SynQor®

MPPS MILITARY FIELD-GRADE

MPPS-4000

3-Phase Military AC-DC Programmable Power Supply

3-Phase, 85-265 $Vrms_{L-L}$ Input Voltage	47-800 Hz Input Frequency	0-80 V Regulated Programmable Output Voltages	4000 W Continuous Output Power

Sealed Construction, Ultra low Weight, Compact Size

DESIGNED & MANUFACTURED IN USA

SynQor's Military AC-DC Power Supply units are designed for the extreme environmental and demanding electrical conditions of Military/Aerospace applications. SynQor's MPPS incorporates field proven high efficiency designs and rugged packaging technologies. This MPPS will accept a 3-Phase input with a wide range of input voltage and frequency values while delivering a well-conditioned continuous 4000 W, DC regulated output to the load. The output voltage and output current limit can be adjusted on the fly via RS-232 or web interface. Current sharing allows multiple units to be used in parallel. The MPPS-4000 Power Supply is designed and manufactured in SynQor's USA headquarters and manufacturing facilities to comply with a wide range of military standards.

Combine Up to Eight Units for Higher Power

MPPS Product Features

- Sealed, weather-proof, shock-proof construction
- 4000W output power
- Adjustable output voltage and output current limit
- Full power operation: -40 °C to +55 °C
- 3-Phase AC Input: 85-265 VrmsL-L; 47-800 Hz
- Power factor correction at AC input
- Up to 8 units can be combined for higher power
- User I/O and Configuration signal port
- Synchronized start and stop of multiple units
- Current sharing for paralleled units
- Battle Mode for over-temperature events
- SNMP Network Port
- 1U high rack mount unit (1.73"H x 17.00"W x 20.42"D)
- Low weight: 29.5 lbs.

In-Line Manufacturing Process

- AS9100 and ISO 9001 certified facility
- Full component traceability

Specification Compliance

MPPS units are designed to meet:

- MIL-STD-1399-300B - Interface Shipboard
- MIL-STD-810G - Environmental Engineering
- MIL-STD-461F - Electromagnetic Interference
- MIL-STD-704F - Aircraft Electrical Power
- MIL-STD-1275D - Vehicle Electrical Power

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PROGRAMMABLE FEATURES				
Model Part Number	**Programmable Voltage Range**	**Programmable Current Range**	**Voltage Set Point Accuracy (Pout = 0W)**	**Maximum Output Current (Short Circuit)**
28V Default (MPPS-4000-3W28)	**0 - 35 V**	**0 - 150 A**	**±35 mV typical ±70 mV max.**	**180 A**
48V Default (MPPS-4000-3W48)	**0 - 54 V**	**0 - 120 A**	**±55 mV typical ±110 mV max.**	**145 A**
72V Default (MPPS-4000-3W72)	**0 - 80 V**	**0 - 78 A**	**±80 mV typical ±160 mV max.**	**95 A**

Specifications subject to change without notice.

INPUT CHARACTERISTICS	
Operating AC Input	
Voltage	3-Phase, 85-265 $Vrms_{L-L}$*
Frequency	47-800 Hz
Input Power Factor	>0.98 at 47-65 Hz >0.97 at 400 Hz >0.92 at 800 Hz
Maximum Input Current	27 Arms May be programmed to less via communications port
AC Input Circuit Breaker Rating	30 Arms

***Power Derating vs. $Vrms_{L-L}$ (see Figure 5)**

OUTPUT CHARACTERISTICS	
Total Output Power (Continuous)**	
28 V set point (MPPS-4000-3W28)	3750 W
48 V set point (MPPS-4000-3W48)	3750 W, Vin = 115V $Vrms_{L-L}$ 4000 W, Vin = 200 $Vrms_{L-L}$
72 V set point (MPPS-4000-3W72)	4000 W
**See figures 1-3, 5,6 and the MPPS user guide for derating details	
Output Ripple Voltage (20MHz BW)	
28 V set point (MPPS-4000-3W28)	150 mV pk-pk typ.
48 V set point (MPPS-4000-3W48)	200 mV pk-pk typ.
72 V set point (MPPS-4000-3W72)	250 mV pk-pk typ.
Current Limit Inception	
All Models	110%-120% Rated Current
Hold-up Time	
To -5% Vset, 4000 W	10 ms
Turn-on Delay	
All Output Voltages	2 s max.
Output Voltage Response to Load Transient	
Iout steps from 50-75% at 0.2 A/µs	
28 V set point (MPPS-4000-3W28)	1 V max
48 V set point (MPPS-4000-3W48)	1.5 V max
72 V set point (MPPS-4000-3W72)	2 V max.
Short Circuit Protection	
Constant current source	110-120% Rated Current

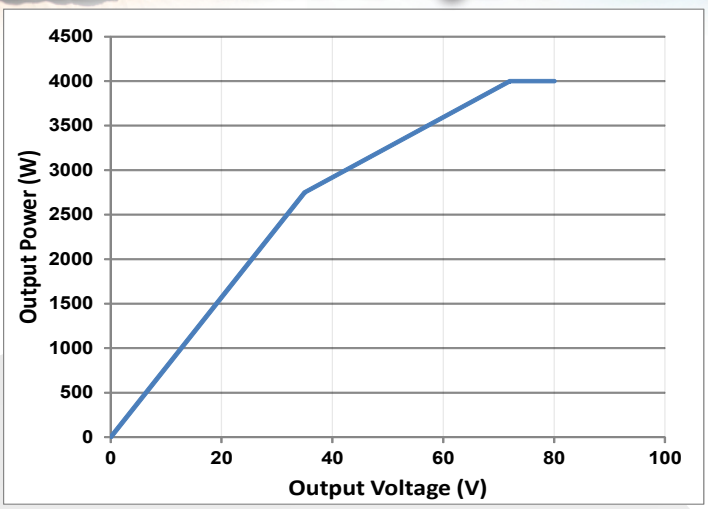


Figure 1: *72V Model Available Output Power vs Output Voltage*

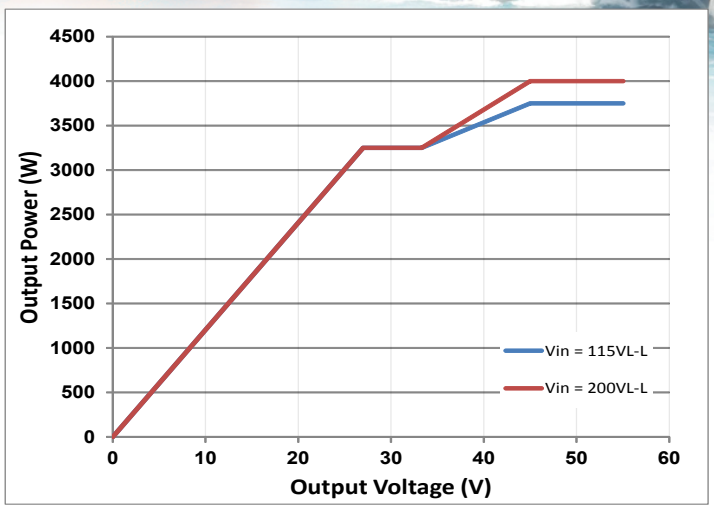


Figure 2: *48V Model Available Output Power vs Output Voltage*

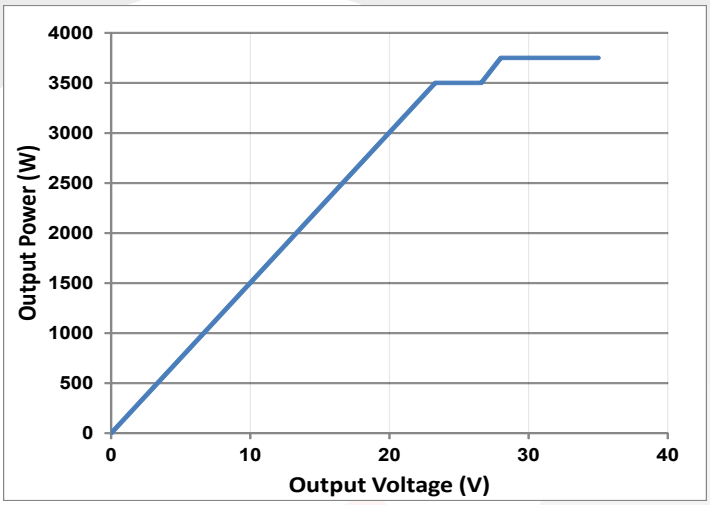


Figure 3: *28V Model Available Output Power vs Output Voltage*

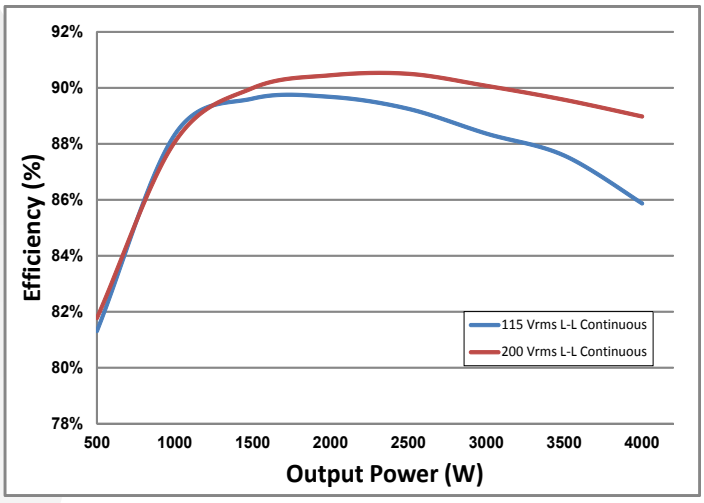


Figure 4: *Typical Efficiency vs Output Power. Vout = 72 V*

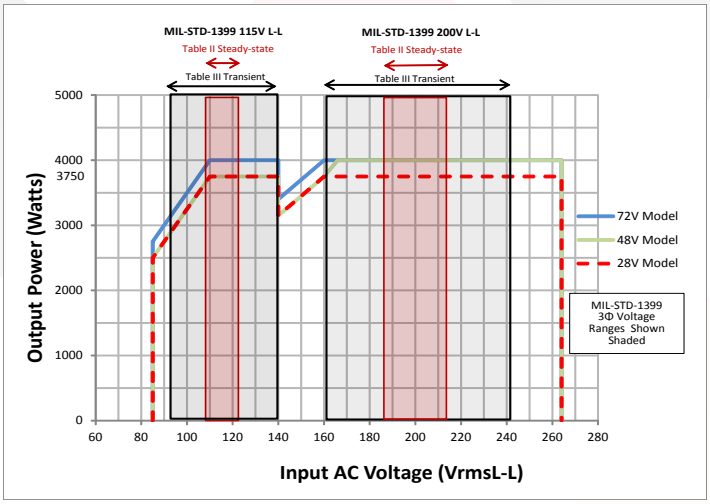


Figure 5: *Available Output Power vs Input AC Voltage*

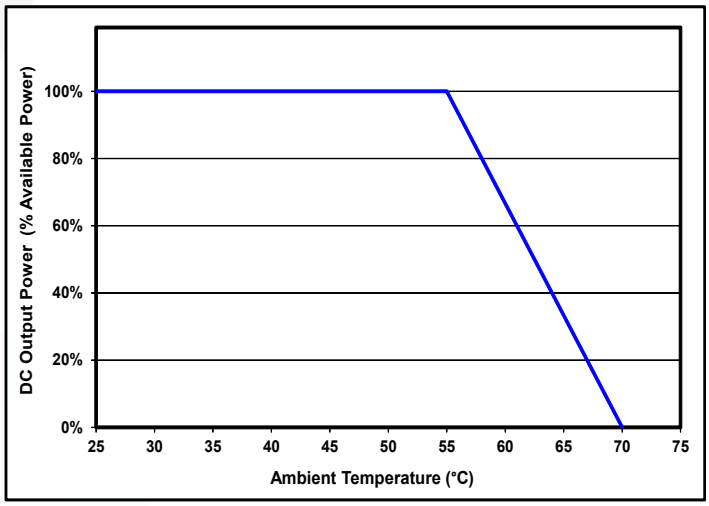
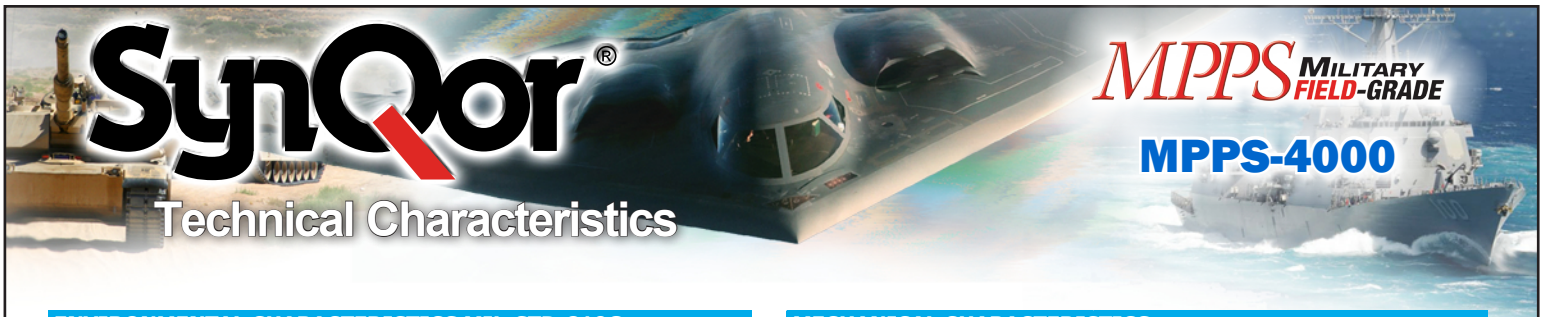


Figure 6: *Thermal Derating Curve. Output power vs. ambient temperature*



ENVIRONMENTAL CHARACTERISTICS MIL-STD-810G	
Temperature Methods 501.5, 502.5	
Operating Temperature	
Full Rated Power	-40 °C — +55 °C
Reduced Power per Figure 6	-40 °C — +70 °C
Storage Temperature	-40 °C — +70 °C
Altitude Method 500.5	
Operating	0 - 18,000 ft
Non-operating	0 - 40,000 ft
Environmental Tests	
Shock/Drop	Method 516.6, Procedures 1,4,6
Temperature Shock	Method 503.5, Procedure 1
Vibration	Method 514.6, CAT 5, 7, 8, 9, 24
Fungus	Method 508.6
Salt Fog	Method 509.5
Sand and Dust	Method 510.5, Procedures 1,2
Rain	Method 506.5 Procedure 1
Humidity	Method 507.5 Procedure 2
Mechanical Vibrations of Shipboard Equipment	Method 528 Procedure 1

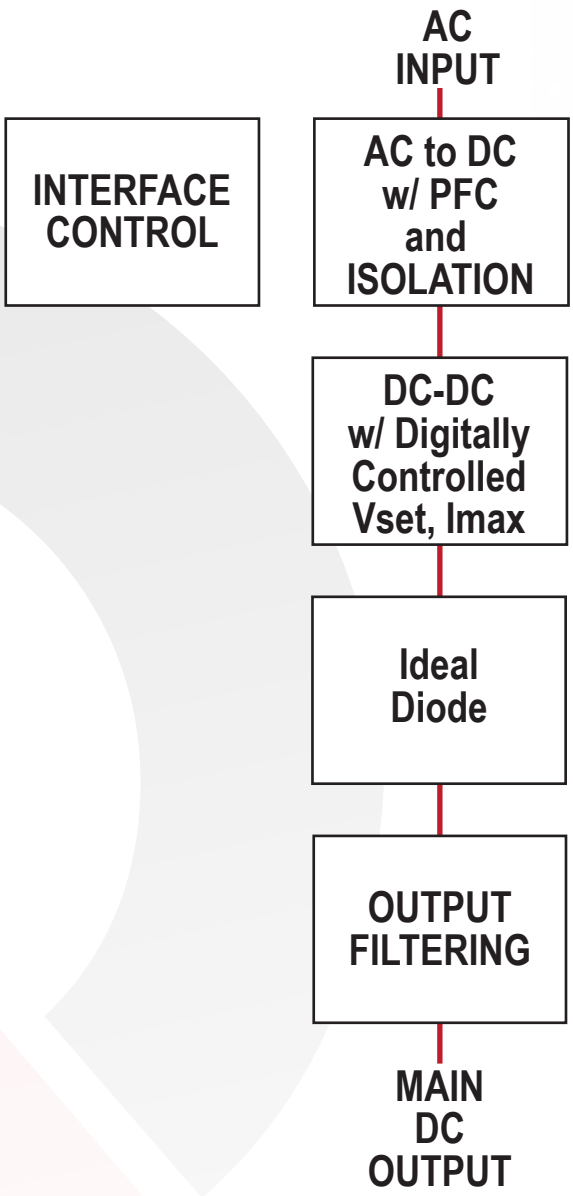
RELIABILITY CHARACTERISTICS MIL-HDBK-217F		
MTBF	190kHrs	MIL-217F Ground Benign, Ta=25 °C

ELECTROMAGNETIC CAPABILITY MIL-STD-461F (At 50/60Hz)	
CE101	30 Hz - 10 kHz
CE102	10 kHz - 10 MHz
CS101	30 Hz - 150 kHz
CS106	10 kHz - 40 GHz
CS114	10 kHz - 200 MHz
CS116	10 kHz - 100 MHz
RE101	30 Hz - 100 kHz
RE102	10 kHz - 18 GHz
RS101	30 Hz - 100 kHz
RS103	2 MHz - 40 GHz

MECHANICAL CHARACTERISTICS	
Standard 1U Chassis	
Chassis Size	1.73”(1U)H x 17.00”W x 20.42”D
Case Material	Aluminum
Total Weight	29.5 lbs
Connectors	
AC Input Connector	MS3470L18-8PW
DC Output Connector (+)	CGE2E18H5FB-16
DC Output Connector (-)	CGE2E18H5FWB-16
User I/O Ports	HD DB15 Female
Configuration I/O Port	HD DB15 Male
Ethernet Port	Amphenol RJF22N00, Code B
Cooling Exhaust Fans	
Sound Pressure Level (SPL)	54 dB(A)
Air Flow	0.67(m3/min) 23.7 CFM

Two fans in system, above specs are for each fan separately.

Block Diagram



High Density DB15 Female (15 Pin Connector)

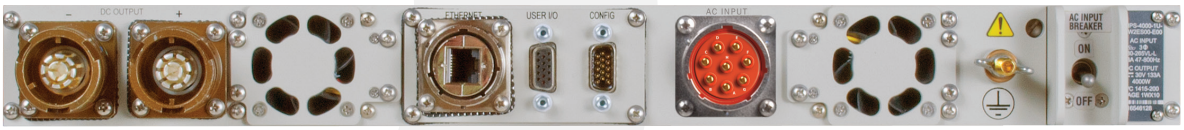
Signal	PIN	Function
TX	2	RS232 DCE Device Transmit
RX	3	RS232 DCE Device Receive
GND	4, 5	Ground reference for all digital inputs and outputs
BATTLE_MODE	6	TTL-Input*, pull "low" to engage Battle Mode (disable internal over-temperature protection), has internal pull-up to +5V.
ACIN_GOOD	7	Open collector* output where "low" indicates AC Input voltage is within range
+5V	8	Vout with minimal current drive usable as a pull-up voltage for open collector output signals. Load must be <35mA
REMOTE_START	12	Drive this line "high" with ≥5mA to enable MPPS outputs
SHUTDOWN	13	Drive this line "high" with ≥5mA to disable MPPS outputs
OUT_OK	14	Open collector* output where "low" indicates Main DC Output voltage is within range
OVER_TEMP	15	Open collector* output where "low" indicates that the MPPS is at or above its maximum temperature

*With an internal 50k Pull-up Resistor to 5V and ESD Protection Diodes.

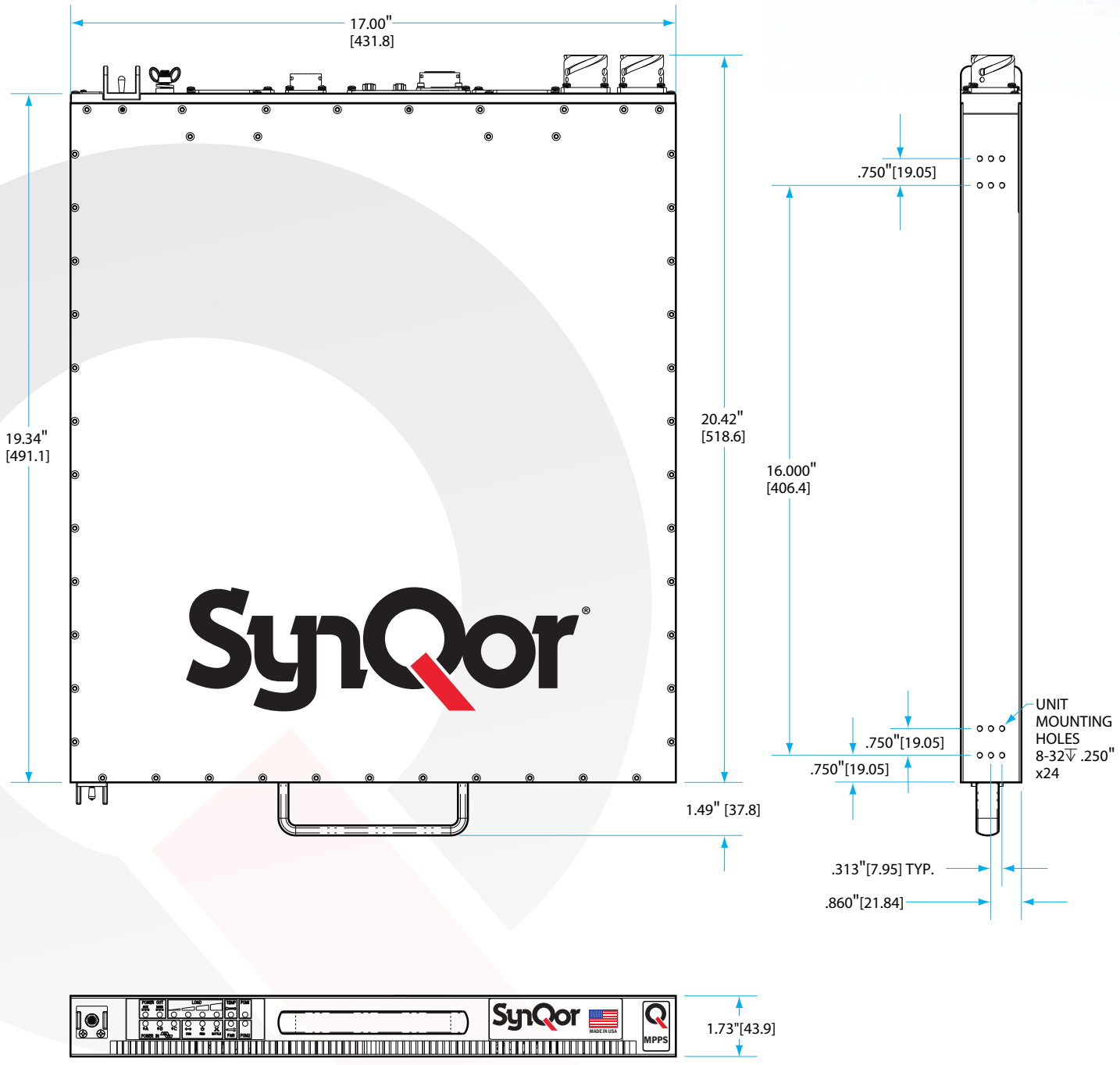
Safety & Qualifications - PENDING
UL 62368-1
CAN/CSA C22.2 No.62368-1
EN 62368-1

MPPS-4000-1U UNIT

MPPS-4000-1U UNIT with AC Input



Mechanical Diagrams



Note:

1) ALL DIMENSIONS IN INCHES [mm]
   TOLERANCES: X.XXIN +/- 0.02 [0.5]
   X.XXXIN +/- 0.010 [0.25]

Accessory Options

Rail Kits	
Slide Rail Kit	**SYN-9002**
Fixed Bracket Kit[2]	**SYN-9038**
Power Cables (10′ long)	
AC Input 30 A (18-8 MIL to NEMA L15-30P)	**SYN-9115**
AC Input 30 A (18-8 MIL Hardwire)	**SYN-9116**
DC Output Negative (Hardwire)	**SYN-9176**
DC Output Positive (Hardwire)	**SYN-9177**
Rackmount Transit Cases	
Transit Case, 3U, Gray, with Casters[2]	**SYN-9410**
Transit Case, 3U, Gray, No Casters[2]	**SYN-9412**

Notes:
1: Other Options also available, check the website or contact power@synqor.com for further information.
2: Fixed Bracket Kit (SYN-9038) with Transit Case (SYN-9410 or SYN-9412) is required for transit and ruggedized use.

User Communications (I/O) Cables	
HD DB15M to DB9F (RS232, 10′)	SYN-9301
HD DB15M to DB15M (RS232 and Digital I/O, 10′)	SYN-9305
Network SNMP (Sealed RJ45, 10′)	SYN-9321
Configuration Cables	
HD DB15F to HD DB15F (Synchronized Control of TWO Parallel Units, 3′)	SYN-9341
HD DB15F to HD DB15F to HD DB15F (Synchronized Control of THREE Parallel Units, 6′)	SYN-9343
HD DB15F to HD DB15F (Synchronized Control of FOUR Parallel Units, 9′)	SYN-9344

Optional
Rackmount Transit Case

Ordering Information

Family	Output Power	Height	AC Input Phase #	AC Input Frequency	DC Output Voltage Range	Output Current Range	Network
MPPS	**4000:** 4000W	**1U:** 1.73″	**3:** 3 Phase	**W**: 47-800Hz	**28:** 0-35V **48:** 0-54V **72:** 0-80V	**150:** 0-150A **120:** 0-120A **078:** 0-78A	**E00:** Ethernet/SNMP

For valid part numbers, refer to the website or contact your local sales representative.

Part Numbering Example: MPPS-4000-1U-3W28-150-E00

Contact SynQor for further information and to order:
Phone: 978-849-0600 **Fax:** 978-849-0602
E-mail: power@synqor.com **Web:** www.synqor.com
Address: 155 Swanson Road, Boxborough, MA 01719 USA

WARRANTY

SynQor offers a 1 year limited warranty. Complete warranty information is listed on our website or is available upon request from SynQor.

PATENTS

SynQor holds numerous U.S. patents, one or more of which apply to most of its power conversion products. Any that apply to the product(s) listed in this document are identified by markings on the product(s) or on internal components of the product(s) in accordance with U.S. patent laws. SynQor's patents include the following:

7,765,687 7,787,261
8,149,597 8,644,027