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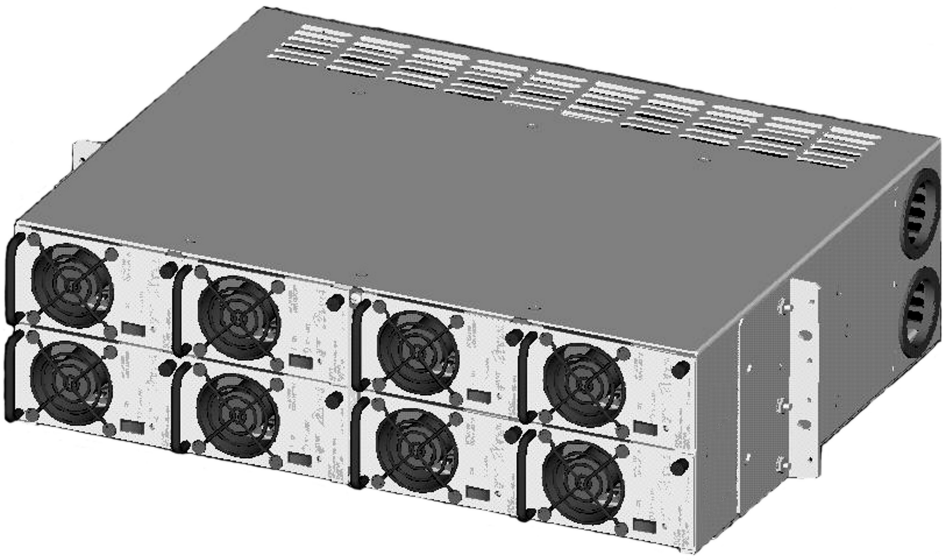
SYSTEM OVERVIEW

Description: A DC-DC Converter Mounting Shelf designed to mount in a 19” or 23” (nominal) equipment mounting rack. The shelf is configured for 19” mounting unless otherwise specified. The Converter Mounting Shelf, when equipped with up to eight separately ordered Converter Modules (Spec. No. 486800127), provides a DC-DC Converter System that operates from +24VDC to provide -48VDC load power.

Spec. No.:	588249301
Model:	MHSA80CAB
Output Voltage:	-48 Volts DC
Output Capacity:	
DC-DC Converter Module:	10 Amperes
Converter Shelf:	80 Amperes
Agency Approval:	UL 1950
Mounting Type:	19” or 23” Relay Rack
Access:	Front and Rear for Installation, Front for Operation and Maintenance
Color:	Off-White Front
Environment:	+65°C for field wiring applications +40°C for factory wiring applications



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System Overview | Picture | Specifications | Physical Size Information | Related Documentation

ORDERING INFORMATION

Use the following information to order a Model MHSA80CAB DC-DC Converter System.

Converter Mounting Shelf (Model MHSA80CAB)

Features

- The mounting shelf accepts up to (8) DC-DC Converter Modules.
- Alarm wire harness included. This pre-assembled wire harness mates with the external alarm connector (J11) on the Converter Mounting Shelf. The harness provides 10-ft. long 22 AWG conductors suitable for splicing.
- Blank Modules for unused module mounting positions are included.

Ordering Notes

1) For each Converter Shelf required, specify (1) Spec. No. 588249301.
2) Order Converter Modules separately. (See below.)

Converter Modules (Model MHSA10B)

Ordering Notes

1) Order up to (8) Spec. No. 486800127 DC-DC Converter Modules for each Converter Mounting Shelf ordered.

Lug and Wire Size Selection – Field Wiring Applications

Note: *The input and output terminations have been evaluated for field wiring connections at a maximum operating ambient temperature of +40°C. For ambient operating temperatures between +40°C and +65°C these terminations are intended only for connection of internal wiring inside the end-use equipment. In such applications, the acceptability of the wire connections relative to secureness, insulation materials, and temperature shall be considered.*

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.

Frame Ground

1/4-20 studs and hardware are provided for installation of a customer-furnished, lug-terminated frame ground lead. The table below lists the recommended crimp lugs for the recommended wire size.

Recommended Wire Size[1]	Recommended Crimp Lug[2]	
	Vendor	**Part No.**
1/0 AWG	T & B	54209
	Burndy	YA25L-2TC38
	Emerson	245347100

[1] This terminal must be connected to earth ground, not power system neutral. Equipment grounding conductor size is based on recommendations of the National Electrical Code Table 250-122 for copper wire. If aluminum or copper clad aluminum grounding conductor is used, refer to Table 250-122 for increased conductor size.

[2] Refer to the installation section of the instruction manual for lug crimping information.

DC Input (Dual Feed - Two DC Input Circuits)

3/8-16 studs and hardware are provided for installation of customer provided DC input lugs and leads. The table below lists the recommended crimp lugs for the recommended wire size.

Operating Ambient Temperature [1]	Feed	Recm Branch Circuit Protection [2]	Loop Length [3]	Recm 90°C Wire Size [1]	Recommended Crimp Lug [4]	
					Vendor	Part No.
30°C	#1	125 Amperes	90 ft.	1/0 AWG	T & B	54209
					Burndy	YA25L-2TC38
					Emerson	245347100
	#2	125 Amperes	90 ft.	1/0 AWG	T & B	54209
					Burndy	YA25L-2TC38
					Emerson	245347100
40°C	#1	125 Amperes	90 ft.	1/0 AWG	T & B	54209
					Burndy	YA25L-2TC38
					Emerson	245347100
	#2	125 Amperes	90 ft.	1/0 AWG	T & B	54209
					Burndy	YA25L-2TC38
					Emerson	245347100

[1] Recommendations for typical operating ambient temperatures of 30°C and 40°C are provided. Conductor sizes are based on recommendations of the National Electrical Code Table 310-16 for copper wire rated at 90°C. For other operating ambient temperatures, refer to the National Electrical Code.

[2] The DC input branch circuit protective device should be of the time-delay or high inrush type.

[3] Wire sizes listed are sufficient to restrict voltage drop to 1.0 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] Refer to the installation section of the instruction manual for lug crimping information.

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.

Operating Ambient Temperature [1]	Loop Length [2]	Recm 90°C Wire Size [1]	Recommended Crimp Lug [3]	
			Vendor	Part No.
30°C	47 ft.	4 AWG	T & B	54206
			Burndy	YA4CL-2TC14
			Emerson	245346800
40°C	47 ft.	4 AWG	T & B	54206
			Burndy	YA4CL-2TC14
			Emerson	245346800

[1] Recommendations for typical operating ambient temperatures of 30°C and 40°C are provided. Conductor sizes are based on recommendations of the National Electrical Code Table 310-16 for copper wire rated at 90°C. For other operating ambient temperatures, refer to the National Electrical Code.

[2] Wire sizes listed are sufficient to restrict voltage drop to 1.0 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.

[3] Refer to the installation section of the instruction manual for lug crimping information.

External Alarms (J11)

A pre-assembled, 10-ft. long cable (Part No. 541658) is supplied. The cable provides 22 AWG, stranded conductors suitable for splicing to customer wiring. If Part No. 541658 cable will not be used, the following table lists the recommended mating connector for J11.

EXTERNAL ALARMS (J11)					
Recommended Wire Size	Recommended Mating Plugs				
	Vendor	Housing	Contact		
			Capacity	Part No.	Hand Crimping Tool [1]
18-20 AWG	Tyco	350720-1	24-18 AWG	350699-3	Tyco 91510-1 (24-18 AWG)
	Emerson	247854400	24-18 AWG	245376400	

[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 -48 volts DC, Positive Ground.

1.1.2 Current: 10 amperes per DC-DC Converter Module, up to a total of 80 amperes per shelf with eight modules installed.

1.1.3 Regulation

(A) Static: Steady state output voltage remains within ±1 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 dBrnC when measured with a noise meter using 600 ohm bridged input and C-message weighting.

(B) Wide band noise does not exceed 250 millivolts peak to peak over the frequency range of 0 Hz to 20 MHz.

(C) Wide band noise does not exceed 30 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: 24 volts DC nominal, with a range of from 21 to 28 volts DC.

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

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 48 volts at 50% load and 24 volts DC input.

Input Voltage	Percent of Full Load	Input Current (Amps)	Efficiency (%)	Typical Heat Dissipation (BTU/Hr)
21 VDC	0	0.90	---	65
	25	6.99	82.1	91
	50	13.18	86.7	126
	75	19.65	86.9	180
	100	26.33	86.1	249
24 VDC	0	0.75	---	61
	25	6.14	81.8	115
	50	11.57	86.5	129
	75	17.18	87.0	179
	100	22.95	86.5	242
28 VDC	0	0.68	---	65
	25	5.37	80.2	104
	50	10.02	85.7	138
	75	14.76	86.8	182
	100	19.65	86.5	240

(B) Maximum Current: Input current is 26.33 amperes at full load (10 amperes) and 21 volts DC input.

1.2.4 Typical Input Data - When equipped with **eight** Converter Modules, with both input circuits paralleled:

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

Input Voltage	Percent of Full Load	Input Current (Amps)	Efficiency (%)	Typical Heat Dissipation (BTU/Hr)
21 VDC	0	7.2	---	516
	25	54.6	84.0	637
	50	105.8	86.1	1030
	75	158.6	85.7	1538
	100	211.5	85.2	2053
24 VDC	0	6.0	---	492
	25	48.4	82.9	688
	50	92.8	86.0	1049
	75	138.8	85.8	1540
	100	184.6	85.5	2015
28 VDC	0	5.4	---	516
	25	41.9	82.1	728
	50	79.8	85.8	1073
	75	119.2	85.7	1562
	100	158.4	85.5	2031

(B) Maximum Current: Input current is 211.5 amperes at full load (80 amperes) and 21 volts DC input.

1.3 Environmental Ratings

1.3.1 Operating Ambient Temperature Range:

(A) Field Wiring Applications (per NEC Table 310-16): -20°C to +40°C (-4°F to +104°F)

(B) Wiring Contained Within End-Use Equipment: -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 Converter Mounting Shelf 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 eight Converter Modules installed and operating, the audible noise at any point 5 feet from any vertical surface of the equipment shelf does not exceed 60 dBA when measured with a sound level meter conforming to ANSI S1.4.

1.3.7 EMI/RFI Suppression: This DC-DC Converter System 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: This unit meets the requirements of UL 1950, Standard for Information Technology Equipment, and is UL Recognized as a power supply for use in Telephone, Electronic Data Processing or Information Processing Equipment. This unit meets the requirements of CSA 22.2, No. 950 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 35-ampere non-user replaceable fuse is located in the positive 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 19.25 to 20.5 volts. While operation is inhibited, the Converter Shelf will draw no more than 20 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: A set of Form-C relay contacts, rated for 1 ampere at 30 volts DC or 0.3 ampere at 60VDC, is provided for each of the following alarms. Relays are energized for normal operating conditions, and de-energized for an alarm condition. Relay contacts are extended to connector J11 for customer connection.

In the alarms listed below, failure conditions include:

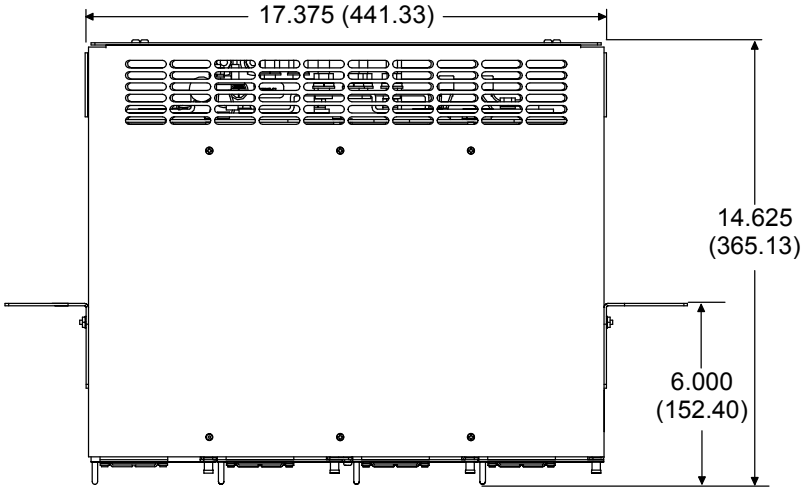
- Converter output increases above 52 volts DC or decreases below 44 volts DC for any reason, including converter failure, High Voltage Shutdown, input voltage below 21 volts DC (low input inhibit), or an overload condition.
- Cooling fan slows or stops due to fan failure or blocked rotor.

(A) Converter Minor Alarm: In the event of a failure in one (or more) converter, relay contacts close between terminals 2 and 6 of J11 and relay contacts open between terminals 5 and 6 of J11. Normal operation provides open relay contacts between terminals 2 and 6 of J11 and closed relay contacts between terminals 5 and 6 of J11.

(B) Converter Major Alarm: In the event of a failure in more than one converter, relay contacts close between terminals 1 and 7 of J11 and relay contacts open between terminals 3 and 7 of J11. Normal operation provides open relay contacts between terminals 1 and 7 of J11 and closed relay contacts between terminals 3 and 7 of J11.

PHYSICAL SIZE INFORMATION

Overall Dimensions



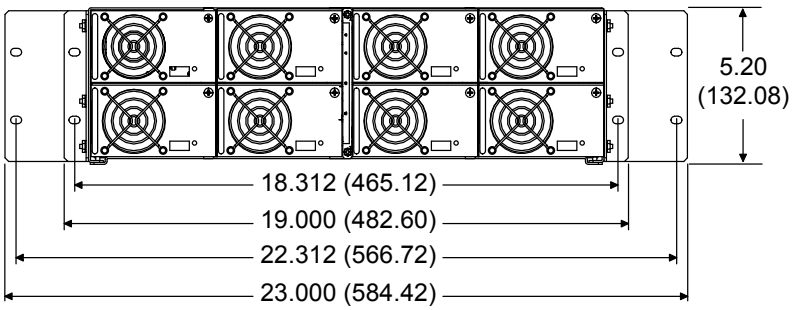
TOP VIEW

NOTES :

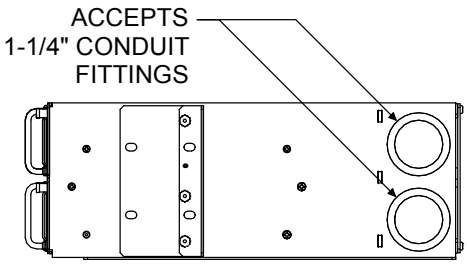
1. ALL DIMENSIONS IN INCHES AND (MILLIMETERS).
2. WEIGHT IN LBS AND (KILOGRAMS).

	Net	Shipping
Shelf	18 (8.2)	22.4 (10.2)
DC-DC Converter Module	3.2 (1.5)	5 (2.3)

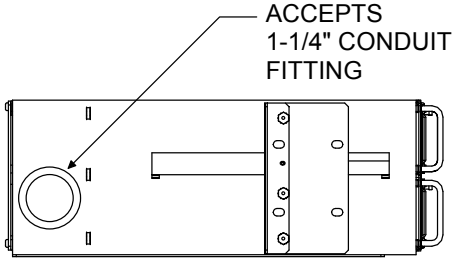
3. FINISH :
   SHELVES: GALVANNEAL.
   CONVERTER
   MODULE
   FRONT
   PANELS: OFF WHITE



FRONT VIEW

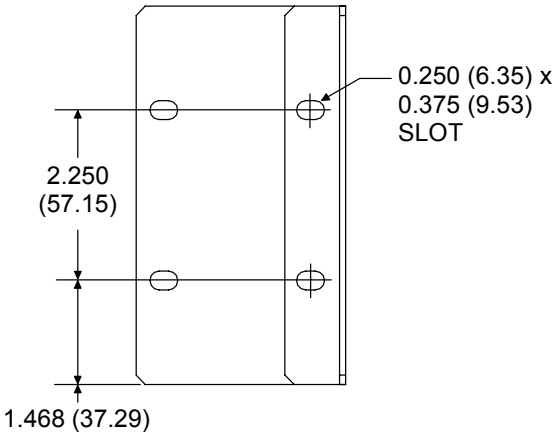


RIGHT SIDE VIEW

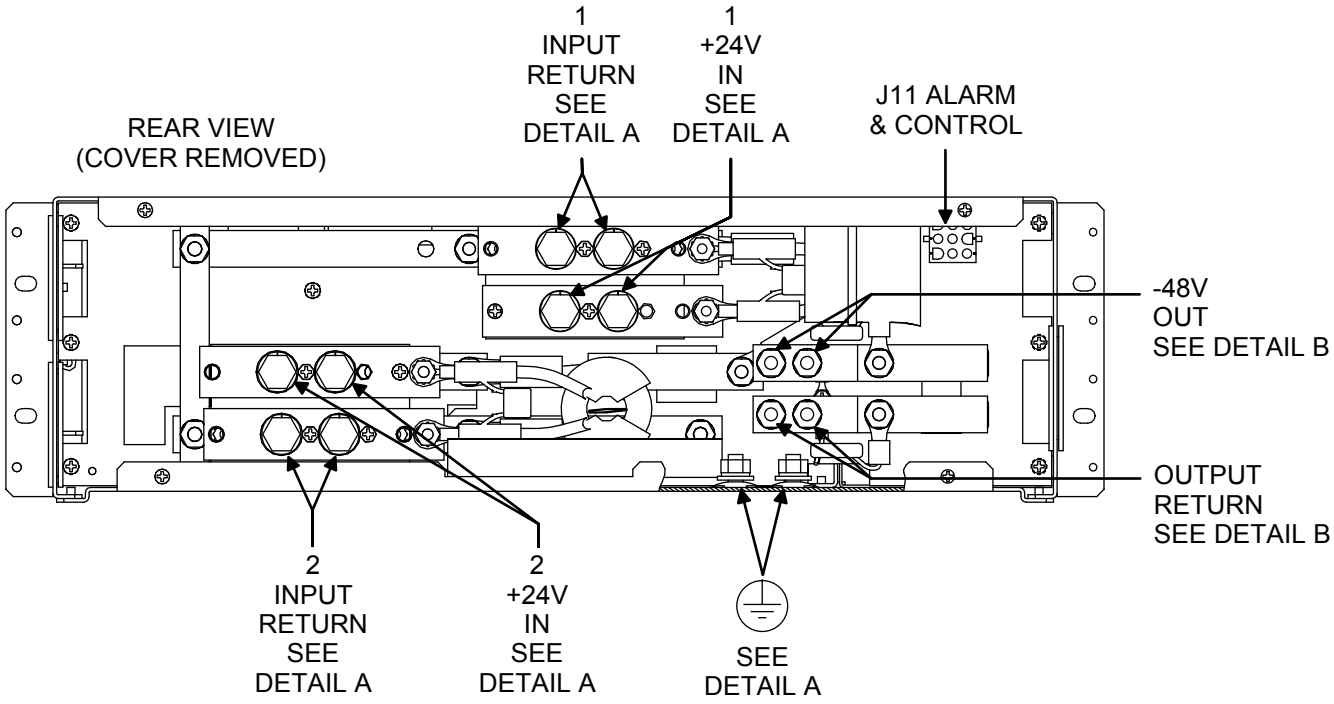


LEFT SIDE VIEW

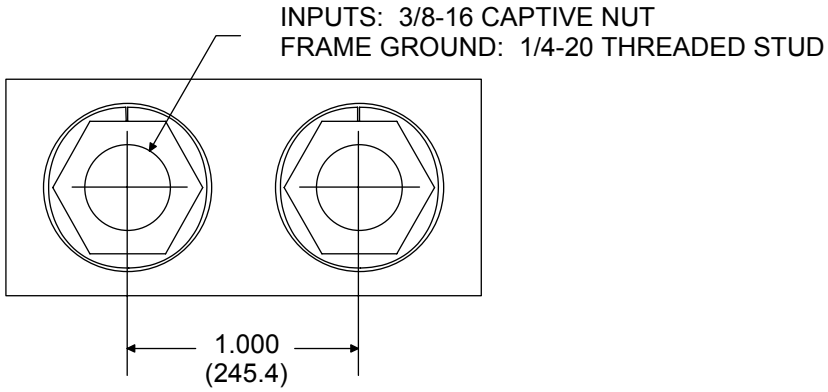
MOUNTING ANGLE DETAIL



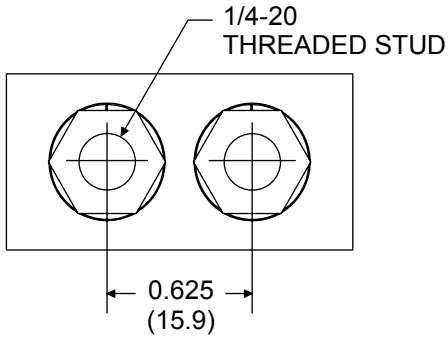
Lug Mounting Hole Size and Spacing Dimensions



DETAIL A



DETAIL B



NOTE: Dimensions in inches and (millimeters).

RELATED DOCUMENTATION

Schematic Diagram: SD588249301
Instructions: Section 6030

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REVISION RECORD

Issue	Change Number (ECO)	Description of Change	Date	Approved
AA	LLP212047	New	03-18-09	John Jasko Brian Goodlive Apr 2, 2009 John Jasko Apr 3, 2009

Emerson Network Power, Energy Systems, North America, Inc.
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