M9201-100

Shipboard, 48VDC/3.6KW Power Supply

Milpower Source M9201-100 is a rugged, 48VDC/3.6KW, high performance AC to DC Power Supply, designed for below-deck Naval Shipboard and High-reliability industrial applications. It converts a three-phase 440VAC/60Hz (delta), shipboard power to a well-regulated filtered and protected 48VDC output optimized for large capacitance, high power pulsed-load applications. The M9201-100 is configured as an air-cooled (internal fans), 19” Rackmount unit, 2U high and 17” deep.

Shown with standard front panel painting (Black). Other colors are available upon request.

M9201-100 Main Features:

- Complies with MIL-STD-1399-300B and MIL-STD-461G.
- Clean sine-wave input current – less than 3% harmonic current.
- Withstands 2,000V / 50µs spikes per MIL-STD-1399-300B.
- Full-load Power-factor higher than 0.98.
- Exceptional step-load response.
- Stable operation when loaded by large capacitance loads
- Full galvanic isolation between Input, Chassis and Outputs.
- 10/100Mb Ethernet control and monitor.
- Over-load, Over-temperature, Over-voltage and Missing-phase protections.
- Designed to tolerate high-impact shocks and vibration.
- Cooled by four RPM controlled fans in a fault-redundant (N+1) high-reliability configuration.
- Up to five M9201-100 units can be paralleled (current share) and provide 18KW of regulated and protected power.
- Less than 1/5th of the Human Body Leakage limits of MIL-STD-1399-300B, allowing safe parallel connection of up to five M9203-105 units.
- J-STD-001B and IPC-610A Class-3 Workmanship.
- Conformal Coating per MIL-I-46058C and IPC-CC-830.

Specification:

AC Input	*Voltage and Frequency*	Compatible with both MIL-STD-1399-300B, Type I, 3-phase, 440VAC/60Hz, ungrounded Delta, and industrial 3-phase, 480VAC/60Hz Delta. Steady-state: 404VAC to 519VAC, 60Hz ±10%. Transient: down to 352VAC for up 2 seconds, and up to 594VAC for up to 2 minutes. No damage for any voltage between 0 to the above limits.
	Power Factor	> 0.98 (Leading) at full load.
	Inrush Current	Internally limited, such that the peak RMS current is less than 5 times the nominal rated input current.
	Isolation	> 20 MΩ at 1,500VDC (AC input to DC output and chassis). Capacitance between AC input to chassis is less than 0.1µF per line.
	Current Waveform	Low-distortion sinusoidal, complies with the 3% Harmonic Current limits (and 6000/f limit between 2KHz to 20KHz) of MIL-STD-1399-300B.
	Leakage Current	Less than 20% of the max. leakage specified in Para. 5.2.4.1 of MIL-STD-1399-300B.
	Missing Phase	Protected from missing phase. Automatic recovery upon phase restoration.
DC Output	*Nominal Ratings*	48VDC/75Amp (Full load). ***Note 1***
	Load Type	Optimized for high capacitance (up to 60mF) pulsed load
	Regulation	±1% (worst case deviation for all operating and environmental conditions)
	Ripple	Less than 50mVpp. Measured on a resistive load of 2 to 75 Amp with load capacitance of 40mF ±50% using a BW of 20Mhz. Less than 0.48Vpp when loaded by less than 2Amp.
	Interrupts Ride-thru	When fully loaded (3.6KW) provides uninterruptible operation (ride-thru) for up to 4mS (10mS at 1.6KW).
	High Power Pulse Response	Recovers from a 500Amp/50µS pulse within 0.5mS (to within ±0.5% of its initial value). Measured with a capacitive load 45mF and a constant current consumption of 5Amp.
	Isolation	Output is galvanically isolated ("floating") from chassis (> 20 MΩ at 200VDC).
	Current Limit	The Output is current-limited (clamped) at 83±8 Amp. ***Note 1***
	Overload Protection	A sustained overload condition that pulls the output voltage below 33±3VDC for more than 200mS will trip the Overload protection and disable the output for two (2) seconds. Automatic recovery upon overload removal. Inhibited in Battleshort mode. ***Note 1***
	Efficiency	Higher than 91% at Full load.
	Turn On Time	Less than 3 seconds from the application of input power.
	Overvoltage Protection	Automatic shutdown (latched) in case of a fault that results in output voltage above 55±2 Vdc. Reset by toggling the DC Output On/Off switch, or by Reset Command. ***Note 1***
	Over Temp. Protection	Automatic shutdown in case of an Over-temperature failure (inhibited in Battleshort mode). Automatic reset when temperature is back within normal range. ***Note 1***

Note 1: Output voltage setting and protections' threshold can be adjusted (at the factory) to user specified values.

Specification (Cont.):

Control & Monitor	***Front Panel Switches***	**On/Off Switch**: When Off, unconditionally inhibits the 48VDC Output and resets all faults. **Battleshort Switch**: By-passes all inhibit commands (except for the On/Off Switch), the Over temperature and the Overload protections.
	Front Panel LEDs	**AC PWR:** A Green LED, indicates that AC input power is connected. **DC OK:** A Green LED, indicates that DC output is available and stable. **FAIL:** A Red LED, indicates a fault condition. **BATTLSHORT:** A White blinking LED, indicates an active Battleshort. **LINK:** A Green LED, indicates that Ethernet cable is connected. **DATA:** A Green (blinking) LED, indicates Ethernet activity.
	Ethernet	100MbE interface allows the remote control and monitor of the unit. Allows remote Enable/Disable of the 48VDC output, faults reset and in response to query commands – provides operational status (faults report, output voltage and current, internal temperature) and logistic data (such as S/N and Versions). Supports UDP/IP multicast reports (transmitting) and unicast command protocol. Configurable Static IP Address, Destination IP Address, Port and Message ID. Software/Firmware upgrade via the Ethernet port.
Environment	***Ambient Temperature***	Non-operating: -40°C to +70°C Operating: -10°C to +40°C
	Humidity	MIL-STD-810G, Method 507.6 Procedure II (Aggravated).
	Ambient Pressure	Operating: 12.6 to 17.7 psi Non-operating: (Air transport) up to 15,000 feet.
	Mechanical Shock	MIL-STD-810G, Method 516.6 Procedure I, Figure 516.6-10, 25g/30mS Terminal Peak Sawtooth (all directions).
	Vibration	Per MIL-STD-167-1, Type I (Environmental) vibration. Random Vibration Per MIL-STD-810G, Method 514.6, Cat. 24, Fig 514.6E-1.
	Shipboard Motion	Up to ±45° with a period of 6 to 10 seconds, all axes.
	Airborne Noise	Does not exceed the octave band sound pressure limits specified in MIL-STD-1474E, Table E-I, Equipment Grade E. (Measured at 25°C ambient, in a Standard 19" Rack.)
EMI	***MIL-STD-461G***	CE101 (CE101-2 limit), CE102, CS101 (CS101-2 limit), CS114 (All Ships and Submarines limits), CS116, RE101 (RE101-2 limit), RE102 (RE102-1, Below deck and RE102-2 Internal to pressure hull limits), RS103 (2MHz to 18GHz, 50V/m). All tests are at full load and with shielded Output and Signal cables per the provisions of MIL-STD-461G.
	DC Magnetic Field	Per DOD-STD-1399-70-1 (Navy)
	Bonding	10mΩ max from any of the six external surfaces of the enclosure to the GND stud. 15mΩ max from any of the I/O connectors' shells to the enclosure.

Specification (Cont.):

Safety Features	*High Voltage*	All exposed terminals are discharge to <30V within 2 Sec of AC Power Removal. Inaccessible terminals (internal to the enclosure) are discharge to <30V within 20 Sec
	High Temperature	The front panel temperature surfaces does not exceed 50°C (at 25°C ambient)
	Power Line Fusing	The 3 AC input lines are protected from non-recoverable (catastrophic) failure by internal fuses that are not accessible to the user. These fuses are a secondary over-load protection and will not trip under any operating conditions (including overload).
Form-factor	19" Rackmount, 2U high and 17" deep. All I/O connectors are on the front panel. Air inlet at the front, air outlet at the rear panel. For detailed dimensions see Milpower Source Drawing: M9201100	
Weight	35 pounds.	
Cooling	Four RPM controlled DC fans (arranged in a fault redundant configuration). Front side inlet, rear side outlet. Cooling air is confined to a close-channel heatsink and is not allowed to flow directly over PWBs and/or Power devices.	
Electrical Interface	**AC Input:** D38999/20WD5PN or eq. **DC** **Output:** D38999/20WH21SN or eq. **Ethernet:** RJF21N (RJ45 Cat. 5e) or eq. **GND:** .250-28 UNF threaded hole. Supplied with a bolt, a flat washer and a spring washer	

Pin Assignment:

The Part Numbers below are of the receptacles on the M9201-100 front panel.

J1 is mounted with the Major Key point upward.

J2 is mounted with the Major Key point downward.

J1 – AC Input	
D388999/20WD5PN (or eq.)	
Pin	**Function**
A	PHASE A
B	PHASE B
C	PHASE C
D	N/C
E	CHASSIS GND

Phase order is not essential.

J2 – DC Output		
D38999/20WH21SN (or eq.)		
Pin	**Function**	**I/O**
A	48VDC_RTN	O
B	48VDC_RTN	O
C	48VDC_RTN	O
D	+48VDC	O
E	+48VDC	O
F	+48VDC	O
G	+48VDC	O
H	+48VDC	O
J	+48VDC	O
K	P_SENSE	I
L	N_SENSE	I
M	48VDC_RTN	O
N	48VDC_RTN	O
P	48VDC_RTN	O
R	48VDC_RTN	O
S	+48VDC	O
T	+48VDC	O
U	+48VDC	O
V	LOADSHARE	I/O
W	48VDC_RTN	O
X	48VDC_RTN	O