-Line
2	No Connection
3	AC-Neutral

Ground Connection: Ferrule Wire

Output Connection:

- Screw Terminals (7, 8) M4
  Max Tightening Tourqe 1.2N•m
- Adjust. Resistor (9)

Pin	Function
7	+VOUT
8	-VOUT
9	VADJ

Signal Connections

CN2: Fan Connector

- Mating Terminal: TKP 2502
- Contact: TKP 8811

Pin	Function
5	+Fan
6	-Fan

CN6: Standby Output

- Mating Term: TKP DH2-4P
- Contact: TKP DHT

Pin	Function
1	+ 5V
2	GND

CN4: Power On Signal

Pin	Function
3	PS-ON
4	GND

See Page 2 for more Info

CN2: Remote Sense

- Mating Term: TKP DH2-4P
- Contact: TKP DHT

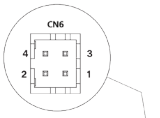
Pin	Function
1	RS -
2	RS +

See Page 4 for more Info

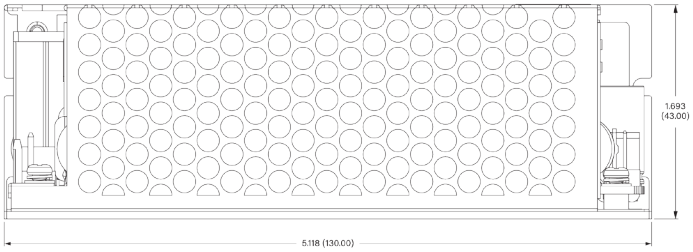
CN3: Power Good

Pin	Function
3	GND
4	Power Good

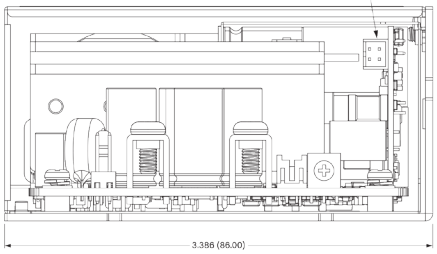
See Page 2 for more Info



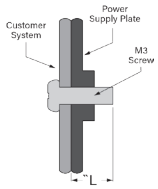
Side View



End View



Connection to Customer System



Unit Mounting Screws:

Position	Screw	L (Recommended)	Max Torque
1, 2	M3	4.0 mm	0.4N•m
3, 4, 5, 6	M3	2.0 mm	0.4N•m

1. The outer case needs to be connected to the system PE

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance = ±0.039 (±1.0)
- Weight (Typ) = 21.34 Oz (605g)
- The Fan Power output (CN2) should not be used to power other devices
- The unit should be connected to PE before operating. This connection can be made at any position (1 to 6) as shown on the mechanical diagram.
- A minimum of 10 mm should be maintained between the power supply and any other components
- The unit uses double pole, neutral fusing. Disconnect the mains before servicing.

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