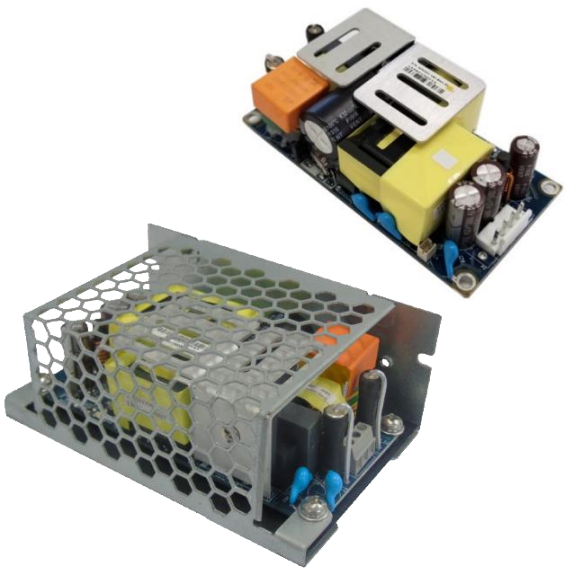
200W High Power Density Medical and Industrial Grade Power Supplies ASM201



- ☑ 200 Watts Output, Forced Air
- ☑ 140 Watts Output, Convection
- ☑ IEC 62638 and IEC 60950 I.T.E. Safety
- ☑ IEC 60601-1 3rd Edition Medical Safety
- ☑ 60601-1-2 4th Edition EMC
- ☑ BF Leakage Current, 2 MOPP Isolation
- ☑ EN 55011 (CISPR11) Class B Emissions
- ☑ IEC Class I/II Certified
- ☑ Approved for Home Medical Usage
- ☑ Miniature 2” x 4” x 1.21” Open Frame Footprint
- ☑ 12V Auxiliary Fan Output
- ☑ High Efficiency, up to 95% at 230 VAC
- ☑ Universal 80-264 VAC Input, 50/60 Hz
- ☑ Power Good Signal

PRODUCT DESCRIPTION

The AstrodyneTDI ASM201 series power supplies are high power density designs that are suitable for both medical and industrial applications. Both Class I and Class II protection models have 2 MOPP isolation and BF leakage current, crucial for patient safety either in the hospital or at home.

These power supplies operate over the input voltage range of 80 to 264 VAC at 50-60Hz frequency and deliver up to 200 Watts of regulated DC output power in a small footprint, low profile form factor. They are compliant with the RoHS directive.

The ASM201 series products are certified to the IEC 60601-1 3rd Edition international medical safety standard, as well as the IEC 62368-1 and IEC 60950-1 I.T.E. safety standards. They are also certified to the collateral standard EN 60601-1-2 4th Edition for electromagnetic compatibility.

Product Models

Model	Output Voltage	Output Current Forced Air / Convection[1,2]	12V Aux. Current[3]	Efficiency (Typ) 230 / 115 VAC
Open Frame Models with Headers				
ASM201-120-BNH-PF1	12 VDC	16.7 A / 11.7 A	0.5 A	93 % / 91 %
ASM201-150-BNH-PF1	15 VDC	13.4 A / 9.4 A	0.5 A	93 % / 91 %
ASM201-180-BNH-PF1	18 VDC	11.1 A / 7.7 A	0.5 A	93 % / 91 %
ASM201-190-BNH-PF1	19 VDC	10.5 A / 7.4 A	0.5 A	93 % / 91 %
ASM201-240-BNH-PF1	24 VDC	8.4 A / 5.9 A	0.5 A	94 % / 92 %
ASM201-280-BNH-PF1	28 VDC	7.1 / 5.0 A	0.5 A	94 % / 92 %
ASM201-300-BNH-PF1	30 VDC	6.7 / 4.7 A	0.5 A	94 % / 92 %
ASM201-360-BNH-PF1	36 VDC	5.5 A / 3.8 A	0.5 A	94 % / 92 %
ASM201-480-BNH-PF1	48 VDC	4.2 A / 2.9 A	0.5 A	95 % / 93 %
ASM201-560-BNH-PF1	56 VDC	3.57 A / 2.5 A	0.5 A	95 % / 93 %
Enclosed Models with Headers				
ASM201-120-BEH-PF1	12 VDC	16.7 A / 11.7 A	0.5 A	93 % / 91 %
ASM201-150-BEH-PF1	15 VDC	13.4 A / 9.4 A	0.5 A	93 % / 91 %
ASM201-180-BEH-PF1	18 VDC	11.1 A / 7.7 A	0.5 A	93 % / 91 %
ASM201-190-BEH-PF1	19 VDC	10.5 A / 7.4 A	0.5 A	93 % / 91 %
ASM201-240-BEH-PF1	24 VDC	8.4 A / 5.9 A	0.5 A	94 % / 92 %
ASM201-280-BEH-PF1	28 VDC	7.1 / 5.0 A	0.5 A	94 % / 92 %
ASM201-300-BEH-PF1	30 VDC	6.7 / 4.7 A	0.5 A	94 % / 92 %
ASM201-360-BEH-PF1	36 VDC	5.5 A / 3.8 A	0.5 A	94 % / 92 %
ASM201-480-BEH-PF1	48 VDC	4.2 A / 2.9 A	0.5 A	95 % / 93 %
ASM201-560-BEH-PF1	56 VDC	3.57 A / 2.5 A	0.5 A	95 % / 93 %

Notes:

1. The current ratings are based on an ambient temperature of +25 deg C; refer to Output Power Derating for other ambient temperatures.
2. The current ratings for Forced Air are based on the presence of the minimum specified air flow requirements; refer to Airflow Guidelines.
3. The auxiliary output is intended to drive an external cooling fan. A minimum 100mA load is required on the main output to enable the auxiliary output. This output is not recommended for use with other devices.

Model	Output Voltage	Output Current Forced Air / Convection[1,2]	12V Aux. Current[3]	Efficiency (Typ) 230 / 115 VAC
Enclosed Models with Terminal Blocks				
ASM201-120-BET-PF1	12 VDC	16.7 A / 11.7 A	0.5 A	93 % / 91 %
ASM201-150-BET-PF1	15 VDC	13.4 A / 9.4 A	0.5 A	93 % / 91 %
ASM201-180-BET-PF1	18 VDC	11.1 A / 7.7 A	0.5 A	93 % / 91 %
ASM201-190-BET-PF1	19 VDC	10.5 A / 7.4 A	0.5 A	93 % / 91 %
ASM201-240-BET-PF1	24 VDC	8.4 A / 5.9 A	0.5 A	94 % / 92 %
ASM201-280-BET-PF1	28 VDC	7.14 / 5.0 A	0.5 A	94 % / 92 %
ASM201-300-BET-PF1	30 VDC	6.7 / 4.7 A	0.5 A	94 % / 92 %
ASM201-360-BET-PF1	36 VDC	5.5 A / 3.8 A	0.5 A	94 % / 92 %
ASM201-480-BET-PF1	48 VDC	4.2 A / 2.9 A	0.5 A	95 % / 93 %
ASM201-560-BET-PF1	56 VDC	3.57 A / 2.5 A	0.5 A	95 % / 93 %

Notes:

1. The current ratings are based on an ambient temperature of +25 deg C; refer to Output Power Derating for other ambient temperatures.
2. The current ratings for Forced Air are based on the presence of the minimum specified air flow requirements; refer to Airflow Guidelines.
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INPUT SPECIFICATIONS

AC Input Voltage Range	100-240 VAC nominal 80-264 VAC tested
AC Input Frequency	47-63 Hz (50/60 Hz nominal)
Input Current	2A max at 115VAC, 60Hz 1A max at 240VAC, 50Hz
Inrush Current	30A max at 115VAC, 60Hz 60A max at 240VAC, 50Hz
Power Factor	0.97 min
Earth Leakage Current	300uA max at 264VAC, 50Hz
Patient Leakage Current	75uA typ at 264VAC (BF Rating)
Input Fuse	4A on both ACL and ACN

MAIN OUTPUT SPECIFICATIONS

Output Voltage	See Product Model charts
Output Power	200W max – see derating
Minimum Load	No minimum load required
Set Point Accuracy	±2.5% max
Load Regulation	±1% max, no load to full load
Line Regulation	±0.5% max, 90-264 VAC
Efficiency	see Product Model charts
Standby Power	210-280mW typ
Hold-up Time	16ms typ., full load, 115VAC
Ripple and Noise 20 MHz BW, measured with 47uF Alum and 0.1uF Ceramic at output	<18V: 1.5% pk-pk max 18V to 36V: 1.25% pk-pk max >36V: 1.0% pk-pk max

ISOLATION

Input to Output	4000 VAC, 2 MOPP
Input to Earth (Class I)	2000 VAC, 1 MOPP
Output to Earth (Class I)	1500 VAC, 1 MOPP

PROTECTION

Over Current *	110 to 160% Rated Current †
Short Circuit *	Hiccup Mode, Auto Recovery
Over Voltage *	105 to 140% Vout, Latching; Recycle Input to Reset
Over Temperature *	Automatic recovery

† Rated Current defined by jumper J6, see Thermal Performance.

All specifications are typical at nominal input, full load, 25°C unless specified otherwise

SAFETY AND COMPLIANCE CERTIFICATIONS

Safety Approvals	IEC 60601-1 3rd Ed, Amend 1; IEC 62368-1; IEC 60950-1; CSA C22.2; CB Scheme
EMC Overall	EN60601-1-2, 4th Ed, Class B
Conducted and Radiated Emissions	EN 55011 (CISPR11), Class B
Harmonic Current	EN 61000-3-2, Class A
Voltage Fluctuations	EN 61000-3-3
ESD Immunity	EN 61000-4-2, Level 4
RF Field Immunity	EN 61000-4-3, Level 3
EFT Burst Immunity	EN 61000-4-4, Level 3
Surge Immunity	EN 61000-4-5, Level 3
Conducted Immunity	EN 61000-4-6, Level 3
Magnet Field Immunity	EN 61000-4-8, Level 4
Voltage Dips and Interruptions	EN 61000-4-11

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	(see derating charts for detail)
≥ 14 CFM, ≥ 110VAC:	full 200W load -40 to +55°C
convection, ≥ 110VAC:	140W load -40 to +55°C
all cooling and voltages:	up to +85°C at reduced load
Cooling	Forced air or free air convection
Storage Temperature*	-40 to +85°C
Operating Humidity*	0% to 95%, non-condensing
Operating Altitude	5000m max
Vibration	2G rms, 5-500Hz, 3 axes, 30min.
MTBF (MIL-HDBK-217, GB)	215k hrs @ 25C

MECHANICAL SPECIFICATIONS

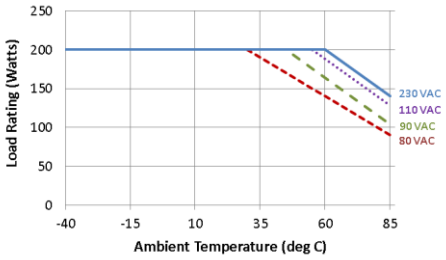
Size **	2” x 4” x 1.21” 50.8 x 101.6 x 30.7 mm
Weight **	6.3 oz / 179 g
Package Type	Open Frame or Enclosed

*** For open frame - see Outline Drawings for enclosed size*

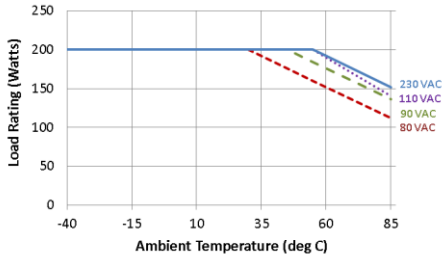
**These are stress ratings. Exposure of the devices to any of these conditions may adversely affect long term reliability. Operation under conditions other than the standard operating conditions is neither warrantied nor implied.*

THERMAL PERFORMANCE

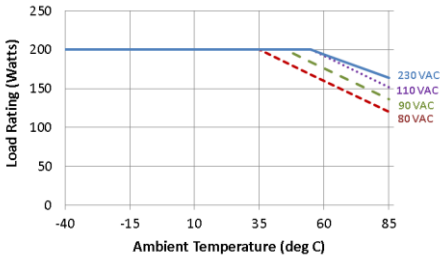
14 CFM Airflow – 12V to 19V Models



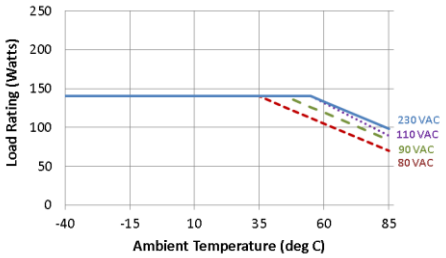
14 CFM Airflow – 24V to 36V Models



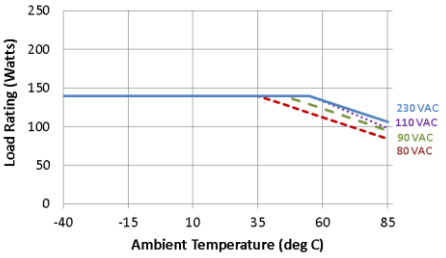
14 CFM Airflow – 48V to 56V Models



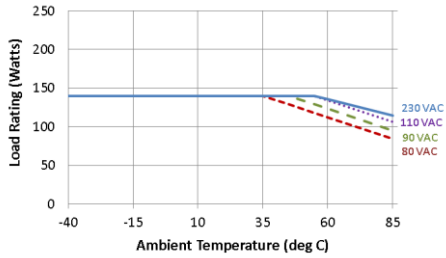
Convection – 12V to 19V Models



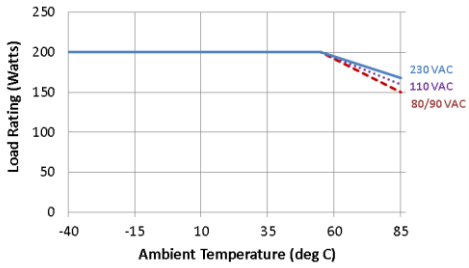
Convection – 24V to 36V Models



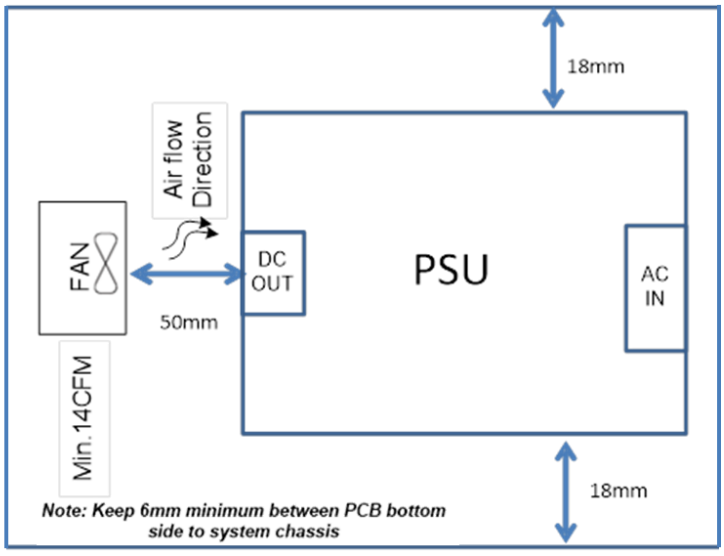
Convection – 48V to 56V Models



23 CFM Airflow – all models



Airflow Guidelines



Jumper J6 Settings

Jumper J6 defines the Over Current Protection threshold, and is factory-installed for operation to a 200 Watt load rating with forced air cooling. For a natural convection cooling application, it is recommended to remove jumper J6 and limit operation to a maximum 140 Watt load. Refer to the Outline Drawings for the location of jumper J6.

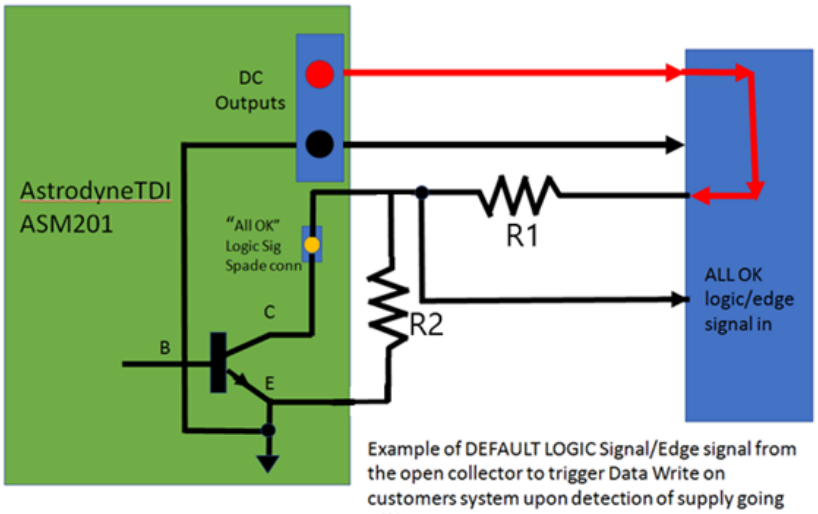
J6 Setting	Maximum Load Power	Application
Installed	200 Watts	Air Cooled (min. 14 CFM)
Removed	140 Watts	Convection Cooled

APPLICATION INFORMATION

Power Good Signal

The Power Good signal uses open collector logic, with a transition threshold set at 90% of the DC output voltage. The signal transition occurs within 10ms (T1, T2) from the time at which the threshold is crossed. The signal is a logic high when the DC output voltage is higher than the threshold.

Power Good Circuit



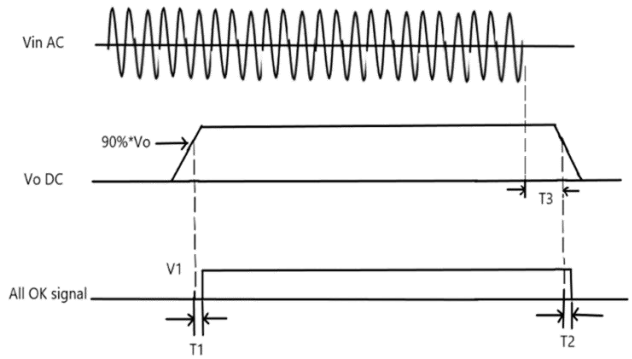
Example of DEFAULT LOGIC Signal/Edge signal from the open collector to trigger Data Write on customers system upon detection of supply going off line

R1 Pull-up Resistor Values for Typical (Positive) Bias Voltage

Output Voltage	Recommended R1 Resistance
12 VDC	8kΩ ~9.2kΩ
15 VDC	11kΩ ~13.2kΩ
18 VDC	15kΩ ~16.8kΩ
19 VDC	16kΩ ~18kΩ
24 VDC	21kΩ ~24.3kΩ
28 VDC	26kΩ ~29.2kΩ
30 VDC	28kΩ ~31.8kΩ
36 VDC	35kΩ ~39.2kΩ
48 VDC	48kΩ ~54kΩ
56 VDC	55kΩ ~62kΩ

The values in the table above will provide a Power Good signal with a logic high in the range of 4.5V ~ 5.0V. The associated recommended value for R2 is 5.62kΩ.

Power Good Signal Timing



Note: The Power Good signal is determined by the output voltage. The Hold-up Time (T3) affects when the output voltage drops after the AC input is removed.

Class I Applications

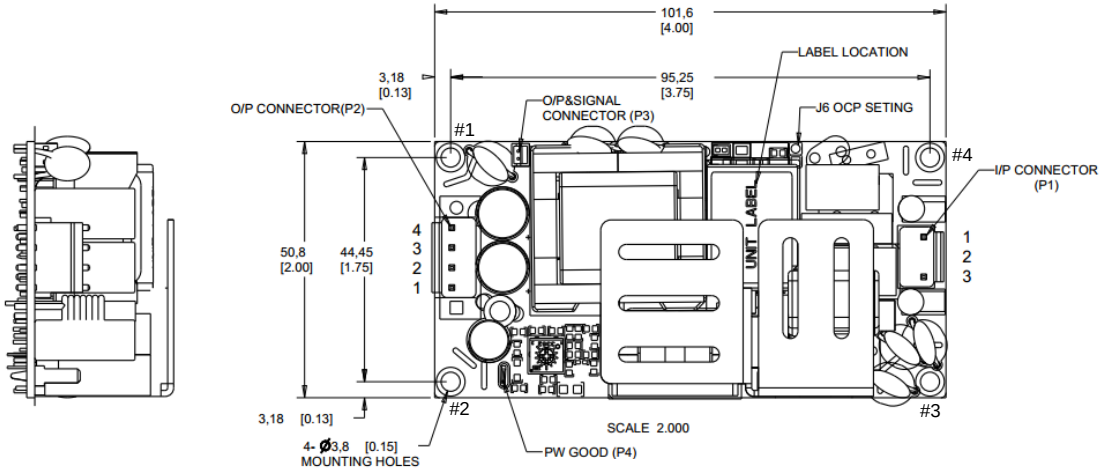
For Class I protection applications, electrically connect the #1 and #3 mounting holes to Protective Earth Ground (refer to Outline Drawings.)

Use of Auxiliary Fan Output

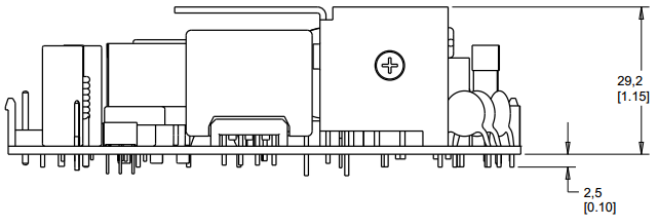
The auxiliary supply is designed to serve as a source for an external cooling fan. A minimum 100mA load is required on the main output to enable the auxiliary output. Do not use this output to drive other devices.

OUTLINE DRAWINGS

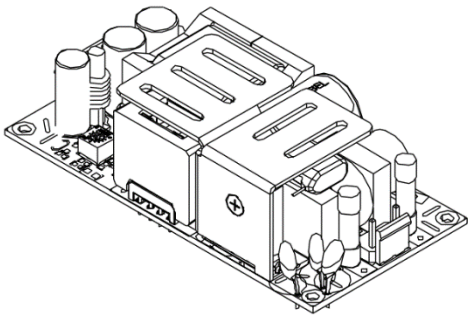
Open Frame with Headers – ASM201-xxx-BNH-zzz (except 12V output model)



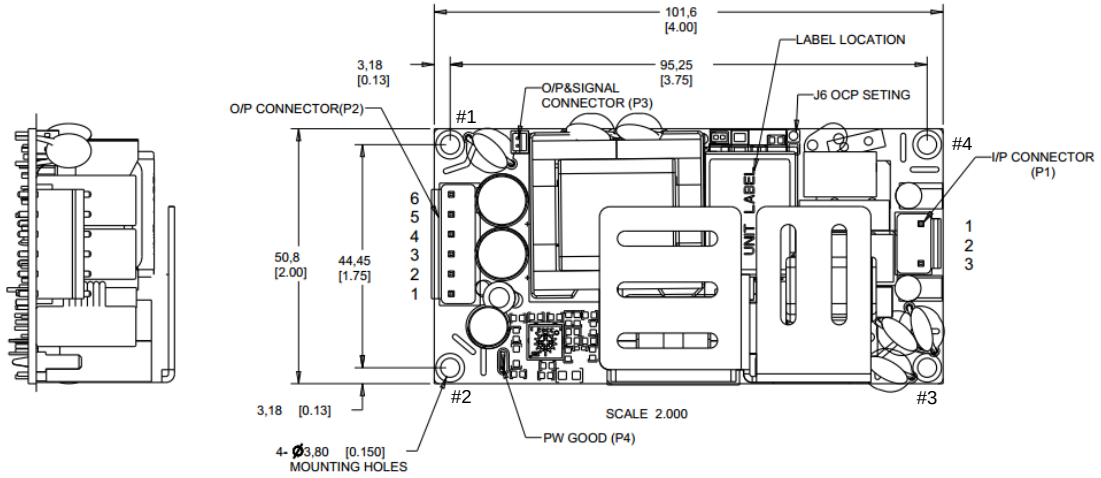
For Class I operation, the #1 and #3 mounting holes must be connected electrically to Protective Earth ground.



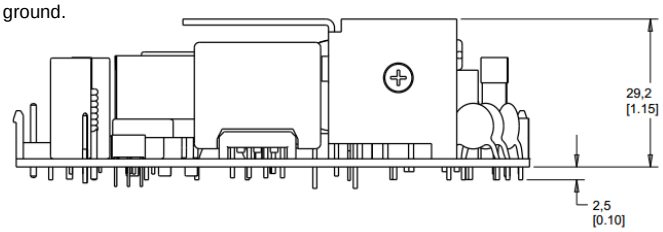
TERMINAL ASSIGNMENTS		
P1	1	ACL
	2	NC
	3	ACN
P2	1	DC_OUTPUT+
	2	DC_OUTPUT+
	3	DC_OUTPUT-
	4	DC_OUTPUT-
P3	1	12V_AUX+
	2	12V_AUX-
P4	1	PW GOOD



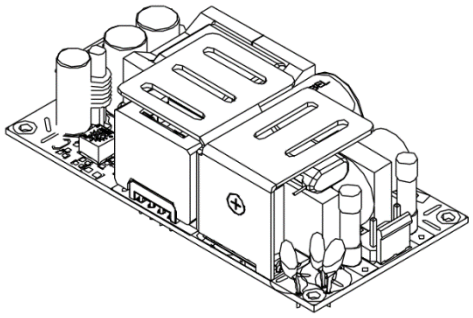
Open Frame with Headers – ASM201-120-BNH-zzz (12V output model)



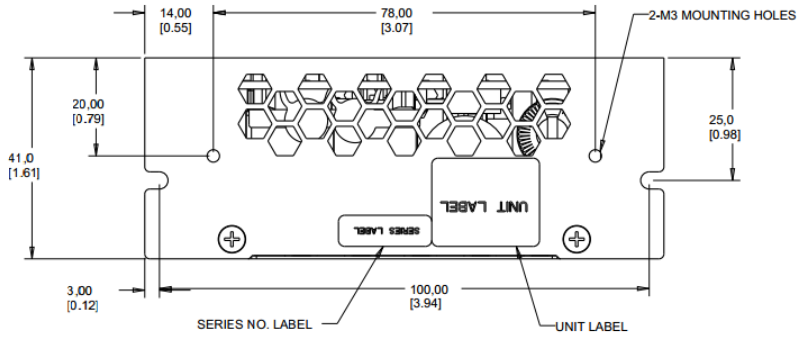
For Class I operation, the #1 and #3 mounting holes must be connected electrically to Protective Earth ground.

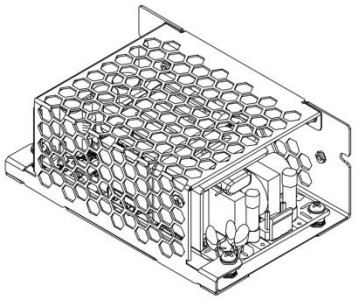


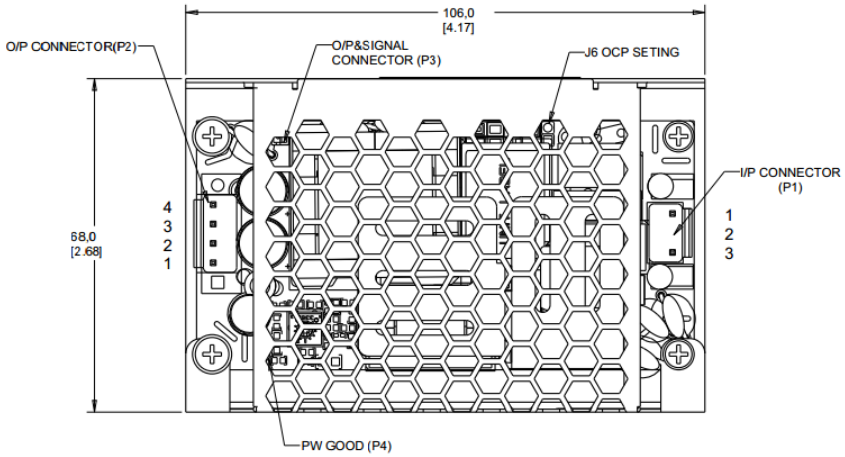
TERMINAL ASSIGNMENTS		
P1	1	ACL
	2	NC
	3	ACN
P2	1	DC_OUTPUT+
	2	DC_OUTPUT+
	3	DC_OUTPUT+
	4	DC_OUTPUT-
	5	DC_OUTPUT-
	6	DC_OUTPUT-
P3	1	12V_AUX+
	2	12V_AUX-
P4	1	PW GOOD



Enclosed with Headers – ASM201-xxx-BEH-zzz (except 12V output model)

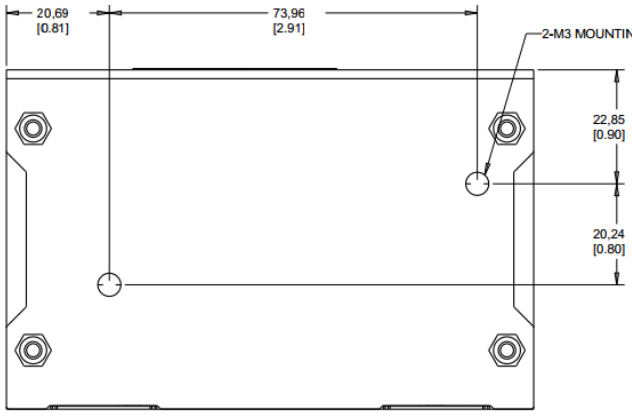


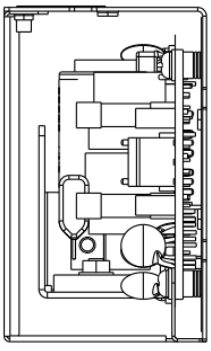




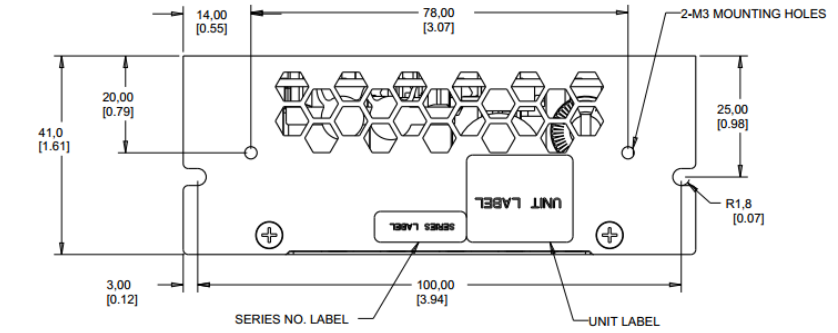
TERMINAL ASSIGNMENTS		
P1	1	ACL
	2	NC
	3	ACN
P2	1	DC_OUTPUT+
	2	DC_OUTPUT+
	3	DC_OUTPUT-
	4	DC_OUTPUT-
P3	1	12V_AUX+
	2	12V_AUX-
P4	1	PW GOOD

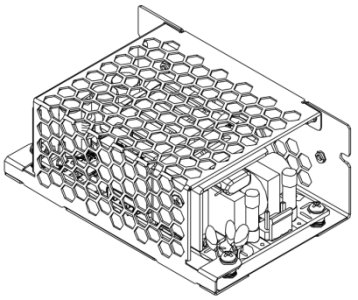
For Class I operation, the metal enclosure must be connected electrically to Protective Earth ground.

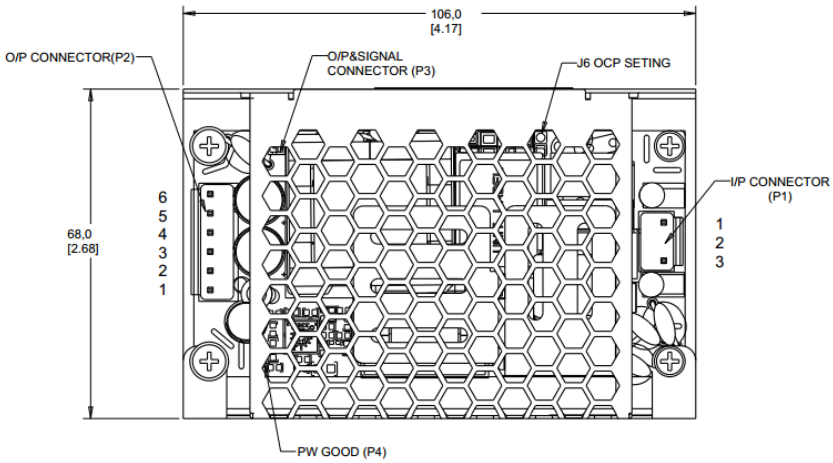




Enclosed with Headers – ASM201-120-BEH-zzz (12V output model)

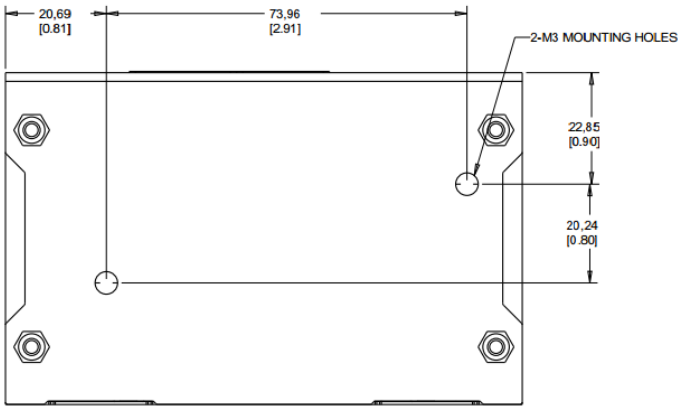


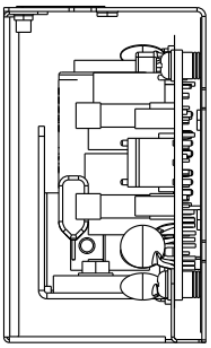




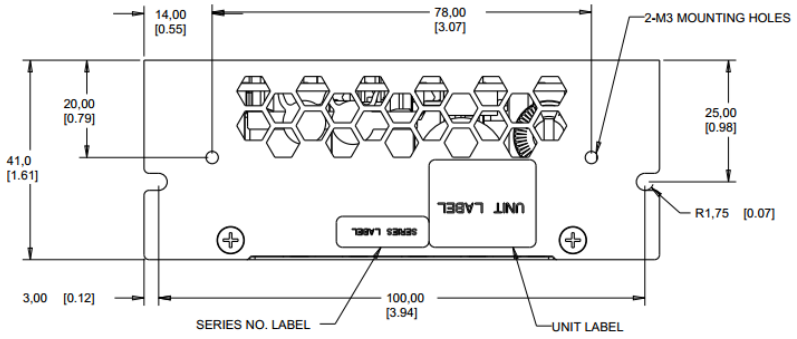
TERMINAL ASSIGNMENTS		
P1	1	ACL
	2	NC
	3	ACN
P2	1	DC_OUTPUT+
	2	DC_OUTPUT+
	3	DC_OUTPUT+
	4	DC_OUTPUT-
	5	DC_OUTPUT-
	6	DC_OUTPUT-
P3	1	12V_AUX+
	2	12V_AUX-
P4	1	PW GOOD

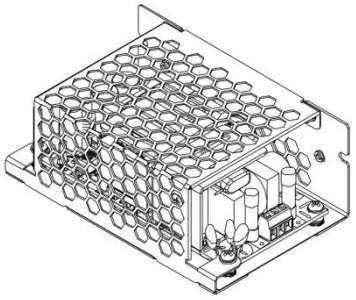
For Class I operation, the metal enclosure must be connected electrically to Protective Earth ground.

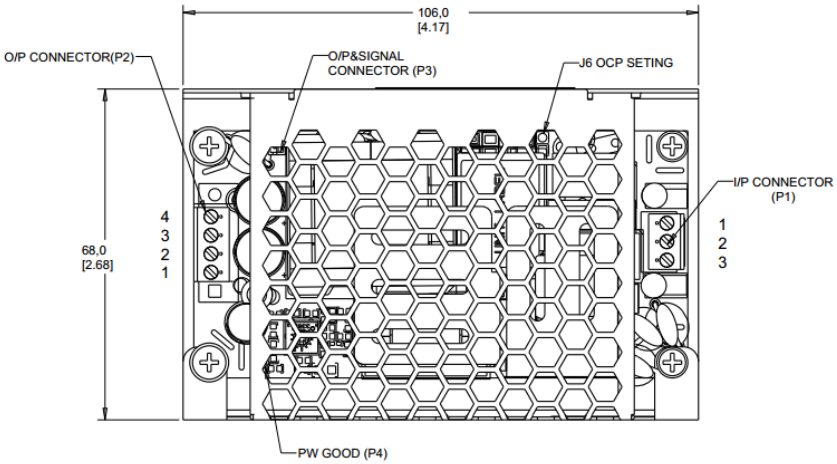




Enclosed with Terminal Blocks – ASM201-xxx-BET-zzz

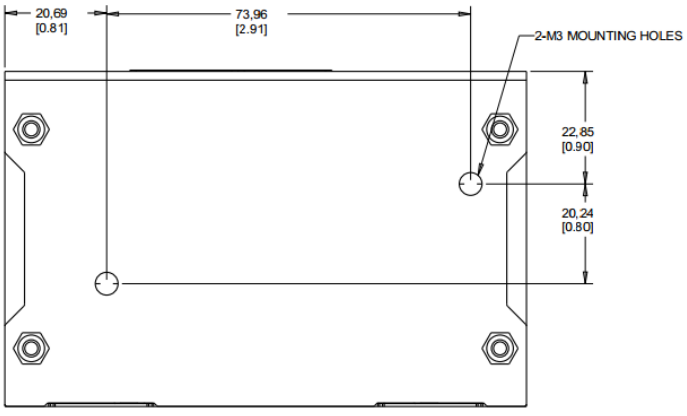


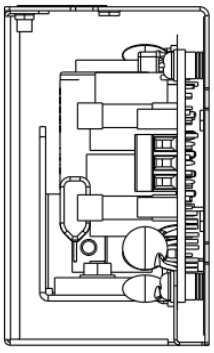




TERMINAL ASSIGNMENTS		
P1	1	ACL
	2	NC
	3	ACN
P2	1	DC_OUTPUT+
	2	DC_OUTPUT+
	3	DC_OUTPUT-
	4	DC_OUTPUT-
P3	1	12V_AUX+
	2	12V_AUX-
P4	1	PW GOOD

For Class I operation, the metal enclosure must be connected electrically to Protective Earth ground.





Headers and Mating Connectors

AC Input Connector (P1): CviLux CI5203P1V00 or CST CSI-5381-0210 or equivalent

Pin No.	Assignment	Mating Housing and equivalents	Terminal Contacts and equivalents
1	AC/L	CviLux CI5203S000M or JST VHR-3N	CviLux CI52T031BE0 (AWG# 18~22) or JST SVH-21T-P1.1 (AWG# 18~22)
2	No Pin		
3	AC/N		

12V Model DC Output Connector (P2): CviLux CI5206P1V00 or CST CSI-5281-0610 or equivalent

Pin No.	Assignment	Mating Housing and equivalents	Terminal Contacts and equivalents
1	DC Output +	CviLux CI5206S000M or JST VHR-6N	CviLux CI52T031BE0 (AWG# 18~22) or JST SVH-21T-P1.1 (AWG# 18~22)
2	DC Output +		
3	DC Output +		
4	DC Output -		
5	DC Output -		
6	DC Output -		

15V-54V Models DC Output Connector (P2): CviLux CI5204P1V00 or CST CSI-5281-0410 or equivalent

Pin No.	Assignment	Mating Housing and equivalents	Terminal Contacts and equivalents
1	No Pin	CviLux CI5204S000M or JST VHR-4N	CviLux CI52T031BE0 (AWG# 18~22) or JST SVH-21T-P1.1 (AWG# 18~22)
2	DC Output +		
3	DC Output +		
4	DC Output -		
5	DC Output -		
6	No Pin		

Aux Fan Connector (P3): CviLux CI1502P1VK0-NH or equivalent

Pin No.	Assignment	Mating Housing and equivalents	Terminal Contacts and equivalents
1	+V12	CviLux CI1502S0000 or JST ZHR-2	CviLux CI15T011PE0 (AWG# 26~32) or JST SZH-002T-P0.5 (AWG# 26~28) JST SZH-003T-P0.5 (AWG# 28~32)
2	DC COM		

Power Good Connector (P4): Keystone 1211 or equivalent

Pin No.	Assignment	Mating Receptacle and equivalents
1	PWR OK	Molex 190020016 or TE 42068-1 or AMP 640925-2