

TPA 250 Series[™] High Density Connectorized DC Distribution Fuse Panel Technical Manual

Effective: March 2021



Safety Notes

Alpha Technologies Services, Inc. considers customer safety and satisfaction its most important priority. To reduce the risk of injury or death and to ensure continual safe operation of this product, certain information is presented differently in this manual. Alpha® tries to adhere to ANSI Z535 and encourages special attention and care to information presented in the following manner:



WARNING! GENERAL HAZARD

GENERAL HAZARD WARNING provides safety information to PREVENT INJURY OR DEATH to the technician or user.



WARNING! ELECTRICAL HAZARD

ELECTRICAL HAZARD WARNING provides electrical safety information to PREVENT INJURY OR DEATH to the technician or user.



WARNING! FUMES HAZARD

FUMES HAZARD WARNING provides fumes safety information to PREVENT INJURY OR DEATH to the technician or user.



WARNING! FIRE HAZARD

FIRE HAZARD WARNING provides flammability safety information to PREVENT INJURY OR DEATH to the technician or user.

There may be multiple warnings associated with the call out. Example:





WARNING! ELECTRICAL & FIRE HAZARD

This WARNING provides safety information for both Electrical AND Fire Hazards



CAUTION!

CAUTION provides safety information intended to PREVENT DAMAGE to material or equipment.



NOTICE:

NOTICE provides additional information to help complete a specific task or procedure.

ATTENTION:

ATTENTION provides specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.

The following sections contain important safety information that must be followed during the installation and operation of the equipment. Read all of the instructions before installing or operating the equipment, and save this manual for future reference.

TPA 250 Series™

High Density Connectorized DC Distribution Fuse Panel Technical Manual

C048-784-30 R01, Rev. B

Effective: March 2021

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Disclaimer

Images contained in this manual are for illustrative purposes only. These images may not match your installation. Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, please contact Alpha Technologies Services, Inc. or your nearest Alpha representative.

Alpha® shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries or other hardware if used or operated in any manner or subject to any condition not consistent with its intended purpose or is installed or operated in an unapproved manner or improperly maintained.

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1.0 Purpose and Applicability

The purpose of this document is to detail the installation and operation instructions for the TPA 250 Series™ high density connectorized DC distribution fuse panel.

1.1 Product Model

This document applies to the following configurations of the TPA 250 Series product:

Table 1. TPA 250 Series Model Configurations

PART NUMBER
C016-2121-10
C016-2122-10
C016-2123-10
C016-2124-10
C016-2125-10
C016-2126-10
C016-2127-10
C016-2128-10

2.0 Theory of Operation

2.1 Introduction

The TPA 250 Series product family consists of single-input (12 TPA fuse positions) and dual-input (6A/6B TPA fuse positions) 1RU fuse panels with connectorized outputs available in 37A or 100A configurations, along with standard LED front display monitoring or optional meter module display. TPA fuses are available for this panel in ratings from 3 ampere up to 50 ampere.

2.2 Features

- TPA fuse positions: 12; each up to 50A max
- Rack mounting: 19 in. or 23 in. rack mount ears
- Mounting offset: Front-flush, mid-mount forward, mid-mount rearward
- LED indicators (panels with LED display; Figure 1)
- Advanced LCD display (panels with meter module; Figure 2)
- Alarm Contacts: Form C dry contacts
- Side-accessible modular jack connections for alarm outputs
- · Polarized, positive latching connectorized outputs
- Optional lacing bar kit (C750-283-10) or telescoping rear rack support kit (C750-277-10)

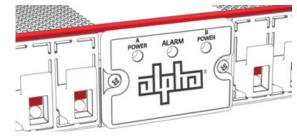


Figure 1. LED display

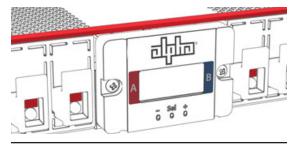


Figure 2. Meter module

3.0 Unpacking and Inspection

The TPA 250 Series fuse panel was carefully packaged at the factory to withstand the normal rigors of shipping. However, you should carefully inspect the box and contents to confirm that no damage has occurred in transit. Most shipping carriers require notification of shipping damage within twenty-four hours of delivery, and it is the responsibility of the recipient to inspect the shipment immediately upon receipt.

3.1 Package Contents

Included with your product are the following items:

- TPA 250 Series fuse panel
- · Mounting hardware kit
- Optional lacing bar kit or rear rack support kit (if ordered)

4.0 Installation

4.1 Installation Preparation

When selecting an installation location, ensure that all of the following conditions are met before proceeding.

4.1.1 Elevated Operating Ambient Temperature

If you install the panel in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, take care to install the equipment in an environment compatible with the maximum ambient temperature (TMA).

4.1.2 Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

4.1.3 Mechanical Loading

Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

4.1.4 Circuit Overloading

Give consideration to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Use appropriate consideration for equipment nameplate ratings when addressing this concern.

4.1.5 Reliable Earthing

Maintain reliable earthing of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

4.1.6 Disconnect Device

A readily accessible disconnect device must be incorporated in the building installation wiring.

4.2 Mounting

NOTICE:

THIS PRODUCT MUST BE INSTALLED WITHIN A RESTRICTED ACCESS LOCATION WHERE ACCESS IS THROUGH THE USE OF A TOOL, LOCK AND KEY, OR OTHER MEANS OF SECURITY, AND IS CONTROLLED BY THE AUTHORITY RESPONSIBLE FOR THE LOCATION. THIS PRODUCT MUST BE INSTALLED AND MAINTAINED ONLY BY QUALIFIED TECHNICIANS. SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

The TPA 250 Series fuse panel can be mounted in a front flush mount configuration, a mid-mount forward configuration, or a mid-mount rearward configuration. Depending on the desired configuration, attach the mounting ears accordingly (see Figure 3).

- **Step 1.** Attach the mounting ears with included 10-32 hardware (see Figure 4).
- **Step 2.** Select the equipment rack location for installation of the fuse panel then secure the panel to the equipment rack by tightening hardware into the mounting ears.

4.2.1 Optional Cable Lacing Bar Kit (C750-283-10)

- **Step 1.** Install the cable lacing rod in between the left and right lacing bar brackets by tightening a supplied 10-32 socket head screw into each end of the threaded rod (see Figure 5).
- **Step 2.** Attach the cable lacing bar assembly to the fuse panel by tightening (2) 10-32 socket head screws per side into the threaded holes located on each side of the fuse panel chassis towards the rear (see Figure 6).

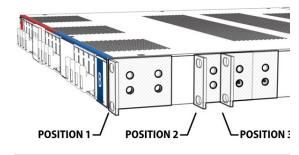


Figure 3. Mounting ear positions

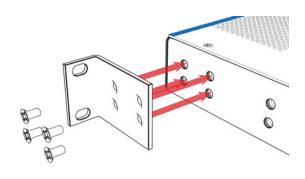


Figure 4. Mounting ears (position 1 shown)



Figure 5. Cable lacing rod

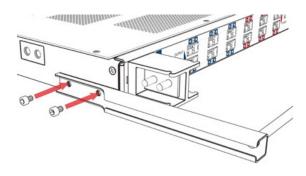
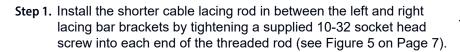
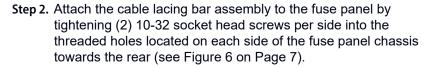


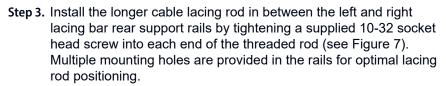
Figure 6. Cable lacing bar assembly install

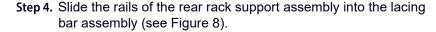
4.2.2 Optional Rear Rack Support Kit (C750-277-10)

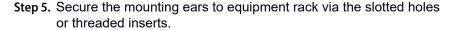
An optional telescoping rear rack support kit is available to help secure the panel to the rear of the equipment rack and to distribute panel weight evenly. In addition to the standard lacing bar included with the TPA 250 Series fuse panel, a new lacing bar is included with this kit which can be repositioned on any of the available lacing bar holes depending on the depth of the equipment rack. Use a hex key to relocate the new lacing bar if needed. See Appendix A for mechanical dimensions of rear rack support kit.











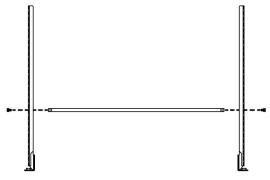


Figure 7. Cable lacing rod (for rear rack support kit)

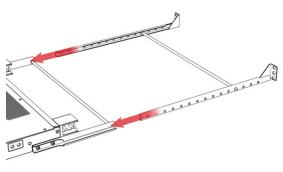


Figure 8. Rear support rails (for rear rack support kit)

4.3 Chassis Ground



CAUTION!

DO NOT ENERGIZE THE PANEL BEFORE CHASSIS GROUND IS CONNECTED.



WARNING! ELECTRICAL HAZARD

DO NOT USE HARDWARE WITH A LENGTH EXCEEDING 3/4 INCH FOR CHASSIS GROUND CONNECTIONS.

The chassis ground is located on both sides of the panel. Two-hole lug landing positions are provided. See table below for termination information. A minimum of #4 AWG chassis ground cable is required.

IMPORTANT: Grounding hardware not included. A properly-sized grounding conductor must be installed per NEC (250.122).

Table 2. Chassis Ground Termination Specifications

		•	
TERMINATION TYPE	HOLE/STUD SIZE	<u> </u>	RECOMMENDED TORQUE VALUE
Threaded insert	1/4 in.	5/8 in.	6.25 ft·lbs

Step 1. Secure the ground cable to the chassis by tightening 1/4 in. hardware (see Figure 9).

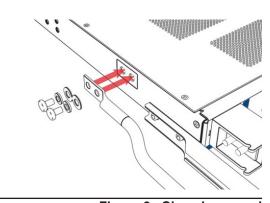


Figure 9. Chassis ground

4.4 Input Connections



WARNING! ELECTRICAL HAZARD

MULTIPLE POWER SOURCES ARE PRESENT, ENSURE ALL INPUT POWER FEEDS ARE NOT ENERGIZED BEFORE INSTALLING THEM. ELECTRICAL INSTALLATION SHOULD ONLY BE PERFORMED BY QUALIFIED PERSONNEL WITH PROPER TOOLS AND PROTECTIVE SAFETY EQUIPMENT.

INPUTS MUST BE PROTECTED BY A LISTED CIRCUIT BREAKER OR BRANCH RATED FUSE. THE CIRCUIT BREAKER OR FUSE MUST BE RATED AT 125% OF THE PANEL RATING.



NOTICE:

MAKE SURE THAT ALL FEEDER CABLES HAVE HEAT SHRINK APPLIED PRIOR TO TERMINATION, AND THAT NO-OXIDE COMPOUND IS APPLIED TO ALL COPPER-TO-COPPER CONNECTIONS.

SEE SECTION 7 ON PAGE 13 FOR COMPRESSION LUG SPECIFICATIONS, TOOLING, AND ORDERING INFORMATION.

Table 3. Input Termination Specifications

TERMINATION TYPE	HOLE/ STUD SIZE	CENTER TO CENTER	RECOMMENDED TORQUE VALUE
Threaded stud	1/4 in.	5/8 in.	6.25 ft·lbs

- **Step 1.** Secure the RTN input cables/lugs to the RTN input studs located on the rear of the panel (see Figure 10). Ensure that all hardware is tightened.
- **Step 2.** Secure the HOT input cables/lugs to the HOT input studs located on the rear of the panel (see Figure 11). Ensure that all hardware is tightened.

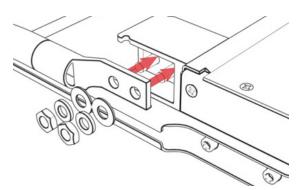


Figure 10. RTN input

4.4.1 Safety Covers



WARNING! ELECTRICAL HAZARD

FAILURE TO INSTALL THE PLASTIC SAFETY COVERS PROPERLY MAY CREATE AN ELECTRICAL HAZARD.

Included with each TPA 250 Series product are (4) input safety covers that are designed to help isolate the input terminations.

- **Step 1.** Align the notch found on the included plastic safety covers with the slots located at the rear of the panel.
- Step 2. Firmly insert into place until fully seated (see Figure 12).

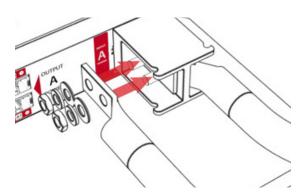


Figure 11. HOT input

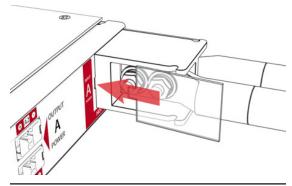


Figure 12. Safety covers

4.5 Output Connections



CAUTION!

DO NOT PERFORM THIS STEP ON CIRCUITS WITH FUSES INSTALLED. ENSURE NO POWER IS PRESENT ON THE CIRCUIT BEING WIRED BEFORE PROCEEDING.



NOTICE:

SEE SECTION 7 ON PAGE 13 FOR TERMINAL SPECIFICATION AND CABLE WHIP ORDERING INFORMATION.

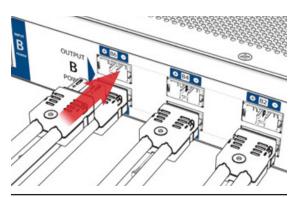


Figure 13. Output connections

There are twelve positive latching DC connector positions for the output circuits found on the TPA 250 Series fuse panel, available in either 37A or 100A connector configurations. Cable whips are available in a variety of lengths and wire gauges. Refer to the front of the panel for the circuit mapping card for circuit mapping information.

Step 1. Insert the DC plugs into the output receptacles until they click. The connectors are keyed to ensure correct polarity (see Figure 13).

4.6 Fuse Installation



NOTICE:

USE BUSSMANN TPA TYPE FUSES ONLY. FUSES MUST CARRY A 10KA OR HIGHER INTERRUPT RATING.

Step 1. Ensure that connected loads are in the off position, then firmly insert a TPA fuse of sufficient ampacity into the position to be fed (see Figure 14).

Step 2. Turn on the connected load.

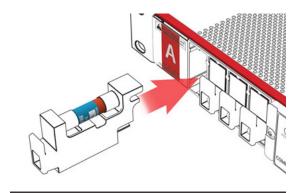


Figure 14. TPA fuse installation

4.7 Alarm Connections



NOTICE:

WHEN DAISY CHAINING, THE ALARM MUST BE MONITORED NORMALLY OPEN.

The TPA 250 Series fuse panel has Form-C dry alarm contacts for remote alarm monitoring. If alarm monitoring is required, (2) 8p8c (RJ-45) modular jacks are provided for alarm connections. The (2) jacks support easy daisy chaining of panels. The 8p8c modular jacks are located on the left side of the panel. Refer to mechanical drawings found in Appendix A for more details.

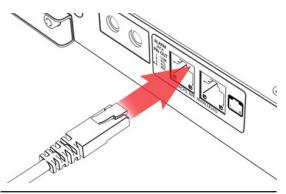


Figure 15. Alarm connections

- **Step 1.** Plug in a UTP cable with a TIA/EIA T568B termination into the alarm jack (see Figure 15). Refer to Table 4 for alarm pinout information.
- **Step 2.** Connect the cable to the site alarm monitoring system.
- **Step 3.** If daisy chaining is required, connect a UTP cable with TIA/EIA T568B termination into the second jack and connect the other end to the next panel in the chain. Repeat this process until all panels are connected.

Table 4. Alarm Contact Pinout

PIN 1	PIN 2	PIN 3	PIN 4-8
MAJOR COM	MAJOR NC	MAJOR NO	Reserved

5.0 Operation

5.1 LED Display

Modules with the LED display include three indicators:

- A Power
- B Power
- Alarm

5.1.1 A Power LED

The A Power LED will illuminate when power is present on the A input bus.

5.1.2 B Power LED

The B Power LED will illuminate when power is present on the B input bus.

5.1.3 Alarm LED

The Alarm LED will illuminate if a fuse is blown.

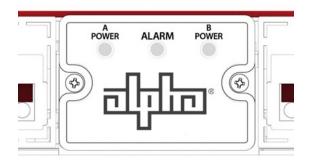


Figure 16. LED Status Display

6.0 Product Specifications



USE BUSSMANN® TPA TYPE FUSES ONLY. FUSES MUST CARRY A 10KA INTERRUPT RATING.

Table 5. Technical Specifications

	C016-2121-10, C016-2123-10, C016-2125-10, C016-2127-10	C016-2122-10, C016-2124-10, C016-2126-10, C016-2128-10
Type of Input	Single Input	Dual Input (A/B)
Circuits	12	12 (6A/6B)
Input Voltage	-42 to -60V DC	-42 to -60V DC
Input Current	250A Max	250A Max
Short Circuit Withstand	10kA	10kA
Maximum Fuse Size	50A TPA	50A TPA
Maximum per Circuit Current	40A	40A
Max Operating Altitude	2000 m	2000 m
Max Ambient Temperature	50° C	50° C
Width	17 in.	17 in.
Height	1.75 in.	1.75 in.
Depth (w/o Lacing Bar Kits)	18 in.	18 in.
Weight	8.5 lbs.	8.5 lbs.

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Table 6. Agency Certifications

UL	
UL File Number	E473904
UL Standard	ANSI/UL 60950-1

7.0 Models and Accessories

Table 7. Model Configurations

DESCRIPTION	PART NUMBER
Single Input, (12) 50A Max TPA Fuse Positions, Connectorized Outputs, 37A Max per Output, 250A Continuous Output Capacity, -48VDC, LED Display	C016-2121-10
Dual Input, 6A/6B 50A Max TPA Fuse Positions, Connectorized Outputs, 37A Max per Output, 250A Continuous Output Capacity, -48VDC, LED Display	C016-2122-10
Single Input, (12) 50A Max TPA Fuse Positions, Connectorized Outputs, 37A Max per Output, 250A Continuous Output Capacity, -48VDC, Meter Module Display	C016-2123-10
Dual Input, 6A/6B 50A Max TPA Fuse Positions, Connectorized Outputs, 37A Max per Output, 250A Continuous Output Capacity, -48VDC, Meter Module Display	C016-2124-10
Single Input, (12) 50A Max TPA Fuse Positions, Connectorized Outputs, 100A Max per Output, 250A Continuous Output Capacity, -48VDC, LED Display	C016-2125-10
Dual Input, 6A/6B 50A Max TPA Fuse Positions, Connectorized Outputs, 100A Max per Output, 250A Continuous Output Capacity, -48VDC, LED Display	C016-2126-10
Single Input, (12) 50A Max TPA Fuse Positions, Connectorized Outputs, 100A Max per Output, 250A Continuous Output Capacity, -48VDC, Meter Module Display	C016-2127-10
Dual Input, 6A/6B 50A Max TPA Fuse Positions, Connectorized Outputs, 100A Max per Output, 250A Continuous Output Capacity, -48VDC, Meter Module Display	C016-2128-10

Table 8. Accessories

DESCRIPTION	PART NUMBER
Lacing Bar Kit; TPA 250 Series Fuse Panel	C750-283-10
Adjustable Rear Mounting Kit with Lacing Bars; TPA 250 Series Fuse Panel	C750-277-10

Table 9. Supported TPA Fuses

DESCRIPTION	
3A TPA Fuse; DC-170V; .58" x 1.5"	C460-060-10
5A TPA Fuse; DC-170V; .58" x 1.5"	C460-061-10
10A TPA Fuse; DC-170V; .58" x 1.5"	C460-062-10
15A TPA Fuse; DC-170V; .58" x 1.5"	C460-063-10
20A TPA Fuse; DC-170V; .58" x 1.5"	C460-064-10
25A TPA Fuse; DC-170V; .58" x 1.5"	C460-065-10
30A TPA Fuse; DC-170V; .58" x 1.5"	C460-066-10
40A TPA Fuse; DC-170V; .58" x 1.5"	C460-067-10
50A TPA Fuse; DC-170V; .58" x 1.5"	C460-068-10

Table 10. Supported Lugs for Chassis Ground Connections

WIRE GAUGE	LUG BARREL	ALPHA PART NUMBER	MANUFACTURER	MANUFACTURER PART NUMBER	CRIMP DIE REQUIRED
#4	Long	C538-085-10	Burndy®	YAZV4C2TC14FX	Burndy U4CRT, W4CVT, W4CRT, X4CRT

Table 11. Supported Lugs for Input Connections

WIRE GAUGE	LUG BARREL	ALPHA PART NUMBER	MANUFACTURER	MANUFACTURER PART NUMBER	CRIMP DIE REQUIRED
#2 AWG	Short; narrow tongue	C538-173-10	Burndy [®]	YAV2CL2NT14FX	Burndy U2CRT, W2CVT, W2CRT, X2CRT
#2 AWG	Standard	C538-158-10	Burndy®	YAV2CL2TC14FX	Burndy U2CRT, W2CRT, W2CVT, X2CRT
#2 AWG	Long	C538-089-10	Burndy®	YAZV2C2TC14FX	Burndy U2CRT, W2CVT, W2CRT, X2CRT

WIRE GAUGE	LUG BARREL		MANUFACTURER	MANUFACTURER PART NUMBER	CRIMP DIE REQUIRED
1/0	Short	C538-350-10	Burndy®	YAV25L2TC14FX	Burndy U25RT, W25VT, W25RT, X25RT
1/0	Standard	C538-125-10	Burndy®	YAV25L2NT14FX	Burndy U25RT, W25VT, W25RT, X25RT
1/0	Long	C538-091-10	Burndy [®]	YAZV252TC14FX	Burndy U25RT, W25VT, W25RT, X25RT
1/0	Long; narrow tongue	C538-260-10	Burndy [®]	YAZV252NT14FX	Burndy U25RT, W25RT, X25RT, W25VT
2/0	Short	C538-357-10	Burndy®	YAV26L2TC14FX	Burndy U26RT, W26VT, W26RT, X26RT
2/0	Standard	C538-313-10	Burndy®	YAV26L2NT14FX	Burndy U26RT, W26VT, W26RT, X26RT
2/0	Long	C538-114-10	Burndy®	YAZV262TC14FX	Burndy U26RT, W26VT, W26RT, X26RT
4/0	Short	C538-410-10	Burndy [®]	YAV28L2TC14FX	Burndy U28RT, W28VT, W28RT, X28RT
4/0	Standard	C538-124-10	Burndy [®]	YAV28L2ENT14FX	Burndy U28RT, W28VT, W28RT, X28RT
4/0	Long	C538-122-10	Burndy®	YAZV282TC14FX	Burndy U28RT, W28VT, W28RT, X28RT

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Table 12. 37A Output Connectorized Cable Assemblies (For C016-2121-10, C016-2122-10, C016-2123-10, C016-2124-10 Models)

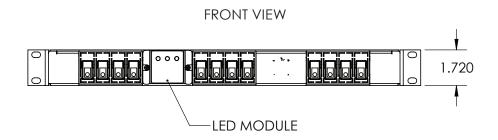
AWG	LENGTH	COLOR	PART NUMBER
#10	7'	Red/Black	C745-420-10
		Blue/Black	C745-422-10
		Red/Red Tracer	C745-437-10
		Blue/Blue Tracer	C745-433-10
	12'	Red/Black	C745-290-10
		Blue/Black	C745-424-10
		Red/Red Tracer	C745-438-10
		Blue/Blue Tracer	C745-434-10
#12	7'	Red/Black	C745-421-10
		Blue/Black	C745-425-10
		Red/Red Tracer	C745-298-10
		Blue/Blue Tracer	C745-299-10
	12'	Red/Black	C745-293-10
		Blue/Black	C745-294-10
		Red/Red Tracer	C745-197-10
		Blue/Blue Tracer	C745-198-10
#14	7'	Red/Black	C745-436-10
		Blue/Black	C745-427-10
		Red/Red Tracer	C745-432-10
		Blue/Blue Tracer	C745-435-10
	12'	Red/Black	C745-296-10
		Blue/Black	C745-429-10
		Red/Red Tracer	C745-227-10
		Blue/Blue Tracer	C745-228-10
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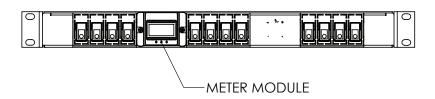
Table 13. 100A Output Connectorized Cable Assemblies (For C016-2125-10, C016-2126-10, C016-2127-10, C016-2128-10 Models)

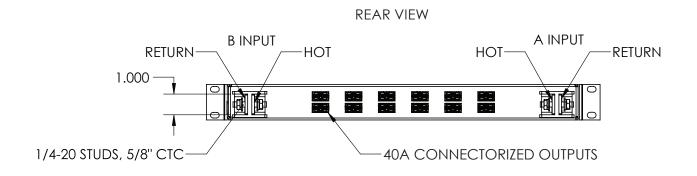
AWG	LENGTH	COLOR	PART NUMBER
#6	7'	Red/Black	C745-400-10
		Blue/Black	C745-461-10
		Red/Red Tracer	C745-263-10
		Blue/Blue Tracer	C745-264-10
	12'	Red/Black	C745-377-10
		Blue/Black	C745-382-10
		Red/Red Tracer	C745-235-10
		Blue/Blue Tracer	C745-236-10
#8	7'	Red/Black	C745-401-10
		Blue/Black	C745-407-10
		Red/Red Tracer	C745-410-10
		Blue/Blue Tracer	C745-414-10
	12'	Red/Black	C745-376-10
		Blue/Black	C745-381-10
		Red/Red Tracer	C745-233-10
		Blue/Blue Tracer	C745-234-10
#10	7'	Red/Black	C745-402-10
		Blue/Black	C745-408-10
		Red/Red Tracer	C745-411-10
		Blue/Blue Tracer	C745-415-10
	12'	Red/Black	C745-375-10
		Blue/Black	C745-380-10
		Red/Red Tracer	C745-418-10
		Blue/Blue Tracer	C745-419-10
#12	7'	Red/Black	C745-403-10
		Blue/Black	C745-409-10
		Red/Red Tracer	C745-412-10
		Blue/Blue Tracer	C745-416-10
	12'	Red/Black	C745-374-10
		Blue/Black	C745-379-10
		Red/Red Tracer	C745-413-10
		Blue/Blue Tracer	C745-417-10
#14	7'	Red/Black	C745-462-10
		Blue/Black	C745-463-10
		Red/Red Tracer	C745-464-10
		Blue/Blue Tracer	C745-465-10
	12'	Red/Black	C745-373-10
		Blue/Black	C745-378-10
		Red/Red Tracer	C745-458-10
		Blue/Blue Tracer	C745-459-10

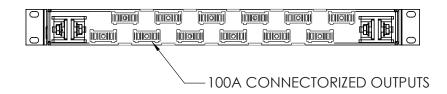
Appendix A: Mechanical Drawings

A.1 Front/Rear Detail



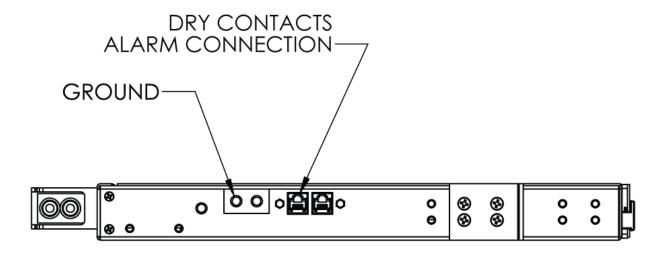


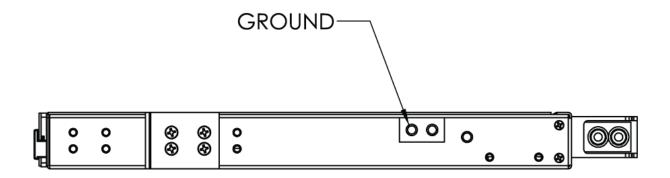




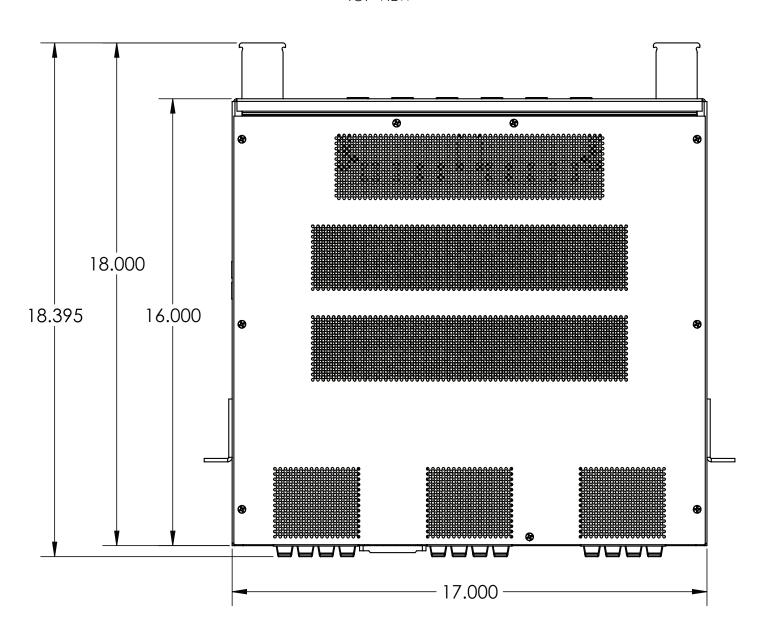
A.2 Left/Right Detail

SIDE VIEW

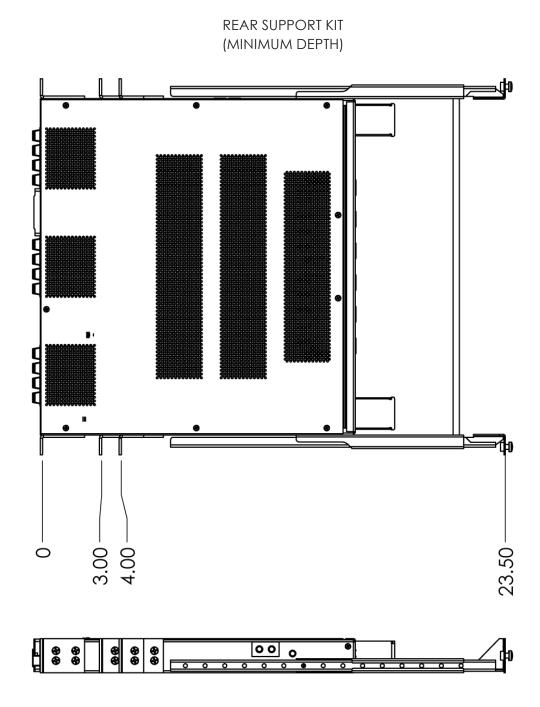




TOP VIEW

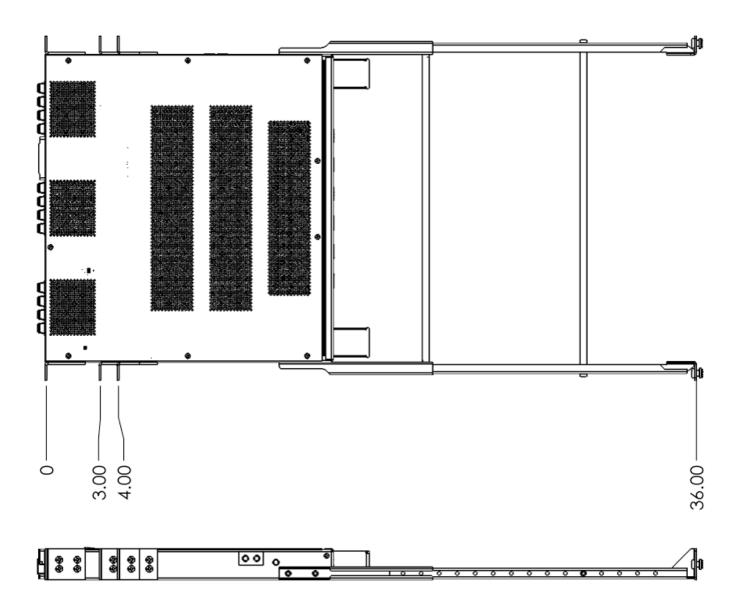


A.4 Rear Support Kit - Minimum Depth (C750-277-10)



A.5 Rear Support Kit - Maximum Depth (C750-277-10)

REAR SUPPORT KIT (MAXIMUM DEPTH)





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