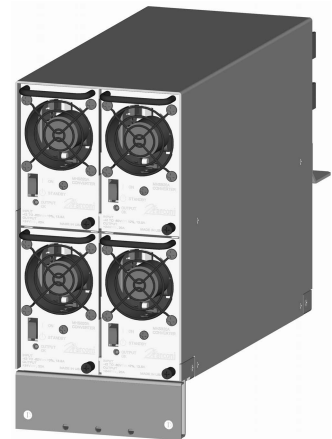


SYSTEM OVERVIEW

Description: The Model MHSB80FRM is a –48 to +24 volt DC-DC Converter Mounting Frame designed to populate one PCU mounting position in a compatible –48VDC Vortex PCU Mounting Shelf. The PCU Mounting Shelf can be either an Intelligence or Expansion Shelf. Compatible shelves are listed in Table 1. The Converter Mounting Frame, when equipped with up to four Converter Modules, comprises a DC-DC Converter System that operates from the shelf’s –48VDC output bus to provide +24VDC load power. A compatible PCU Mounting Shelf can accept a maximum of one DC-DC Converter System. Paralleled Converter Systems may be located in Intelligence and Expansion Shelves, or in multiple Expansion Shelves. The DC-DC Converter System operates independently of the MCA.



NOTE: The PCU Mounting Shelf **must** have an access opening present in the rear panel for wiring connections, as shown in [Electrical Connection Locations, Lug Mounting Dimensions](#). Early versions of this shelf did not have the opening, and therefore will not accept the DC-DC Converter.

Model	Spec. No.
V200ICAB	588700701
V200ECAB	588700801
V260ICAB	588703600
V260ECAB	588703700
V260/340ECAB	588704700

Table 1
Compatible Vortex PCU Mounting Shelves

Spec. No.:	588249600
Model:	MHSB80FRM
Output Voltage:	+24 Volts DC
Output Capacity:	
DC-DC Converter Module:	20 Amperes
Converter Frame:	80 Amperes
Agency Approval:	UL 60950 Recognized
Mounting Type:	Mounts in compatible Vortex PCU Mounting Shelf
Access:	Front and Rear for Installation, Front for Operation and Maintenance
Color:	Off-White Front
Environment:	+65°C

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ORDERING INFORMATION

Use the following information to order a Model MHSB80FRM DC-DC Converter System for field installation in an existing Vortex Intelligence Shelf or Expansion Shelf.

When equipment described in this document is ordered as part of a Vortex Power System or Vortex Intelligence Shelf or Expansion Shelf, refer to power system or shelf documentation for ordering information.

Converter Mounting Frame (Model MHSB80FRM)

Features

- ◆ The mounting frame accepts up to (4) DC-DC Converter Modules.
- ◆ The frame occupies one PCU position in a compatible Vortex PCU Mounting Shelf.

Restrictions

Each PCU Mounting Shelf accepts a maximum of one Converter Mounting Frame.

Ordering Notes

- 1) For each Converter Frame required, specify (1) Spec. No. 588249600.
- 2) Order Converter Modules separately. (See below.)
- 3) Order Accessory External Alarm Wire Harness separately as required. (See below.)

Converter Modules (Model MHSB20A)

Ordering Notes

- 1) Order up to (4) Spec. No. 486800128 DC-DC Converter Modules for each Converter Mounting Frame ordered.

Accessory External Alarm Wire Harness

Features

- ◆ This pre-assembled wire harness mates with the external alarm connector (J13) on the Converter Mounting Frame. The harness provides 10-ft. long 22 AWG conductors suitable for splicing.

Ordering Notes

- 1) If required, order (1) Part No. 514148 for each Converter Mounting Frame ordered.

LUG, CONNECTOR, AND WIRE SIZE SELECTION

All lugs for customer connections must be ordered separately.

For lug selection, refer to the following tables.

For lug mounting hole size and spacing dimensions, refer to the DIMENSIONS section.

Equipment Grounding (Frame Ground)

A Frame Ground connection is established when the Converter Frame is installed in the PCU Mounting Shelf. No additional grounding means is provided.

DC Input

DC Input connections are automatically made when the Converter Frame is installed in the PCU Mounting Shelf. No additional DC Input connections are required.

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DC Output

1/4-20 studs and hardware are provided for installation of customer provided DC output lugs and leads. The table below lists the recommended crimp lugs for the recommended wire size.

Ambient Operating Temp.	Rec'm 90°C Wire Size (Notes 1, 4)	Wire Stranding Class	Recommended Lug		Crimp Tool Required (Note 2) T&B Model TBM12 or TBM15 Hydraulic Heads			Loop Length (Notes 3, 4)
			Vendor	Part No.	Color Key	Die Index/ Code No.	Die Cat. Number	
30°C	4 AWG	B	T&B	54206	Gray	29	15527	47
			Burndy	YA4CL-2TC14				
			Emerson	245346800				
		I	T&B	54207	Brown	33	15528	
			Burndy	YA2CL-2TC14				
			Emerson	245346900				
	2 AWG	B	T&B	54207	Brown	33	15528	74
			Burndy	YA2CL-2TC14				
			Emerson	245346900				
		I	T&B	54208	Green	37	15513	
			Burndy	YA1CL-2TC14				
			Emerson	245347000				
40°C	4 AWG	B	T&B	54206	Gray	29	15527	47
			Burndy	YA4CL-2TC14				
			Emerson	245346800				
		I	T&B	54207	Brown	33	15528	
			Burndy	YA2CL-2TC14				
			Emerson	245346900				
	2 AWG	B	T&B	54207	Brown	33	15528	74
			Burndy	YA2CL-2TC14				
			Emerson	245346900				
		I	T&B	54208	Green	37	15513	
			Burndy	YA1CL-2TC14				
			Emerson	245347000				
65°C	1 AWG	B	T&B	54208	Green	37	15513	94
			Burndy	YA1CL-2TC14				
			Emerson	245347000				

Notes:

1. Wire sizes are based on recommendations of the National Electrical Code, Table 310-16 for copper wire at the indicated conductor temperature.
2. The lugs should be crimped to the specifications given in the manufacturer's instructions furnished with the crimp lug or tool.
3. DC output wire size is sufficient to restrict voltage drop to one volt or less at rated full load output current for the loop lengths shown. Loop length is the sum of the lengths of the positive and negative leads.
4. If paralleling two or more Converter Frames, output wire from all frames should be of the same gauge and similar length.

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External Alarms (J13)

The following table lists the recommended mating connector for J13.

Note: A pre-assembled accessory wire harness is available. See [Accessory External Alarm Wire Harness](#) for details.

CONVERTER FAIL ALARMS - J13 on the DC-DC Converter Frame					
Recommended Wire Size	Recommended Mating Plugs				
	Vendor	Housing	Contact ¹		
			Capacity	Part No.	Hand Crimping Tool ¹
22 AWG for Loop Lengths Up to 200 ft. or 18-20 AWG for Loop Lengths Over 200 ft.	Tyco	172167-1	22-18 AWG	770903-3 (strip) 770987-3 (loose)	Tyco 90711-2
	Emerson	247874900	22-18 AWG	245381700 (strip)	

1. Contacts should be crimped to the specifications given in the manufacturer's instructions furnished with crimp tool or connector.

SPECIFICATIONS

1.1 Output Ratings

1.1.1 Voltage: Nominal +24 volts DC, Negative Ground.

1.1.2 Current: 20 amperes per DC-DC Converter Module, up to a total of 80 amperes per frame with four modules installed.

1.1.3 Regulation

(A) Static: Steady state output voltage remains within ± 0.5 volt of the pre-adjusted voltage for any load current from no load to full load and over the specified input voltage range.

(B) Dynamic: For a step load change of 50% within the range of 10% to 100% of full rated current, the maximum voltage transient will not exceed 5% of the initial steady state voltage.

1.1.4 Filtering: With at least 10% of rated full load on the output (-20 °C to +65 °C)

(A) Voice band noise is less than 32 dBmC when measured with a noise meter using 600 ohm bridged input and C-message weighting.

(B) Wide band noise does not exceed 150 millivolts peak to peak over the frequency range of 0 Hz to 20 MHz.

(C) Wide band noise does not exceed 15 millivolts rms over the frequency range of 0 Hz to 20 MHz (as measured with an HP3400A true rms voltmeter).

(D) Noise below -20°C is slightly higher.

1.2 Input Ratings

1.2.1 Voltage: -48 volts DC nominal, with an acceptable range of from -42 to -56 volts DC.

1.2.2 Filtering: Noise reflected back to the central office battery is less than 32 dBmC.

1.2.3 Typical Input Data - When equipped with **one** Converter Module.

(A) The output voltage of the DC-DC Converter Module is initially adjusted to 24 volts at 50% load and 48 volts DC input.

Input Voltage	Percent of Full Load	Input Current (Amps)	Efficiency (%)	Typical Heat Dissipation (BTU/Hr)
42 VDC	0	0.29	---	15
	25	3.37	84.2	61
	50	6.49	88.1	98
	75	9.68	88.3	144
	100	12.99	87.3	206
48 VDC	0	0.27	---	15
	25	2.96	84.9	62
	50	5.68	88.0	98
	75	8.47	88.3	144
	100	11.33	87.6	202
56 VDC	0	0.25	---	15
	25	2.56	84.1	66
	50	4.89	87.6	101
	75	7.26	88.2	144
	100	9.71	87.6	201

(B) Maximum Current: Maximum input current is 13 amperes at full load (20 amperes) and 42 volts DC input.

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1.2.4 Typical Input Data - When equipped with **four** Converter Modules.

(A) The output voltage of the DC-DC Converter Modules is initially adjusted to 24 volts at 50% load and 48 volts DC input.

Input Voltage	Percent of Full Load	Total Input Current (Amps)	Efficiency (%)	Typical Heat Dissipation (BTU/Hr)
42 VDC	0	1.20	---	60
	25	13.56	84.7	251
	50	26.20	87.3	416
	75	39.12	87.4	618
	100	52.36	86.7	864
48 VDC	0	1.16	---	60
	25	11.96	84.1	262
	50	22.92	87.4	413
	75	34.20	87.5	614
	100	45.76	86.8	859
56 VDC	0	1.04	---	60
	25	10.36	83.2	277
	50	19.76	86.8	432
	75	29.36	87.3	621
	100	39.20	86.9	854

(B) Maximum Current: Maximum input current is 52.4 amperes at full load (80 amperes) and 42 volts DC input.

1.3 Environmental Ratings

1.3.1 Operating Ambient Temperature Range: -20°C to +65°C (-4°F to +149°F).

1.3.2 Storage Ambient Temperature Range: -40°C to +85°C (-40°F to +185°F).

1.3.3 Humidity: This DC-DC Converter System is capable of operating in an ambient relative humidity range of 0 to 95%, non-condensing.

1.3.4 Altitude: The maximum operating ambient temperature should be derated by 10°C at an elevation of 10,000 feet. For elevations between sea level and 10,000 feet, derate the maximum operating ambient temperature linearly.

1.3.5 Ventilation Requirements: Each Converter Module is fan cooled, using front to back ventilation. The PCU Mounting Shelf in which the DC-DC Converter System is mounted must be located such that ventilation openings are not blocked and temperature of the air entering the cabinet is not above or below the [Operating Ambient Temperature Range](#) stated in this document.

1.3.6 Audible Noise: With four Converter Modules installed and operating, the audible noise at any point 5 feet from any vertical surface of the PCU Mounting Shelf does not exceed 60 dBA when measured with a sound level meter conforming to ANSI S1.4.

1.3.7 EMI/RFI Suppression:

(A) This DC-DC Converter System, when mounted in a PCU Mounting Shelf listed in Table 1-1, conforms to the requirements of FCC rules Part 15, Subpart B, Class A for radiated and conducted noise.

(B) This DC-DC Converter System, when mounted in a PCU Mounting Shelf listed in Table 1-1 that is equipped with List 3 (Class B filter option) conforms to the requirements of FCC rules Part 15, Subpart B, Class B, for radiated and conducted noise.

1.3.8 Filtering: Noise reflected back to the central office battery is within the parameters set forth in Telcordia Technical Reference TR-TSY-000009, paragraph 5.0, using test measurements in Telcordia Technical Reference PUB 43802, pages 5 and 6.

1.3.9 Safety Compliance:

(A) This unit meets the requirements of UL 60950, Standard for Information Technology Equipment, and is UL Recognized as a power supply for use in Telephone, Electronic Data Processing or Information Processing Equipment.

(B) This unit meets the requirements of CAN/CSA 22.2, No. 60950-00 and is tested and Certified by UL ("c UR") as a Component Type Power Supply.

1.4 Standard Features

1.4.1 Type of Power Conversion Circuit: High Frequency.

1.4.2 Input Protection:

(A) **Fusing:** A 20-ampere non-user replaceable fuse is located in the negative input lead of each Converter Module.

(B) **Low Input Voltage Inhibit:** Operation of the Converter Modules will inhibit if the input voltage drops to within the range of 38.5 to 41.0 volts. While operation is inhibited, the Converter Frame will draw no more than 10 mA. Operation will automatically resume after the input voltage returns to within normal operating limits.

1.4.3 Output Protection:

(A) **Overvoltage Protection:** Operation of a DC-DC Converter Module will automatically shut down and lock out if the output voltage of the module exceeds 115% to 125% of the nominal voltage. Manual restart is necessary after the overvoltage condition is corrected.

(B) **Overcurrent Protection:** When the output current of a DC-DC Converter Module increases to a preset overcurrent value between 102.5% and 115% of rated full load, the output voltage of the module will automatically decrease to limit current to this value. The output will recover to within specified limits when the overload condition is removed.

(C) **Over Temperature Protection:** The operation of a DC-DC Converter Module will automatically shut down and lock out if the internal temperature of the module exceeds a predetermined value. Operation will automatically resume after the over-temperature condition is corrected.

1.4.4 Series Paralleling Output Diode: A series paralleling output diode is provided in each Converter Module. This allows the Converter Modules to be paralleled for redundancy.

1.4.5 External Alarm Circuits: Alarm relay contacts are rated for 1 ampere at 30 volts DC or 0.3 ampere at 60 volts DC.

(A) **Minor Alarm:** A single set of Form A relay contacts closes in the event of an alarm condition in one Converter Module. Contacts remain closed in the event of a major alarm condition. Alarm conditions include:


- Converter output increases above 26 volts DC or decreases below 22 volts DC for any reason, including converter failure, High Voltage Shutdown, input voltage below 42 volts DC (low input inhibit), or an overload or overtemperature condition.
- Cooling fan slows or stops due to fan failure or blocked rotor.

(B) **Major Alarm:** A single set of Form A relay contacts closes in the event of an alarm condition in more than one Converter Module. Alarm conditions are as in (A) above.

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1.4.6 External Control Inputs: None provided.

1.4.7 Local Controls (See Operation section of the separate [Installation and User Instructions](#) for a complete description.)

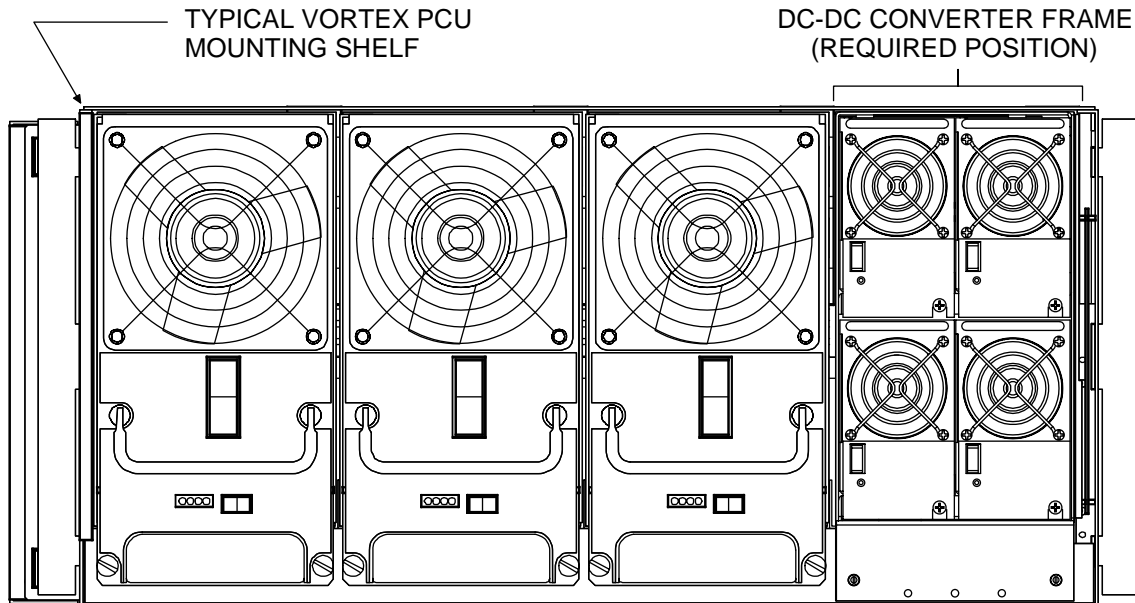
Location	NAME/Description	Type
Converter Module	ON / STANDBY (I / )	Rocker Switch

1.4.8 Local Status and Alarm Indicators: (See Operation section of the separate [Installation and User Instructions](#) for a complete description.)

Location	NAME/Description	Type
Converter Module	OUTPUT OK	LED – green
Converter Mounting Frame	INPUT OK	LED – green
	MINOR ALARM	LED – yellow
	MAJOR ALARM	LED – red

PHYSICAL SIZE INFORMATION

Overall Dimensions



NOTES :

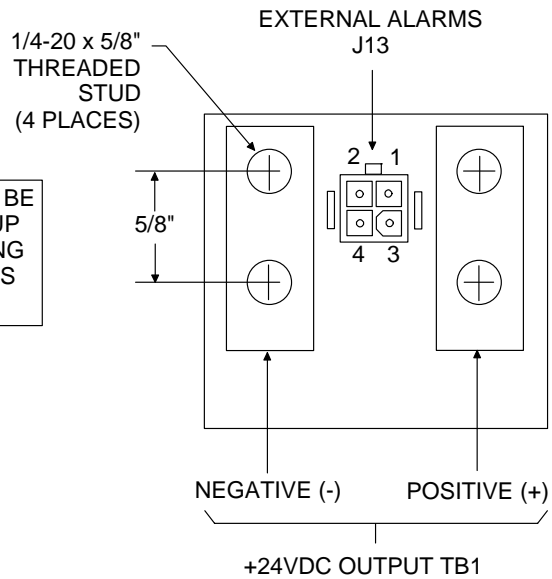
1. See PCU Mounting Shelf documentation for overall shelf dimensions.
2. Weights are in Lbs. and (Kilograms):

	Net	Shipping
DC-DC Converter Frame	8.5 (3.9)	11.5 (5.2)
DC-DC Converter Module	3.2 (1.5)	5 (2.3)

3. Finish:
 Frame & Converter Module Bodies: Galvanneal.
 Converter Module Front Panels: Off White

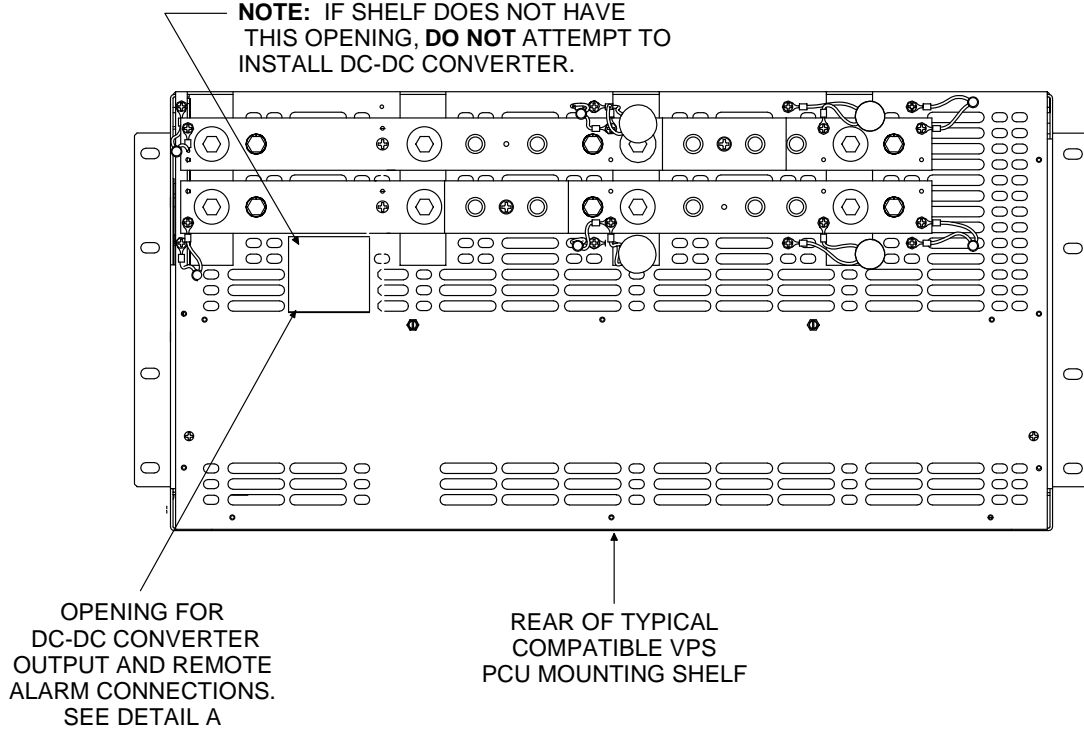
Electrical Connection Locations, Lug Mounting Dimensions

NOTE: OUTPUT LUGS MAY BE INSTALLED WITH BARREL UP OR DOWN TO ROUTE WIRING UPWARDS OR DOWNWARDS AS REQUIRED.



DETAIL A

NOTE: IF SHELF DOES NOT HAVE THIS OPENING, **DO NOT** ATTEMPT TO INSTALL DC-DC CONVERTER.



RELATED DOCUMENTATION

- Schematic Diagram:** SD588249600
- Installation and User Instructions:** Section 5905

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APPENDIX (a record of changes made to this document)

Issue	Change Number (ECO)	Description of Change	Date	Approved
AA	LLP034491	New.	9/1/04 9/1/04	J. Kirkpatrick R. Schroeder
AB	LLP202639	Updated corporate references.		

Emerson Network Power / 1122 F Street / Lorain, Ohio 44052-2293 / (440) 288-1122

In Canada:

Emerson Electric Canada Limited
 122 Edward St. / St. Thomas, Ontario N5P 1Z2 / (519) 637-4900

In Mexico:

Emerson Network Power de Mexico S.A. de C.V.
 Apartado Postal 77001 / Mexico 10 D.F., MX 11200 / (525) 576-8277

