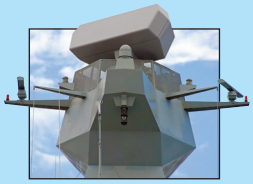
MPC Military Field-Grade

Uninterruptible Power Supply

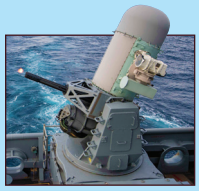


Operator's Guide

MPC-1250-270 Series









MPC-1250-1U

N+M Redundancy (optional)









SynQor®

Advancing The Power Curve®

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Hazardous Voltages

The ***INPUT AND OUTPUT POWER*** connectors and cables of the SynQor MPC may have voltages that are unsafe. ***INJURY OR DEATH ON CONTACT*** may result. Appropriate safety precautions should be taken. All connections should be made in accordance with ***LOCAL ELECTRICAL CODES.***

- The MPC ***CHASSIS*** should be connected to earth or system ground with Ground Stud on the rear panel, see mechanical diagrams.
- For the ***AC INPUT*** cable and connector:
  - Do not assume that a hazardous voltage is not present at the terminals of the AC input connector, even if the MPC appears to be off.
  - Do not make contact with the terminals of the AC input connector.
  - Always connect the cable to the MPC before it is connected to the source of AC power.
  - Always disconnect the AC input cable from the source of AC power before disconnecting it from the MPC.
  - If the AC input cable is connected to the source of AC power and not connected to the MPC, do not contact the exposed terminals of the AC input cable.
  - Do not assume that the source of AC power is not present.
  - Connections between the AC input cable and the source of AC power should not be accessible.
- For the ***DC3 OUTPUT*** cable and connector:
  - Do not assume that a hazardous voltage is not present at the terminals of the DC3 OUTPUT connector, even if the MPC appears to be off.
  - Do not make contact with the terminals of the DC3 OUTPUT connector.
  - Connect the DC3 OUTPUT cable to the MPC before the MPC is turned on.
  - If connection of the load to the DC3 OUTPUT cable has exposed conductors, make this connection before connecting the DC3 OUTPUT cable to the MPC.
  - Connections between the DC3 OUTPUT cable and the load should not be accessible.
- For the ***DC INPUT*** cable and connector (if present):
  - The rated DC input voltage of the MPC is below the level considered hazardous.
  - The DC input terminals of the MPC are isolated from the AC input and DC3 OUTPUTs with reinforced safety insulation.
  - However, never assume the terminals of the DC input connector or the wires of the DC input cable are safe to contact, *even if the MPC or DC input source appears to be off.*

- For the ***DC1 and DC2*** cable and connectors (if present):
  - The rated DC output voltage of the MPC is below the level considered hazardous.
  - The DC output terminals of the MPC are isolated from the AC input and DC3 OUTPUTs with reinforced safety insulation.
  - However, never assume the terminals of the DC output connector or the wires of the DC output cable are safe to contact, even if the MPC appears to be off.

Hazardous Energies

The ***INPUT AND OUTPUT POWER*** connectors and cables of the SynQor MPC may be the source of high levels of energy. Do not inappropriately make electrical contact between any terminal of a connector and another, or between any wire of a cable and another, or between any terminal or wire and the MPC's chassis or ground. ***DAMAGING ELECTRICAL ARCS*** may result. Care should be taken to avoid accidental electrical contacts of this sort.

Protection from the Environment

The SynQor MPC is a ruggedly built product having its electronics contained in sealed chambers. It is capable of withstanding harsh levels of mechanical acceleration, shock and vibration, temperature and pressure variations, and exposure to water, salt, sand and dust within the levels specified in the data sheet. ***THESE LEVELS SHOULD NOT BE EXCEEDED.***

Do not obstruct the air intake in the front of the MPC or the fan exhausts in the rear panel of the MPC while the MPC is operating.

No User Serviceable Parts

The SynQor MPC has no user serviceable parts inside of it. ***DO NOT REMOVE*** the cover of the MPC or any of its connectors. Only factory trained personnel should perform repairs.

Product Description

The SynQor MPC-1250 Series is an advanced technology military-grade Military Power Conditioner (MPC) that uses highly efficient power electronic circuitry to achieve a high power level in a low-profile, low-weight, rack-mountable package. It provides voltage and frequency conditioning, electrical isolation, and power flow smoothing between the power inputs and its power outputs.

A communication/control port is available to permit monitoring and control by a host computer system. Front panel LEDs and an audible alarm provide information on the status of the MPC.

The MPC-1250 Series products can draw power from an AC input having a wide range of voltage and frequency levels, or from an optional 28 V nominal DC input. The AC input has priority over the DC input. The MPC provides up to 1250 W of DC output power from up to three DC outputs. The main high voltage DC output (DC3) supplies up to 1250 W, and is user adjustable from 25 - 325 V. The default DC3 OUTPUT voltage is 270 V. An optional DC2 output provides up to 1250 W a fixed 24, 28, or 50 V. An optional DC1 output provides up to 500 W at 12 V, 15 V, 24 V, 28 V, 40 V, or 50 V.

The electronic circuitry within the MPC-1250 Series products is designed, qualified and screened according to SynQor's MIL-COTS Standards. It complies with the requirements of MIL-STD-704F, MIL-STD-1399-300B, MIL-STD-1275D and MIL-STD-461F, as well as IEC-EN61000 specifications for world-wide commercial utility applications.

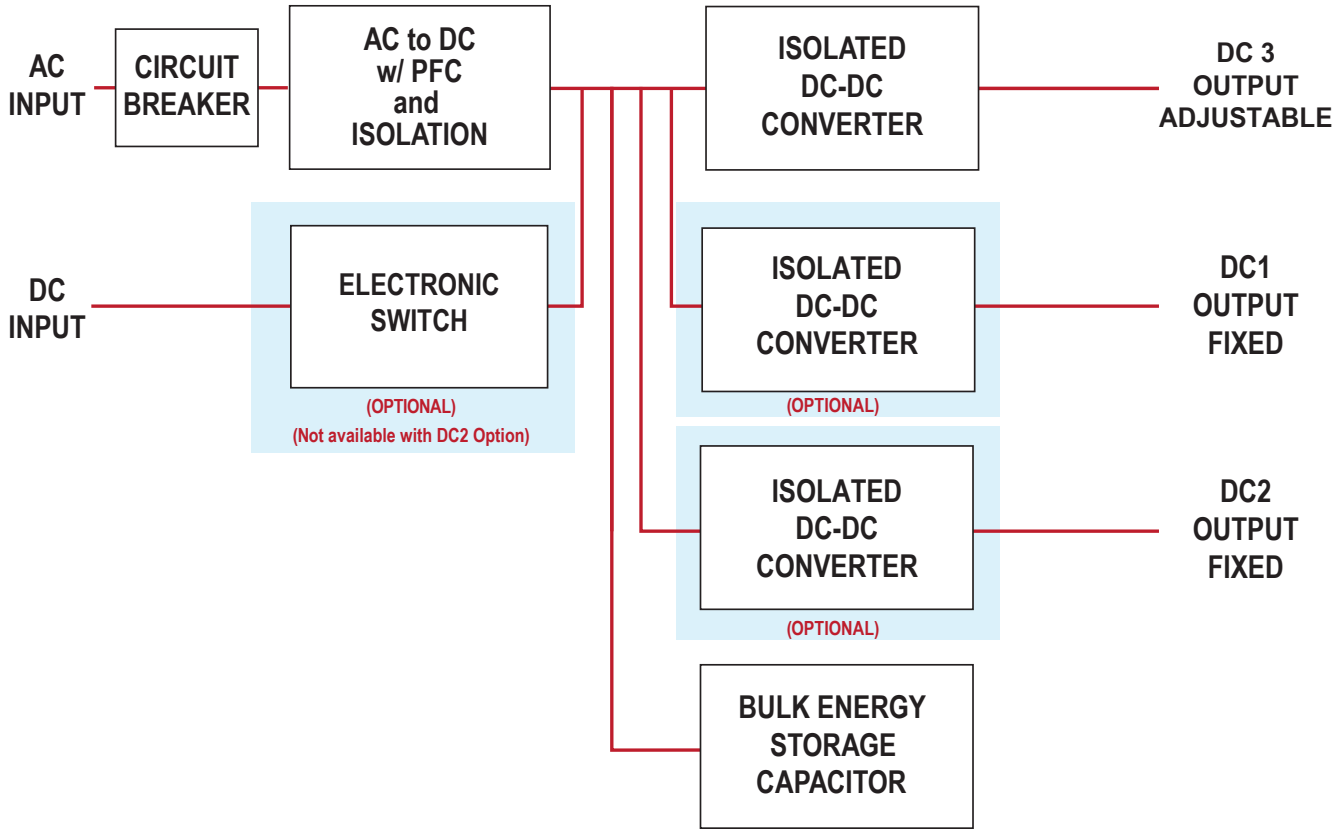
The MPC-1250 Series products are designed and manufactured to withstand the harsh environments and use encountered in military applications. The electronic circuitry is contained in a sealed chamber constructed from a die-cast aluminum chassis that is weather-proof and shock-proof. Redundant, water-proof fans on the rear panel draw cooling air over the heat-sink fins below the sealed chamber. Military-grade circular connectors are used, and optional attached connector covers are available for when the cables are not attached. The MPC-1250 Series products comply with a wide range of testing according to MIL-STD-810G.

The SynQor MPC-1250 Series products are designed and manufactured in the U.S.A.

Product Topology

The SynQor MPC-1250 Series products use a true on-line double conversion topology that provides protection to the load from spikes, noise, surges, brownouts, blackouts, etc. in the input power sources. They also provide smoothing of load transients and nonlinear load profiles so that the input power sources are not subjected to these disturbances. There is a seamless transfer from any power source to another so that there is no disruption in the output voltage.

As the figure below shows, there is a nominal 28 V mid-bus within the MPC that draws power from one of up to three power sources: the AC INPUT, or the optional DC INPUT (with that order of priority based on availability). EMI filters are present at all external inputs and outputs.



Power flows from the AC INPUT through an AC-DC converter that has Power Factor Correction (PFC) and high voltage safety isolation. Power flows from the DC INPUT through an electronic switch that is closed when the AC INPUT power is absent and the DC INPUT voltage is within its specified range.

The DC3 OUTPUT is created by an isolated DC-DC converter that draws power from the mid-bus. This DC-DC provides high voltage safety isolation and a tightly regulated, user adjustable output voltage. Optional DC outputs at various voltage and power levels are available. The DC1 option is limited to 500 W. The DC2 option can deliver up to 1250 W output. When the DC2 option is selected, DC Input is not available. DC1, DC2, and DC3 are isolated from each other.

Bulk energy storage capacitors are connected to the mid-bus to help smooth imbalances in power flow between the inputs and outputs of the MPC.

There is a communication/control port that provides a digital interface to a host computer system.

Part Numbering Scheme and Options

This table shows the part numbering scheme for the full line of SynQor MPC-1250-270 products:

Base Model			
Model Number	Power	Height (W x D x H)	Weight
MPC-1250-270	**1250 W**	**1U** (17.00" x 21.60" x 1.73")	**24 lbs.**

Base Model	Options				
	AC Input Freq	DC3 Output Voltage	DC Input / DC2 Output	DC1 Output	Additional Options
MPC-1250-1U-	**L** **W**	**270**	**S** **D** **M** **P** **R** **V** **W** **Y**	**00** **12** **15** **24** **28** **40** **50**	**-E** **00** **CE**

Not all combinations make valid part numbers, please contact SynQor for availability. See the Product Summary web page for more options.

Examples:
MPC-1250-1U-L270D50-E00,
MPC-1250-1U-W270M28-E00

Options	
AC Input Freq	**L** 47-65 Hz **W** 47-800 Hz
DC3 Output	**270** 270 V Default, 25-325 Vdc
DC Input / DC2 Output	**S** Not Installed **D** DC Input **M** DC2 Out 24 VDC with Droop Share **P** DC2 Out 24 VDC No Share **R** DC2 Out 28 VDC with Droop Share **V** DC2 Out 28 VDC No Share **W** DC2 Out 50 VDC No Share **Y** DC2 Out 50 VDC with Droop Share
DC1 Output	**00** None **12** 12 V **15** 15 V **24** 24 V **28** 28 V **40** 40 V **50** 50 V
Additional Options	**-E** Ethernet/SNMP with Configuration Loading **00** No CE Marking

The MPC-1250 Series of products provide up to 1250 W of total power (DC1 + DC2 + DC3). The MPC is a 1U high rackmount unit, weighing 24 lbs.

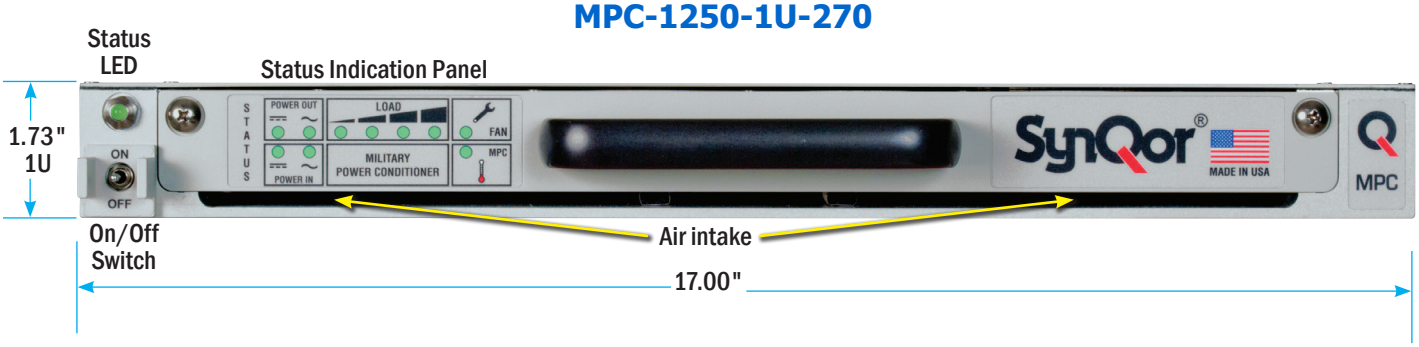
The MPC has various options that can be specified according to the part numbering scheme shown in the table:

- The allowable frequency of the AC INPUT can either be in the 47-65 Hz range (for 50 Hz and/or 60 Hz systems) or in the 360-800 Hz range (for 400 Hz and Variable Frequency systems)
- The DC3 high voltage output of the MPC-1250 Series can be adjusted by the user from 25 V to 325 Vdc. Default is 270 Vdc.
- Two optional DC OUTPUT capabilities are available: DC1 with up to 500 W capability, and DC2 with up to 1250 W capability an optional droop share.
- There is an optional DC INPUT that is specified to comply with MIL-STD-704F and MIL-STD-1275D for 28 V systems. DC2 is not available if DC INPUT is selected.
- RS232 serial port and logic-level I/O communication are included in the standard model. An Ethernet port providing web and SNMP interfaces is also included in the standard model.

Product Specifications

The following pages show the electrical and mechanical specifications of the MPC-1250-S-1U-270 Series of products. Data sheets showing these specifications and other information can be found at the web site **https://www.synqor.com/MPC**.

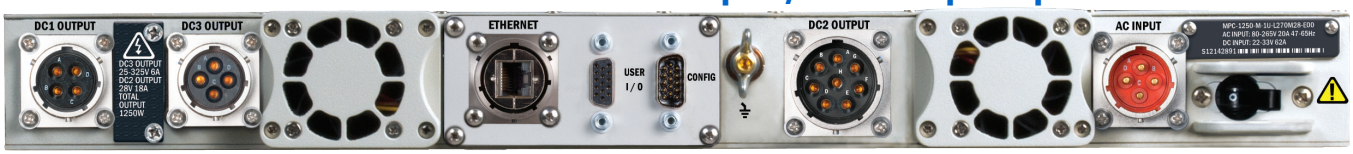
MPC-1250-1U-270



MPC-1250-1U-270 with DC Input / DC1 Output Option



MPC-1250-1U-270 with DC1 Output / DC2 Output Option



Electrical Characteristics

INPUT CHARACTERISTICS	
Operating AC Input	
Voltage	80-265 Vrms*
Frequency	47-65 Hz (47-800 Hz Optional)
Input Power Factor	>0.98 at 47-65 Hz >0.97 at 400 Hz >0.93 at 800 Hz
Maximum Input Current Continuous	20 A (full load, 85 Vrms)
AC Input Circuit Breaker Rating (* Power Derating to 80% below 90 Vrms)	25 A
Operating DC Input (Optional)	
Voltage	22-33 V
Continuous Maximum Input Current	62 A (full load, 22 V)
Transient Maximum Input Current	75 A

OUTPUT CHARACTERISTICS		
Total Output Power Continuous	1250 W	
Maximum DC3 Output Power	1250 W	
Maximum DC2 Output Power	1250 W	
Maximum DC1 Output Power	510 W	
(Note: Available DC3 power is reduced by power delivered to DC2 and DC1)		
DC 3 Output (Adjustable)		
Voltage Range	25 - 325 V	
Voltage Setpoint (Default)	270 V	
Voltage Setpoint Accuracy	± 3%	
Voltage Setpoint Resolution	1 V	
Voltage Regulation (Over Load & Temperature)	± 5%	
Current limit Range (User Adjustable)	0 - 6.0 A	
Current Limit Resolution	4 mA	
Current Limit Accuracy	± 50 mA	
Short Circuit Protection Trip Current	20 A	
Maximum Output Capacitance	18 mF	
DC1 Output (Optional, Fixed)		
Voltage Regulation (Over Load & Temperature)	± 3%	
Common Voltage/Power combinations (DC1) (Other Options Available)	12 V at 42 A 15 V at 34 A 24 V at 21 A 28 V at 18 A 40 V at 12.5 A 50 V at 10 A	=504 W =510 W =504 W =504 W =500 W =500 W
DC2 Output (Optional, Fixed)		
Voltage Setpoint	± 3%	
No Sharing		
Voltage Regulation (Over Load & Temperature)	-2%	
Common Voltage/Power combinations (DC2)	50 V at 20 A 24 V at 50 A 28 V at 44.6 A	=1000 W =1200 W =1250 W
Droop Share (Output droops vs. load to allow passive sharing among modules.)		
24 V Option		
Voltage Regulation (Over Load & Temperature)	-15% 26 V at 0 A 22 V at 50 A	 =1100 W
28 V Option		
Voltage Regulation (Over Load & Temperature)	-13% 30 V at 0 A 26 V at 48.1 A	 =1250 W
50 V Option		
Voltage Regulation (Over Load & Temperature)	-10% 52 V at 0 A 48.5 V at 20.6 A	 =1000 W

Specifications subject to change without notice.

ENVIRONMENTAL CHARACTERISTICS MIL-STD-810G	
Temperature Methods 501.5, 502.5	
Operating Temperature	-40 °C to +70 °C [1]
Non-operating Temperature	-40 °C to +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	100 kHrs	MIL-217F Ground Benign, Ta=25 °C

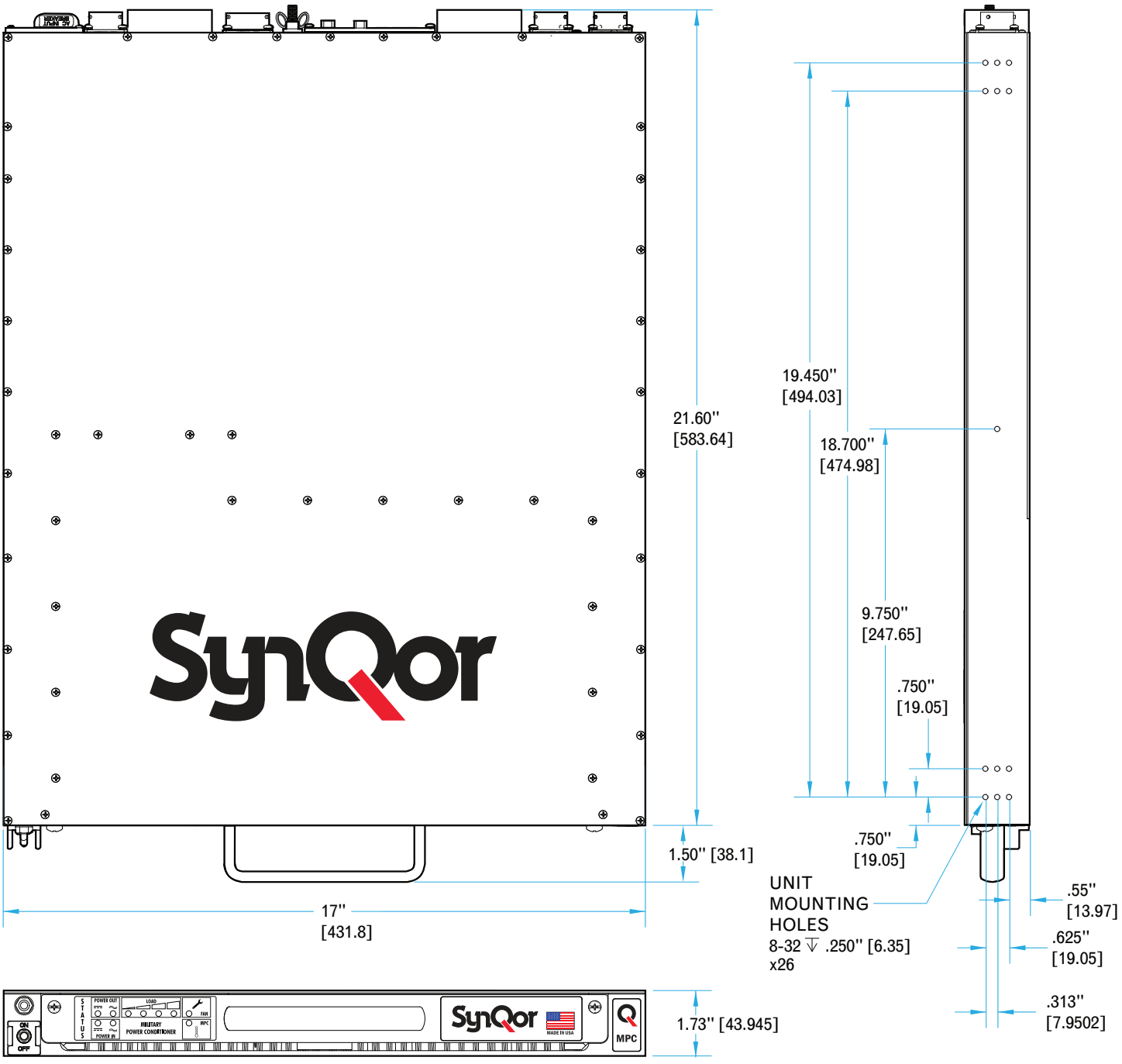
ELECTROMAGNETIC CAPABILITY MIL-STD-461F	
CE101	30 Hz - 10 kHz
CE102	10 kHz - 10 MHz
CS101	30 Hz - 150 kHz
CS106	10 kHz - 40 GHz
CS114	10 kHz - 200 MHz
CS116	10 kHz - 100 MHz
RE101	30 Hz - 100 kHz
RE102	10 kHz - 18 GHz
RS101	30 Hz - 100 kHz
RS103	2 MHz - 40 GHz

MECHANICAL CHARACTERISTICS	
1U Standard Chassis	
Chassis Size	17.00"W x 21.60"D x 1.73"(1U)H
Case Material	Aluminum
Total Weight	24 lbs.
Connectors	
AC Input Connector	MS3470L14-4P
User I/O Ports	HD DB15 Female
Configuration I/O Port	HD DB15 Male
Ethernet Port	Amphenol RJF22N00, Code B
DC Input Connector	MS3470L18-8P
DC1 Output Connector	MS3470L14-4SW
DC2 Output Connector	MS3470L18-8S
DC3 Output Connector	MS3470L14-4S
Cooling Exhaust Fans	
Sound Pressure Level (SPL)	54 dB(A)
Air Flow	0.67(m^3/min) 23.7 CFM

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

[1] 100% rated power at 55C, 0%rated power at 70C. Derate linearly.

1U Mechanical Diagram



Note:

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

MPC Efficiency

Figure 1 shows the typical efficiency with which the MPC-1250-270 series uninterruptible power supplies delivers power to its DC3 OUTPUT from a 230 Vrms AC INPUT, an 115 Vrms AC INPUT or a 28 V DC INPUT.

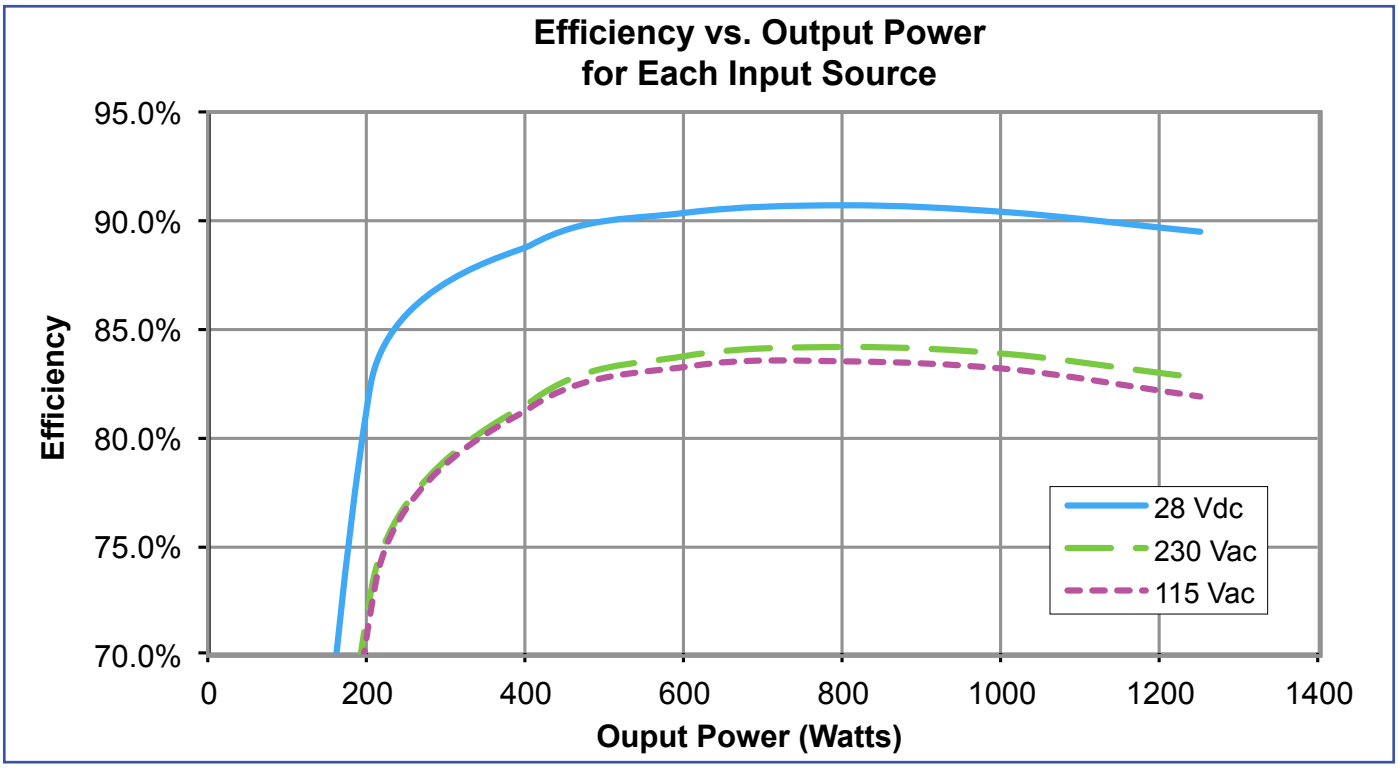


Figure 1

Total Output Power that can be derived from the AC INPUT

The total MPC output power (the DC3 power plus the optional DC1, DC2 power) for the MPC-1250-270 series is rated at 1250 W for an ambient temperature as high as 55 °C (131 °F). It draws this power first from the AC INPUT (if its voltage is within range) and then the DC INPUT (if its voltage is within range).

However, when the AC INPUT voltage is at the low end of its range (<90 Vrms) or the ambient temperature is at the high end of its range (>45 °C / 113 °F) the MPC will not be able to deliver its full rated output power in the steady-state without switching over to either the DC INPUT (if it is available and >22 Vdc). Figure 2 indicates the total steady-state output power that the MPC can derive **from the AC INPUT** under these extreme conditions. See Figure 3 for information on transient conditions.

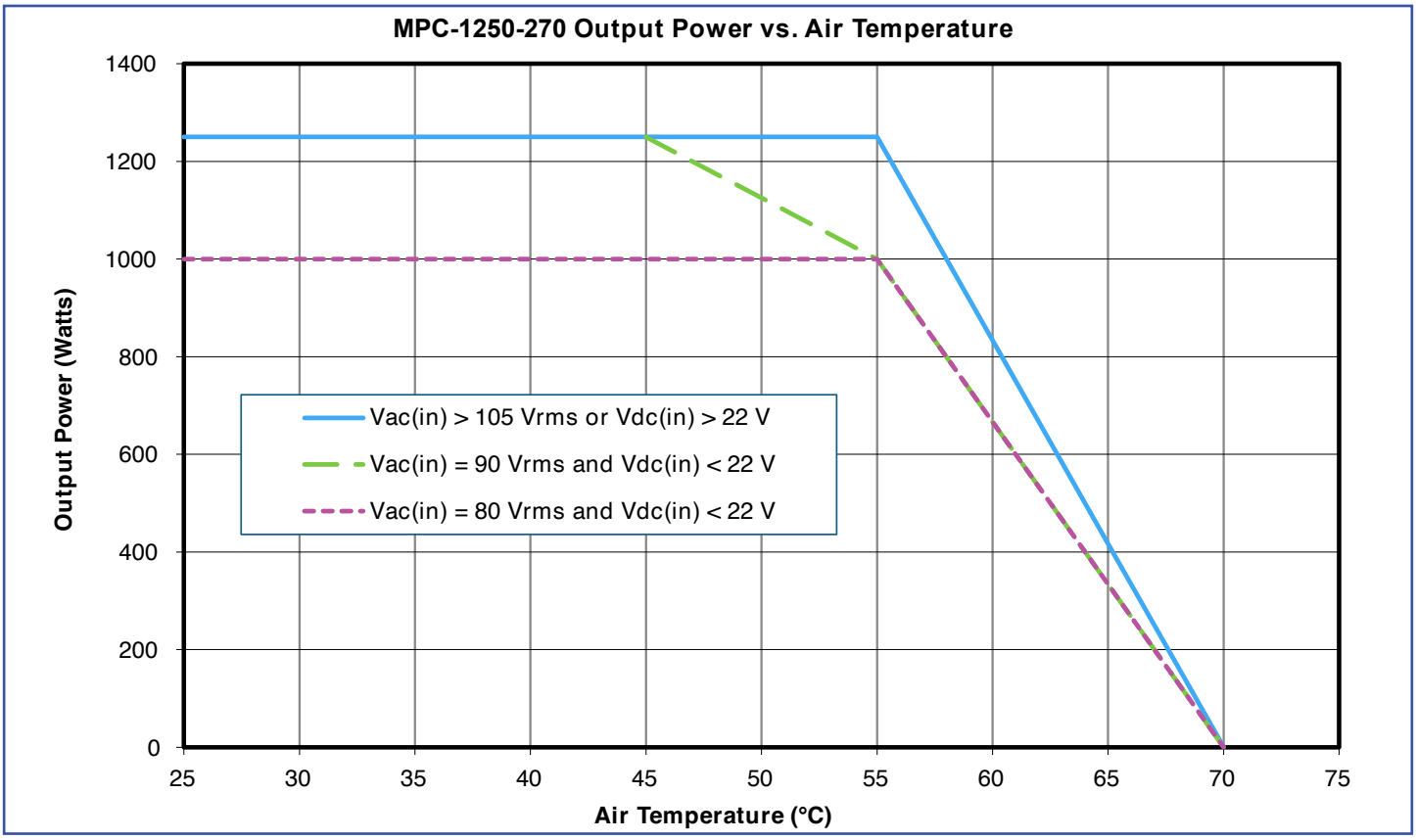


Figure 2

- If the AC INPUT voltage is above 105 Vrms, then the MPC can deliver its full rated output power of 1250 W from the AC INPUT for an ambient temperature as high as 55 °C (131 °F) without needing to switch over to the optional DC INPUT.
- If the AC INPUT is between 90 Vrms and 80 Vrms then the total output power that can be derived from the AC INPUT linearly decreases from 1250 W at 90 Vrms to 1000 W at 80 Vrms (except for at the high end of the ambient temperature range – see below). For example, the total output power that could be derived from the AC INPUT would be 1125 W at 85 Vrms as long as the ambient temperature is not above 50 °C (122 °F). If the total output power is greater than this derated value, the MPC will switch to the DC INPUT (if it is available and >22 V).
- If the AC INPUT voltage is 90 Vrms **AND** the ambient air temperature is above 45 °C (113 °F), the total output power that can be derived from the AC INPUT linearly decreases from 1250 W at 45 °C (113 °F) to 1000 W at 55 °C (131 °F). For example, the total output power that could be derived from the AC INPUT would be 1125 W at an AC INPUT voltage of 90 Vrms and an ambient temperature of 50 °C (122 °F). A higher output power than this would cause the MPC to switch over to its DC INPUT.

- When the AC INPUT voltage is between 105 Vrms and 90 Vrms **AND** the ambient temperature is between 45 °C and 55 °C, the total output power that can be derived from the AC INPUT can be calculated by linearly interpolating between the curves shown. For example, the total output power that can be derived from the AC INPUT when the voltage is 97.5 Vrms would be 1250 W up to an ambient temperature of 50 °C (122 °F) and then derate to 1125 W at 55 °C (131 °F).

Furthermore, there is a limited (and uncommon) range of AC INPUT voltage between 132 Vrms and 160 Vrms in which the total output power that can be derived from the AC INPUT is also derated, as shown in the graph below.

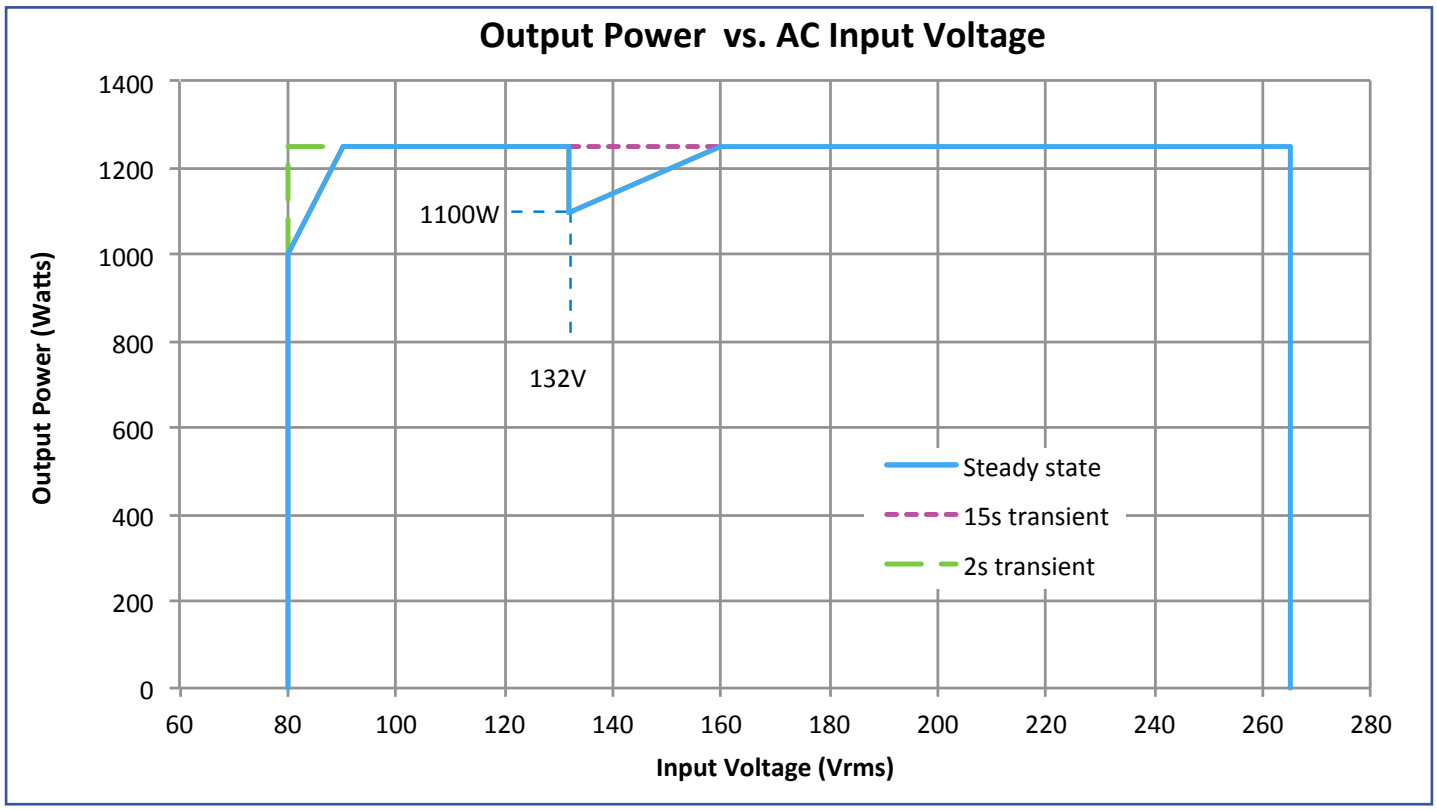


Figure 3

Note that the full rated output power of 1250 W can be derived from the AC INPUT having a voltage within this uncommon range for 15 seconds before the MPC will switch over to the DC INPUT. Also note that the MPC can drive it full rated power for a 2 second interval even if the AC INPUT voltage drops below 90 Vrms.

Although the DC3 output voltage can be adjusted from 25 V to 325 V, full power is only available above 210V. DC3 output power will be limited the maximum output current of 6A when the output voltage is set below 210 V. See Figure 4 for the available output power vs output voltage.

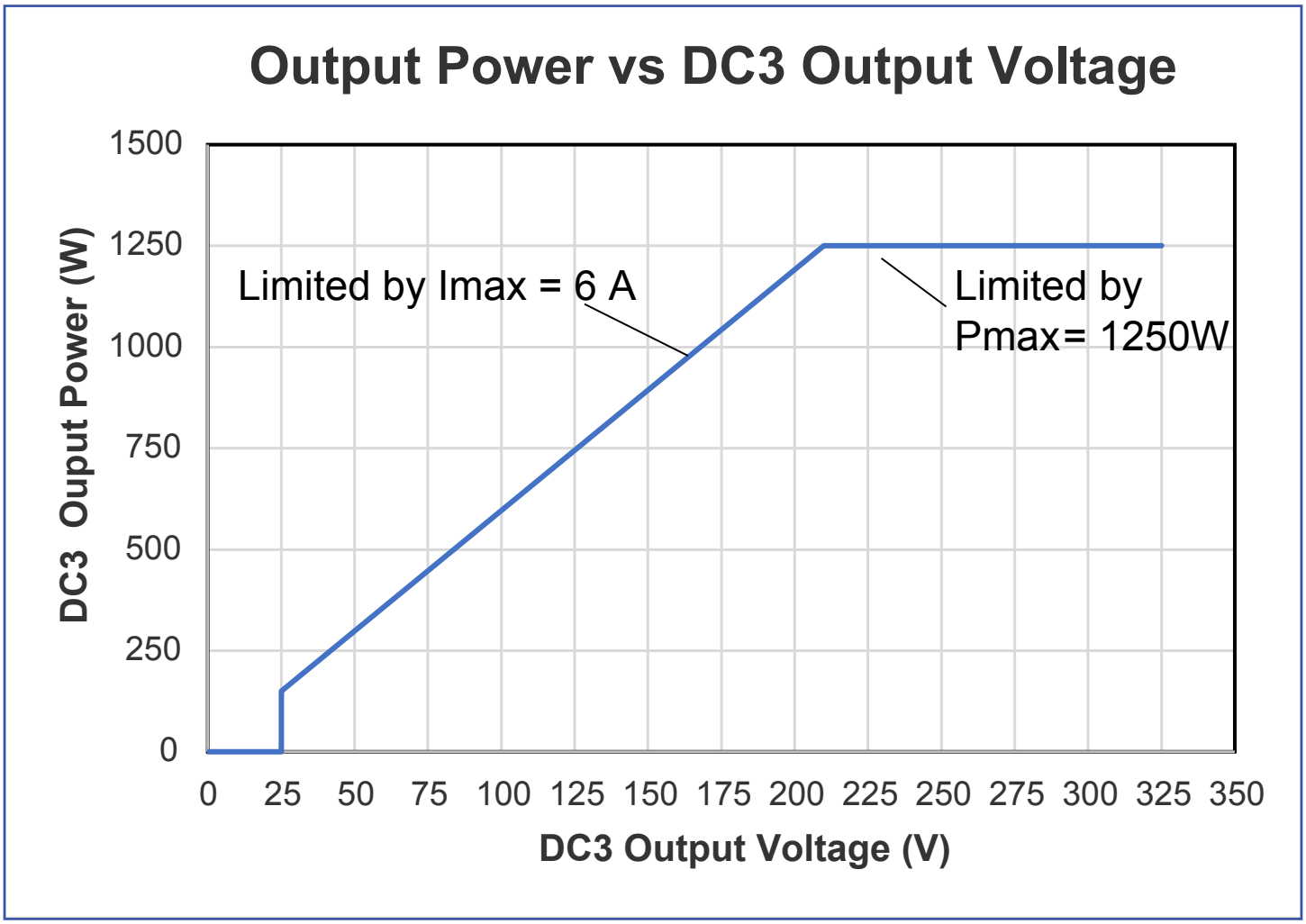
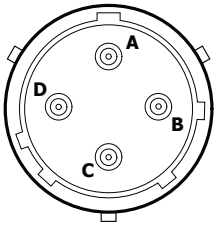


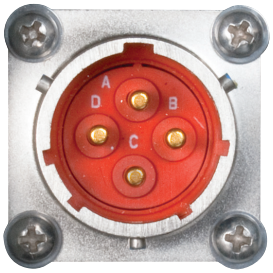
Figure 4

Power Cable Wiring Diagram

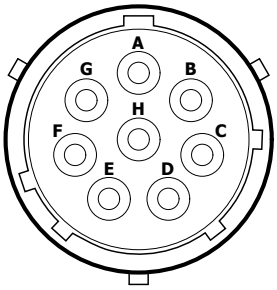
Looking at the rear panel, the MPC connector terminals have the following functions and locations:

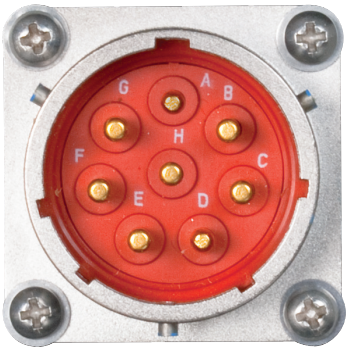
AC INPUT	
Pin	Function
A	Line
B	Neutral
C	No Connect
D	Ground



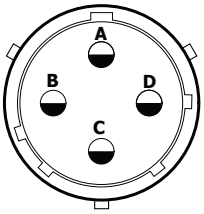


DC INPUT	
Pin	Function
G, F, E	+VIN
B, C, D	VIN Return
A, H	No Connect



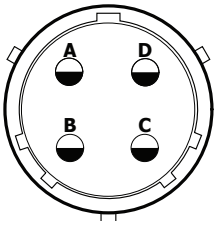


DC3 OUTPUT	
Pin	Function
A	VOUT Return
B	+VOUT
C	No Connect
D	Ground



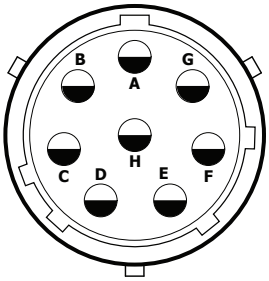


DC1 OUTPUT	
Pin	Function
C, D	+VOUT
A, B	VOUT Return





DC2 OUTPUT	
Pin	Function
G, F, E	+VOUT
B, C, D	VOUT Return
A, H	No Connect





Power Cable Wire Size

SynQor recommends the following cables for use with the MPC-1250-270 Series:

AC Input:	SYN-9101	MPC connection to NEMA 5-20 Plug, 10’
	SYN-9104	MPC connection to NEMA 5-15 Plug, 10’
	SYN-9102	MPC connection to Hardwire Termination, 10’
DC Input:	SYN-9151	MPC connection to Ring Connectors, 10’
	SYN-9154	MPC connection to NATO Connector, 10’
DC3 OUTPUT:	SYN-9130	MPC connection to Hardwire Termination, 10’
DC1 Output:	SYN-9171	MPC connection to Fork Connectors, 10’
	SYN-9172	MPC connection to Hardwire Termination, 10’
DC2 Output:	SYN-9174	MPC connection to Hardwire Termination, DC2 Output, 10’
	SYN-9175	MPC connection to Fork Connectors, DC2 Output, 10’

Other options may be available. Contact info@synqor.com or visit the website: **https://www.synqor.com** for more information. If it is necessary to develop custom cables for your application, please read through the following section for some important considerations. Damage caused by improper wiring of cables will not be covered under SynQor’s warranty.

Both the input and output cables of the MPC carry substantial current, and since the wires in these cables have resistance the current flowing through them causes a voltage drop from one end of the cable to the other. In other words, the voltage across the cable at its downstream end is smaller than the voltage across the cable at its upstream end. Mathematically, the amount that the voltage drops is equal to the resistance of the cable’s wire multiplied by the current flowing through the wire. It is therefore **important** to make sure that the **resistance of the cable’s wire is small** enough to keep this voltage drop to an acceptably small value.

While this is an issue for all of the power cables, **it is particularly important for the DC INPUT and DC2 Output cables** because the current flowing through it is very high (as high as 65 A for the MPC-1250-270 Series) and the voltage across it is already relatively small (as low as 22 V). In fact, a common problem that arises (when the DC INPUT cable has too small a wire) is that the voltage seen at the DC INPUT of the MPC falls below the minimum specified value of 22 V even though the voltage at the source of the DC power is greater than 22 V.

The resistance of a wire depends directly on its length. A wire twice as long as another will have twice the resistance, holding all other things constant. The resistance also depends on the reciprocal of the cross-sectional area of the wire, which in turn depends on the square of the wire’s diameter. A wire with half the diameter of another will therefore have four times the resistance, holding all other things constant.

Therefore, the longer a cable is, the more important it is that the wire’s diameter be large. Alternatively, a cable can have multiple pairs of wires to achieve a larger “effective wire diameter”. This second approach gives a more flexible cable. For 10 ft long cables, SynQor recommends that for the MPC-1250-270 Series:

- The AC INPUT cable have 3 wires (one for the ground) of 12 AWG
- The DC INPUT cable have 6 wires (three for each connection) of 12 AWG
- The DC3 OUTPUT cable have 3 wires (one for ground) of 12 AWG
- The DC2 OUTPUT cable have 6 wires (three for each connection) of 12 AWG
- The DC1 OUTPUT cable have 4 wires (two for each connection) of 12 AWG

Additional details about the effects of a resistance-related voltage drop are included in “Trouble-Shooting Guide - Cable wire resistance is too high”.

Set-Up

The recommended procedure for setting up the MPC is the following:

- Make sure the AC BREAKER on the rear panel of the MPC is in the OFF position.
- Connect the ground wire to the ground stud on the rear panel of the MPC.
- Connect all OUTPUT cables, first to the MPC and then to the various loads.
- **VERIFY** that the optional DC OUTPUT cable is connected to the MPC and the load with the correct polarity.
- Connect the USER I/O cables.
- Connect all INPUT cables, first to the MPC and then to the various sources.
- An overcurrent protect and disconnect device should be installed on the DC INPUT circuit. An example of a suitable device is a Carling Technologies, C-series, 80 A 65 VDC, CA1-B0-14-680-321-J circuit breaker. (www.carlingtech.com)
- **VERIFY** that the optional DC INPUT cable is connected to the MPC and the source of DC power with the correct polarity.
- Turn on the sources (if they have an upstream breaker).
- Move the AC BREAKER on the rear panel of the MPC to the ON position.

Note: Be careful to not toggle the ON/OFF switch during the setup. Doing so could cause the MPC to turn on and present a hazardous voltage at its output.

Start-Up

- **VERIFY** that all connections to the MPC are correct.
- If either the AC source or the DC source (or both) is present and within specifications, the color of the LED above the ON/OFF switch will be amber. This indicates that the MPC is in standby mode and ready to turn on.
- Momentarily push the ON/OFF switch on the front panel of the MPC upward. The switch can then be released and it will return to its normal (neutral) position.
- The MPC will immediately enable its outputs (assuming there is no fault condition). The color of the LED above the ON/OFF switch will change to green. The LEDs on the front panel will indicate the amount of power being delivered to the load and the input source from which this power is being drawn.

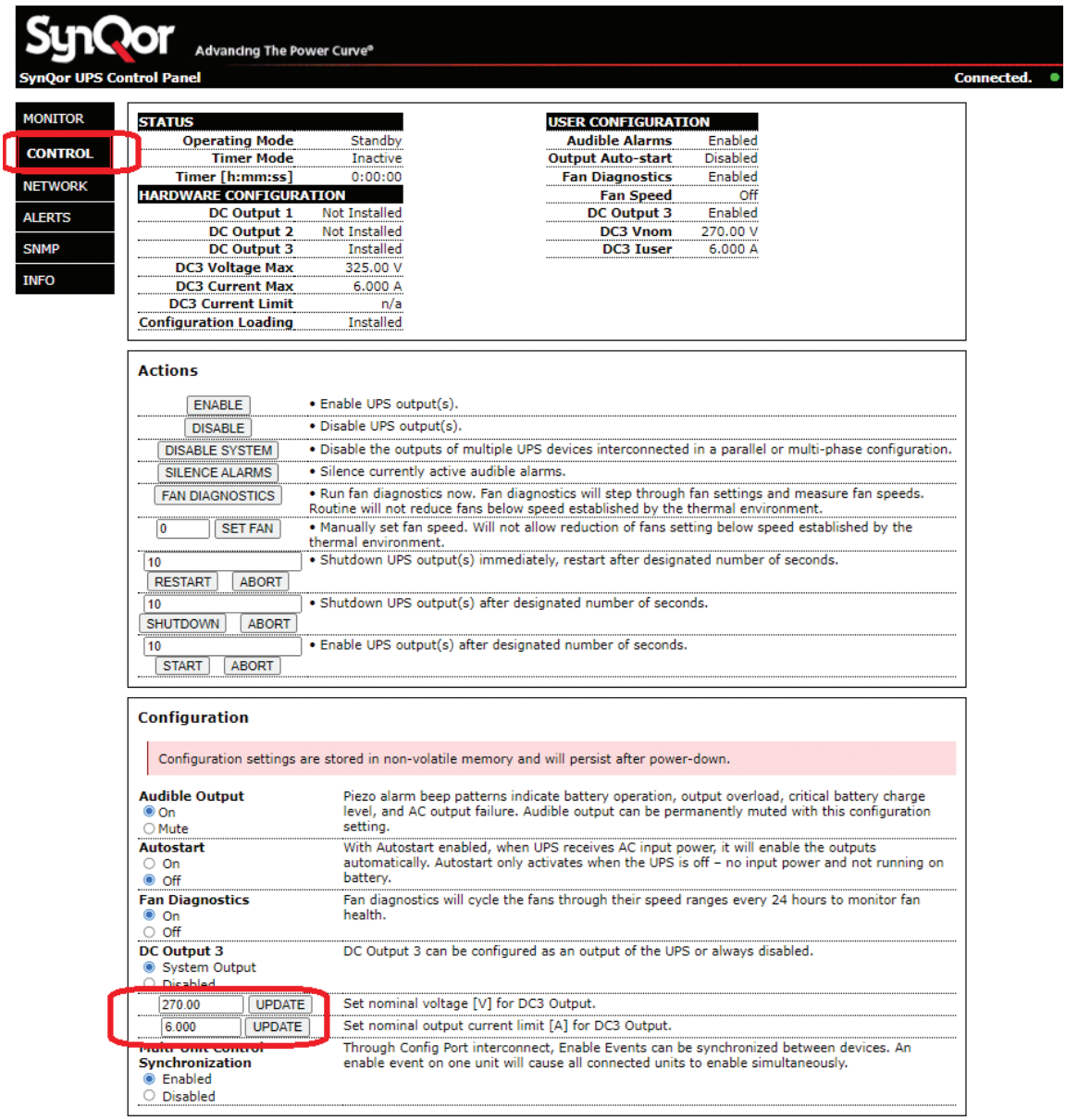
Shut-Down

- Shut down the equipment connected to the MPC.
- Push the ON/OFF switch on the front panel of the MPC downward and hold it in this position for 1 second (or more). The color of the LED above the ON/OFF switch will change to amber (if one or both input power sources are present) or it will be off (if no power sources are present). The switch can then be released to return to its normal position.
- The MPC will disable its outputs and shut down.
- The LEDs will either be appropriately illuminated (if one or both input power sources are present) or they will be off (if no power sources are present).
- It is not necessary to move the AC BREAKER on the rear panel of the MPC to the OFF position.

Setting DC3 OUTPUT Voltage and Current

The MPC-1250-270 Series has a user settable DC3 OUTPUT. The output voltage can be set from 25 V to 325 V. Note that full power (1250 W) is only available when the output voltage is set in the range 210-325 V since the output current is limited to 6.00 A. The output current can be set from 0.05 A to 6.00 A. At higher output voltage, the current will be limited below 6.00 A since the MPC-1250-270 is rated to 1250 W. See the figure below.

The output voltage can be set through the web page or through the RS-232 interface. To set the voltage through the web page, navigate to the control page. Under "Configuration", enter the desired output voltage in volts and the desired current limit in amps. Click update to apply the changes. These values are stored in non-volatile memory, and do not need to be reentered after the MPC-1250 is power cycled.



To set the voltage through the RS-232 interface, configure the RS-232 terminal by following the procedure described in section VI. Using a third party terminal application such as HyperTerminal, send the following commands:

SET DC3 IMAX x [mA]
SET DC3 VOUT x [V]

Example: Set Vout to 200V, Imax to 3A.

SynQor>SET DC3 VOUT 200
Flash Updated.

SynQor>SET DC3 IMAX 3000
Flash Updated.

NOTE that after each command the system will return "Flash Updated". This indicates that the values have been stored in non-volatile memory, and do not need to be reentered when the MPC-1250 is power cycled.

Power Cable Connections/Disconnections While Operating

For safety reasons, it is highly recommended that the input and output power cables be connected to the MPC before the source of AC or DC input power is turned on, and before the MPC is turned on (see **Section I: Warnings** and the **SET-UP** section above). Similarly, it is **highly recommended** to first turn off the MPC and the sources of input power before any power cables are disconnected from the MPC.

However, the SynQor MPC is capable of having any of its input or output power cables connected at any time (if safely done), including when the MPC is turned on and delivering power to the load. For instance:

- Even if the MPC is turned on, one can connect or disconnect the input power cables without harming the MPC or disrupting power delivery to the load. When there is an external source of power connected to the MPC, the unit will draw power from that source, choosing the AC INPUT source first, if present, and then the optional DC input source. The transfer from one source of power to another is seamless.

- Even if the MPC is turned on, one can connect or disconnect an output power cable without harming the MPC or disrupting power delivery to a load that might be connected to the other output.

NOTE that disconnecting an input or output power cable while that cable is handling power will likely cause an arc to form as the terminals are pulled apart. This arcing is not harmful to the MPC, although if done enough times it will degrade the connector to the point where it will need to be replaced. This problem is particularly acute for the **DC INPUT cable** because its current is so high. Disconnecting this cable while a large current is flowing is **not recommended**.

ALSO NOTE that when the MPC is turned on and delivering power to a load, and then another piece of equipment is connected to the same output, it is possible that this connection will momentarily disrupt the quality of the MPC's output voltage. For instance, consider the case where the DC3 OUTPUT power cable has a terminal strip that allows several loads to be connected to it. If the MPC is turned on and delivering power to several of these loads and then another load is connected to the terminal strip, it is possible that this new load will momentarily draw a large surge of current as it starts up. If this happens, the output of the MPC could reach its maximum current limit, and the MPC will reduce its output voltage to keep the current from getting any larger. This reduction in voltage will be corrected once the new load reaches its normal mode of operation, but in the mean time the reduction of the MPC's output voltage might cause one or more of the other loads to malfunction. Whether or not this will be a problem depends on the characteristics of the various loads.

Cooling System

The SynQor MPC-1250-270 Series products are cooled by fans that draw air into the intake below the front panel and exhaust it out the two fan ports on the rear panel. Care should be taken to ensure there is no obstruction to this airflow, either at the front intake or the rear exhaust ports. Similarly, care should be taken to avoid obstructing the fan blades.

The speed of the cooling fans is automatically controlled to provide adequate MPC cooling while extending the life of the fan bearings. Under low ambient temperature and/or low MPC output power the fans will be driven at a low speed. If the ambient temperature and output power are such that the MPC cannot otherwise maintain its specified maximum temperature for its internal circuitry, the fans will momentarily be driven at a speed that exceeds their rated long-term running speed. There is an LED on the front panel which indicates the status of the fans.

If the ambient temperature is low enough (for the level of power being delivered to the load), the fans may not be on. This is not a malfunction. It is done to preserve the life of the fans. If the fans are off, check the Fan Service Required LED on the front panel. If it is GREEN, the fans are functioning properly and simply not needed under the present conditions.

The fans are weather-proof and water-proof.

The MPC has two fans to provide redundancy for these exposed, moving components. With only a single operating fan the MPC is still able to deliver 100% rated power at an ambient temperature as high as 40°C, and it is able to deliver 80% of its rated power at an ambient temperature as high as 55°C.

Front Panel Indicators

To indicate the status of the MPC, there is one LED above the ON/OFF switch on the left side of the front panel of the MPC and an additional 10 LEDs on the front panel. There is also an audible alarm. These indicators are described in this section.

LEDs

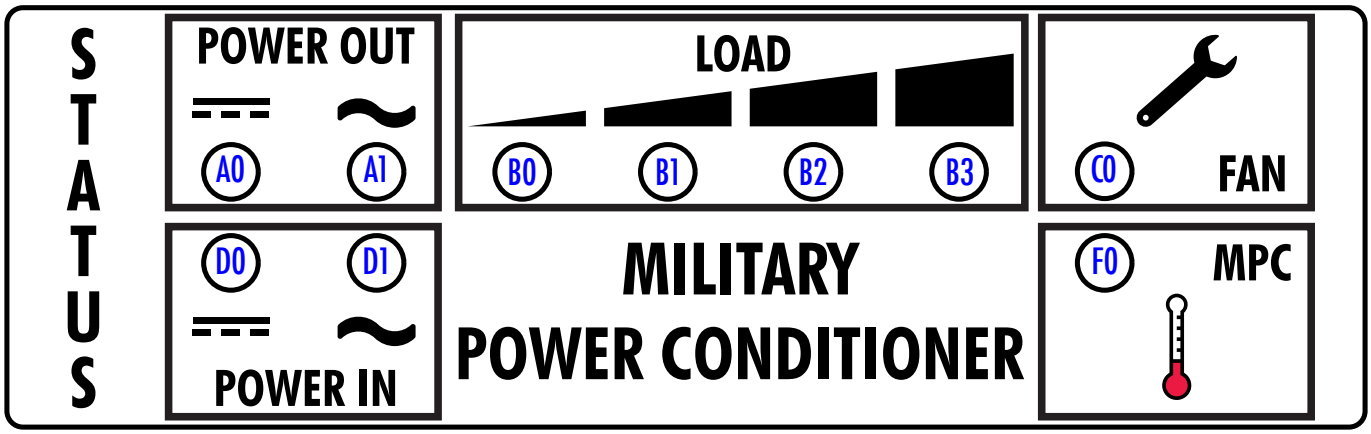
LED above the ON/OFF switch

This LED has four possible indications, according to the table below:

LED Appearance	Description	Indication
	Green	MPC is Running *(Outputs are Enabled)*
	Amber	MPC is on Standby *(Outputs are Enabled)*
	Red	MPC has a Fault Condition
	Off	MPC is Off

LEDs on the Front Panel

Each MPC has 10 LEDs, as shown below, that indicated the operational status of the MPC:



Power-In Indicators (LEDs in positions D0 and D1)

The LED in position D0 indicates the status of the optional DC INPUT and the LED in position D1 indicates the status of the AC INPUT, according to the table below:

LED Appearance	Description	Indication
	**Green**	*Input is Ready to Provide Load Power*
	**Pulsing Green**	*Input is the One Presently Selected as the Source of Power*
	**Amber**	*Input has Returned within Range and Diagnostic Tests are Being Performed*
	**Off**	*Input is Not within Range (Or the DC INPUT Option is not Installed)*

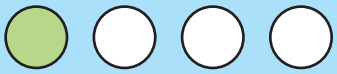
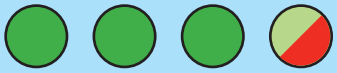
Power-Out Indicators (LEDs in positions A0 and A1)

The LED in position A0 indicates the status of the optional DC OUTPUT and the LED in position A1 indicates the status of the DC3 OUTPUT, according to the table below:

LED Appearance	Description	Indication
	**Green**	*MPC is On and the Output Voltage is Within Range*
	**Amber**	*MPC is On but the Output Voltage is Out of Range*
	**Red**	*MPC is Off and the Output Voltage is Within Range*
	**Off**	*MPC is Off (Or the DC OUTPUT Option is not Installed)*

Load Power Indicators (LEDs in positions B0 – B3)

The LEDs in positions B0 through B3 indicate the total output power of the MPC (The DC3 OUTPUT power plus the optional DC OUTPUT power) according to the table below:

LED Appearance	Description	Indication
	*B0 Dimmed Green;B1-B3 Off*	*Total Load Power <25%*
	*B0 Green; B1 Dimmed Green; B2-B3 Off*	*Total Load Power <50%*
	*B0, B1 Green; B2 Dimmed Green; B3 Off*	*Total Load Power <75%*
	B0, B1, B2 Green; B3 Dimmed Green	*Total Load Power <100%*
	*B0; B1; B2 Green; B3 Blinking Red*	*Total Load Power ≥100%*

MPC Cooling System Indicator (LED in position F0)

The LED in position F0 indicates the temperature and status of the cooling system for the MPC according to the table below:

LED Appearance	Description	Indication
	**Green**	*Moderate MPC Temperature (Fans Running at 33%)*
	**Blinking Green**	*Warm MPC Temperature (Fans Running at 67%)*
	**Amber**	*Elevated MPC Temperature (Fans Running at 100%)*
	**Red**	*Maximum MPC Temperature (Fans Running at 110%)*

Fan Service Required Indicator (LED in position C0)

The LED in position C0 indicates whether the two cooling fans in the rear panel of the MPC are OK or if their performance is degraded, according to the table below:

LED Appearance	Description	Indication
	**Green**	*Both Fans are OK*
	**Amber**	*One or Both Fans Have Recently Had Degraded Performance and Diagnostic Tests are Being Performed*
	**Red**	*One or Both Fans Presently Have Degraded Performance*

Audible alarm

For critical situations a pattern of audible tones will be repeated every 5 seconds, according to the table below. This audible alarm can be **silenced** by holding the ON/OFF switch on the front panel in the "UP" position until a chirp is heard. A new alarm condition will cause the audible alarm to be reactivated. Contact Factory for instructions on how to permanently silence the alarm.

Number of Tones in Pattern	Indication
Two	*Load Power is greater than or approaching 100% Rated Power*
Three	*DC3 OUTPUT Voltage is Low MPC May Need to be Turned Off and Back On to Reset DC3*

Operating Environment

The SynQor MPC-1250-270 Series is designed for the extreme environmental conditions of military and aerospace applications. All the electronic circuitry is contained in a sealed, weather-proof, shock-proof chamber constructed of die-cast aluminum. Only the redundant, water-proof cooling fans are exposed to the environment.

The MPC has been qualified to the following requirements of MIL-STD-810G:

MIL-STD-810G Test Method	Name	Procedure	Details
500.5	Low Pressure	I, II and III	▪ 15,000 ft. operating ▪ 40,000 ft. storage
501.5	High Temperature	I and II	▪ +55°C operating ▪ +65°C storage
502.5	Low Temperature	I and II	▪ -20°C operating ▪ -40°C storage
503.5	Temperature Shock	I	▪ 10 cycles; >10°C/minute
506.5	Rain	I	▪ 4" rain/hour ▪ 40 mph wind velocity
507.5	Humidity	NA	▪ >95%
508.6	Fungus	NA	▪ 28 day test
509.5	Salt Fog	NA	▪ 5% salt solution ▪ 2 cycles (24 hr wet/24 hr dry)
510.5	Sand and Dust	I and II	▪ 20 mph blowing dust ▪ 40 mph blowing sand
514.6	Vibration	Category 5	▪ 5Hz (300 RPM) ▪ Loose Cargo
514.6	Vibration	Category 7	▪ General Exposure
514.6	Vibration	Category 8	▪ C-130 Aircraft level
514.6	Vibration	Category 9	▪ General Exposure
514.6	Vibration	Category 24	▪ PSD = 0.04 g^2/Hz; 20-2000 Hz ▪ Operating
516.6	Shock	I, IV and VI	▪ 20 g/20 ms; 40 g/11 ms; 75 g/6 ms ▪ 48 inch drop in transit case ▪ 30 degree tilt and drop
528	Mechanical Vibrations of Shipboard Equipment	I	▪ Operating

Multiple MPC Configurations

The MPC-1250-270 has three DC outputs that can be combined to provide the following functionality:

- Higher Output power
- N+M redundancy
- Balanced load for a 3-Phase systems

The DC1 outputs are not parallelable between multiple modules. A direct parallel connection of DC1 outputs from different modules will result in a circulating power between the two MPC devices. Diode-ORing devices added externally at the DC1 outputs will prevent any circulating power. However, the outputs will still not necessarily share the load current equally

DC3 uses digital current sharing to ensure the load is balanced. Units typically share output power within ±3%. Up to 32 units can have their DC3 OUTPUTs connected in parallel, with N+M redundancy.

DC2 uses droop share to ensure the load is balanced. Units typically share output power within ±5%. Up to 3 units can have their DC2 outputs connected in parallel.

Parallel Connection of Outputs: DC3

The DC3 OUTPUT can be placed in parallel with the proper configuration cable. This cable provides digital current sharing for all connected units.

Sharing is optimized when the output resistance is matched between all parallel units. The output cables should have the same construction, similar length, and be connected at a single point.

N+M Redundancy - Ideal Diode

The ideal diode on the DC3 OUTPUT provides N+M redundancy when multiple units are placed in parallel. An N+M redundant system consists of N units to supply the maximum load, and M additional units to provide redundancy. Typically, one additional unit is used for redundancy giving “N+1 redundancy”.

During normal operation, all N+M units will deliver power to the load. Should one unit fail, the remaining units will increase their output current to continue to power the load. The failed unit can be removed and replaced to restore the redundancy level of the system to its original design. The replacement unit can be inserted into a live, operating system, but for safety reasons it is recommended that all units in the system be disabled first.

In addition to N+M redundancy, the ideal diode prevents power from flowing into the unit during normal operation. This ensures that power cannot circulate between multiple units when the outputs are in parallel. The digital communications ensures the load is shared evenly.

Configuration Cables

Configuration cables are necessary for paralleling the DC3 OUTPUT. They provide the following features:

- Synchronized start up, shut down, and fault recovery
- Digital communication for load sharing
- Up to 32 units in parallel.

The table below lists configuration cables for systems of 2-5 units. Contact the factory for configuration cables that support more than five units in parallel.

Configuration Cables for Paraleling	
2 Units Parallel, 3′	SYN-9341
3 Units Parallel, 6′	SYN-9343
4 Units Parallel, 9′	SYN-9344
5 Units Parallel, 12′	SYN-9345

Parallel Connection of Outputs: DC2

The DC2 output can be put in parallel simply by connecting the output cables of each unit together. The units share current by the semi-regulated droop characteristic of DC2. Typical sharing accuracy is ±5%. Worst case sharing accuracy is ±10%. Due to the wide range sharing accuracy, it is only practical to put three DC2 outputs in parallel.

Sharing is optimized when the output resistance is matched between all parallel DC2 outputs. The output cables should have the same construction, similar length, and be connected at a single point.

Configuration cables are not required for load sharing, but may be used for synchronized enable and disable of the DC2 output. Use SYN-9341 for two units in parallel, SYN-9343 for three units.

On/Off Control - Parallel Systems

When several units are connected in parallel with a configuration cable, any “on” front panel switch actuation will cause all outputs to turn on at once. In addition, the “remote-on” rear panel signal can be used for a coordinated start. Any “off” front panel switch actuation will cause

that specific unit be turned off. All other units will continue to deliver power, assuming the load can be supported with one less unit.

For coordinated shutdown, the user must send "SYSTEM DISABLE" over RS-232. See Section V of the Owner's guide for details on the RS-232 interface. See the MPC User Commands document for more information on the "SYSTEM DISABLE" command.

Connection of AC and/or DC INPUTS

There are several ways that the AC and/or DC INPUTS of multiple MPC units can be connected to sources of power:

- They could be connected to the same AC and/or DC source, respectively.
- They could be connected to different AC and/or DC sources, respectively.

All that is necessary is to ensure that the input voltage falls within the specified range of the AC and/or DC INPUTS of the individual MPC units.

Furthermore, the individual AC and/or DC INPUT cables can be first combined into a single cable (of appropriate minimum wire size), or they can be left as separate cables, each connected to the desired AC or DC source.

Note that the MPC input circuit breaker disconnects the unit from the AC input bus should a MPC experience a hardware fault on its input stage.

3-Phase AC INPUT Source

When three MPC units are used (with their DC OUTPUTS connected in parallel), each MPC unit's AC INPUT can be connected to a different phase of a 3-Phase source. There are two different ways to do this:

- each MPC unit's AC INPUT can be connected from a line (i.e., L1 or L2 or L3) of the AC source to the neutral wire of the AC source (assuming it is present), or
- each MPC unit's AC INPUT can be connected from one line of the AC source to another (i.e., L1 to L2, L2 to L3, or L3 to L1)

Either connection scheme is acceptable, as long as the resultant input voltage falls within the specified range of the AC INPUT of the individual MPC units.

If DC3 OUTPUTs are connected in parallel, the load on each AC INPUT phase will be balanced typically within ±5%.

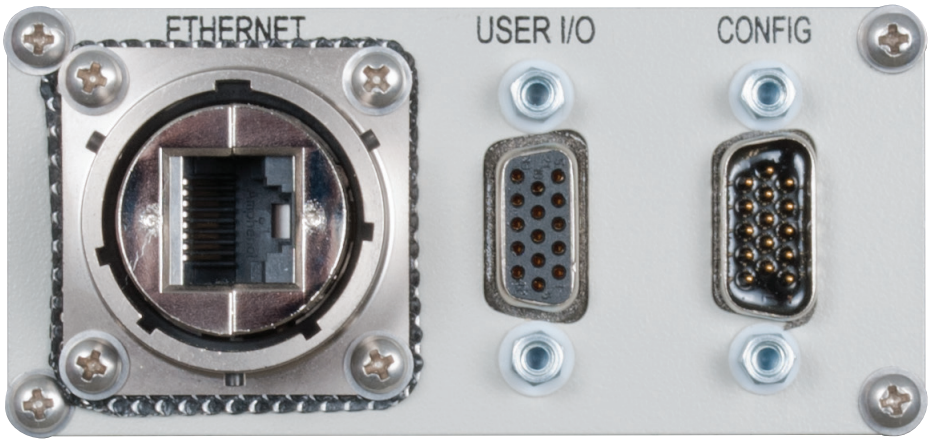
If the DC2 outputs are connected in parallel, the load on each AC INPUT phase will be balanced typically within ±7%.

Wiring Caution

WARNING: *LETHAL VOLTAGES MAY BE PRESENT ON MPC DC3 OUTPUT CONNECTIONS. ALWAYS REMOVE INPUT POWER BEFORE MAKING MULTI-UNIT DC3 OUTPUT CONNECTIONS. ALL DC3 OUTPUT CABLE CONNECTORS MUST BE INSTALLED DURING OPERATION AS A DISCONNECTED CABLE CONNECTOR MAY HAVE EXPOSED VOLTAGE PRESENT FROM ANOTHER UNIT IN THE GROUP .*

Control Cable Connections

There are two high-density (three-row) DB15 connectors located on the rear panel of the MPC:



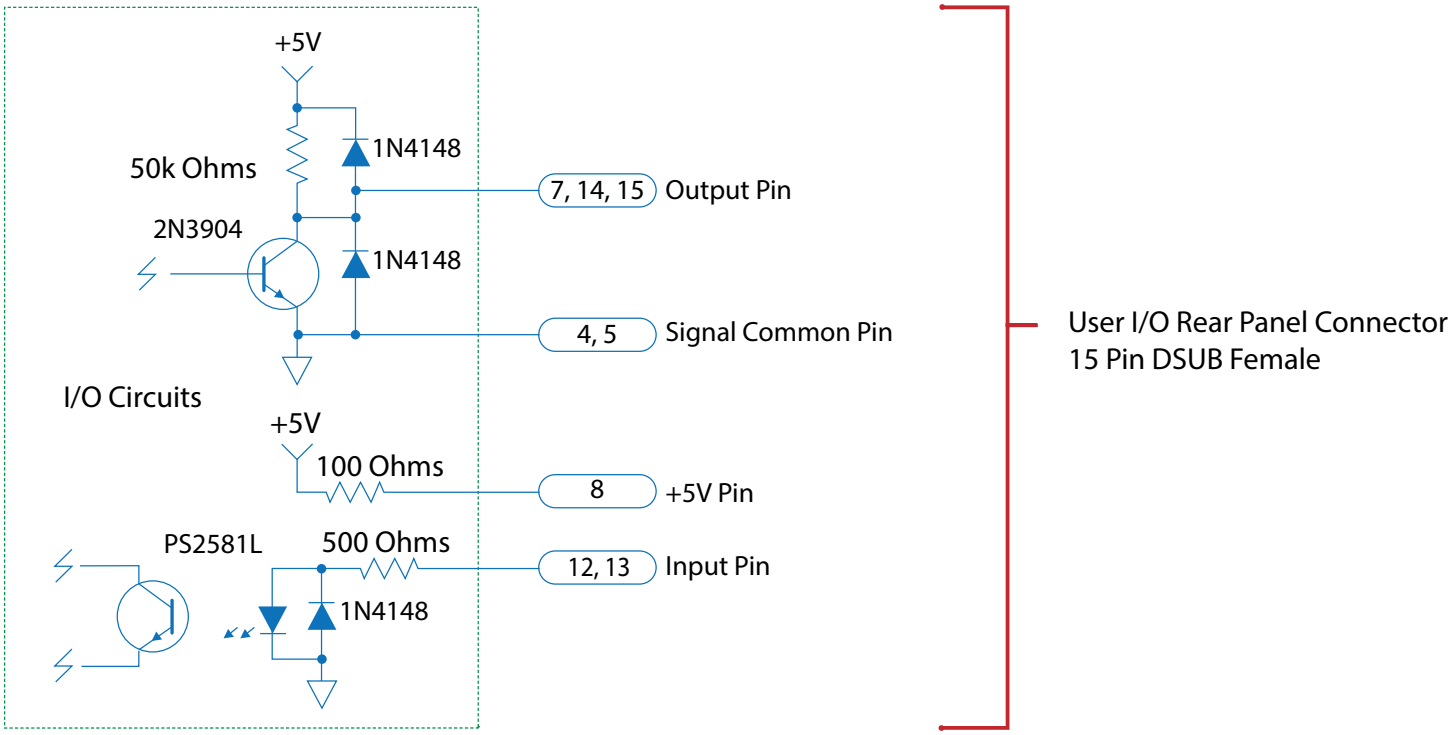
The User I/O female DB15 connector on the left is for a connection to a host/system computer so that it can control the MPC and receive information regarding the status of the MPC.

The Configuration male DB15 connector on the right is for a connection between one SynQor MPC and another when, for instance, they have their outputs connected in parallel and they therefore need to communicate and coordinate with each other.

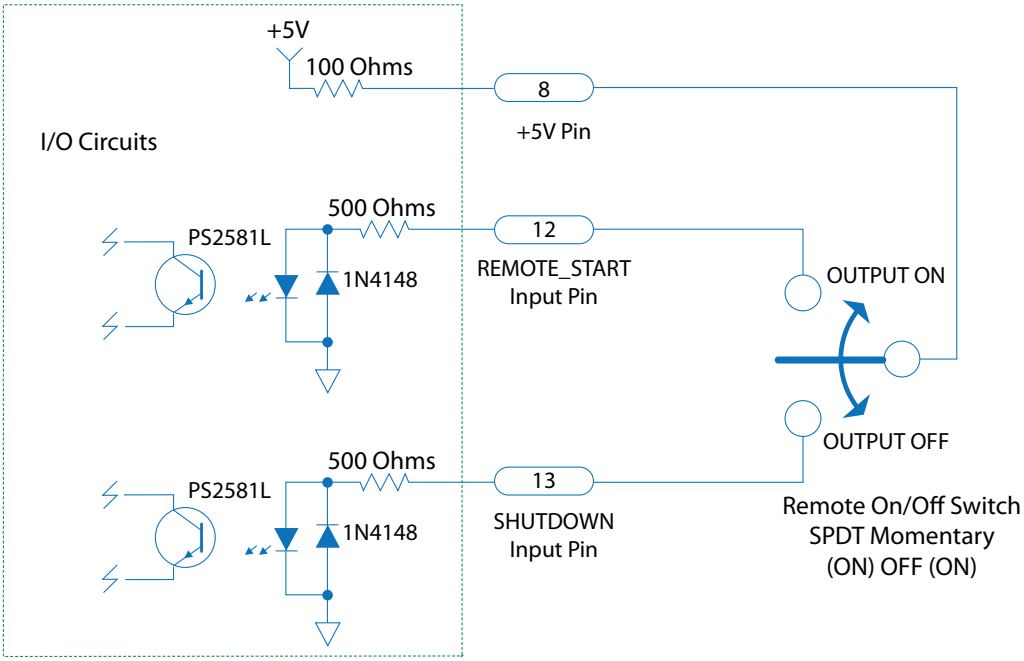
The designation/location of the pins for the User I/O female high-density DB15 connector is shown below:



Internal User I/O Circuits



Remote On/Off Switch Connections



Note: A 2PDT or 3PDT switch may be substituted for single control of 2 or 3 MPC machines, respectively.

Digital Input/Output Control Signals

There are 2 input and 5 output digital signals available on the User I/O female high-density DB15 connector. The pin assignments and functions of these digital I/O signals are as follows:

Signal	Pin Number	Function
+5 V	8	Bias voltage with minimal current drive usable as a pull-up voltage for the open collector output signals (100Ω source resistance)
GND	4 and 5	Ground reference for all digital inputs and outputs
$\overline{\text{ACIN_GOOD}}$	7	Open collector* output where “low” indicates AC Input voltage is within range
$\overline{\text{OUT_OK}}$	14	Open collector* output where “low” indicates DC3 OUTPUT voltage is within range
$\overline{\text{OVER_TEMP}}$	15	Open collector* output where “low” indicates that the MPC is at or above its maximum temperature
REMOTE_START	12	Drive this line “high” with ≥ 5mA to enable the MPC outputs
SHUTDOWN	13	Drive this line “high” with ≥ 5mA to disable the MPC outputs

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

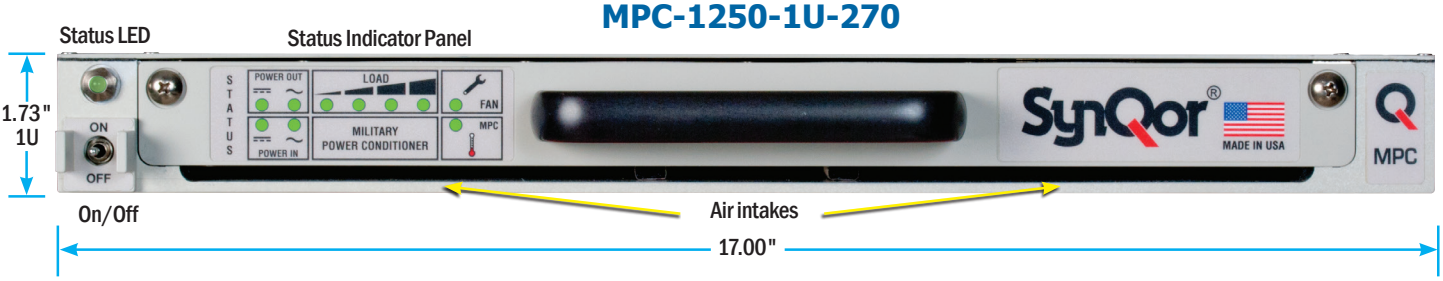
RS232 Serial Interface

The same User I/O female high-density DB15 connector also provides for an RS232 interface between the MPC and the host/system computer. The interface has a 115.2k baud with eight data bits, no parity bit and one stop bit. The pin assignments and functions for this RS232 interface are as follows:

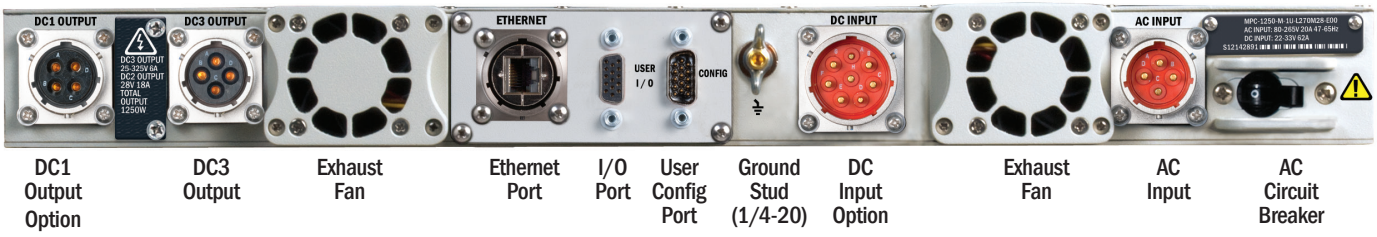
Signal	Pin Number	Function
GND	4 and 5	Ground reference for RX and TX signals
RX	3	RS232 DCE/MPC Device Receive signal
TX	2	RS232 DCE/MPC Device Transmit signal

The RS232 port provides readback of MPC's state, as well as the configuration and control of the MPC's operation. The port can be used from a standard terminal interface, or from a custom computer application.

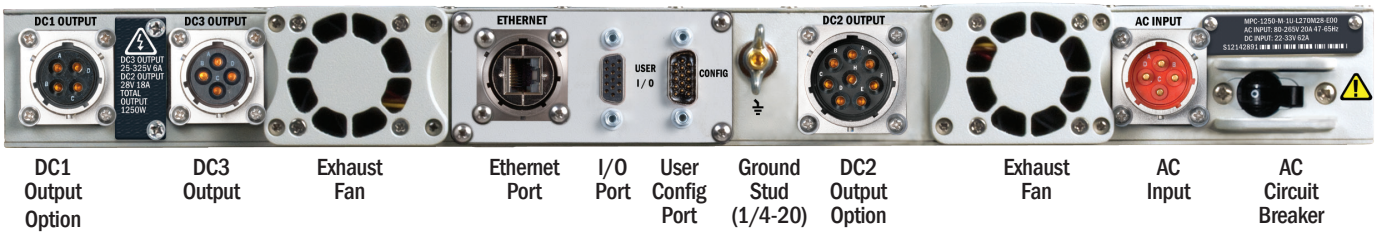
MPC-1250-1U-270



MPC-1250-1U-270 with DC Input/DC1 Output Option



MPC-1250-1U-270 with DC1 Output/DC2 Output Option



Readback information that is available:

- AC Input Voltage
- AC Input Current
- AC Input Frequency
- DC Input Voltage
- DC3 OUTPUT Voltage
- DC3 OUTPUT Current
- DC3 OUTPUT Power
- Total Output Power
- External Switch Input Status
- Fan RPM
- Internal Temperatures

Parameters that are controllable through the interface:

- Output enable / disable
- Fan diagnostics
- Alarm enable / disable
- DC3 OUTPUT Voltage Setpoint
- DC3 OUTPUT Current Limit

For a detailed description of the terminal interface see the SynQor website at:
https://www.SynQor.com/UPS/documents/UPS_User_Commands.pdf

Ethernet Interface

The Ethernet interface provides a web page based user interface for monitoring and control of the MPC. The user can configure email alerts for MPC alarm conditions. The interface also exposes an SNMP interface compliant to RFC-1628.

The Ethernet interface supports 10BASE-T and 100BASE-T standards. It utilizes a standard RJ-45 connector, also allowing a metallic sealable circular military outer housing. The interface supports auto-negotiation, polarity correction, and Auto-MDIX (detection and use of straight through or cross-over cables).

IP address assignment can be done via DHCP or user entry of a static address. The interface also supports a direct connection between the MPC and a host computer by including a DHCP server internal to the MPC.

For a detailed description of the Ethernet port and SNMP implementation see the SynQor website at: **https://www.synqor.com/ups/documents/UPS_Ethernet_SNMP_UG.pdf**

Fans

The fans on the rear panel have sealed bearings that do not require any maintenance.

Cleaning

The MPC-1250-270 unit has a sealed chamber for its electronics that is weather-proof. Only the fans on the rear panel are exposed to the environment, and these fans are also weather-proof. The unit can therefore be cleaned without concern of getting liquids inside the chamber. **NOTE**, however, that if the cables have been removed from the connectors the connectors should have their covers installed. If they are not, then care should be taken to not get excess liquid on the connector terminals. **ALSO NOTE** that care should be taken to not get excess liquid on the switch of the AC BREAKER on the back panel.

Cleaning should be done either with soap and water or with an Isopropyl alcohol and water mixture. A soft cloth should be used.

Do not immerse the unit in water to clean it.

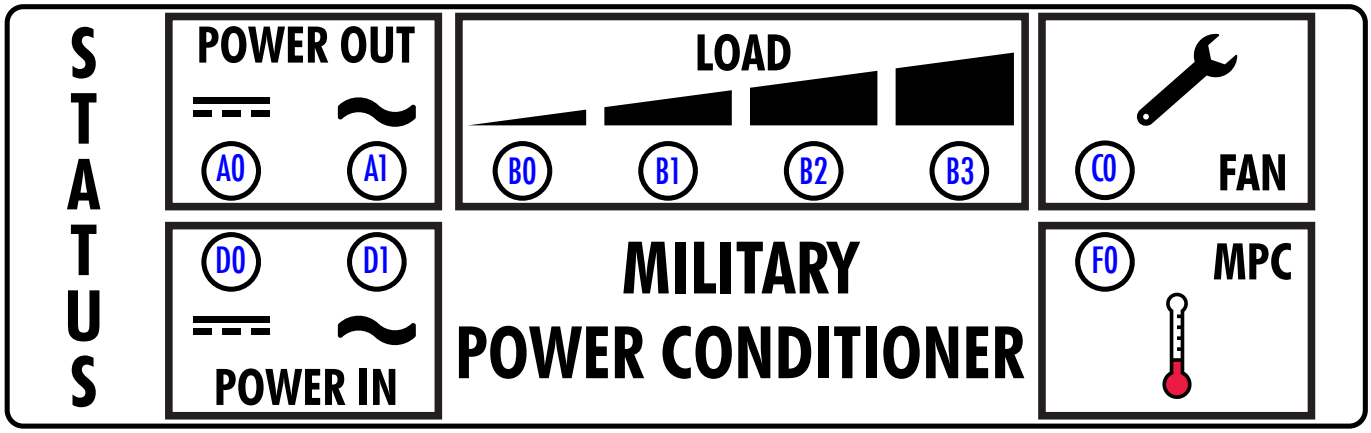
Fault Conditions

The SynQor MPC has no user-serviceable parts within it. If it has an internal malfunction only a factory trained personnel should attempt to repair it.

There are, however, several external conditions that could cause the MPC to not operate as desired. These external conditions can likely be corrected by the user.

The 10 LEDs on the front panel are the best and first place to look to determine what might be wrong with the MPC. The table on the next several pages is therefore organized by what these LEDs indicate, and for each indication there is a listing of what might possibly be wrong.

The front panel LED array is shown below. The designations of the 10 LEDs in this array are used in the following table.



LED	Indication	Possible Problem(s)
D1: **AC INPUT Power LED**	LED is OFF	•The AC INPUT power source is not turned on. •The AC INPUT cable is not connected or it is wired wrong. •The AC Breaker on the rear panel is OFF. •The AC INPUT voltage is either too low or too high.
	LED is a STEADY GREEN and not a PULSING GREEN. MPC is instead running off the optional DC INPUT	•The AC INPUT voltage is within its proper range but the MPC is not selecting it for its source of power. •The AC INPUT voltage and the total load power may exceed the power derating curves given earlier in this Guide. •The AC INPUT cable may have too much series resistance. Thicker wire should be used.
D0: **DC INPUT Power LED**	LED is OFF	•The optional DC INPUT is not available on this unit. •The DC INPUT power source is not turned on. •The DC INPUT cable is not connected or it is wired wrong. •The DC INPUT cable is connected to the DC source with the wrong polarity. •The DC INPUT voltage is either too low or too high •The DC INPUT cable may have too much series resistance. Thicker wire should be used.
A1: **DC3 OUTPUT Power LED**	LED is OFF	•The MPC is OFF and needs to be turned ON.
	LED is AMBER	•The DC3 OUTPUT load is higher than 1250 W by enough to trigger the power limit circuitry. •The DC3 OUTPUT is shorted within the cable or a load.
	LED is RED	•The MPC has been turned OFF, but due to a malfunction within the MPC it is still running and providing an DC3 OUTPUT voltage. •Some other source of voltage is connected to the DC3 OUTPUT and is powering it when the MPC is not.
A0: **DC OUTPUT Power LED**	LED is OFF	•The optional DC OUTPUT is not available on the unit. •The MPC is OFF and needs to be turned ON.
	LED is AMBER	•DC1 load is higher than 500W, or DC2 load is higher than 1250W •DC1 or DC2 is shorted within the cable or load •Some other source is connected to DC1 or DC2
	LED is RED	•The MPC has been turned OFF, but due to a malfunction within the MPC it is still running and providing an DC OUTPUT voltage. •Some other source of voltage is connected to the DC OUTPUT and is powering it when the MPC is not

LED	Indication	Possible Problem(s)
B0 – B3: LOAD POWER LEDs	B3 is BLINKING RED	•Total MPC load power is greater than or approaching 1250 W. The MPC may still be delivering its specified output voltage because the load power is not high enough to trigger the power limit circuitry.
	B0 – B3 are all OFF	•No power is being delivered to the load. •The MPC is OFF and needs to be turned ON. •The loads or output cables are not connected. •The loads are all turned off. •The loads are simply not drawing any appreciable power at the time.
F0: MPC Cooling System LED	LED is BLINKING GREEN	•Indicates that the fans are running at 67% of their rated speed. There is no problem.
	LED is AMBER	•Indicates that the fans are running at 100% of their rated speed. There is no problem, but the unit is operating at a high ambient temperature and a high load combination.
	LED is RED	•Fans are running at 110% of rated speed to keep the unit cool. The maximum recommended temperature may be exceeded, but the fans are keeping things cool enough to avoid triggering the over-temperature shut-down circuitry.

LED	Indication	Possible Problem(s)
C0: Fan Service Required LED	LED is AMBER	•One or both fans have recently had degraded performance but seem to be ok now. The MPC is running a diagnostic test.
	LED is RED	•One or both fans presently have degraded performance, even if they are running, and service is recommended at the earliest convenient time. •Ensure that the fan blades are not obstructed from turning
Audible Alarm: (pattern repeats every 5 seconds)	Two tones	•The total MPC load power is above 1250 W. •Loads should be reduced if this condition persists.
	Three tones	•The DC3 OUTPUT voltage is low. This occurs when the DC3 OUTPUT is overloaded and begins acting as a current source with the user programmed current limit. •In rare cases, the DC3 OUTPUT may be latched off. This occurs when the DC3 experiences 10 short circuit events within 10 seconds of each other. To reset the DC3 OUTPUT, the MPC must be turned OFF and then ON

Two other conditions should be mentioned:

- The fans are off when the MPC is running

  It is normal for the fans to be off, even if the MPC is running and delivering power to the load, as long as the temperature of the MPC is low enough. If the Fan Service Required LED (C0) is green, both of the fans are OK, even if they are not running.

- The MPC does not turn off when the ON/OFF switch is pushed down

  When the ON/OFF switch on the front panel is pushed down, the MPC does not respond to this signal for approximately 1 second. This is done to ensure that the MPC is not accidently turned off. If the user does not hold the ON/OFF switch in the OFF position for a full second before releasing it, the MPC will not turn off.

Other possible situations that are the result of external issues that a user could likely correct are related to:

- Loads that draw a large surge of current at start-up

  When the MPC is running and powering one or more loads connected to its DC3 OUTPUT, and then an additional load of the DC3 OUTPUT is turned on. If this newly started load draws a large surge current at start-up, it can cause the current limit of the MPC's DC3 OUTPUT to be triggered, and the DC3 OUTPUT voltage will then drop. This drop could cause the existing loads to be disturbed. Furthermore, if the voltage drops far enough, the MPC will turn off it DC3 OUTPUT and initiate a new start-up sequence. This latter action would cause the power flow to the existing loads to be interrupted.

  If this disruption of existing loads is a problem, then the solution is to make sure the loads that display this start-up surge characteristic are all started first, or that all loads are started at the same time.

- Cable wire resistance is too high:

  As mentioned in the section "Power Cables Wire Size", the resistance of a power cable's wires gives a voltage drop from the upstream to the downstream end of the cable. This voltage drop, if large enough, will cause the either MPC to determine that the voltage at its AC INPUT or its DC INPUT is below its minimum specified value, even though the corresponding voltage at the source of AC or DC power is within the specified range.

  This problem is particularly possible for the DC INPUT, since the DC INPUT current is so high (as much as 65 A at full power) and the DC INPUT voltage is so low (as low as 22 V).

  The phenomenon that may be displayed is the following.

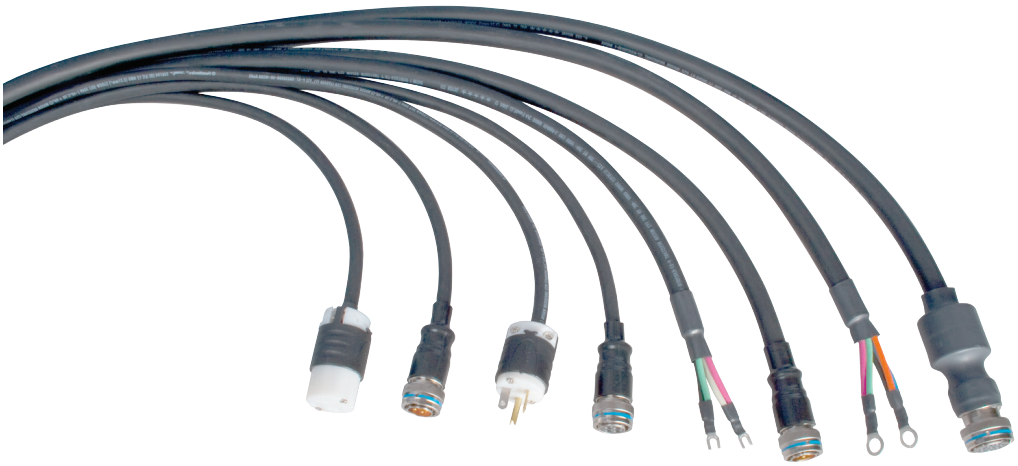
  - Assume the AC INPUT source is not present, but the DC INPUT source is

- The MPC, before it turns on, does not draw any power or current from the DC INPUT, and therefore the voltage drop across the DC INPUT cable is zero.
- The MPC sees that the voltage at the DC INPUT is within its specified range, and enables its outputs.
- As the load then draws power, the MPC begins to draw current from the DC INPUT cable. This current causes a voltage drop to appear across the cable.
- If the voltage at the DC source is close to, but still above, its 22 V minimum, but the voltage drop across the cable is large enough for the voltage at the DC INPUT of the MPC to fall below 22 V, then the MPC will lose power and reset to the STANDBY state.
- Since the MPC no longer draws current from the DC INPUT, the voltage drop across the DC INPUT cable goes back to zero volts.
- After a while, the MPC decides the DC INPUT voltage is back within its proper range, and begins to draw a current from the DC INPUT.
- The cycle above repeats itself for a total of three times, at which point the MPC stops trying to draw power from the DC INPUT for one minute. After this one minute another set of 3 cycles are repeated, followed by another stop for one minute, and so on.

This same problem can also occur for the AC INPUT if the voltage at the AC source is close to the specified 80 Vrms minimum limit. In this case the MPC will try ten times before stopping for a one minute interval.

The solution to this problem is to make sure that the cable has wires of sufficient diameter, or “gauge” for the length of the cable. The longer the cable, the bigger diameter the wire should have.

See the section “Power Cable Wire Size” for recommended cable wire sizes.



MPC Military Field-Grade

Uninterruptible Power Supply

Operator's Guide

MPC-1250-270 Series



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