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# Matrix C16™

## High Density Connectorized DC Distribution Breaker Panel

### Technical Manual

Effective: January 2020



# 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 maintenance of the equipment and batteries. Read all of the instructions before installing or operating the equipment, and save this manual for future reference.

# Matrix C16™

## High Density Connectorized DC Distribution Breaker Panel Technical Manual

C048-725-30 Rev. B

Effective: January 2020

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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.

### Contact Information

Sales information and customer service in USA

(7AM to 5PM, Pacific Time):

1 800 322 5742

Complete Technical Support in USA

(7AM to 5PM, Pacific Time or 24/7 emergency support):

1 800 863 3364

Sales information and Technical Support in Canada:

1 888 462 7487

Website:

[www.alpha.com](http://www.alpha.com)

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# 1.0 Purpose and Applicability

The purpose of this document is to detail the installation and operation instructions for the Matrix C16™ breaker panel.

## 1.1 Product Model

This document applies to the following configurations of the Matrix C16 breaker panel:

**Table 1. Matrix C16 Model Configurations**

PART NUMBER	DESCRIPTION
C016-1621-10	Matrix C16; Single Input; SmartSwitch
C016-1622-10	Matrix C16; Dual Input; SmartSwitch
C016-1623-10	Matrix C16; Single Input; LED Display, w/o Ethernet
C016-1624-10	Matrix C16; Dual Input; LED Display; w/o Ethernet

# 2.0 Theory of Operation

## 2.1 Introduction

The Matrix C16 1RU High Power Density DC Distribution Center provides high reliability, high power, DC distribution in a compact 1RU space to maximize rack space for signal equipment.

## 2.2 Features

- Compact 1RU form factor
- 400A total rating
- 8A and 8B output circuits (dual input), 16 output circuits (single Input)
- Enclosed breaker compartment to prevent nuisance trips
- Remote monitoring via Form-C dry alarm contacts
- SmartSwitch with per circuit current monitoring
- Available embedded web server for real time network monitoring

# 3.0 Unpacking and Inspection

The Matrix C16 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

- Matrix C16 1RU High Power Density DC Distribution Center
- Installation kit
- Rear plastic safety shields

## **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 Mechanical 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.

### 4.2.1 Rack Mount Ears

The Matrix C16 can be mounted in a 19in or 23in rack configuration, in a front flush or offset mid-mount orientation.

**Step 1.** Depending on the size of the rack, select one of the following sets of mounting ears:

- For 19" racks, use (2) C590-1936-10
- For 23" racks, use (2) C590-1937-10

**Step 2.** Attach the two (2) front mounting ears in the appropriate configuration using the included #10-32 hardware as shown in Figure 1.

### 4.2.2 Cable Lacing Bar

NOTE: Installation of the rear cable lacing bar is optional but highly recommended to provide strain relief for connected cables.

NOTE: If using optional rear rack support kit (C750-284-10), skip to Section 4.2.3

**Step 1.** Attach the lacing bar to the rear of the panel using the included #10-32 hardware as shown in Figure 2.

**Step 2.** Insert the panel into the rack and secure the front mounting ears to the rack using the included #12-24 hardware.

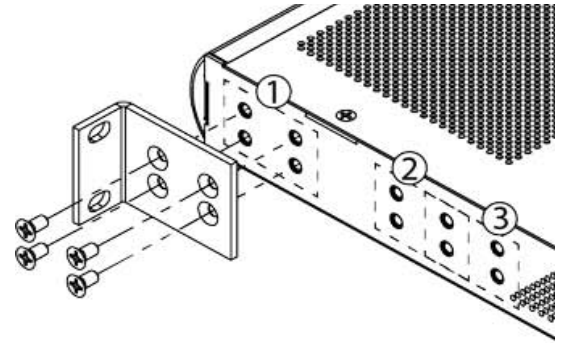


Figure 1. Mounting Ears

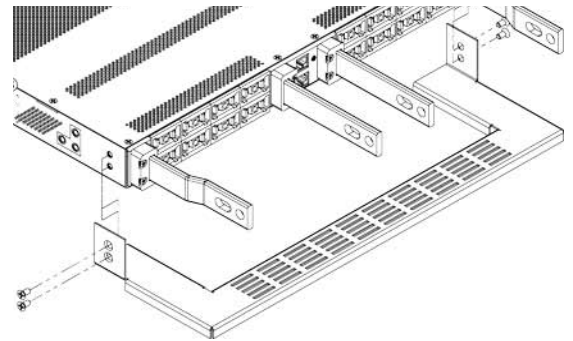


Figure 2. Cable Lacing Bar



### 4.2.3 Optional Rear Rack Support Kit (C750-284-10)

The optional rear rack support kit provides additional support to the rear of the panel by mounting to the rear rack posts. An adjustable cable lacing bar is included.

**Step 1.** Attach the rear rack support brackets to each side of the Matrix C16 using the included #10-32 hardware as shown in Figure 3 and Figure 4.

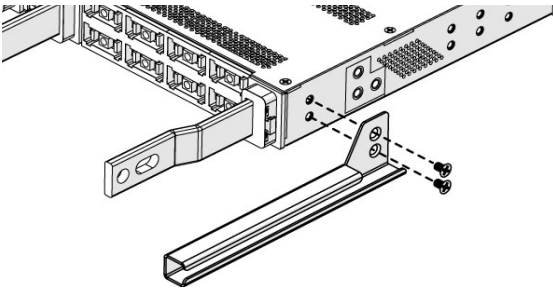


Figure 3. A-Side Rear Support Bracket

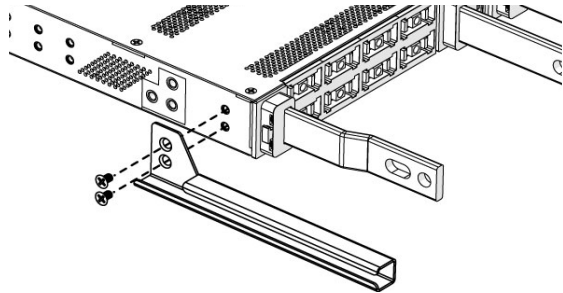


Figure 4. B-Side Rear Support Bracket

**Step 2.** Align each rear support rail as shown in Figure 5. Select a hole position for the lacing bar and secure to each rear support rail using the included #10-32 hardware, then insert the rear support rail assembly into the rear support brackets as shown in Figure 6. Secure the ears of the rear rack support assembly to a rack using the included 1/4"-20 hardware.

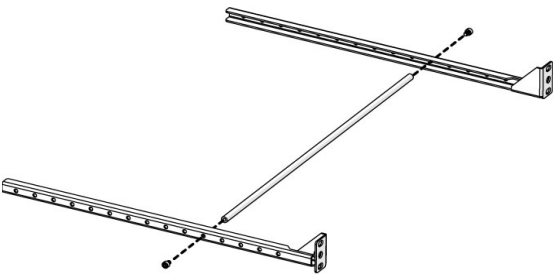


Figure 5. Rear Support Rail & Lacing Bar

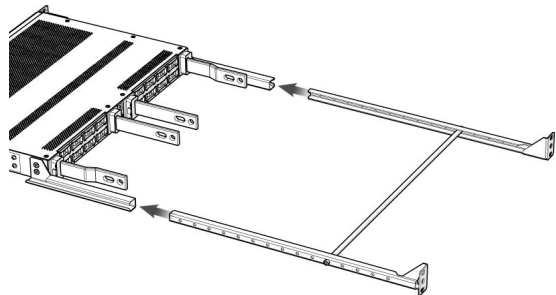


Figure 6. Insert Rear Support Rail & Lacing Bar

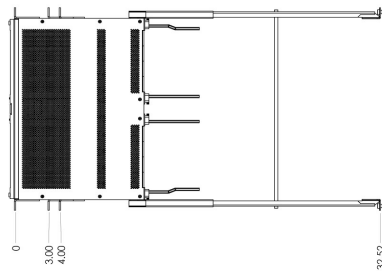


Figure 7. Rear Rack Support Kit - Fully Extended

### 4.3 Ground Installation



CAUTION!

DO NOT ENERGIZE THE PANEL BEFORE CHASSIS GROUND IS CONNECTED.

The chassis ground is located on each side of the panel. A two hole lug landing position is provided per side. See table below for termination information. A minimum of #6 AWG chassis ground cable is required.

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

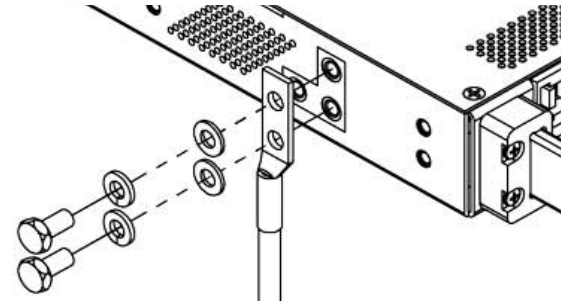


Figure 8. Chassis Ground Connection

Table 2. Ground Termination Summary

TWO HOLE LANDING TYPE	HOLE/STUD SIZE	CENTER TO CENTER	RECOMMENDED TORQUE VALUE
Threaded Insert	1/4in-20	5/8in	90in-lbs

**Step 1.** Connect the lug to the chassis (see Figure 8) with the included 1/4in-20 hardware. Make sure heat shrink and no-oxide compound are applied appropriately prior to attachment.

**Step 2.** Torque the fasteners to 90in-lbs.

## 4.4 Input Connections



### WARNING! ELECTRICAL HAZARD

TO PROTECT PERSONNEL AND EQUIPMENT, 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.



### 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. USE ONLY COMPONENTS AND CRIMPING TOOLS APPROVED BY AGENCIES OR CERTIFYING BODIES RECOGNIZED IN YOUR COUNTRY OR REGION.

Table 3. Electrical Termination Summary

TWO HOLE LANDING TYPE	HOLE/ STUD SIZE	CENTER TO CENTER	RECOMMENDED TORQUE VALUE
Through Hole	3/8in	5/8in - 1in	145in-lbs

### 4.4.1 Straight Lug Input Configuration

(See Figure 9)

- Step 1.** Secure the HOT input cables lug(s) to the HOT input bus bar(s) with the included 3/8"-16 x 1" hardware. Torque the bolts to 145 in-lbs.
- Step 2.** Secure the RTN cable lug(s) to the RTN input bus bar(s) with the included 3/8"-16 x 1" hardware. Torque the bolts to 145 in-lbs.

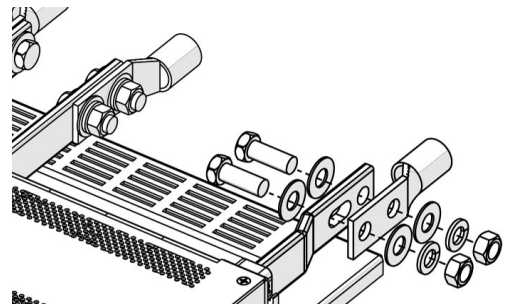


Figure 9. Straight Input Lug Installation

### 4.4.2 Optional 90 Degree Lug Input Configuration

(See Figure 10)

- Step 1.** Secure the 90 degree HOT input bus bar adaptor(s) to the HOT input bus bar(s) with the included 3/8"-16 x 1" hardware. Torque the bolts to 145 in-lbs.
- Step 2.** Secure the 90 degree RTN input bus bar adaptor(s) to the RTN input bus bar(s) with the included 3/8"-16 x 1" hardware. Torque the bolts to 145 in-lbs.

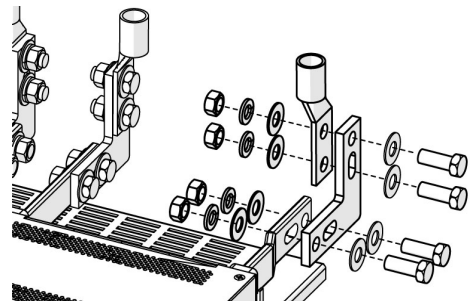


Figure 10. 90 Degree Input Lug Installation

## 4.5 Rear Plastic Safety Shields



### WARNING! ELECTRICAL HAZARD

FAILURE TO INSTALL THE PLASTIC SAFETY SHIELDS PROPERLY MAY CREATE AN ELECTRICAL HAZARD. THE PANEL MAY BE ENERGIZED WHEN INSTALLING THE REAR PLASTIC SAFETY COVERS. USE INSULATED TOOLS AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN INSTALLING OR REMOVING THE REAR PLASTIC SAFETY COVERS. WHEN ALL REAR ELECTRICAL CONNECTIONS HAVE BEEN COMPLETED, THE REAR PLASTIC SAFETY COVERS MUST BE INSTALLED. THE COVERS CAN BE REMOVED LATER TO SERVICE THE PANEL.

When all input cables have been installed, attach the rear plastic safety covers that go over each input landing position.

### 4.5.1 Straight Isolators

**Step 1.** Pry the isolator open and place it around the cable. Ensure that it is in the correct orientation (see Figure 11).

**Step 2.** Slide the isolator forward until it covers the bus bars and its corresponding isolator, against the metal chassis. It is held in place by friction. Repeat these steps for all of the straight-mounted input bus bars on the panel.

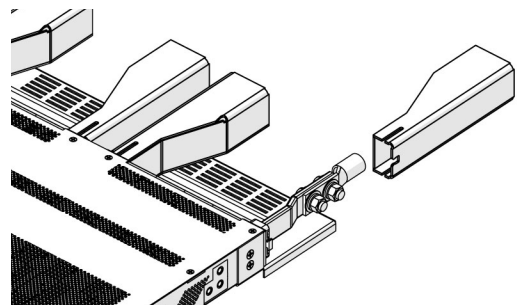


Figure 11. Straight Isolators

### 4.5.2 Optional 90 Degree Isolators

**Step 1.** Place the bottom portion of the isolator on the bottom of the input bus assembly and align with the top portion of the isolator as shown in Figure 12.

**Step 2.** Install the two plastic snap-in clips at the top of the isolator assembly to secure it in place. Repeat these steps for all 90 degree-mounted input bus bars on the panel.

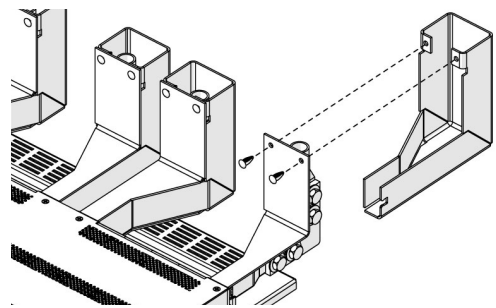


Figure 12. 90 Degree Isolators

## 4.6 Output Connections



### WARNING! ELECTRICAL HAZARD

ENSURE CIRCUIT BREAKERS ARE IN THE OFF POSITION BEFORE PLUGGING IN OUTPUT CONNECTIONS.

**NOTE:** When viewing the connectors from the rear of the panel, ensure that each RTN cable is oriented on the left position of each connector.

**Step 1.** Locate the connectorized output cable whips that were shipped with your C16 panel.

**Step 2.** Insert the connector into the desired output position until it clicks (see Figure 13). The connector is keyed to prevent reverse polarity. Refer to the output circuit map label for output circuit mapping information.

**Step 3.** Lace the output cable to the previously installed lacing bar. Repeat these steps for all desired output circuits to be installed.

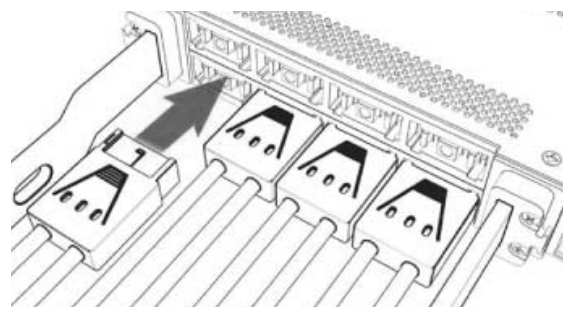


Figure 13. Output Connections

## 4.7 Alarm Installation

The Matrix C16 has Form-C dry alarm contacts for remote alarm monitoring. An 8p8c- (RJ-45) modular jack can be found in the center of the panel when viewed from the rear. It is the lower of the two jacks as shown in Figure 14. Plug a Cat 5/5e/6 UTP cable with a TIA/EIA T568B termination into the alarm jack. Refer to Table 4 below for termination pinout.

Table 4. Alarm Contact PinOut

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

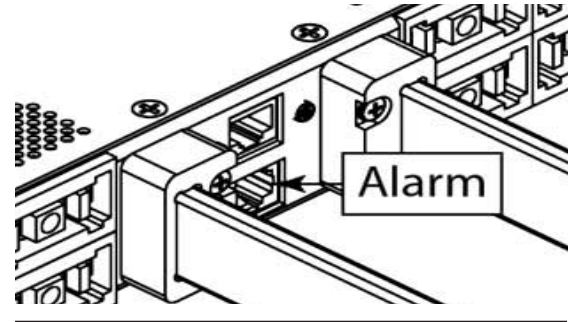


Figure 14. Alarm Jack

## 4.8 Breaker Installation

 **NOTICE:**

SLIMLINE BREAKERS RATED GREATER THAN 65A DO NOT CARRY A UL 489 RATING AT THIS TIME.



**CAUTION!**

MAKE SURE CIRCUIT BREAKERS ARE IN THE OFF POSITION PRIOR TO INSTALLATION. ENSURE CIRCUIT BREAKERS ARE COMPLETELY INSERTED.

There are 16 breaker positions in the Matrix C16 breaker panel.

**Step 1.** Remove the breaker compartment door from the panel by loosening the two thumb screws on the door.

**Step 2.** Select a breaker of sufficient ampacity and insert it into the desired output circuit, making sure to seat the breaker securely (see Figure 15).

**NOTE:** A breaker legend is applied to the inside of the compartment door to allow an installer to mark the use of each breaker.

**Step 3.** Once all desired circuit breakers have been installed, reinstall the breaker compartment door and secure it with the thumb screws.

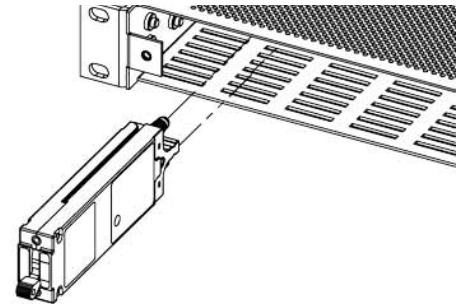


Figure 15. Breaker Installation

## 4.9 Installing the Network Cable

If remote monitoring over the network is required, complete the following steps to connect the Ethernet module with embedded web server.

**NOTE:** For initial configuration, it is recommended to use a crossover Cat 5/5e/6 UTP cable to connect a laptop directly to the Ethernet port of the Matrix panel. If the laptop is configured for Auto MDI-X, a straight-through cable may be used.

**Step 1.** Connect a Cat 5/5e/6 UTP Ethernet cable from the local network to the Ethernet port on the rear of the panel. Refer to "Appendix A: Mechanical Drawings" on Page 27 for exact location. Use a TIA/EIA T-568B pinout for the network connection.

**Step 2.** For information on configuring the web server, see "5.6 Review System Status via the Embedded Web server" on Page 18.

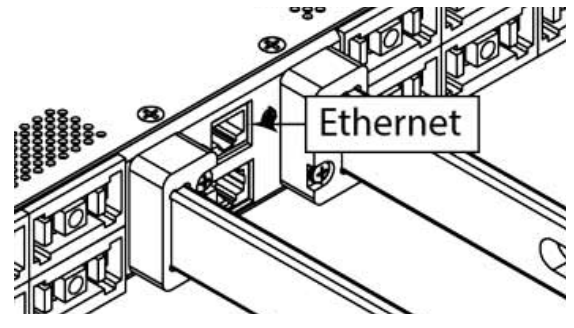


Figure 16. Ethernet Jack

## 5.0 Operation (Models with SmartSwitch)

Operation instructions for models without the SmartSwitch controller can be found in Section 6.0 “Operation (Models with LED Display)” on Page 21.

If you are using the Ethernet based web server, see Section 5.6 “Review System Status via the Embedded Web Server” on Page 18 for setup and operation instructions. Refer to section 5.7 on Page 20 for a SmartSwitch user interface map.

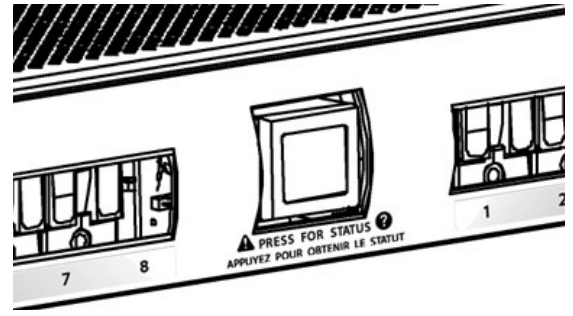


Figure 17. SmartSwitch Controller

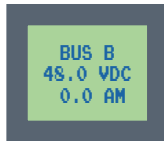
### 5.1 User Interface

To advance any item in the menu, tap the SmartSwitch screen (fully depress the screen itself for less than one second).

To select a value or enter a menu, press and hold the SmartSwitch for at least 3 seconds.

### 5.2 Home Screen Information

The SmartSwitch home screen displays Input bus voltage, input bus current, and alarm status. Under normal operation, the home screen backlight will remain green.



The dual input Matrix C16 SmartSwitch home screen will automatically cycle between the A and B bus displays. Tapping the screen once will cycle through the home screens manually. The available options from the home screen are Input A, Input B displays as well VIEW BKR LOAD and SETUP menus.

The home screen also indicates the real time status of the panel based on its backlight color. Refer to Table 2 below for status information.

Table 5. Backlight Status

BACKLIGHT COLOR	STATUS INDICATED	ALARM TYPE
Green	Normal Operation	N/A
Orange	Warning/Pre-Alarm	Minor
Red	Alarm	Major

## 5.3 Initial Operation

Once all breakers are installed and power is present on the inputs, remove the breaker compartment door and slide the power switch to the on position. The power switch is located on the front right side of the SmartSwitch. The display will turn on and display the Alpha® logo followed by the firmware version.

### 5.3.1 Breaker Inventory Process

Before the monitoring features of the Matrix panel can be used, a breaker inventory must be taken.

**Step 1.** Upon first power up, the system will prompt “TURN ON THE BKRS HOLD 3S.”

**Step 2.** Turn on all breakers to be inventoried. Press and hold the SmartSwitch as prompted.

**Step 3.** The SmartSwitch will now display the number of breakers installed in the panel. If the number of breakers displayed is incorrect, ensure that all installed breakers are fully seated, in the correct orientation, and turned on.

**Step 4.** If the number of breakers is correct, press and hold the SmartSwitch for 3 seconds to continue.

**Step 5.** The SmartSwitch will now display “STORED PRESS TO CONT.” Tap the SmartSwitch to continue and set the breaker ampacity.



### 5.3.2 Setting Breaker Ampacity

The SmartSwitch will now display “SETUP BKR AMPS HOLD 3S.”

**Step 1.** Hold the SmartSwitch for 3 seconds to enter the menu to set breaker ampacity.

**Step 2.** The first breaker in inventory will be shown, along with its currently set ampacity. If the ampacity is incorrect, press and hold the SmartSwitch for 3 seconds to enter the menu.

**Step 3.** Tap the SmartSwitch until the correct ampacity is displayed (the display will advance through standard Slimline breaker ampacities: 1, 3, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 80, 90, and 100), then press and hold for 3 seconds to save the value.

**Step 4.** The next breaker in inventory will now be displayed. Repeat Steps 1-3 for each breaker in inventory.

**Step 5.** Once all of the breaker ampacities are set correctly, advance to the screen that says “EXIT HOLD 3 S” and hold the SmartSwitch for 3 seconds to exit the menu and save the values.




This completes the initial SmartSwitch setup.



## 5.4 “VIEW BKR LOAD HOLD 3 S”


Entering this menu will display voltage, current, and alarm status information for each circuit that is stored in inventory. When the menu is entered, the first circuit in inventory will be displayed. Tapping the SmartSwitch will advance to the next circuit in inventory.



VIEW BKR  
LOAD  
HOLD 3 S

## 5.5 “SETUP HOLD 3 S” – Setup Menu

The setup menu is used to configure the SmartSwitch. The system will prompt you with “SETUP HOLD 3 S” to enter the menu. This menu is accessed by tapping the home screen until the prompt appears, then pressing and holding the SmartSwitch for 3 seconds.



SETUP  
HOLD 3 S

### 5.5.1 “SETUP BKR INV HOLD 3 S” – Breaker Inventory

Press and hold the SmartSwitch for 3 seconds to enter the menu and perform a breaker inventory. Follow the on-screen prompts to finish inventorying circuits. A breaker inventory must be performed every time a new circuit is added to the Matrix panel. Refer to "5.3.1 Breaker Inventory Process" on Page 16 for instructions on how to complete a breaker inventory.



SETUP  
BKR INV  
HOLD 3 S

### 5.5.2 “SETUP BUS ALMS” – Bus Alarm Menu

This menu is used to set the input bus rating to enable the panels over current monitoring features.

**Step 1.** To set the bus A ampacity, select the option that says “SETUP BUS A HOLD 3 S.” The SmartSwitch will then display “HOLD TO EDIT, TAP TO SHIFT.” Tap to access the first bus.




SETUP  
BUS ALMS  
HOLD 3 S

**Step 2.** Three digits will now appear on screen with an arrow under the first digit.



SETUP  
BUS A  
HOLD 3 S

**Step 3.** To edit a digit, hold the SmartSwitch for 3 seconds, then tap to change its value. Hold for 3 seconds to save the edits.



BUS A  
299 AMPS

**Step 4.** Repeat these steps for each digit that needs to be edited.

**Step 5.** Repeat for bus B.

### 5.5.3 “SETUP BKR ALMS HOLD 3 S” – Breaker Alarm Menu

This menu is used to configure the alarm and warning threshold for overcurrent alarms.

The alarm setting is used to set the threshold for the panel's overcurrent alarm. An alarm condition will annunciate locally with a red display and an audible alarm. It will also cause a remote alarm via the Form-C dry alarm contact and email alerts via the Ethernet web server.

The warning setting is used to set the threshold for the panel's overcurrent warning (pre-alarm). The warning will only annunciate locally.



SETUP  
BKR ALMS  
HOLD 3 S

### 5.5.4 “SETUP VOLT CAL HOLD 3 S” – Voltage

#### Calibration Menu

This menu is used to calibrate displayed bus voltages. Voltage can only be edited if within valid voltage range.

## 5.5.5 “SETUP ADVANCED HOLD 3 S” –

### Advanced Settings Menu

The advanced menu contains the following functions. Changing these settings or using these functions may affect the monitoring capabilities of the panel.



#### Restore Defaults

Resets all of the panel settings back to factory default. This will clear breaker inventory and set the breaker ampacity, warning, and alarm thresholds back to their default settings.

#### Setup Demo

This assigns fake values to current and breaker inventory for demonstration purposes. It should not be used during normal operation.

#### System Info

This displays the firmware version installed on the controller.

## 5.6 Review System Status via the Embedded Web Server

This section applies to the Matrix family products with the optional embedded web server installed. If a panel does not have an Ethernet web server but you would like to add one, or if you are unsure if this option is installed on your panel, contact Alpha Support.

The optional embedded Ethernet module provides remote monitoring via IP-based Ethernet networks and a web browser. To view the system status, you will need to connect the Ethernet port on the rear of your Matrix to your network. See "4.9 Installing the Network Cable" on Page 14 for information on installing the network cable.

By default, the Ethernet module is configured from the factory with a static IP address and network settings, as defined below.

### 5.6.1 Default Static Network Settings

Set up a local network to communicate with the embedded web server at the following network settings:

- IPv4 Address: 192.168.123.123
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.123.1
- Primary DNS: 192.168.123.1
- Secondary DNS: 8.8.8.8

Once you establish a connection to the embedded Ethernet module, use the following credentials to gain access to the protected data and administrative pages:

- Username: root
- Password: password

## 5.6.2 Navigating the Web Server

Upon loading the Matrix web server, the Realtime Status page will be displayed. Click on the "Administration" tab to view or modify settings.

## 5.6.3 Administration Settings

When accessing the web server for the first time, it is necessary to configure the administration settings. Click on the "Administration" tab to access these settings.

### Network Settings

See "5.6.1 Default Static Network Settings" on page 18 for the default network settings for the Matrix web interface. You can access and change any of the settings on this page. After applying changes, you must reboot the Matrix Ethernet web server using the link located at the bottom of the Administration Settings page.

### Notification Settings

Allows a user to edit settings for SNMP traps or email alerts. All remote alarms are disabled by default.

### E-mail and SNMP Settings

Used to configure SNMP trap destinations, SNMP community string and alert email destinations. After applying changes, you must reboot the Matrix Ethernet web server using the link located at the bottom of the Administration Settings page.

### Site Settings

Settings for site name and location displayed on the Ethernet web server and SNMP data.

### Channel Settings

Allows a user to enter channel labels which can be accessed via SNMP.

### Upload Firmware

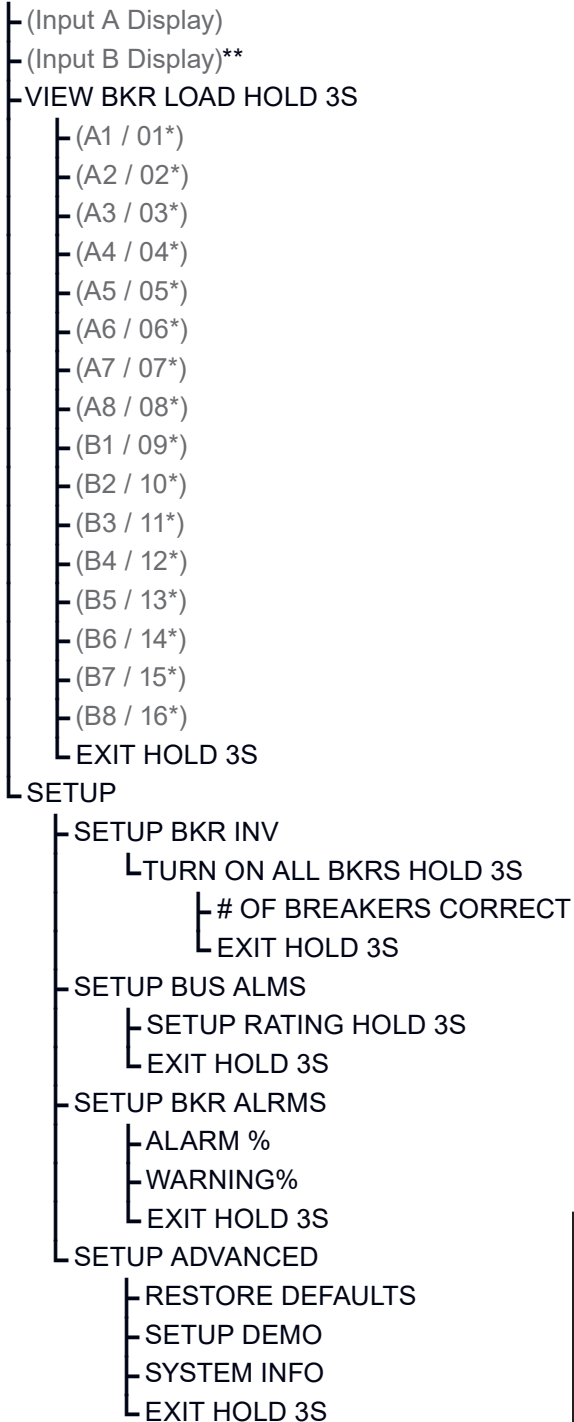
This menu is used to update the firmware for the Ethernet web server. Contact Alpha support for further information.

### Reboot Device

This allows the user to reboot the Ethernet web server device remotely.

## 5.7 SmartSwitch User Interface Map

FROM STANDBY:



### About this map

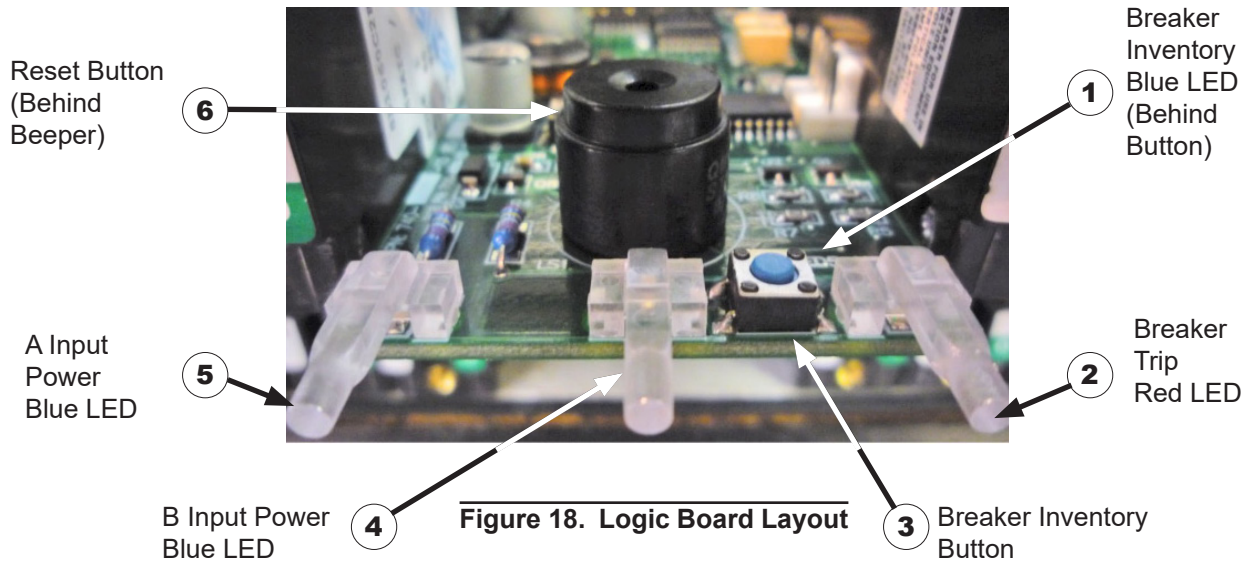
- Screens in parentheses "( )" are information only. There are no further menu items beyond these screens.
- Press and hold SmartSwitch for 3 seconds to enter a menu. Tap to advance between items.

\* Dual Input Matrix / Single Input Matrix breaker display

\*\* Does not display on single input Matrix (skips to breaker menu).

## 6.0 Operation (Models with LED Display)

### 6.1 Layout and Function of Logic PCB Interface



#### 1. Breaker Inventory LED

Upon first power-up, the Breaker Inventory LED will flash to indicate that there is no breaker inventory present in nonvolatile memory, and that a breaker inventory should be taken before the panel is put into service. When the Breaker Inventory button is pressed and held, this LED will light until the breaker inventory is stored in nonvolatile memory. The LED will then report the breaker inventory by flashing once for each breaker.

#### 2. Breaker Trip LED

The red Breaker Trip LED will light if an inventoried breaker has tripped, or if a new breaker has been turned on since the last breaker inventory was taken.

#### 3. Breaker Inventory Button

The Breaker Inventory Button, when held for more than five seconds, is used to store the breaker inventory in nonvolatile memory. The button may also be used to temporarily silence, indefinitely disable, or re-enable the beeper (see Section 6.3 “To Temporarily Silence the Breaker Trip Alarm Beeper” for more information. ).

#### 4. B Input Power LED

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

#### 5. A Input Power LED

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

#### 6. Reset Button

In the unlikely event that a power anomaly or static discharge causes improper operation of the microprocessor, the Reset button may be used to reset the microprocessor. The breaker inventory is not affected. However, when used in combination with the Breaker Inventory button, the Reset button may be used to reset the nonvolatile memory to factory defaults (see Section 6.5 “To Perform a Factory Reset” for more information).

## 6.2 To Inventory the Circuit Breakers

1. From the factory, when power is applied to the panel for the first time, the blue Breaker Inventory LED will flash at about a one second interval. This indicates that it is necessary to inventory the circuit breakers that are installed in the panel.
2. Turn on all the circuit breakers that are installed in the panel. Press and hold the Breaker Inventory button. Hold the button down until the blue Breaker Inventory LED turns on, then subsequently turns off (about five seconds). This indicates that all of the breakers that are installed and turned on have been inventoried and saved to the non-volatile memory of the microprocessor. The Breaker Inventory LED will then report the number of inventoried breakers by flashing once for each breaker that is installed.
3. Check the inventory and the breaker trip indicator function by sequentially turning off each circuit breaker one at a time. When a breaker is turned off the red Breaker Trip LED will turn on and the alarm beeper will sound. When the breaker is turned back on, the LED will turn off and the alarm beeper will silence.
4. The breaker inventory will remain in non-volatile memory even if the unit is de-powered.
5. If a new breaker is installed at a later date, the red breaker trip LED will turn on, indicating that a new inventory must be taken.

## 6.3 To Temporarily Silence Breaker Trip Alarm Beeper

1. To silence the breaker trip alarm beeper, tap the Breaker Inventory button momentarily (press until the blue breaker inventory LED turns on, then release). [Note: the logic PCB only recognizes a momentary tap when the breaker inventory button is released after the blue breaker inventory LED has turned on.]
2. The breaker trip alarm beeper will silence.
3. The breaker trip alarm beeper will re-engage if an additional breaker is tripped, or if the tripped breaker is reset and re-trips.

## 6.4 To Disable/Re-Enable the Breaker Trip Alarm Beeper

1. To prevent the breaker trip alarm beeper from sounding on any breaker trip, momentarily tap the breaker inventory button (press until the blue breaker inventory LED turns on, then release) four times in a row.
2. The breaker trip alarm beeper will not sound when a breaker is tripped.
3. To re-enable the breaker trip alarm beeper, repeat step 1.

## 6.5 To Perform a Factory Reset

1. To perform a full factory reset (erasing all breaker inventory and alarm settings), hold the breaker inventory button and momentarily tap the processor reset button.
2. Continue holding the breaker inventory button until the blue Breaker Inventory LED turns off.
3. When the breaker inventory button is released, the blue breaker inventory LED will be flashing, indicating that the factory reset was successful.

## 7.0 Maintenance Operations

### 7.1 Breaker Removal



#### CAUTION!

THE PANEL MAY BE ENERGIZED. THE PANEL SHOULD ONLY BE SERVICED BY QUALIFIED PERSONNEL WITH INSULATED TOOLS AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT. ONLY REMOVE A BREAKER ONCE IT IS TURNED OFF.

Included in the Matrix C16 installation kit is a circuit breaker extraction tool.

- Step 1.** Remove the breaker compartment door by loosening the two thumbscrews.
- Step 2.** Turn off the circuit breaker to be removed.
- Step 3.** Using the captive screws, attach the breaker extractor to the breaker. There are threaded inserts on the face of the breaker for this purpose (see Figure 19).
- Step 4.** Pull the breaker straight out from the front of the panel (see Figure 20).
- Step 5.** Reinstall the breaker compartment door.

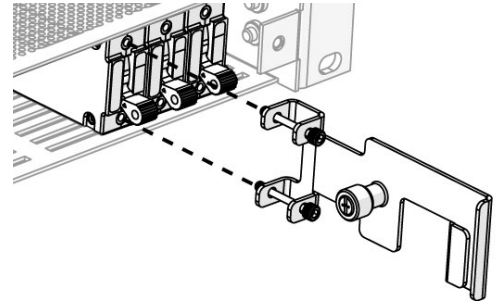


Figure 19. Breaker Extraction Tool

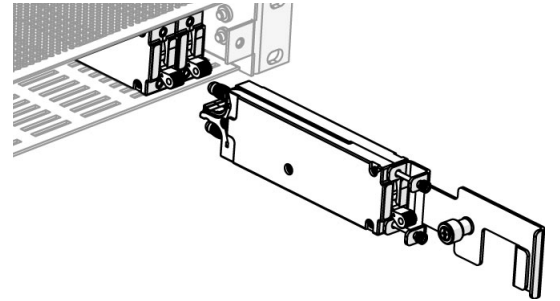


Figure 20. Breaker Removal

### 7.2 Output Connector Removal



#### WARNING! ELECTRICAL HAZARD

ENSURE THE BREAKER FOR THE CIRCUIT BEING SERVICED IS TURNED OFF BEFORE SERVICING THE OUTPUT CIRCUIT.

- Step 1.** Turn off the breaker for the circuit being serviced.
- Step 2.** Make sure the output cable being removed is not laced to any other cables or to the lacing bar, otherwise it will be difficult to remove completely.
- Step 3.** Press the tab on either the top or bottom of the connector and pull it straight back, away from the panel.

## 8.0 Product Specifications

**Table 6. Technical Specifications**

Electrical	
Voltage	-48VDC
Input Busses	Single or dual (A/B)
Load Current Per Bus	320A max. continuous
Total Load Current	320A max. continuous
Alarm Contacts	Form-C, 60VDC @ 0.5A max
Circuits	Up to 16
Maximum Input Interruption Device	400A

Mechanical	
Dimensions L x H x D	17 x 1.75 x 16.5
Weight	8.5

Environmental	
Operating Temperature	0 to 50°C
Humidity	0 to 95% RH non-condensing
Elevation	-500 to 3000m

**Table 7. Agency Certifications**

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



## 9.0 Models and Accessories

**Table 8. Model Configurations**

DESCRIPTION	PART NUMBER
Matrix C16 Panel; Single Input; -48VDC; (16) Connectorized Breaker Positions; SmartSwitch Supervisory Controller; Ethernet	C016-1621-10
Matrix C16 Panel; Dual Input; -48VDC; (16) Connectorized Breaker Positions; SmartSwitch Supervisory Controller; Ethernet	C016-1622-10
Matrix C16 Panel; Single Input; -48VDC; (16) Connectorized Breaker Positions; Standard LED Indicators; w/o Ethernet	C016-1623-10
Matrix C16 Panel; Dual Input; -48VDC; (16) Connectorized Breaker Positions; Standard LED Indicators; w/o Ethernet	C016-1624-10

**Table 9. Accessories**

DESCRIPTION	PART NUMBER
Output Connector Kit (#6-8 AWG); Includes (6) C545-187-10 #6-8 AWG 100A Connectors	C016-1262-10
Output Connector Kit (#10-14 AWG); Includes (6) C545-187-10 #10-14 AWG 100A Connectors	C016-1264-10
90 Degree Input Lug Bracket Connection Kit - Dual Input	C750-171-10
Matrix C16 Rear Mount Support Kit w/Adjustable Lacing Bar	C750-284-10

**Table 10. Replacement Parts**

DESCRIPTION	PART NUMBER
SmartSwitch Supervisory Controller (C016-1621-10 and C016-1622-10 models only)	C740-413-40
Circuit Breaker Puller/Extractor Tool	C016-1318-10
Embedded Ethernet Module Option for Remote Monitoring (C016-1621-10 and C016-1622-10 models only)	C740-558-40
Matrix C16 Mounting Kit; Includes Mounting Ears/Hardware for 19" and 23" Rack Configurations	C750-175-10-B (Black Powdercoat) C750-175-10-W (White Powdercoat)

**Table 11. Compatible Circuit Breakers**

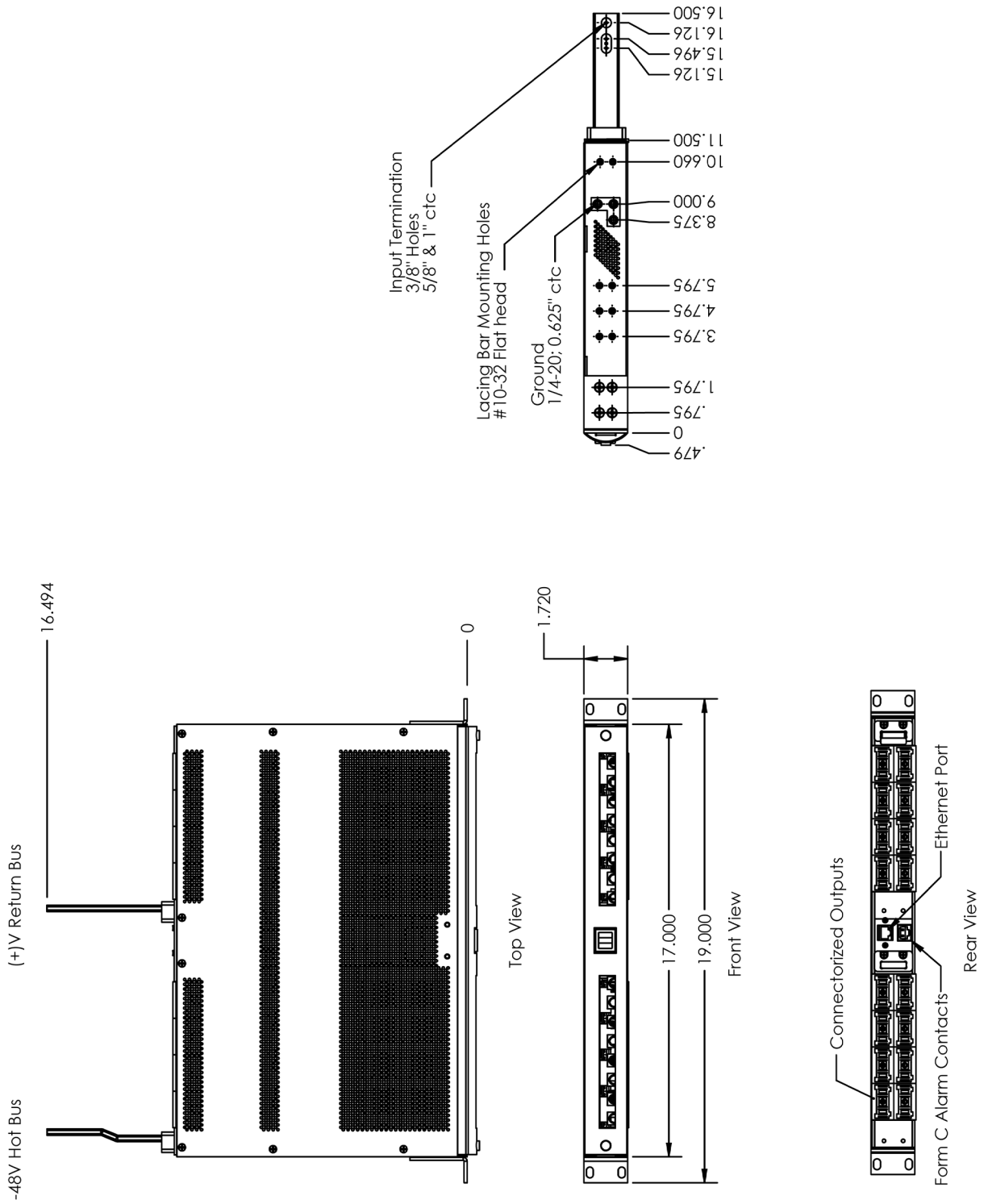
DESCRIPTION	PART NUMBER
2A Slimline Circuit Breaker	C470-711-10
3A Slimline Circuit Breaker	C470-700-10
5A Slimline Circuit Breaker	C470-701-10
10A Slimline Circuit Breaker	C470-702-10
20A Slimline Circuit Breaker	C470-703-10
30A Slimline Circuit Breaker	C470-704-10
40A Slimline Circuit Breaker	C470-705-10
50A Slimline Circuit Breaker	C470-706-10
60A Slimline Circuit Breaker	C470-707-10
70A Slimline Circuit Breaker	C470-728-10
80A Slimline Circuit Breaker	C470-729-10
100A Slimline Circuit Breaker	C470-730-10

**Table 12. Connectorized Cable Assemblies**

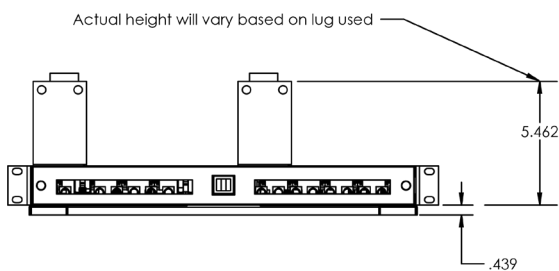
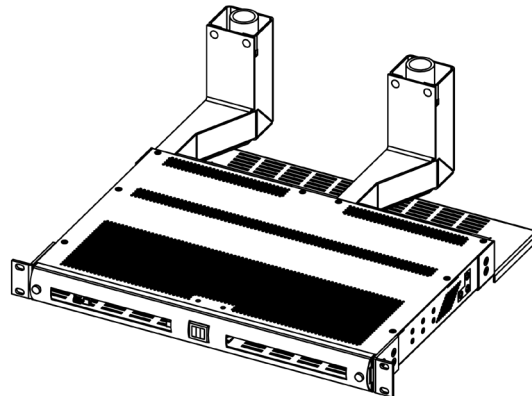
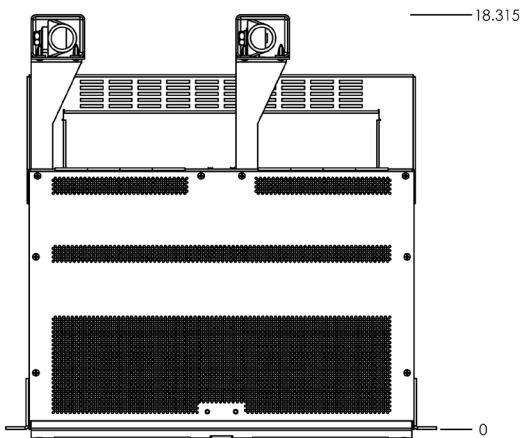
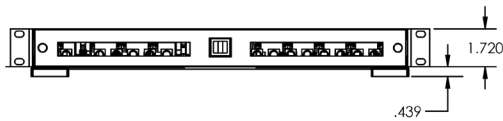
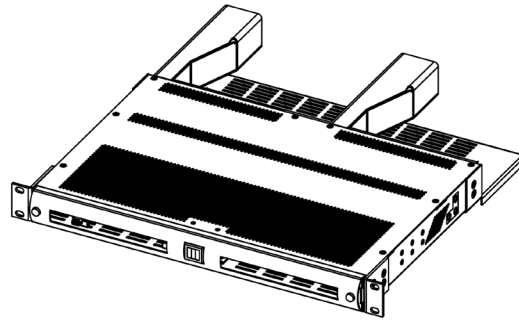
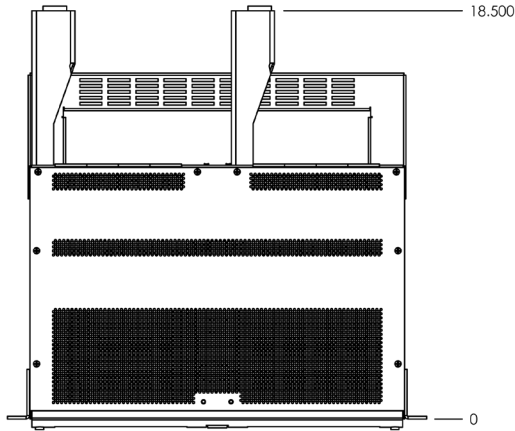
AWG	LENGTH	COLOR	PART NUMBER
#6	7'	Red/Black	C745-400-10
		Blue/Black	C745-461-10
		Red/Red Tracer	C745-263-10
		Blue/Blue Tracer	C745-264-10
	12'	Red/Black	C745-377-10
		Blue/Black	C745-382-10
		Red/Red Tracer	C745-235-10
		Blue/Blue Tracer	C745-236-10
#8	7'	Red/Black	C745-401-10
		Blue/Black	C745-407-10
		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

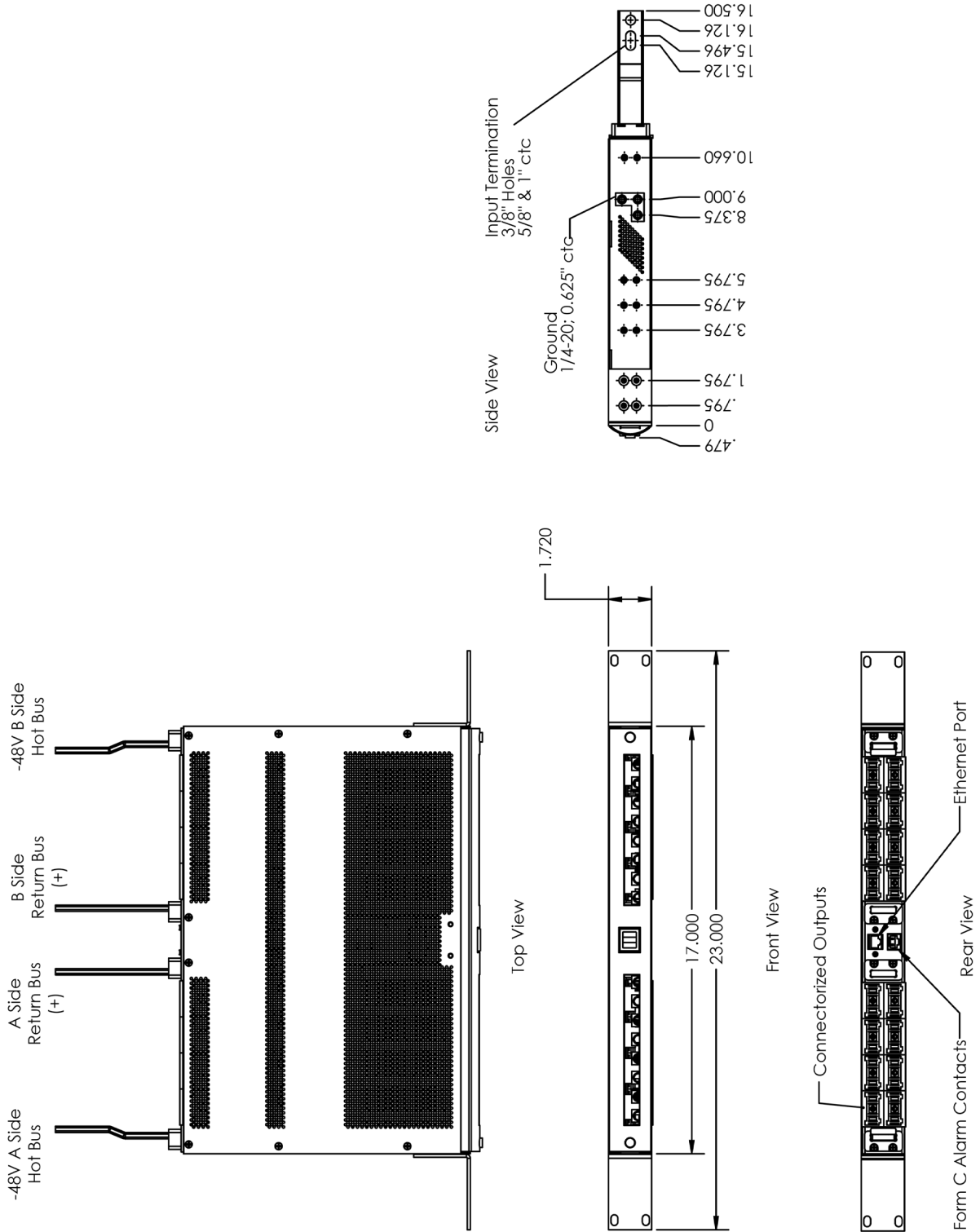
## A.1 Single-Input Matrix C16 (C016-1621-10) w/o Safety Shields



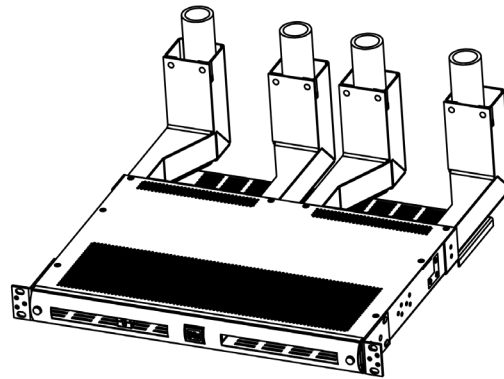
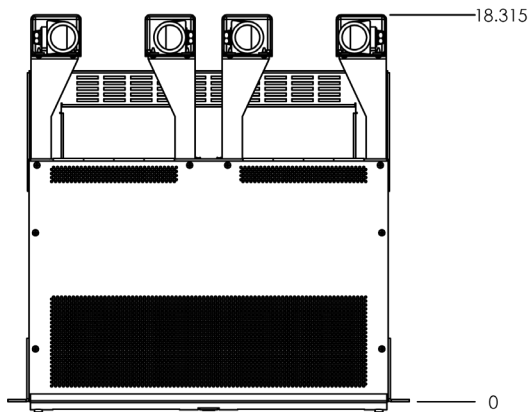
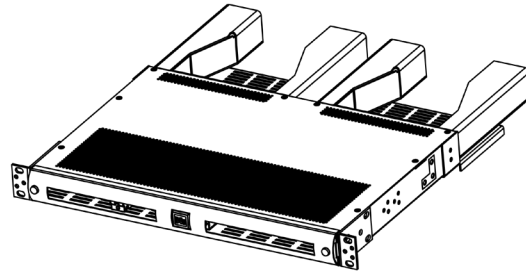
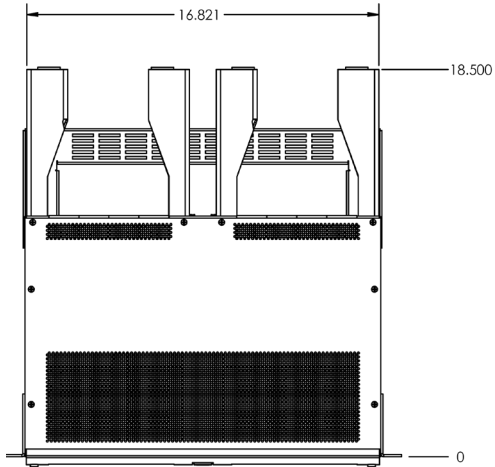
## A.2 Single-Input Matrix C16 (C016-1621-10) w/ Straight and 90 Degree Safety Shields



# A.3 Dual-Input Matrix C16 (C016-1622-10) w/o Safety Shields



## A.4 Dual-Input Matrix C16 (C016-1622-10) w/Straight and 90 Degree Safety Shields



Total height may vary based on lug used





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**Alpha Technologies Services, Inc. | 3767 Alpha Way, Bellingham, WA 98226, USA**

Tel.: Toll Free North America: +1 800 322 5742 | Outside US: +1 360 647 2360 | Technical Support: +1 800 863 3364

For more information visit our website at: [www.alpha.com](http://www.alpha.com)

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