

## LPS INTRODUCTION

**LPS** is Emerson Network Power's next generation power platform. Its high-degree of integration and revolutionary design pack unparalleled capacity and features into a small footprint. Key features and benefits include:

- A patented internal bus work that improves AC and DC cable routing options.
- A modular distribution design that includes built-in monitoring for both fuses and breakers.
- An integrated DC bus that eliminates costly overhead busses and eases plant expansion.
- An integrated **LMS**<sup>1</sup> design that simplifies monitoring of external equipment.
- A controller with a backplane that accepts plug-in MCA alarm cards, MCA I/O cards, and LMS I/O cards.

## LPS48E1 OVERVIEW

**LPS48E1** is a –48VDC digital power plant that operates with 200 Amp Power Conversion Units (PCUs). Two input options are currently available: 480VAC and 208/240VAC.

Each bay provides power conversion and distribution – up to ten PCUs (2000A total) along with 2400A of distribution. Larger plants up to 10,000A are created by adding secondary bays.

The heart of this system is the **LPS200E50** (480VAC) or **LPS200D50** (208/240VAC) PCU. A true three-phase three-wire rectifier, the unit operates at 0.998 power factor and with less than 5% THD. It can deliver 110% of rated current up to 40°C, and a reduced amount up to 80°C by virtue of its thermal current limit feature. Designed for positive ground applications, the normal output voltage ranges from 47 to 58 volts, with a test voltage adjustable down to 45 volts.

AC service is wired individually to each PCU. A horizontal terminal strip is located on the left top of the bay. An optional Power Distribution Service Cabinet (**PDSC**) bolted to the left side of the bay facilitates wiring in one or two AC branch circuit applications.

Distribution is divided into two rows, top and bottom. Each row has a flexible design that accommodates breakers and fuses, up to a 1200 amps maximum. There can be up to 24 (3-100A) breakers/fuses or up to 12 (100-800A) devices, or a combination. Elements of 100A and greater include a shunt for monitoring by the meter, control and alarm (**MCA**) panel.

The MCA provides a multi-line vacuum fluorescent display. It also consists of a removable CPU, alarm cards, and optional input/output (I/O) cards. These are located in a shelf below the distribution. The shelf is dual-purpose and also accepts an LMS CPU for modem and Ethernet access, plus LMS I/O cards for other monitoring points.

As a system, the MCA controls the steady state output voltage to within 0.05% of any setting, from no load to full load. The MCA also uses a patented algorithm to balance the PCU output currents to within 1% of their rated current.



<sup>1</sup> LMS is Emerson Network Power's newest monitor featuring a distributed I/O architecture, an Ethernet port, and Web pages.

[Home](#)

Family:	LPS
Spec. No.:	582140000
Model:	LPS48E1
Output Voltage:	-48 Volts DC
Output Capacity:	
per System (five Power/Distribution Bays):	10,000 Amperes, maximum
per Power/Distribution Bay	2400 Amperes, maximum
per Distribution Row (two Distribution Rows per Power/Distribution Bay):	1200 Amperes
per PCU:	200A / -48V
Agency Approval:	<a href="#">Listed UL 1801</a> , <a href="#">NEBS</a>
Framework Type:	Seismic Rated (Zone 4) Box Framework (Seismic rated through design verification and analysis only. Test results pending.)
Mounting Width:	24 Inches, plus 10 inches if PDSC used
Mounting Depth:	30 Inches
Mounting Height:	84 Inches
Access:	Single Bay Plants: Front Access for Installation, Maintenance, and Operation.  Multi-Bay Plants: Front and Rear Access for Installation and Maintenance, Front for Operation.
Secondary Bay(s) Available:	Nine
Control:	Microprocessor
Color:	Silver (Lorain Spec. M500-142)
Options:	<a href="#">480VAC Input Option</a> , <a href="#">208/240VAC Input Option</a> , <a href="#">Primary Bay (cannot be used with bolt-on PDSC [AC Input 'Power Distribution Service Cabinet'])</a> , <a href="#">Primary Bay (must be used with bolt-on PDSC [AC Input 'Power Distribution Service Cabinet'])</a> , <a href="#">Secondary Bay (cannot be used with bolt-on PDSC [AC Input 'Power Distribution Service Cabinet'])</a> , <a href="#">Secondary Bay (must be used with bolt-on PDSC [AC Input 'Power Distribution Service Cabinet'])</a> , <a href="#">480VAC Input PCU</a> , <a href="#">208/240VAC Input PCU</a> , <a href="#">480VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet') (22kA interrupting capacity)</a> , <a href="#">480VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet') (65kA interrupting capacity)</a> , <a href="#">208/240VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet') (65kA interrupting capacity)</a> , <a href="#">Surge Suppression Option for 480VAC Input PDSC</a> , <a href="#">Surge Suppression Option for 208/240VAC Input PDSC</a> , <a href="#">Optional LMS Monitor</a> (Refer to SAG586505000 for additional LMS options.), <a href="#">MCA Customer Alarm Relay Card</a> , <a href="#">MCA Analog Input/Output and Binary Input Circuit Card</a> , <a href="#">MCA Binary Input Circuit Card</a>

[Home](#)

Accessories: [Distribution Devices](#), [Internal Ground Busbar Assembly](#),  
[External Top-Mount Battery Input Busbar Assembly](#), [Busbar  
Shield Kit](#), [External Top-Mount Ground \(Load Return\) Busbar  
Assemblies](#), [Load Return Lug Extension Busbar Assembly](#), [Battery  
Charge Temperature Compensation Probe](#), [Replacement MCA  
Network Cable](#), [Replacement LMS Network Cable](#), [Replacement  
Circuit Cards](#),

Environment: [0°C to +40°C \(+32°F to +104°F\)](#)

[Home](#)

**582140000  
Primary  
Power/Distribution  
Bay**

[List 30](#): Optional  
480 VAC  
Input Bolt-On  
PDSC  
(22kAIC)

[List 31](#): Optional  
480 VAC  
Input Bolt-On  
PDSC  
(65kAIC)

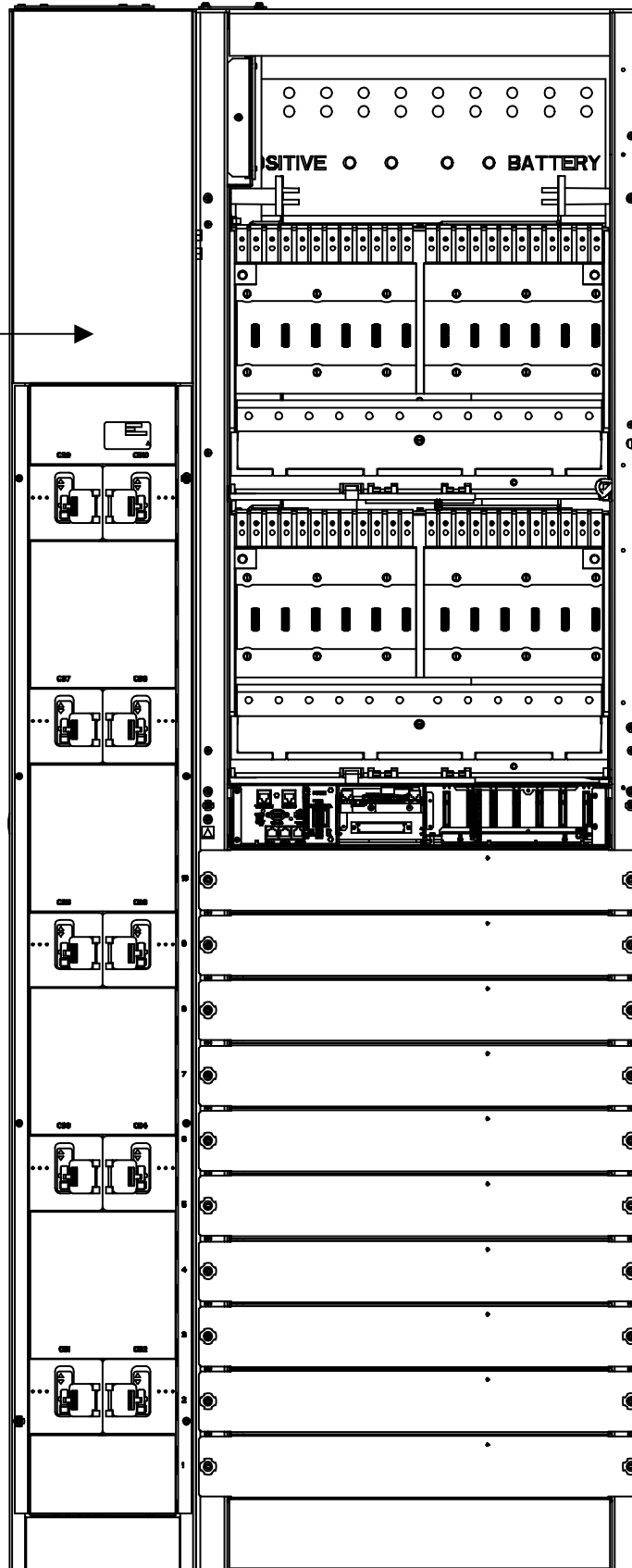
[List 32](#): Optional  
208/240 VAC  
Input Bolt-On  
PDSC  
(65kAIC)

[List 35](#): Surge  
Suppression  
Option  
(480 VAC  
Input PDSC)

[List 36](#): Surge  
Suppression  
Option  
(208/240 VAC  
Input PDSC)

[List 1](#): Primary  
Power/Distribution  
Bay (e/w Individual  
PCU Feed AC  
Input Termination  
Panel)

[List 2](#): Primary  
Power/Distribution  
Bay (for use with  
optional bolt-on  
PDSC)



[List A](#): 480VAC Plant  
Input

[List B](#): 208/240VAC  
Plant Input

Distribution Row  
(see [Distribution  
Devices](#) in  
*ACCESSORY  
INFORMATION*  
Section for  
distribution  
options)

Distribution Row  
(see [Distribution  
Devices](#) in  
*ACCESSORY  
INFORMATION*  
Section for  
distribution  
options)

(see [Monitor/Control  
Diagram](#))

[List 20](#): PCU  
(480VAC  
Input)

[List 21](#): PCU  
(208/240VAC  
Input)

[Home](#)

**582140000  
 Secondary  
 Power/Distribution  
 Bay**

[List 30](#): Optional  
 480 VAC  
 Input Bolt-On  
 PDSC  
 (22kAIC)

[List 31](#): Optional  
 480 VAC  
 Input Bolt-On  
 PDSC  
 (65kAIC)

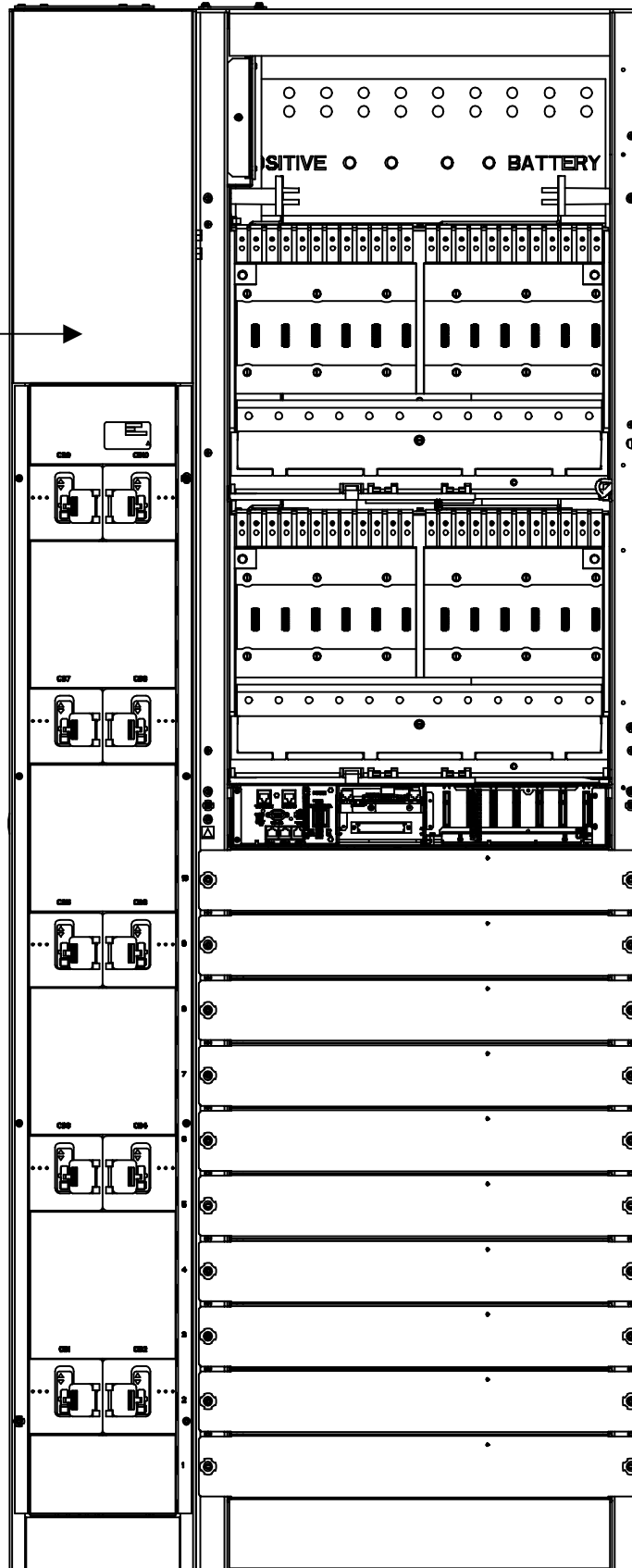
[List 32](#): Optional  
 208/240 VAC  
 Input Bolt-On  
 PDSC  
 (65kAIC)

[List 35](#): Surge  
 Suppression  
 Option  
 (480 VAC  
 Input PDSC)

[List 36](#): Surge  
 Suppression  
 Option  
 (208/240 VAC  
 Input PDSC)

[List 11](#): Secondary  
 Power/Distribution  
 Bay (e/w Individual  
 PCU Feed AC Input  
 Termination Panel)

[List 12](#): Secondary  
 Power/Distribution  
 Bay (for use with  
 optional bolt-on  
 PDSC)



[List A](#): 480VAC Plant  
 Input

[List B](#): 208/240VAC  
 Plant Input

Distribution Row  
 (see [Distribution  
 Devices](#) in  
 ACCESSORY  
 INFORMATION  
 Section for  
 distribution  
 options)

Distribution Row  
 (see [Distribution  
 Devices](#) in  
 ACCESSORY  
 INFORMATION  
 Section for  
 distribution  
 options)

(see [Monitor/Control  
 Diagram](#))

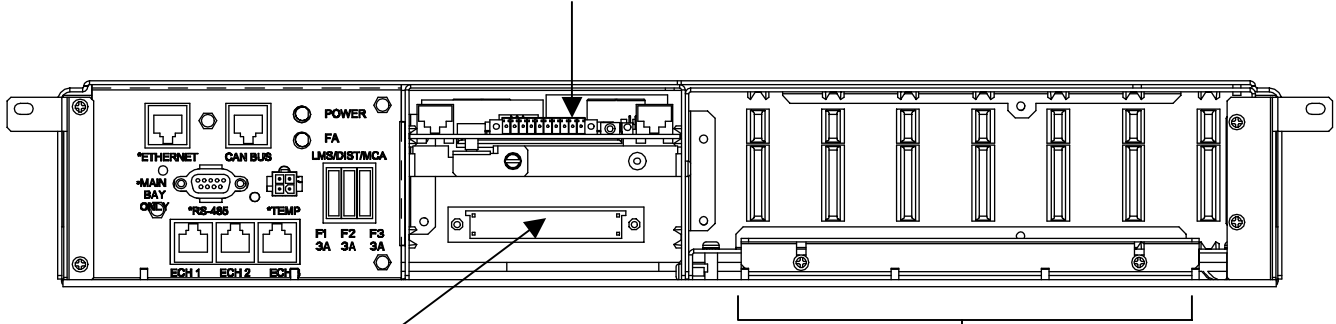
[List 20](#): PCU  
 (480VAC  
 Input)

[List 21](#): PCU  
 (208/240VAC  
 Input)

## 582140000 Monitor/Control Diagram

P/O List [1](#) and [2](#): MCA Circuit Card  
(Primary Bay)

P/O List [11](#) and [12](#): ROUTER Circuit Card  
(Secondary Bay)



[List 50](#): Optional LMS Monitor

Refer to SAG586505000  
for additional LMS options.

### **Available MCA Input/Output (I/O) Circuit Cards**

[List 70](#): MCA Customer Alarm  
Relay Circuit Card (Six [6]  
Form-C Contacts)

[List 71](#): MCA Analog Input/Output  
and Binary Input Circuit Card

[List 72](#): MCA Binary Input Circuit  
Card

See *ACCESSORY INFORMATION*  
Section for...

[Internal Ground Busbar Assembly](#)

[External Top-Mount Battery Input  
Busbar Assembly](#)

[Busbar Shield Kit](#)

[External Top-Mount Ground \(Load  
Return\) Busbar Assemblies](#)

[Load Return Lug Extension Busbar  
Assembly](#)

[Battery Charge Temperature  
Compensation Probe](#)

### **SEE ALSO**

[System Overview](#)

[Table of Contents](#)

[List Information](#)

[Accessory Information](#)

[List of Parts](#)

[Specifications](#)

[Physical Size Information](#)

[Related Documentation](#)

**TABLE OF CONTENTS**

<a href="#">System Overview</a>	<a href="#">Picture</a>	<a href="#">List Information</a>	<a href="#">Accessory Information</a>	<a href="#">List of Parts</a>	<a href="#">Specifications</a>	<a href="#">Physical Size Information</a>	<a href="#">Related Documentation</a>
<b>LPS INTRODUCTION</b>							<b>1</b>
<b>LPS48E1 OVERVIEW</b>							<b>1</b>
<b>582140000 Primary Power/Distribution Bay</b>							<b>4</b>
<b>582140000 Secondary Power/Distribution Bay</b>							<b>5</b>
<b>582140000 Monitor/Control Diagram</b>							<b>6</b>
<b>TABLE OF CONTENTS</b>							<b>7</b>
<b>LIST INFORMATION</b>							<b>9</b>
<b>List Structure</b>							<b>9</b>
Power System List Options							9
Distribution Options							10
See also the following located in this document							11
<b>List Descriptions</b>							<b>12</b>
List A: 480VAC Plant Input Voltage							12
List B: 208/240VAC Plant Input Voltage							12
List 1: Primary Power/Distribution Bay (Common Equipment)							12
List 2: Primary Power/Distribution Bay (Common Equipment)							13
List 11: Secondary Power/Distribution Bay (Common Equipment)							14
List 12: Secondary Power/Distribution Bay (Common Equipment)							15
List 20: PCU (480VAC Input)							16
List 21: PCU (208/240VAC Input)							16
List 30: Optional 480VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet')							16
List 31: Optional 480VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet')							17
List 32: Optional 208/240VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet')							17
List 35: Surge Suppression for 480VAC Input PDSC							17
List 36: Surge Suppression for 208/240VAC Input PDSC							18
List 50: Optional LMS Monitor							18
List 70: Additional MCA Six (6) Output Form-C Relay Circuit Card							19
List 71: MCA I/O Circuit Card P/N 524550							19
List 72: MCA I/O Circuit Card P/N 524551							19
<b>ACCESSORY INFORMATION</b>							<b>21</b>
<b>Distribution Devices</b>							<b>21</b>
218 Circuit Breaker Assemblies							23
TPL Fuses and Fuseholder Assemblies							25
Bullet Nose-Type Circuit Breakers and Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly							27
TLS/TPS Fuses, Bullet Nose-Type Fuseholders, and Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly							29
Replacement Alarm, Reference, and Control Fuses							32
<b>Optional Internal Ground Busbars</b>							<b>32</b>
<b>Optional External Top-Mount Horizontal Battery Input Busbar Assembly</b>							<b>34</b>
<b>Optional Busbar Shield Kit</b>							<b>34</b>
<b>Optional External Top-Mount Ground (Load Return) Busbar Assemblies</b>							<b>34</b>
<b>Optional Load Return Lug Extension Busbar Assembly</b>							<b>35</b>
<b>Recommended Wire Sizes, Branch Circuit Protection, and Lugs</b>							<b>43</b>
Distribution (Load) Wire Sizes and Lugs							43

---

Battery Wire Sizes and Lugs.....	47
Bay Frame Grounding Wire Sizes and Lugs.....	49
AC Input (Individual PCU Feeds) Wire Sizes, Branch Circuit Protection, and Lugs.....	50
AC Input (Dual PCU Feeds) Wire Sizes, Branch Circuit Protection, and Lugs.....	52
AC Input (Single PCU Feed) Wire Sizes, Branch Circuit Protection, and Lugs.....	54
External Alarm, Reference, and Control Wire Sizes.....	56
<b>Optional Battery Charge Temperature Compensation Probe for Digital Compensation.....</b>	<b>57</b>
<b>Replacement/Additional MCA Network Cable.....</b>	<b>58</b>
<b>Replacement/Additional LMS Network Cable.....</b>	<b>58</b>
<b>Replacement Circuit Cards.....</b>	<b>58</b>
<b>LIST OF PARTS.....</b>	<b>59</b>
<b>SPECIFICATIONS.....</b>	<b>63</b>
<b>1. System.....</b>	<b>63</b>
1.1 Environmental Ratings.....	63
1.2 Compliance Information.....	64
1.3 Local Controls and Indicators.....	64
<b>2. DC Distribution.....</b>	<b>64</b>
2.1 Ratings.....	64
2.2 Local Controls and Indicators.....	64
<b>3. PCU.....</b>	<b>65</b>
3.1 Output Ratings.....	65
3.2 Input Ratings (480VAC – List 20).....	66
3.3 Input Ratings (208/240VAC – List 21).....	68
3.4 Standard Features.....	71
<b>4. MCA.....</b>	<b>75</b>
4.1 Standard Features.....	75
<b>5. Optional LMS Monitoring System.....</b>	<b>85</b>
<b>PHYSICAL SIZE INFORMATION.....</b>	<b>86</b>
<b>Primary and Secondary Bays Floor Hole Drilling Pattern Dimensions.....</b>	<b>86</b>
<b>Overall Dimensions - Primary and Secondary Power/Distribution Bays.....</b>	<b>87</b>
<b>Overall Dimensions – Optional PDSC (AC Input 'Power Distribution Service Cabinet').....</b>	<b>88</b>
<b>Overall Dimensions – Optional Battery Charge Digital Temperature Compensation Probes P/N 107021 (25 feet) and P/N 106824 (100 feet).....</b>	<b>89</b>
<b>RELATED DOCUMENTATION.....</b>	<b>90</b>
<b>APPENDIX (A RECORD OF CHANGES MADE TO THIS DOCUMENT).....</b>	<b>91</b>



[Home](#)

## LIST INFORMATION

### List Structure

When viewing electronically, click on the *List #* to jump to the detailed description page.

### Power System List Options

List #	Part Number	Description
<a href="#">A</a>	5821400000A	Specifies 480VAC Plant Input.
<a href="#">B</a>	5821400000B	Specifies 208/240VAC Plant Input.
<a href="#">1</a>	58214000001	Common Equipment for one (1) 2000 Ampere <b>Primary</b> Power/Distribution Bay Mounted in a 7'0"H x 24"W x 30"D Box Framework. <b>E/W</b> Individual PCU Feed AC Input Termination Panel.
<a href="#">2</a>	58214000002	Common Equipment for one (1) 2000 Ampere <b>Primary</b> Power/Distribution Bay Mounted in a 7'0"H x 24"W x 30"D Box Framework. <b>For use with</b> bolt-on PDSC (AC Input 'Power Distribution Service Cabinet') (List 30, List 31, or List 32).
<a href="#">11</a>	58214000011	Common Equipment for one (1) 2000 Ampere <b>Secondary</b> Power/Distribution Bay Mounted in a 7'0"H x 24"W x 30"D Box Framework. <b>E/W</b> Individual PCU Feed AC Input Termination Panel.
<a href="#">12</a>	58214000012	Common Equipment for one (1) 2000 Ampere <b>Secondary</b> Power/Distribution Bay Mounted in a 7'0"H x 24"W x 30"D Box Framework. <b>For use with</b> bolt-on PDSC (AC Input 'Power Distribution Service Cabinet') (List 30, List 31, or List 32).
<a href="#">20</a>	58214000020	200 Ampere / -48 Volt Power Conversion Unit (PCU) (480VAC Input).
<a href="#">21</a>	58214000021	200 Ampere / -48 Volt Power Conversion Unit (PCU) (208/240VAC Input).
<a href="#">30</a>	58214000030	Optional Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet'). (480VAC Input) (22kA interrupting capacity). For use with List 2 and List 12.
<a href="#">31</a>	58214000031	Optional Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet'). (480VAC Input) (65kA interrupting capacity). For use with List 2 and List 12.
<a href="#">32</a>	58214000032	Optional Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet'). (208/240VAC Input) (65kA interrupting capacity). For use with List 2 and List 12.
<a href="#">35</a>	58214000035	Surge Suppression (480VAC Input PDSC). For use with List 30 and List 31.
<a href="#">36</a>	58214000036	Surge Suppression (208/240VAC Input PDSC). For use with List 32.
<a href="#">50</a>	58214000050	Optional LMS Monitor
<a href="#">70</a>	58214000070	Optional MCA Customer Alarm Relay Circuit Card (6 Form-C Contacts)
<a href="#">71</a>	58214000071	Optional MCA Analog Input/Output and Binary Input Circuit Card
<a href="#">72</a>	58214000072	Optional MCA Binary Input Circuit Card
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Battery Charge Temperature Compensation Probe</a>

[Home](#)

List #	Part Number	Description
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Replacement/Additional MCA Network Cables</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Replacement/Additional LMS Network Cables</a>

**Distribution Options**

List #	Part Number	Description
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">218 Circuit Breaker Assemblies</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">TPL Fuses and Fuseholder Assemblies</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Bullet-Nose Type Circuit Breakers and Bullet-Nose Type Circuit Breaker/Fuseholder Mounting Assemblies</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">TLS/TPS Fuses, Bullet Nose-Type Fuseholders, and Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assemblies</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Internal Ground Busbar Assembly</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">External Top-Mount Battery Input Busbar Assembly</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Busbar Shield Kit</a>
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">External Top-Mount Ground (Load Return) Busbar Assemblies</a>

[Home](#)

List #	Part Number	Description
--	Order by Part Number (see <i>Accessory Information Section</i> )	<a href="#">Load Return Lug Extension Busbar Assembly</a>

**See also the following located in this document**

- [System Overview](#)
- [Table of Contents](#)
- [Accessory Information](#)
- [List of Parts](#)
- [Specifications](#)
- [Physical Size Information](#)
- [Related Documentation](#)

## List Descriptions

### List A: 480VAC Plant Input Voltage

#### Features

- ◆ Specifies 480VAC Plant Input Voltage.

### List B: 208/240VAC Plant Input Voltage

#### Features

- ◆ Specifies 208/240VAC Plant Input Voltage.

### List 1: Primary Power/Distribution Bay (Common Equipment)

[List of Parts](#)

#### Features

- ◆ Provides common equipment for one (1) "power and distribution" bay rated for up to 2400 amperes.
- ◆ Mounted in a 7'0"H x 24"W x 30"D box framework.
- ◆ Provides ten (10) PCU mounting positions.
- ◆ Provides an AC input termination panel that accepts ten (10) AC input branch circuits, one (1) per PCU mounting position.
- ◆ Provides forty-eight (48) distribution device mounting positions.
- ◆ Provides two (2) rows of distribution. Each row contains an MCA monitoring circuit card; which can be set for no group designation, Group A designation, or Group B designation.
- ◆ Provides the MCA Assembly and Local MCA Control Panel.
- ◆ Provides mounting for optional LMS Main CPU circuit card.
- ◆ Provides a seven-slot card cage for mounting MCA customer alarm relay circuit cards, MCA I/O circuit cards, and/or optional LMS I/O circuit cards. Two (2) MCA customer alarm relay circuit cards provided.
- ◆ Expandable either left or right.

#### Restrictions

Only one (1) Primary Bay per power system required.

#### Ordering Notes

- 1) Specify [List A](#) (480VAC Input) or [List B](#) (208/240VAC Input).
- 2) Order PCUs as required per [List 20](#) (480VAC Input) or [List 21](#) (208/240VAC Input).
- 3) Order distribution fuse and/or circuit breaker devices as required per [Distribution Devices](#) in the *ACCESSORY INFORMATION* section.
- 4) Order additional MCA customer alarm relay circuit card(s) as required per [List 70](#), and optional MCA I/O circuit cards per [List 71](#) and [List 72](#).
- 5) Order a Battery Charge Temperature Compensation Probe as required per [Battery Charge Temperature Compensation Probe for Digital Compensation](#) in the *ACCESSORY INFORMATION* section.
- 6) Order optional LMS Monitor and LMS options as required per [List 50](#).
- 7) Order load distribution lugs as required per [Distribution \(Load\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.

[Home](#)

- 8) Order battery (input) lugs as required per [Battery Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 9) Order AC input lugs as required per [AC Input \(Individual PCU Feeds\) Wire Sizes and Lugs](#), [AC Input \(Dual PCU Feeds\) Wire Sizes and Lugs](#), or [AC Input \(Single PCU Feed\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 10) Order bay grounding lugs as required per [Bay Frame Grounding Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 11) Order internal ground busbar assembly, external top-mount battery input busbar assembly, busbar shield kit, external top-mount ground (load return) busbar assembly, and/or load return lug extension busbar assembly as required per the appropriate sections located under [ACCESSORY INFORMATION](#).

## **List 2: Primary Power/Distribution Bay (Common Equipment)**

[List of Parts](#)

### **Features**

- ◆ Provides common equipment for one (1) "power and distribution" bay rated for up to 2400 amperes.
- ◆ Mounted in a 7'0"H x 24"W x 30"D Box Framework.
- ◆ Provides ten (10) PCU mounting positions.
- ◆ Provides forty-eight (48) distribution device mounting positions.
- ◆ Provides two (2) rows of distribution. Each row contains an MCA monitoring circuit card; which can be set for no group designation, Group A designation, or Group B designation.
- ◆ Provides the MCA Assembly and Local MCA Control Panel.
- ◆ Provides mounting for optional LMS Main CPU circuit card.
- ◆ Provides a seven-slot card cage for mounting MCA customer alarm relay circuit cards, MCA I/O circuit cards, and/or optional LMS I/O circuit cards. Two (2) MCA customer alarm relay circuit cards provided.
- ◆ Expandable either left or right.

### **Restrictions**

Only one (1) Primary Bay per power system required.

Requires [List 30](#) (480VAC Input), [List 31](#) (480VAC Input), or [List 32](#) (208/240VAC Input) Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet').

### **Ordering Notes**

- 1) Specify [List A](#) (480VAC Input) or [List B](#) (208/240VAC Input).
- 2) Order Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet') per [List 30](#) (480VAC Input), [List 31](#) (480VAC Input), or [List 32](#) (208/240VAC Input).
- 3) Order PCUs as required per [List 20](#) (480VAC Input) or [List 21](#) (208/240VAC Input).
- 4) Order distribution fuse and/or circuit breaker devices as required per [Distribution Devices](#) in the *ACCESSORY INFORMATION* section.
- 5) Order additional MCA customer alarm relay circuit card(s) as required per [List 70](#), and optional MCA I/O circuit cards per [List 71](#) and [List 72](#).
- 6) Order a Battery Charge Temperature Compensation Probe as required per [Battery Charge Temperature Compensation Probe for Digital Compensation](#) in the *ACCESSORY INFORMATION* section.
- 7) Order optional LMS Monitor and LMS options as required per [List 50](#).

[Home](#)

- 8) Order load distribution lugs as required per [Distribution \(Load\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 9) Order battery (input) lugs as required per [Battery Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 10) Order AC input lugs as required per [AC Input \(Individual PCU Feeds\) Wire Sizes and Lugs](#), [AC Input \(Dual PCU Feeds\) Wire Sizes and Lugs](#), or [AC Input \(Single PCU Feed\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 11) Order bay grounding lugs as required per [Bay Frame Grounding Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 12) Order internal ground busbar assembly, external top-mount battery input busbar assembly, busbar shield kit, external top-mount ground (load return) busbar assembly, and/or load return lug extension busbar assembly as required per the appropriate sections located under [ACCESSORY INFORMATION](#).

**List 11: Secondary Power/Distribution Bay (Common Equipment)**

[List of Parts](#)

**Features**

- ◆ Provides common equipment for one (1) "power and distribution" bay rated for up to 2400 amperes.
- ◆ Mounted in a 7'0"H x 24"W x 30"D Box Framework.
- ◆ Provides ten (10) PCU mounting positions.
- ◆ Provides an AC input termination panel that accepts ten (10) AC input branch circuits, one (1) per PCU mounting position.
- ◆ Provides forty-eight (48) distribution device mounting positions.
- ◆ Provides two (2) rows of distribution. Each row contains an MCA monitoring circuit card; which can be set for no group designation, Group A designation, or Group B designation.
- ◆ Provides the Router Assembly.
- ◆ Provides mounting for optional LMS Expansion CPU circuit card.
- ◆ Provides a seven-slot card cage for mounting MCA customer alarm relay circuit cards, MCA I/O circuit cards, and/or optional LMS I/O circuit cards.
- ◆ MCA and LMS Network bay interconnect cables provided (Qty. 1 P/N 514642, Qty. 1 P/N 514639).

**Ordering Notes**

- 1) Specify [List A](#) (480VAC Input) or [List B](#) (208/240VAC Input).
- 2) Order PCUs as required per [List 20](#) (480VAC Input) or [List 21](#) (208/240VAC Input).
- 3) Order distribution fuse and/or circuit breaker devices as required per [Distribution Devices](#) in the *ACCESSORY INFORMATION* section.
- 4) Order additional MCA customer alarm relay circuit card(s) as required per [List 70](#), and optional MCA I/O circuit cards per [List 71](#) and [List 72](#).
- 5) Order optional LMS Expansion CPU circuit card as required per [List 50](#). Also order additional LMS Network cables as required per [Replacement/Additional LMS Network Cables](#).
- 6) Order load distribution lugs as required per [Distribution \(Load\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 7) Order battery (input) lugs as required per [Battery Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.

[Home](#)

- 8) Order AC input lugs as required per [AC Input \(Individual PCU Feeds\) Wire Sizes and Lugs](#), [AC Input \(Dual PCU Feeds\) Wire Sizes and Lugs](#), or [AC Input \(Single PCU Feed\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 9) Order bay grounding lugs as required per [Bay Frame Grounding Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 10) Order internal ground busbar assembly, external top-mount battery input busbar assembly, busbar shield kit, external top-mount ground (load return) busbar assembly, and/or load return lug extension busbar assembly as required per the appropriate sections located under [ACCESSORY INFORMATION](#).
- 11) If Secondary Bays are placed on both sides of the Primary Bay, a different length MCA Network cable is required that connects a Secondary Bay on one side with a Secondary Bay on the other side. Order per [Replacement/Additional MCA Network Cables](#). Refer to the Installation Instructions (Section 5876) for bay line-up and MCA Network cabling requirements.
- 12) Side cover panels are provided with Primary Bays. These cover panels are used with Secondary Bays when bays are placed next to each other. In installations where a Secondary Bay is placed by itself, order (1) of each of the following side cover panels per exposed side: P/N 514482 and P/N 514484.

### **List 12: Secondary Power/Distribution Bay (Common Equipment)**

[List of Parts](#)

#### **Features**

- ◆ Provides common equipment for one (1) "power and distribution" bay rated for up to 2400 amperes.
- ◆ Mounted in a 7'0"H x 24"W x 30"D Box Framework.
- ◆ Provides ten (10) PCU mounting positions.
- ◆ Provides forty-eight (48) distribution device mounting positions.
- ◆ Provides two (2) rows of distribution. Each row contains an MCA monitoring circuit card; which can be set for no group designation, Group A designation, or Group B designation.
- ◆ Provides the Router Assembly.
- ◆ Provides mounting for optional LMS Expansion CPU circuit card.
- ◆ Provides a seven-slot card cage for mounting MCA customer alarm relay circuit cards, MCA I/O circuit cards, and/or optional LMS I/O circuit cards.
- ◆ MCA and LMS Network bay interconnect cables provided (Qty. 1 P/N 514643, Qty. 1 P/N 509900).

#### **Restrictions**

Requires [List 30](#) (480VAC Input), [List 31](#) (480VAC Input), or [List 32](#) (208/240VAC Input) Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet').

#### **Ordering Notes**

- 1) Specify [List A](#) (480VAC Input) or [List B](#) (208/240VAC Input).
- 2) Order Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet') per [List 30](#) (480VAC Input), [List 31](#) (480VAC Input), or [List 32](#) (208/240VAC Input).
- 3) Order PCUs as required per [List 20](#) (480VAC Input) or [List 21](#) (208/240VAC Input).
- 4) Order distribution fuse and/or circuit breaker devices as required per [Distribution Devices](#) in the *ACCESSORY INFORMATION* section.
- 5) Order additional MCA customer alarm relay circuit card(s) as required per [List 70](#), and optional MCA I/O circuit cards per [List 71](#) and [List 72](#).



[Home](#)

- 6) Order optional LMS Expansion CPU circuit card as required per [List 50](#). Also order additional LMS Network cables as required per [Replacement/Additional LMS Network Cables](#).
- 7) Order load distribution lugs as required per [Distribution \(Load\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 8) Order battery (input) lugs as required per [Battery Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 9) Order AC input lugs as required per [AC Input \(Individual PCU Feeds\) Wire Sizes and Lugs](#), [AC Input \(Dual PCU Feeds\) Wire Sizes and Lugs](#), or [AC Input \(Single PCU Feed\) Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 10) Order bay grounding lugs as required per [Bay Frame Grounding Wire Sizes and Lugs](#) in the *ACCESSORY INFORMATION* section.
- 11) Order internal ground busbar assembly, external top-mount battery input busbar assembly, busbar shield kit, external top-mount ground (load return) busbar assembly, and/or load return lug extension busbar assembly as required per the appropriate sections located under [ACCESSORY INFORMATION](#).
- 12) If Secondary Bays are placed on both sides of the Primary Bay, a different length MCA Network cable is required that connects a Secondary Bay on one side with a Secondary Bay on the other side. Order per [Replacement/Additional MCA Network Cables](#). Refer to the Installation Instructions (Section 5876) for bay line-up and MCA Network cabling requirements.
- 13) Side cover panels are provided with Primary Bays. These cover panels are used with Secondary Bays when bays are placed next to each other. In installations where a Secondary Bay is placed by itself, order (1) of each of the following side cover panels per exposed side: P/N 514482 and P/N 514484.

**List 20: PCU (480VAC Input)**

[List of Parts](#)

**Features**

- ◆ Consists of one (1) Model LPS200E50 PCU, Spec. No. 486532600.

**Ordering Notes**

- 1) Each Power/Distribution Bay holds up to ten PCUs.

**List 21: PCU (208/240VAC Input)**

[List of Parts](#)

**Features**

- ◆ Consists of one (1) Model LPS200D50 PCU, Spec. No. 486534000.

**Ordering Notes**

- 1) Each Power/Distribution Bay holds up to ten PCUs.

**List 30: Optional 480VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet')**

**Features**

[List of Parts](#)

- ◆ Provides an AC Input Service Cabinet pre-wired to the PCU mounting positions.
- ◆ Provides a 30 ampere AC Input Circuit Breaker rated for 22kA interrupting capacity for each PCU position. Circuit breakers are pad-lockable.
- ◆ Provides terminations for one or two AC input branch circuits.



[Home](#)

### **Ordering Notes**

- 1) Order one (1) List 30, List 31, or List 32 as required for each [List 2](#) or [List 12](#) ordered.
- 2) Order a [List 35](#) if additional surge suppression is required.

### **List 31: Optional 480VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet')**

#### **Features**

[List of Parts](#)

- ◆ Provides an AC Input Service Cabinet pre-wired to the PCU mounting positions.
- ◆ Provides a 30 ampere AC Input Circuit Breaker rated for 65kA interrupting capacity for each PCU position. Circuit breakers are pad-lockable.
- ◆ Provides terminations for one or two AC input branch circuits.

#### **Ordering Notes**

- 1) Order one (1) List 30, List 31, or List 32 as required for each [List 2](#) or [List 12](#) ordered.
- 2) Order a [List 35](#) if additional surge suppression is required.

### **List 32: Optional 208/240VAC Input Bolt-On PDSC (AC Input 'Power Distribution Service Cabinet')**

#### **Features**

[List of Parts](#)

- ◆ Provides an AC Input Service Cabinet pre-wired to the PCU mounting positions.
- ◆ Provides a 60 ampere AC Input Circuit Breaker rated for 65kA interrupting capacity for each PCU position. Circuit breakers are pad-lockable.
- ◆ Provides terminations for one or two AC input branch circuits.

#### **Ordering Notes**

- 1) Order one (1) List 30, List 31, or List 32 as required for each [List 2](#) or [List 12](#) ordered.
- 2) Order a [List 36](#) if additional surge suppression is required.

### **List 35: Surge Suppression for 480VAC Input PDSC** [List of Parts](#)

#### **Features**

- ◆ Provides two (2) surge suppression assemblies for the PDSC. One wired to PCU AC input circuit breakers CB1, CB3, CB5, CB7, and CB9. The other to CB2, CB4, CB6, CB8, and CB10.
- ◆ 100kA interrupting capacity.
- ◆ Overcurrent fusing and thermal protection.

#### **Restrictions**

For use with [List 30](#) or [List 31](#) manufactured after 12/01/04 only.

See [Surge Protection](#) in the SPECIFICATION section for additional ratings.

#### **Ordering Notes**

- 1) Order if additional surge suppression is required.
- 2) A wire harness is factory connected to Form-C relay contacts located on each surge suppression assembly for remote monitoring. Connect the wire harness to the first two binary inputs on an MCA I/O circuit card (separately ordered – See List 71 and 72). The MCA then provides alarm display messages

and an audible alarm when a surge suppression assembly activates. Order a [List 71](#) or [List 72](#) MCA I/O Circuit Card as required to provide MCA binary inputs for the surge suppression alarms.

- 3) Note that two (2) MCA customer alarm relay circuit cards are provided with the primary bay. If remote surge suppression alarm relay contacts are required and you expect to use the alarm relays on the factory provided cards for other uses, order a [List 70](#) MCA relay circuit card as required.

### **List 36: Surge Suppression for 208/240VAC Input PDSC**

[List of Parts](#)

#### **Features**

- ◆ Provides two (2) surge suppression assemblies for the PDSC. One wired to PCU AC input circuit breakers CB1, CB3, CB5, CB7, and CB9. The other to CB2, CB4, CB6, CB8, and CB10.
- ◆ 100kA interrupting capacity.
- ◆ Overcurrent fusing and thermal protection.

#### **Restrictions**

For use with [List 32](#) only.

See [Surge Protection](#) in the SPECIFICATION section for additional ratings.

#### **Ordering Notes**

- 1) Order if additional surge suppression is required.
- 2) A wire harness is factory connected to Form-C relay contacts located on each surge suppression assembly for remote monitoring. Connect the wire harness to the first two binary inputs on an MCA I/O circuit card (separately ordered – See List 71 and 72). The MCA then provides alarm display messages and an audible alarm when a surge suppression assembly activates. Order a [List 71](#) or [List 72](#) MCA I/O Circuit Card as required to provide MCA binary inputs for the surge suppression alarms.
- 3) Note that two (2) MCA customer alarm relay circuit cards are provided with the primary bay. If remote surge suppression alarm relay contacts are required and you expect to use the alarm relays on the factory provided cards for other uses, order a [List 70](#) MCA relay circuit card as required.

### **List 50: Optional LMS Monitor**

[List of Parts](#)

#### **Features**

- ◆ Provides the LMS Monitoring System.
- ◆ Refer to the "[Specifications](#)" section of this document for further information.

#### **Restrictions**

LMS Monitoring System Main CPU card mounted in the Primary Bay only.

LMS Monitoring System Expansion CPU cards mounted in Secondary Bays (required only if LMS I/O circuit cards are to be installed in the same bay).

#### **Ordering Notes**

- 1) Order the optional LMS Monitor if increased monitoring capabilities are required. Order the LMS Main CPU circuit card for the Primary Bay. Order the LMS Expansion CPU circuit card for Secondary Bays that are to be equipped with LMS I/O circuit cards.
- 2) Order additional LMS Network cables as required per [Replacement/Additional LMS Network Cables](#). Note that LMS Network cables are factory provided with Lists 11 and 12.

[Home](#)

- 3) This List option only provides the LMS CPU circuit cards for the bays, additional LMS options must be ordered separately per SAG586505000.

**List 70: Additional MCA Six (6) Output Form-C Relay Circuit Card**

[List of Parts](#)

**Features**

- ◆ Provides six relays each with one set of Form-C relay contacts.
- ◆ These relays are used for alarm applications and can be programmed by the user.
- ◆ Refer to the "[Specifications](#)" section of this document for further information.
- ◆ Plugs into any slot in 7-position card cage in Primary and Secondary Bays.
- ◆ User maps relay closure to any or multiple programmable alarm functions.

**Restrictions**

Relay contacts rated for 2A at 30 volts DC.

The system may contain up to 16 MCA Relay circuit cards.

**Ordering Notes**

- 1) Order one (1) List 70 relay circuit card for every six (6) **customer** relay contacts to be provided by the MCA.

**List 71: MCA I/O Circuit Card P/N 524550**

[List of Parts](#)

**Features**

- ◆ Provides 1 analog input, 1 analog output (for remote plant output current monitoring), and 4 binary inputs.
- ◆ Refer to the "[Specifications](#)" section of this document for further information.
- ◆ Plugs into any slot in 7-position card cage in Primary and Secondary Bays.

**Restrictions**

Analog input and output rating = 0-50mv DC.

Binary input rating = dry contact.

Analog inputs should be protected by a 49.9 ohm resistor.

Recommended to use current limiting resistors to protect binary input wiring.

**Ordering Notes**

- 1) Order optional MCA I/O circuit cards as required.

**List 72: MCA I/O Circuit Card P/N 524551**

[List of Parts](#)

**Features**

- ◆ Provides 4 binary inputs.
- ◆ Refer to the "[Specifications](#)" section of this document for further information.
- ◆ Plugs into any slot in 7-position card cage in Primary and Secondary Bays.

**Restrictions**

Binary input rating = dry contact.

[Home](#)

Recommended to use current limiting resistors to protect binary input wiring.

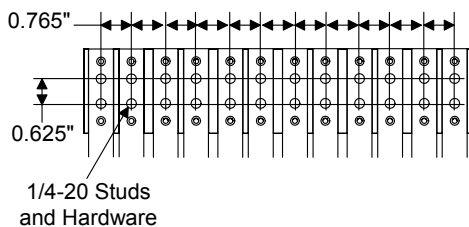
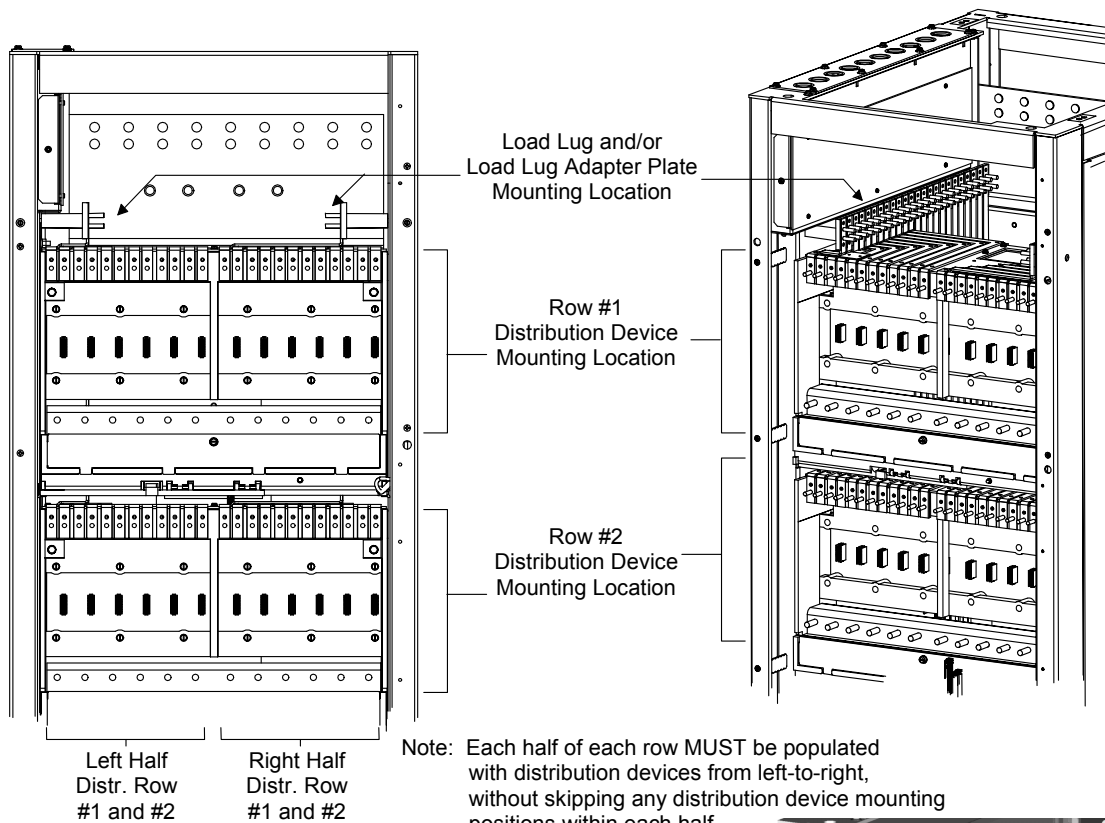
**Ordering Notes**

- 1) Order optional MCA I/O circuit cards as required.

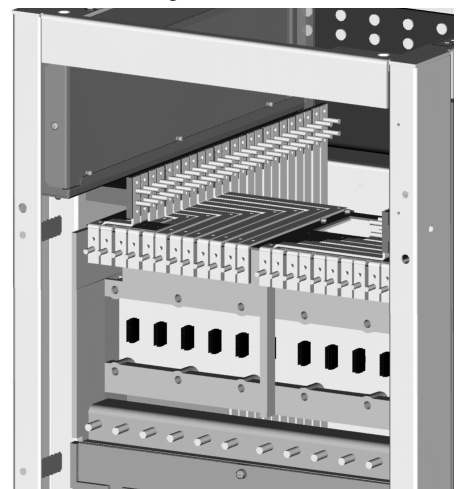
## ACCESSORY INFORMATION

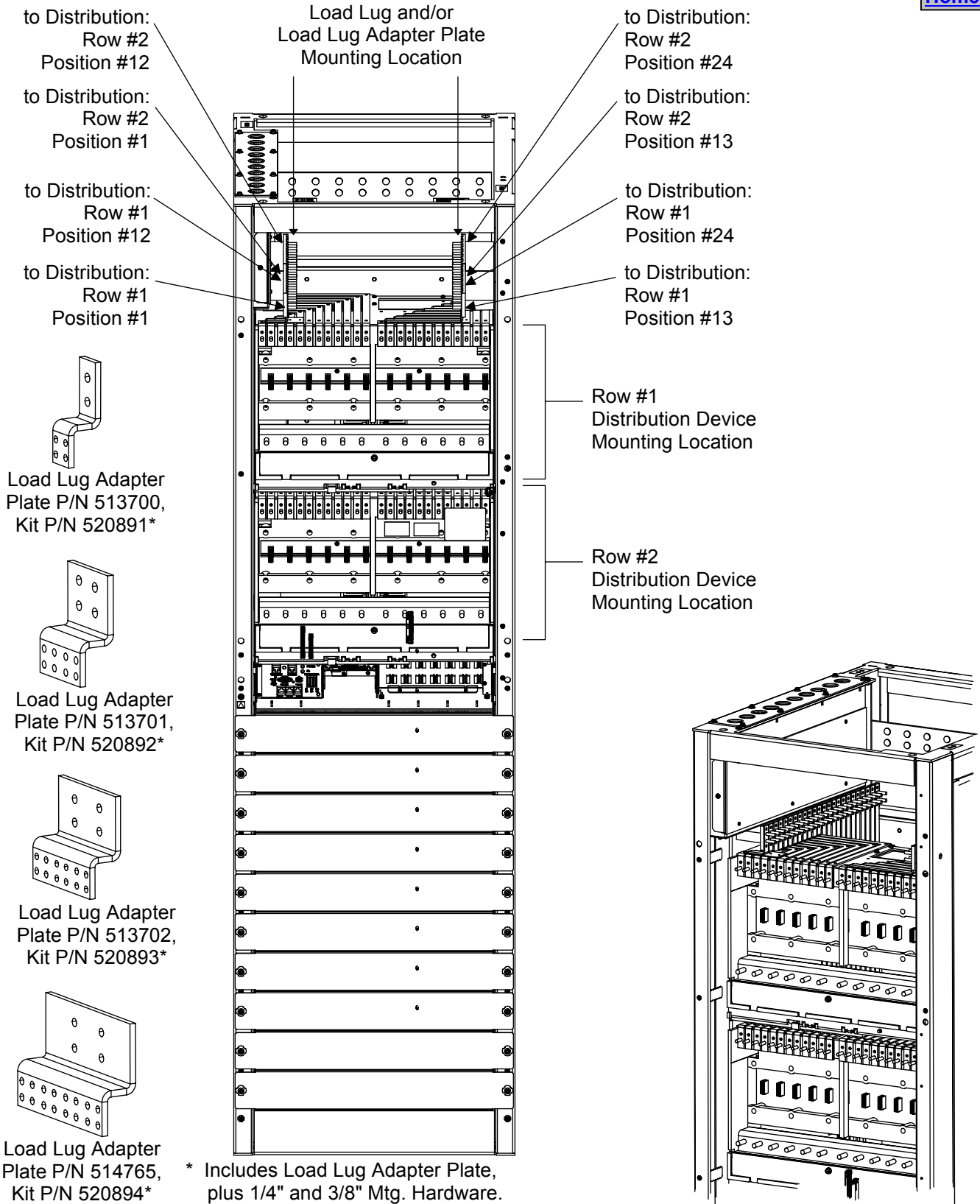
### Distribution Devices

Each bay has two (2) distribution rows. Each distribution row has twenty-four (24) fuse/circuit breaker device mounting positions. Note that the various fuse/circuit breaker devices require different number of mounting positions, as detailed in the following sections. Note also that each distribution row is divided into half, and each half **MUST** be populated with distribution devices from left-to-right, without skipping any distribution device mounting positions within each half. The load side of each fuse/circuit breaker mounting position is bused up to the top of the bay. Each fuse/circuit breaker device is supplied with a load lug adapter plate that mounts to the appropriate load side busbars at the top of the bay (except bullet nose-type devices which use the existing busbars provided at the top of the bay and do not require a lug adapter plate). Load return leads are terminated either inside the bay if equipped with the optional internal ground busbar, or outside the bay if equipped with the optional external ground busbar mounted on top of the bay (see [internal](#) and [external](#) ground busbar accessory options).



Load Lug and/or Load Lug Adapter Plate Mounting Location Dimensions (for load return lug requirements, refer to the internal and external ground bar accessory options)





**218 Circuit Breaker Assemblies**

**Features**

- ◆ Each circuit breaker assembly is equipped with a shunt for MCA load current measurements.
- ◆ Bolts into bay's distribution device mounting positions.
- ◆ Respective load lug adapter plate provided with each circuit breaker assembly. Load lug adapter plate provides 3/8" clearance holes on 1" centers for installation of customer provided two-hole lugs. For load return lug requirements, refer to the [internal](#) and [external](#) ground busbar accessory options.

**Restrictions**

Load should not exceed 80% of device rating.

Refer to Table 1 for required distribution row mounting positions.

Each distribution row is divided into half. Each half MUST be populated with distribution devices from left-to-right, without skipping any distribution device mounting positions within each half.

Maximum size of wire to be connected to a single lug position is 750 kcmil.

Maximum lug width, 1.937 inches.

**Ordering Notes**

- 1) Order circuit breaker assemblies per Table 1.
- 2) For distribution (load) wire size and lug selection, refer to the section titled [Distribution \(Load\) Wire Sizes and Lugs](#) under "Recommended Wire Sizes, Branch Circuit Protection, and Lugs".

Ampere Rating	Required Distribution Row Mounting Positions	Number of Poles	Part Number		for wire size and lug selection, refer to the following table
			Electrical Trip <sup>1</sup> (White Handle)	Electrical/Mechanical Trip <sup>2</sup> (Black Handle)	
100	2	1	513766	513767	<a href="#">Table 7</a>
125	2	1	513768	513769	
150	2	1	513770	513771	
175	2	1	513772	513773	
200	2	1	513774	513775	
225	2	1	513776	513777	
250	2	1	513778	513779	
300	4	2	513780	513781	
350	4	2	513782	513783	
400	4	2	513784	513785	
450	6	3	513786	513787	
500	6	3	513788	513789	
600	6	3	513790	513791	
800	8	4	513792	513793	

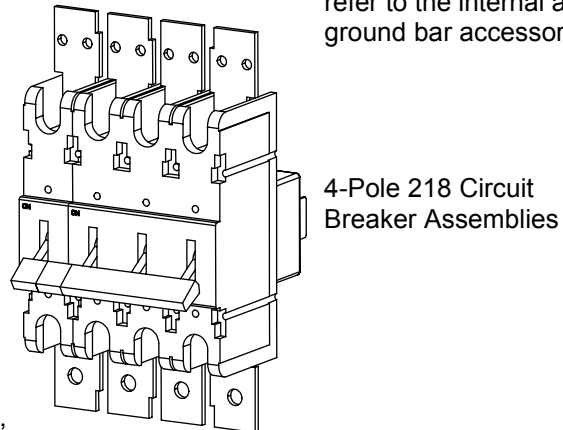
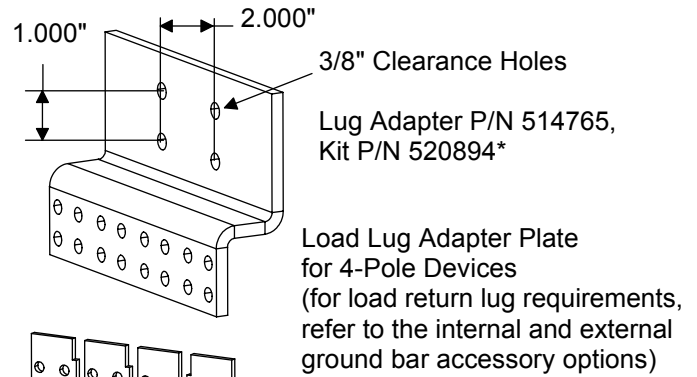
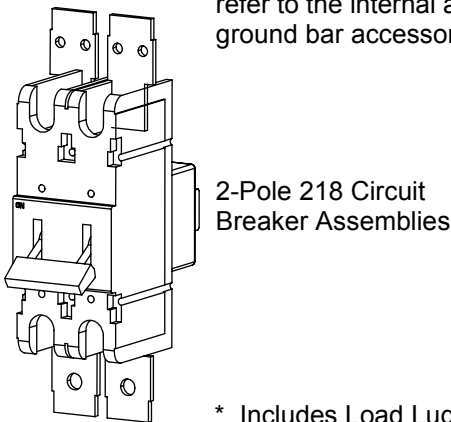
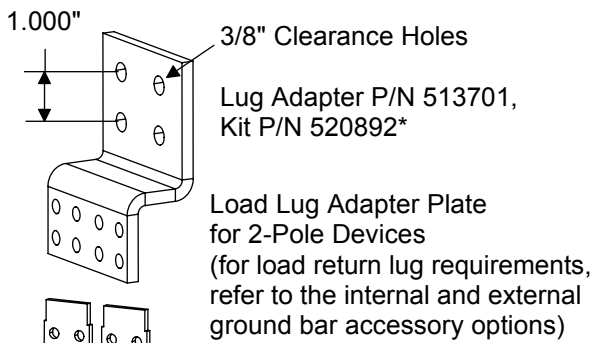
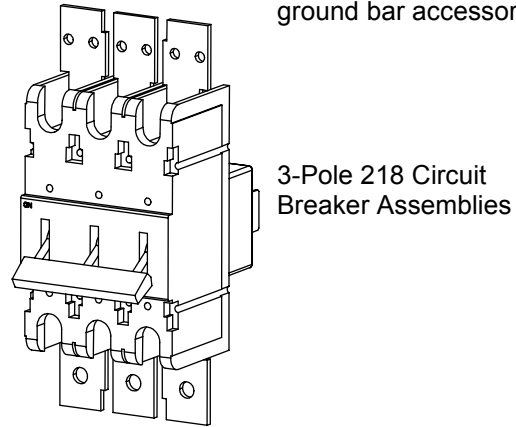
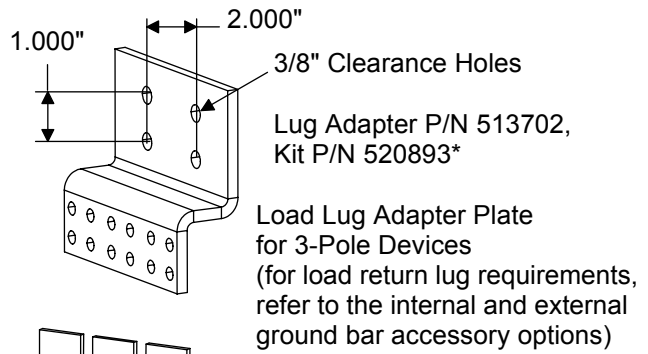
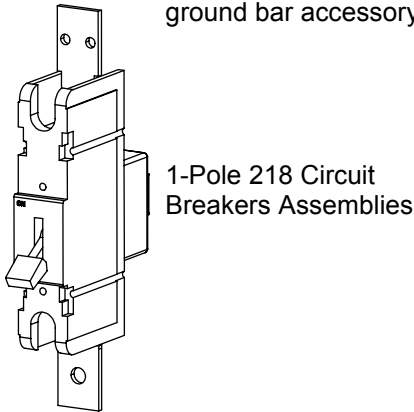
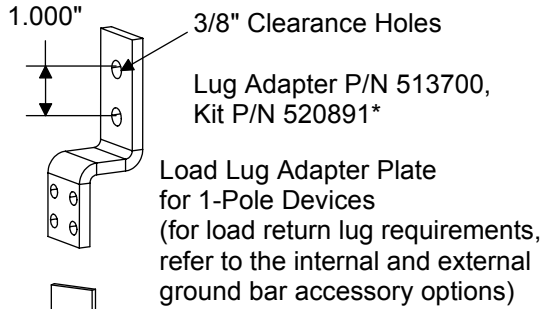
Circuit Breaker Alarm Operation:

<sup>1</sup> Provides an alarm during an electrical trip condition only.

<sup>2</sup> Provides an alarm during an electrical or manual trip condition.

Table 1  
 218 Circuit Breaker Assemblies





\* Includes Load Lug Adapter Plate,  
 plus 1/4" and 3/8" Mtg. Hardware.



[Home](#)

**TPL Fuses and Fuseholder Assemblies**

**Features**

- ◆ Each fuseholder assembly is equipped with a shunt for MCA load current measurements.
- ◆ Bolts into bay's distribution device mounting positions.
- ◆ Respective load lug adapter plate provided with each fuseholder assembly. Load lug adapter plate provides 3/8" clearance holes on 1" centers for installation of customer provided two-hole lugs. For load return lug requirements, refer to the [internal](#) and [external](#) ground busbar accessory options.

**Restrictions**

Load should not exceed 80% of device rating.

Refer to Table 2 for required distribution row mounting positions.

Each distribution row is divided into half. Each half MUST be populated with distribution devices from left-to-right, without skipping any distribution device mounting positions within each half.

Maximum size of wire to be connected to a single lug position is 750 kcmil.

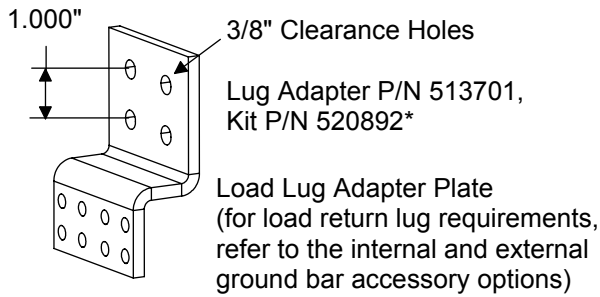
Maximum lug width, 1.937 inches.

**Ordering Notes**

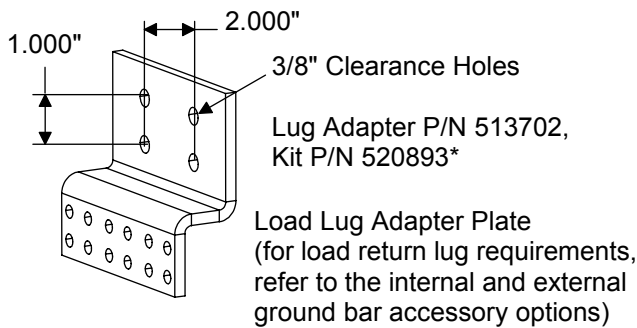
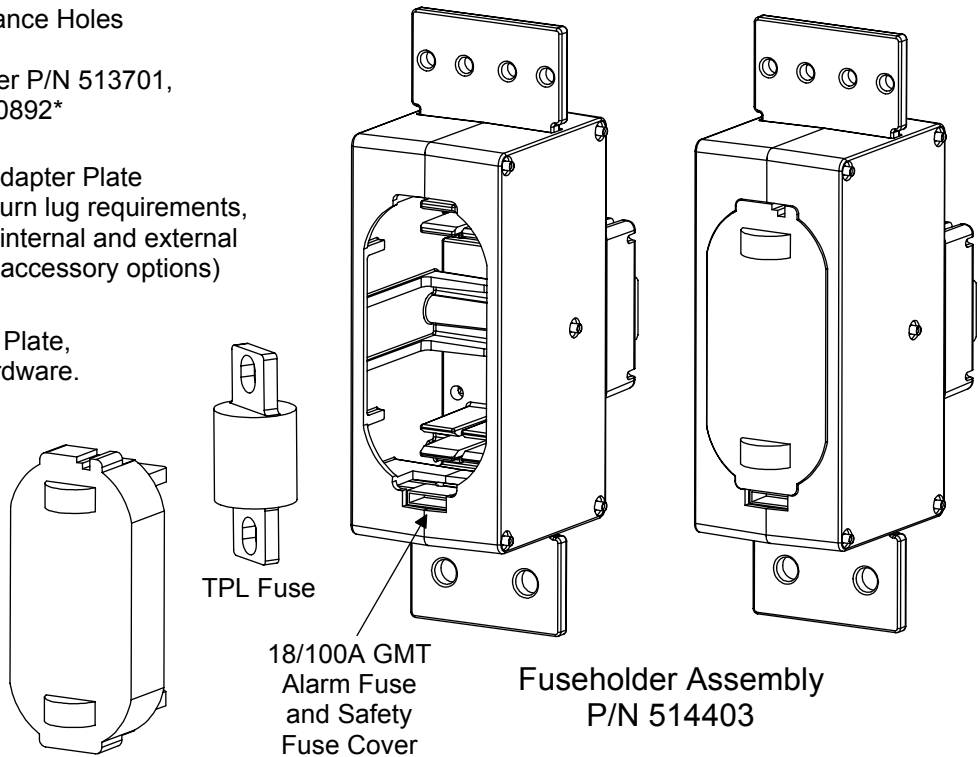
- 1) Order fuses per Table 2.
- 2) Order the appropriate fuseholder assembly for each fuse ordered per Table 2.
- 3) For each fuse ordered, also order one (1) P/N 248610301 alarm fuse, and one (1) P/N 248898700 safety fuse cover.
- 4) For distribution (load) wire size and lug selection, refer to the section titled [Distribution \(Load\) Wire Sizes and Lugs](#) under "Recommended Wire Sizes, Branch Circuit Protection, and Lugs".

Ampere Rating	Required Distribution Row Mounting Positions	Part Number		for wire size and lug selection, refer to the following table
		Fuse	Fuseholder Assembly	
70	4	248251500	514403	<a href="#">Table 7</a>
80	4	248252000	514403	
100	4	248252600	514403	
150	4	248253300	514403	
200	4	248254000	514403	
225	4	248254500	514403	
250	4	248255000	514403	
300	4	248255700	514403	
400	4	248257000	514403	
500	4	248258000	514403	
600	4	248259000	514403	
800	6	102901	514404	
18/100A GMT Alarm Fuse			P/N 248610301	
Safety Fuse Cover			P/N 248898700	

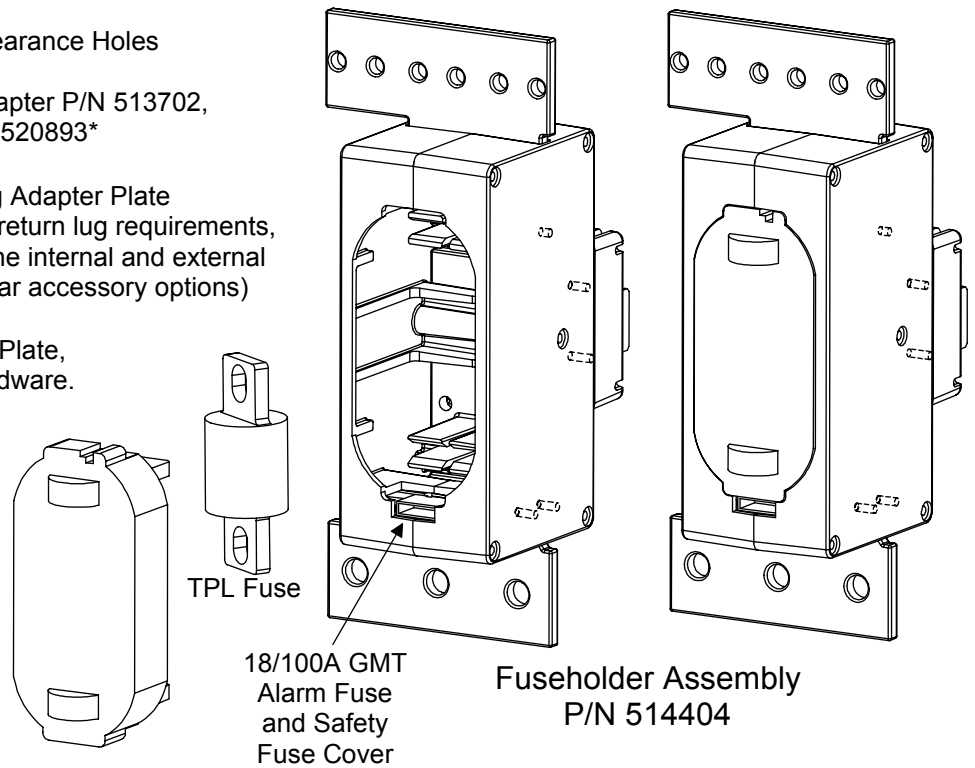
Table 2  
 TPL Fuses and Fuseholder Assemblies



\* Includes Load Lug Adapter Plate, plus 1/4" and 3/8" Mtg. Hardware.



\* Includes Load Lug Adapter Plate, plus 1/4" and 3/8" Mtg. Hardware.



## **Bullet Nose-Type Circuit Breakers and Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly**

### **Features**

- ◆ Each bullet nose-type circuit breaker/fuseholder mounting assembly can mount up to six (6) bullet nose-type circuit breakers and/or fuseholders.
- ◆ Each bullet nose-type circuit breaker/fuseholder mounting assembly is equipped with a shunt for MCA load current measurements (one shunt per six bullet nose-type devices).
- ◆ Bolts into bay's distribution device mounting positions.
- ◆ Load lugs are connected to the existing load busbars provided at the top of the bay. These busbars provide 1/4-20 studs on 5/8" centers and hardware for installation of customer provided two-hole lugs. For load return lug requirements, refer to the [internal](#) and [external](#) ground busbar accessory options.

### **Restrictions**

Load should not exceed 80% of device rating.

Each bullet nose-type circuit breaker/fuseholder mounting assembly requires six (6) distribution row mounting positions.

Each distribution row is divided into half. Each half MUST be populated with distribution devices from left-to-right, without skipping any distribution device mounting positions within each half.

Bullet nose-type circuit breaker/fuseholder mounting assembly rated for 480 amperes, maximum.

***Caution: An overcurrent protective device with a rating of 150 amperes or greater SHALL HAVE an empty mounting position between it and any other overcurrent protective device within the circuit breaker/fuseholder mounting assembly.***

Maximum size of wire to be connected to a single lug position is 2 AWG.

Maximum lug width, 0.671 inches.

### **Ordering Notes**

- 1) Order circuit breakers per Table 3.
- 2) Order a Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly, P/N 513747, for every six circuit breaker/fuseholder combinations ordered.
- 3) For distribution (load) wire size and lug selection, refer to the section titled [Distribution \(Load\) Wire Sizes and Lugs](#) under "Recommended Wire Sizes, Branch Circuit Protection, and Lugs".

Ampere Rating	Number of Poles (and Mtg. Pos.)	Part Number		for wire size and lug selection, refer to the following table
		Electrical Trip <sup>1</sup> (White Handle)	Electrical/Mechanical Trip <sup>2</sup> (Black Handle)	
1	1	102272	101596	<a href="#">Table 6</a>
3	1	102273	101597	
5	1	102274	101598	
10	1	102275	101599	
15	1	102276	101600	
20	1	102277	101601	
25	1	102278	101602	
30	1	102279	101603	
35	1	102280	101604	
40	1	102281	101605	
45	1	121998	121997	
50	1	102282	101606	
60	1	102283	101607	
70	1	102284	101608	
75	1	102285	101609	
80	1	121996	121995	
100	1	102286	101610	
Bullet Nose-Type Circuit Breaker/ Fuseholder Mounting Assembly			P/N 513747	

Circuit Breaker Alarm Operation:

- <sup>1</sup> Provides an alarm during an electrical trip condition only.
- <sup>2</sup> Provides an alarm during an electrical or manual trip condition.

Table 3  
Bullet Nose-Type Circuit Breakers and Bullet Nose-Type  
Circuit Breaker/Fuseholder Mounting Assembly

## **TLS/TPS Fuses, Bullet Nose-Type Fuseholders, and Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly**

### **Features**

- ◆ Each bullet nose-type circuit breaker/fuseholder mounting assembly can mount up to six (6) bullet nose-type circuit breakers and/or fuseholders.
- ◆ Each bullet nose-type circuit breaker/fuseholder mounting assembly is equipped with a shunt for MCA load current measurements (one shunt per six bullet nose-type devices).
- ◆ Bolts into bay's distribution device mounting positions.
- ◆ Load lugs are connected to the existing load busbars provided at the top of the bay. These busbars provide 1/4-20 studs on 5/8" centers and hardware for installation of customer provided two-hole lugs. For load return lug requirements, refer to the [internal](#) and [external](#) ground busbar accessory options.

### **Restrictions**

Load should not exceed 80% of device rating.

Each bullet nose-type circuit breaker/fuseholder mounting assembly requires six (6) distribution row mounting positions.

Each distribution row is divided into half. Each half MUST be populated with distribution devices from left-to-right, without skipping any distribution device mounting positions within each half.

Bullet nose-type circuit breaker/fuseholder mounting assembly rated for 480 amperes, maximum.

**Caution: An overcurrent protective device with a rating of 150 amperes or greater SHALL HAVE an empty mounting position between it and any other overcurrent protective device within the circuit breaker/fuseholder mounting assembly.**

Maximum size of wire to be connected to a single lug position is 2 AWG.

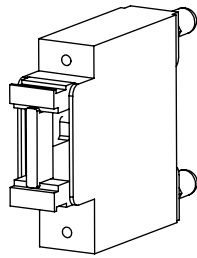
Maximum lug width, 0.671 inches.

### **Ordering Notes**

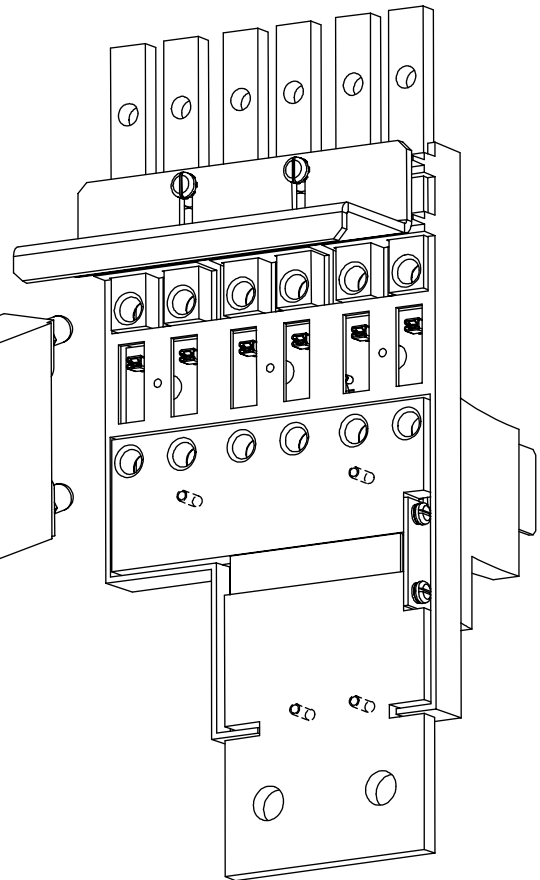
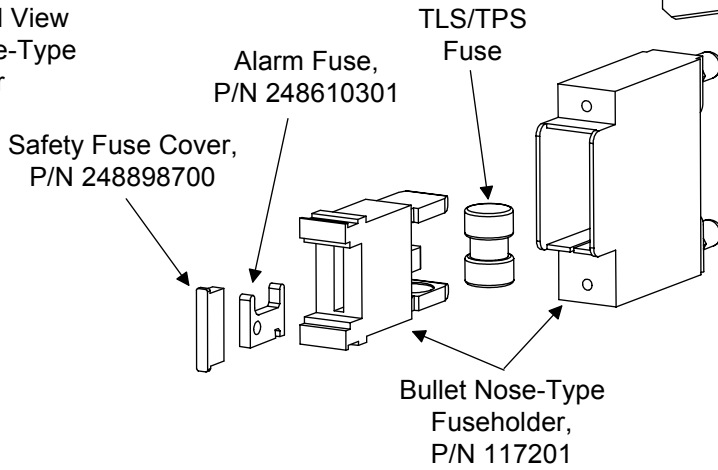
- 1) Order fuses per Table 4.
- 2) For each fuse ordered, also order a Bullet Nose-Type Fuseholder P/N 117201.
- 3) For each fuse ordered, also order one (1) P/N 248610301 alarm fuse, and one (1) P/N 248898700 safety fuse cover.
- 4) Order a Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly, P/N 513747, for every six circuit breaker/fuseholder combinations ordered.
- 5) For distribution (load) wire size and lug selection, refer to the section titled [Distribution \(Load\) Wire Sizes and Lugs](#) under "Recommended Wire Sizes, Branch Circuit Protection, and Lugs".

Ampere Rating	Part Number	Bussmann P/N	Littelfuse P/N	for wire size and lug selection, refer to the following table
3	248230900	TPS-3	TLS003	<a href="#">Table 6</a>
5	248231000	TPS-5	TLS005	
6	248231200	TPS-6	TLS006	
10	248231500	TPS-10	TLS010	
15	248231800	TPS-15	TLS015	
20	248232100	TPS-20	TLS020	
25	248232400	TPS-25	TLS025	
30	248232700	TPS-30	TLS030	
40	248233300	TPS-40	TLS040	
50	248233900	TPS-50	TLS050	
60	248234200	TPS-60	TLS060	
70	248234500	TPS-70	TLS070	
80	118413	--	TLS080	
90	118414	--	TLS090	
100	118415	--	TLS100	
18/100A GMT Alarm Fuse	248610301	GMT-A	--	--
Safety Fuse Cover	248898700	GMT-Y	--	--
Bullet Nose-Type Fuseholder				P/N 117201
Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly				P/N 513747

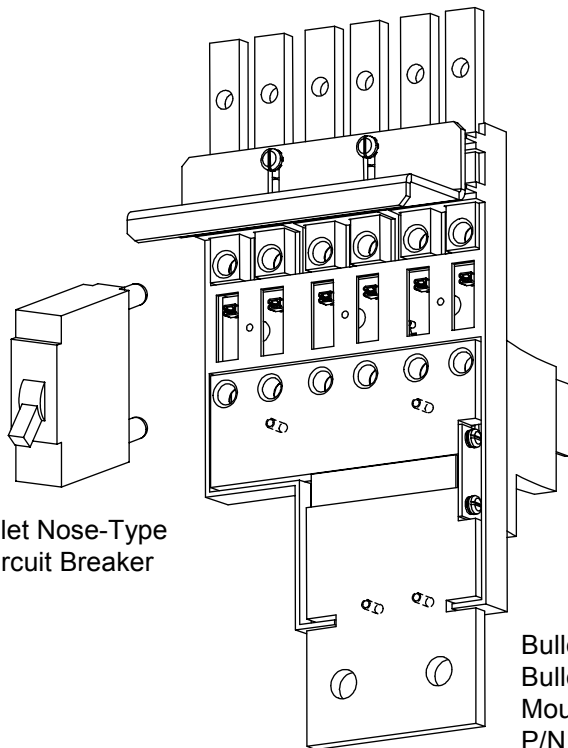
Table 4  
TLS/TPS Fuses, Bullet Nose-Type Fuseholders, and  
Bullet Nose-Type Circuit Breaker/Fuseholder Mounting Assembly



Assembled View  
 Bullet Nose-Type  
 Fuseholder



Bullet Nose-Type Circuit Breaker and  
 Bullet Nose-Type Fuseholder  
 Mounting Assembly,  
 P/N 513747



Bullet Nose-Type  
 Circuit Breaker

Bullet Nose-Type Circuit Breaker and  
 Bullet Nose-Type Fuseholder  
 Mounting Assembly,  
 P/N 513747

Note: Load leads are connected to the existing load busbars provided at the top of the bay. These busbars provide 1/4" studs on 5/8" centers and hardware for installation of customer provided two-hole lugs. (for load return lug requirements, refer to the internal and external ground bar accessory options)

**Replacement Alarm, Reference, and Control Fuses**

Alarm, reference, and control fuses are located on the fuseblock mounted in the left center of the bays. These fuses are not available for customer connected loads. Note also that distribution fuses also contain alarm-type fuses as detailed in the previous sections of this document.

ASSEMBLY	DESIG.	FUNCTION	SIZE (Amperes)	TYPE	PART NO.
Bay	F1	LMS CPU Circuit Card Input Power	3	SAN-O AX-1	248609200
	F2	Distribution Row Monitoring Circuit Card Input Power	3	SAN-O AX-1	248609200
	F3	MCA/Router Circuit Card Input Power	3	SAN-O AX-1	248609200
	--	Safety Fuse Cover	--	SAN-O SAX-1	248898600
Distribution Fuseholder Alarm Fuse	FA	Fuse Alarm	18/100A	Bussmann GMT-A	248610301
	--	Safety Fuse Cover	--	Bussmann GMT-X	248898700

Table 5  
Alarm, Reference, and Control Fuses

**Optional Internal Ground Busbars**

**Features**

- ◆ Provides two (2) internal ground busbars which mount inside the bay between the two top distribution load busbars.
- ◆ Provides for installation of customer provided two-hole lugs with 1/4" clearance holes on 5/8" centers.
- ◆ Provides for installation of customer provided two-hole lugs with 3/8" clearance holes on 1" centers.

**Restrictions**

FACTORY INSTALLED ONLY.

Not recommended for use with >100A distribution devices.

Rated for 2000 amperes per busbar.

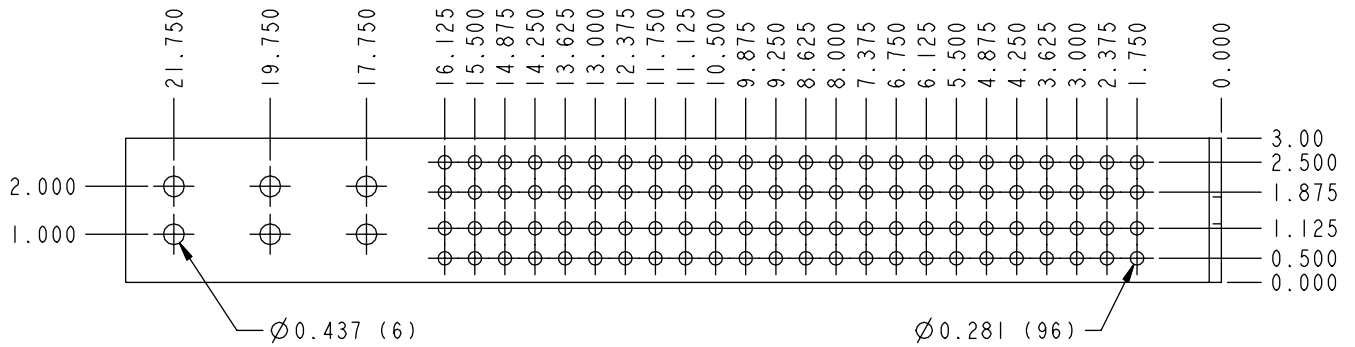
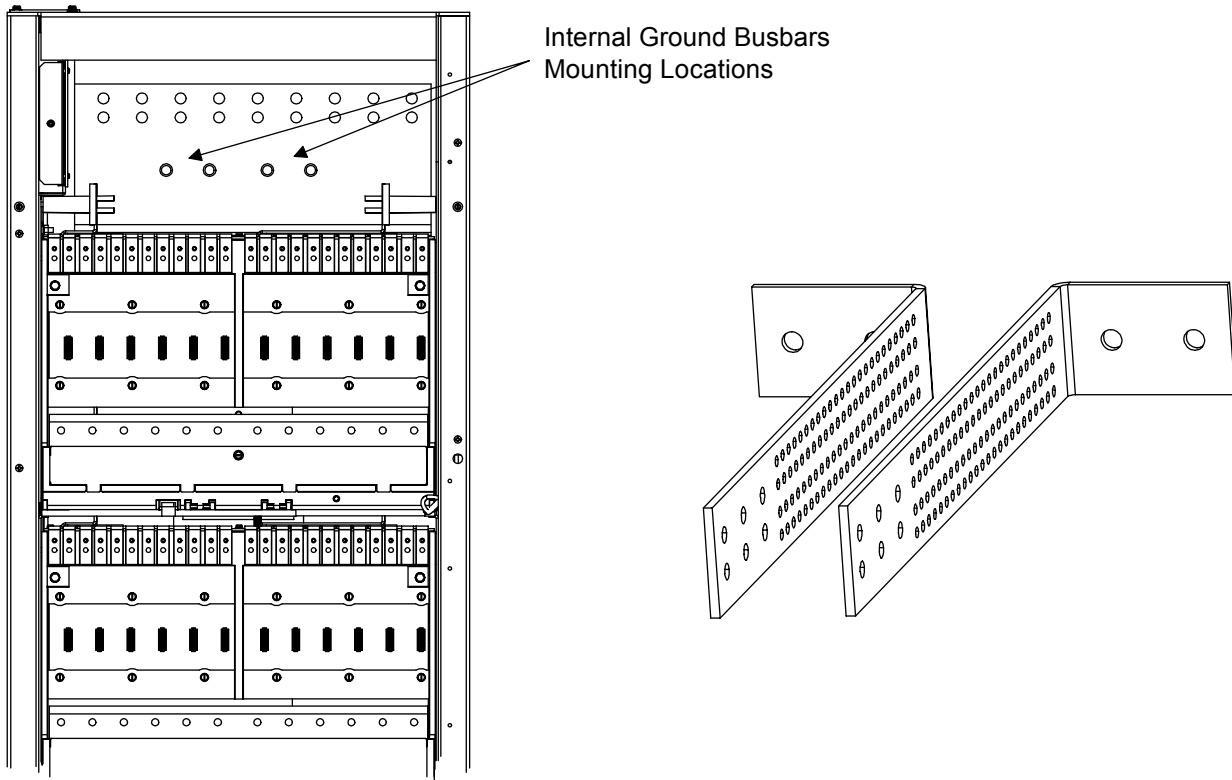
All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting bolts and hardware.

**Ordering Notes**

- 1) Order (2) internal ground busbars per bay, P/N 514446.
- 2) Order (1) insulator per bay, P/N 513752.
- 3) Factory to supply busbar mounting hardware as required.





Internal Ground Busbar Assembly P/N 514446

## Optional External Top-Mount Horizontal Battery Input Busbar Assembly

### Features

- ◆ Provides a battery input busbar assembly which mounts to the top of the bay.
- ◆ Provides for installation of customer provided two-hole lugs with 3/8" clearance holes on 1" centers.

### Restrictions

Rated for 2000 amperes.

All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting bolts and hardware.

### Ordering Notes

- 1) Order an External Top-Mount Battery Input Busbar Assembly per bay as required, P/N 514431.

## Optional Busbar Shield Kit

### Features

- ◆ Provides a plastic shield which mounts below the "Negative Battery (Supply -48V)" busbar on the External Top-Mount Battery Input Busbar Assembly P/N 514431.

### Restrictions

Requires the External Top-Mount Battery Input Busbar Assembly P/N 514431.

### Ordering Notes

- 1) Order a Busbar Shield Kit (P/N 528482) as required for each External Top-Mount Battery Input Busbar Assembly ordered.

## Optional External Top-Mount Ground (Load Return) Busbar Assemblies

### Features

- ◆ Provides a ground busbar assembly which mounts to the External Top-Mount Battery Input Busbar Assembly P/N 514431.
- ◆ Provides for installation of customer provided two-hole lugs with 3/8" clearance holes on 1" centers.

### Restrictions

Requires the External Top-Mount Battery Input Busbar Assembly P/N 514431.

All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting bolts and hardware.

### Ordering Notes

- 1) Order an External Top-Mount Ground (Load Return) Busbar Assembly per bay as required.  
P/N 514688, 6000A, for use with List 1 and 11 (no PDSC [AC Input 'Power Distribution Service Cabinet'])  
P/N 514689, 10000A, for use with List 1 and 11 (no PDSC [AC Input 'Power Distribution Service Cabinet'])  
P/N 514690, 6000A, for use with List 2 and 12 equipped with a List 30 or 31 PDSC (AC Input 'Power Distribution Service Cabinet')

P/N 514691, 10000A, for use with List 2 and 12 equipped with a List 30 or 31 PDSC (AC Input 'Power Distribution Service Cabinet')

## Optional Load Return Lug Extension Busbar Assembly

### Features

- ◆ Provides a load return lug extension busbar which mounts to an External Top-Mount Ground (Load Return) Busbar Assembly.
- ◆ Provides for installation of customer provided two-hole lugs with 3/8" clearance holes on 1" centers.

### Restrictions

Rated for 1000 amperes.

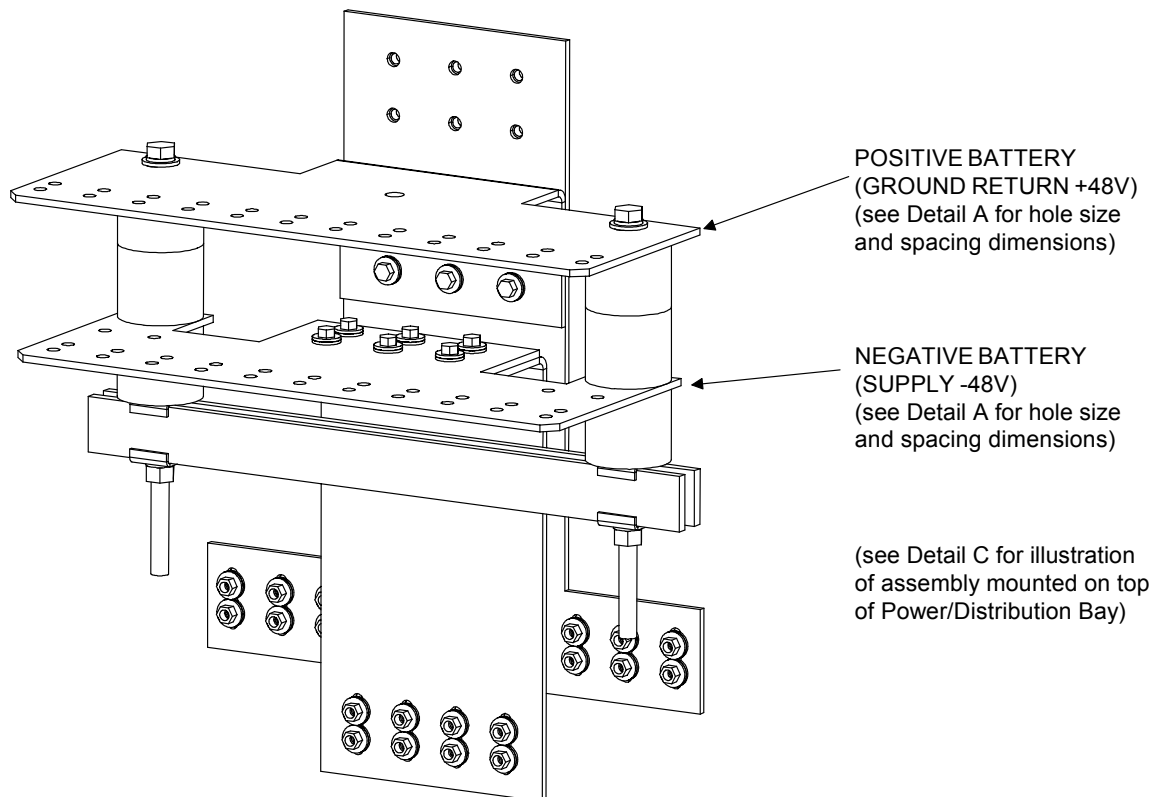
Requires an External Top-Mount Ground (Load Return) Busbar Assembly; P/N 514688, 514689, 514690, or 514691.

All lugs for customer connections must be ordered separately.

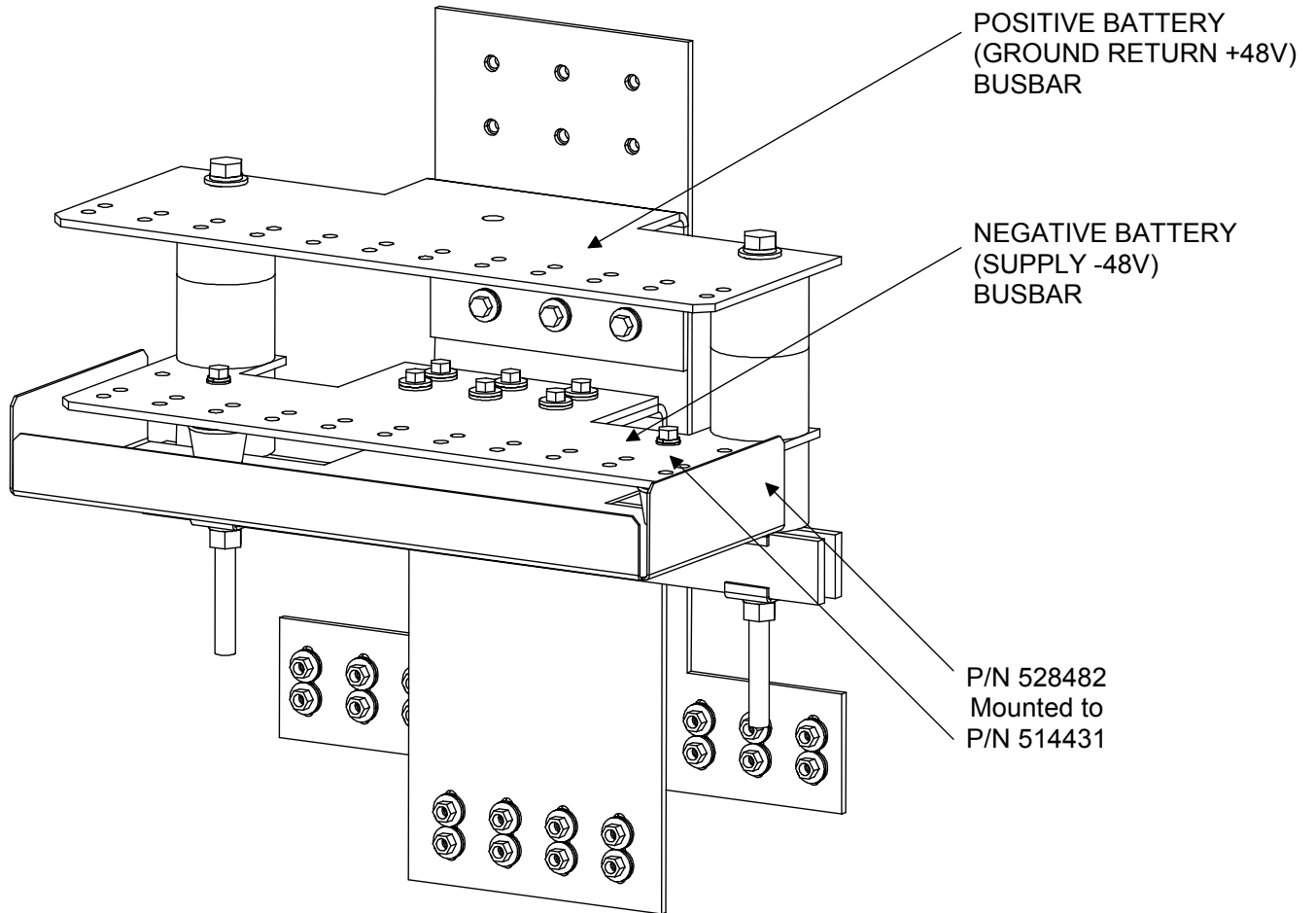
Customer needs to supply lug mounting bolts and hardware.

### Ordering Notes

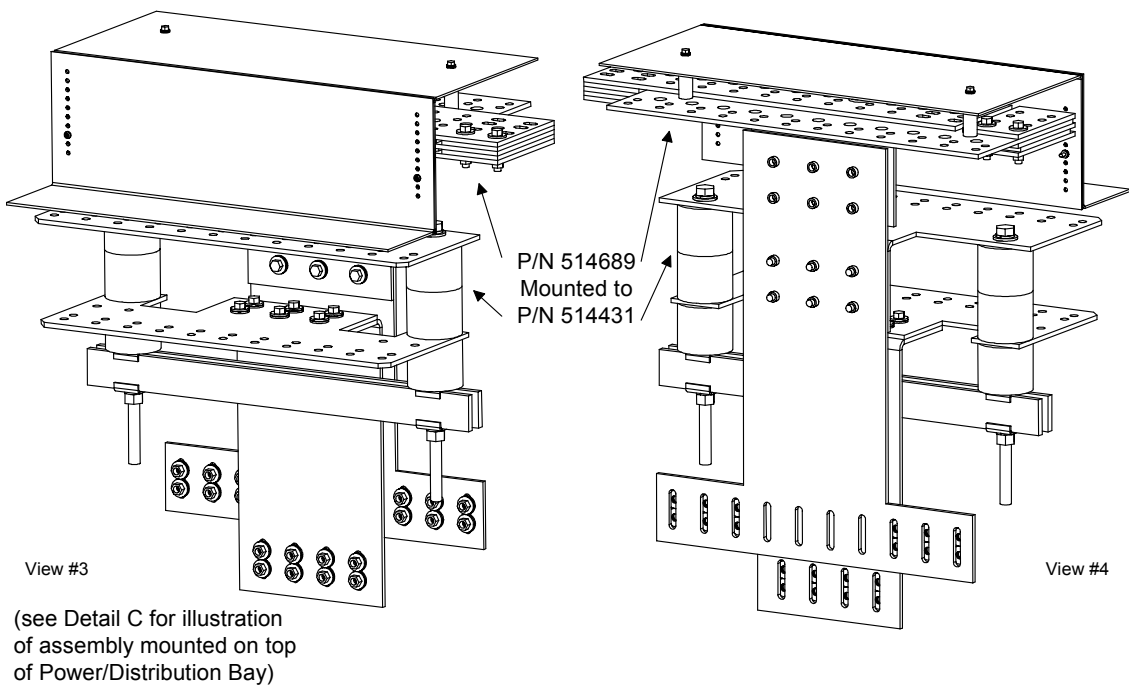
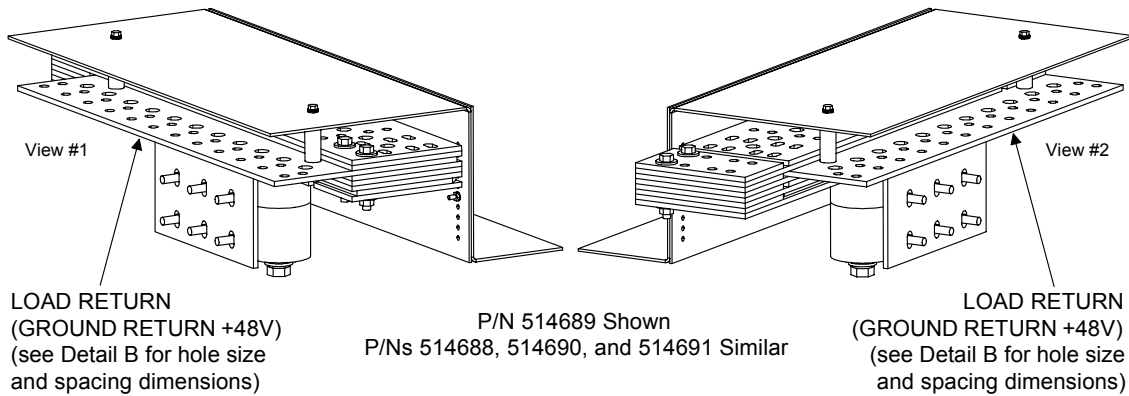
- 1) Order a Load Return Lug Extension Busbar Assembly per bay as required, P/N 514543.



External Top-Mount Battery Input Busbar Assembly (P/N 514431)

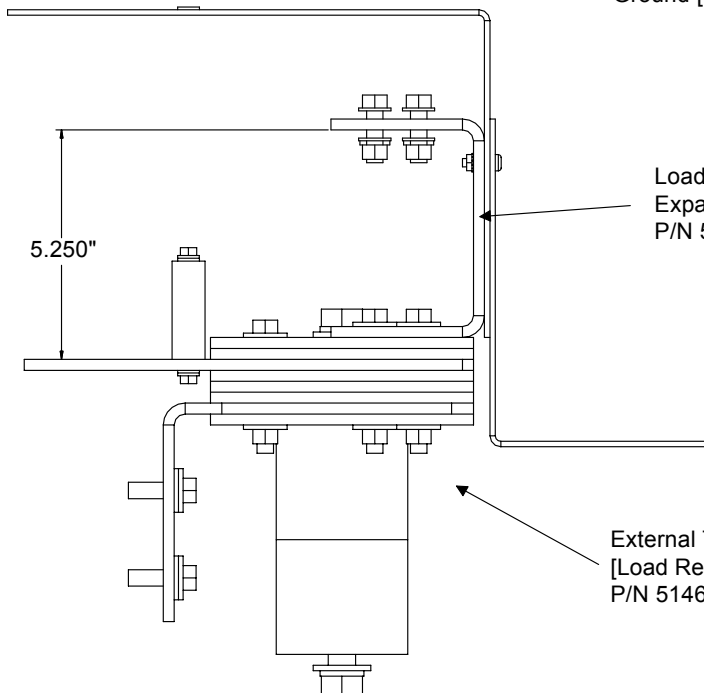
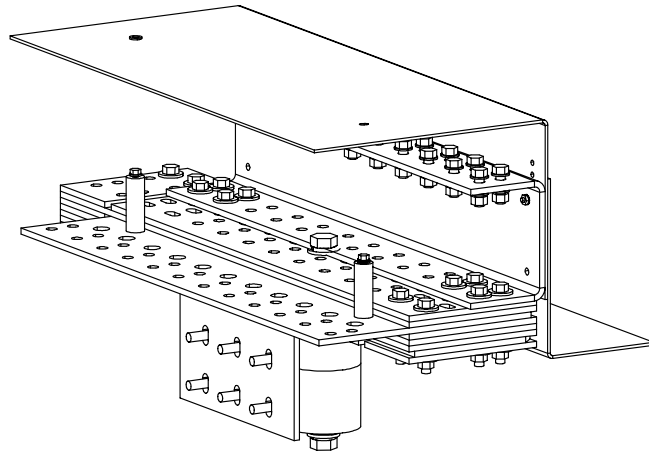
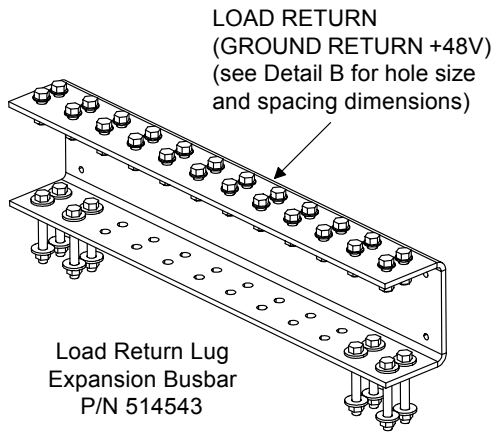


Busbar Shield Kit (P/N 528482)



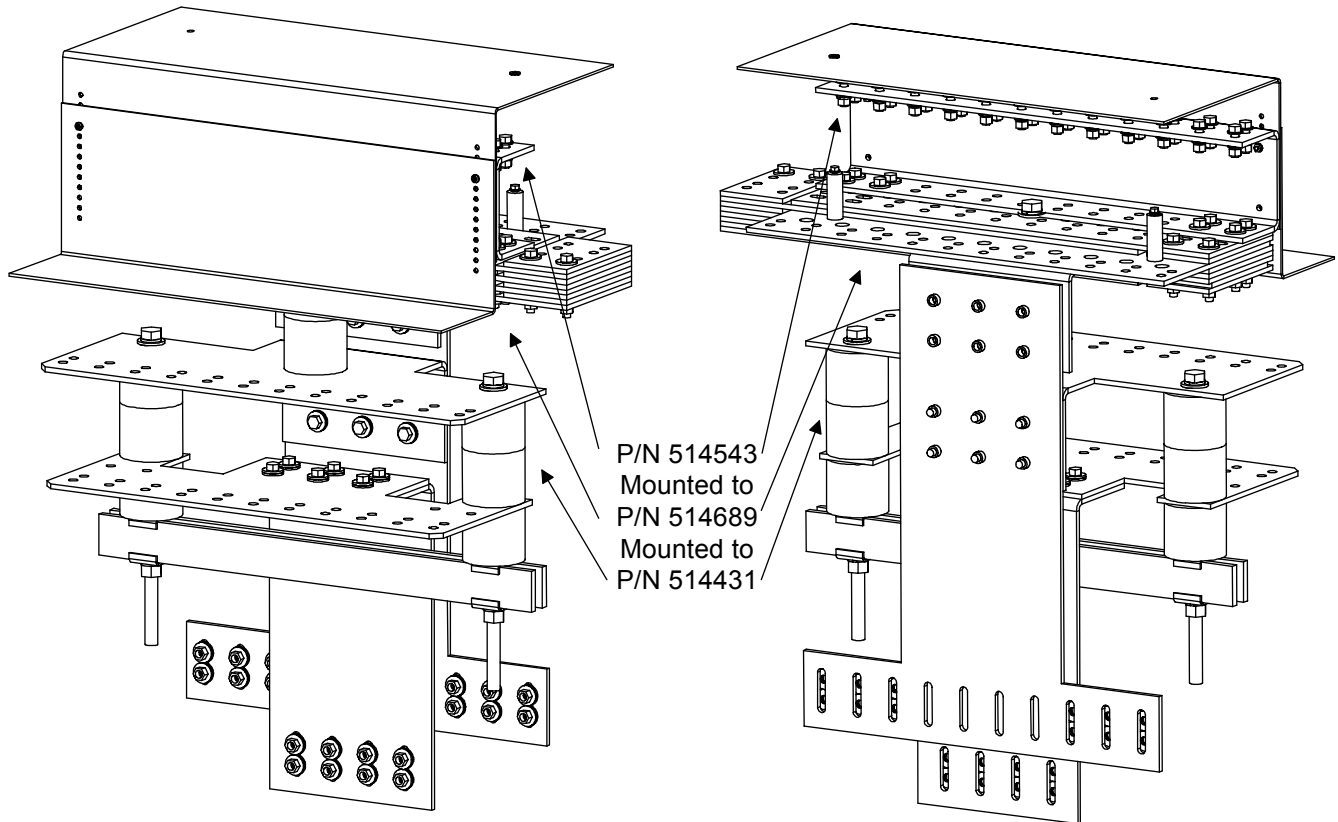
**External Top-Mount Ground (Load Return) Busbar Assemblies**  
(for use with External Top-Mount Battery Input Busbar Assembly P/N 514431)

- P/N 514688 (6000A) (for use with List 1 and 11, no PCU AC Input Service Cabinet)
- P/N 514689 (10000A) (for use with List 1 and 11, no PCU AC Input Service Cabinet)
- P/N 514690 (6000A) (for use with List 2 and 12 e/w List 30 or 31 PCU AC Input Service Cabinet)
- P/N 514691 (10000A) (for use with List 2 and 12 e/w List 30 or 31 PCU AC Input Service Cabinet)



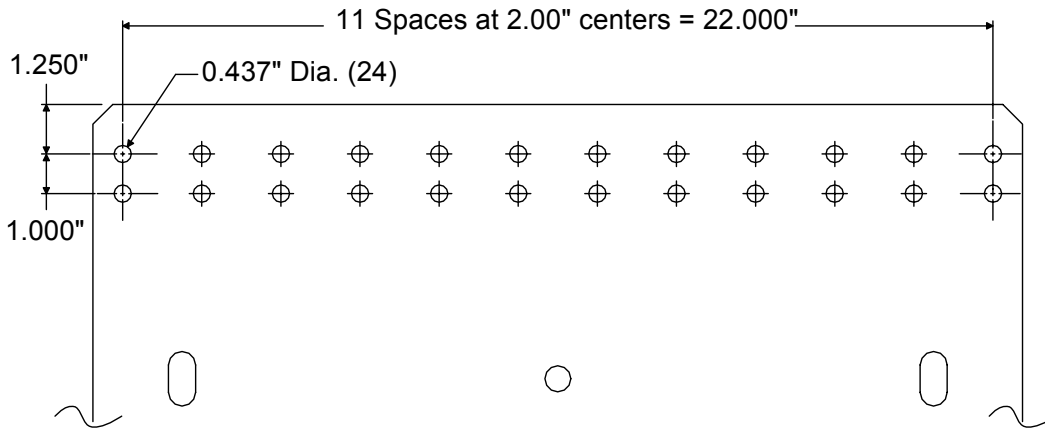
(see Detail C for illustration  
of assembly mounted on top  
of Power/Distribution Bay)

Load Return Lug Extension Busbar P/N 514543 (cont'd on next page)  
(mounts to External Top-Mount Ground [Load Return] Busbar Assembly

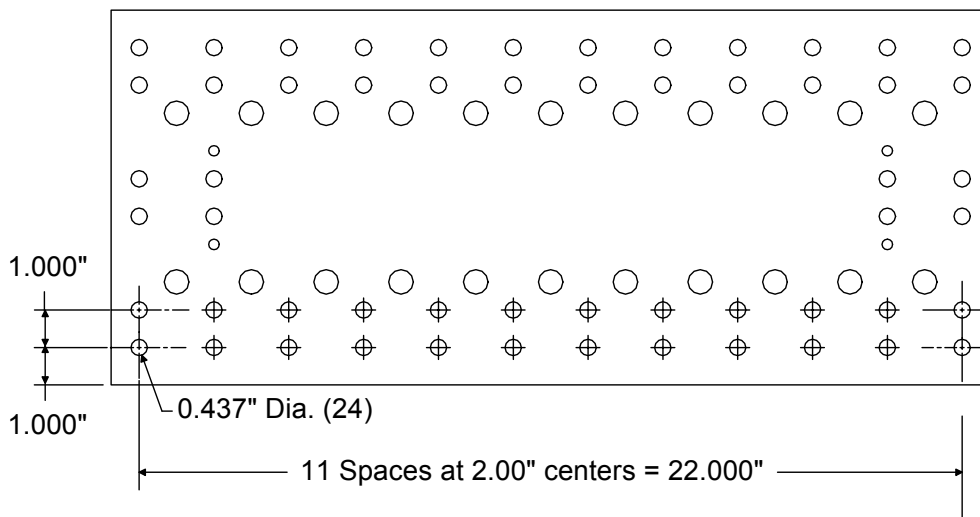


(see Detail C for illustration  
of assembly mounted on top  
of Power/Distribution Bay)

**Load Return Lug Expansion Busbar P/N 514543 (cont'd from previous page)**  
**(mounts to External Top-Mount Ground [Load Return] Busbar Assemblies)**

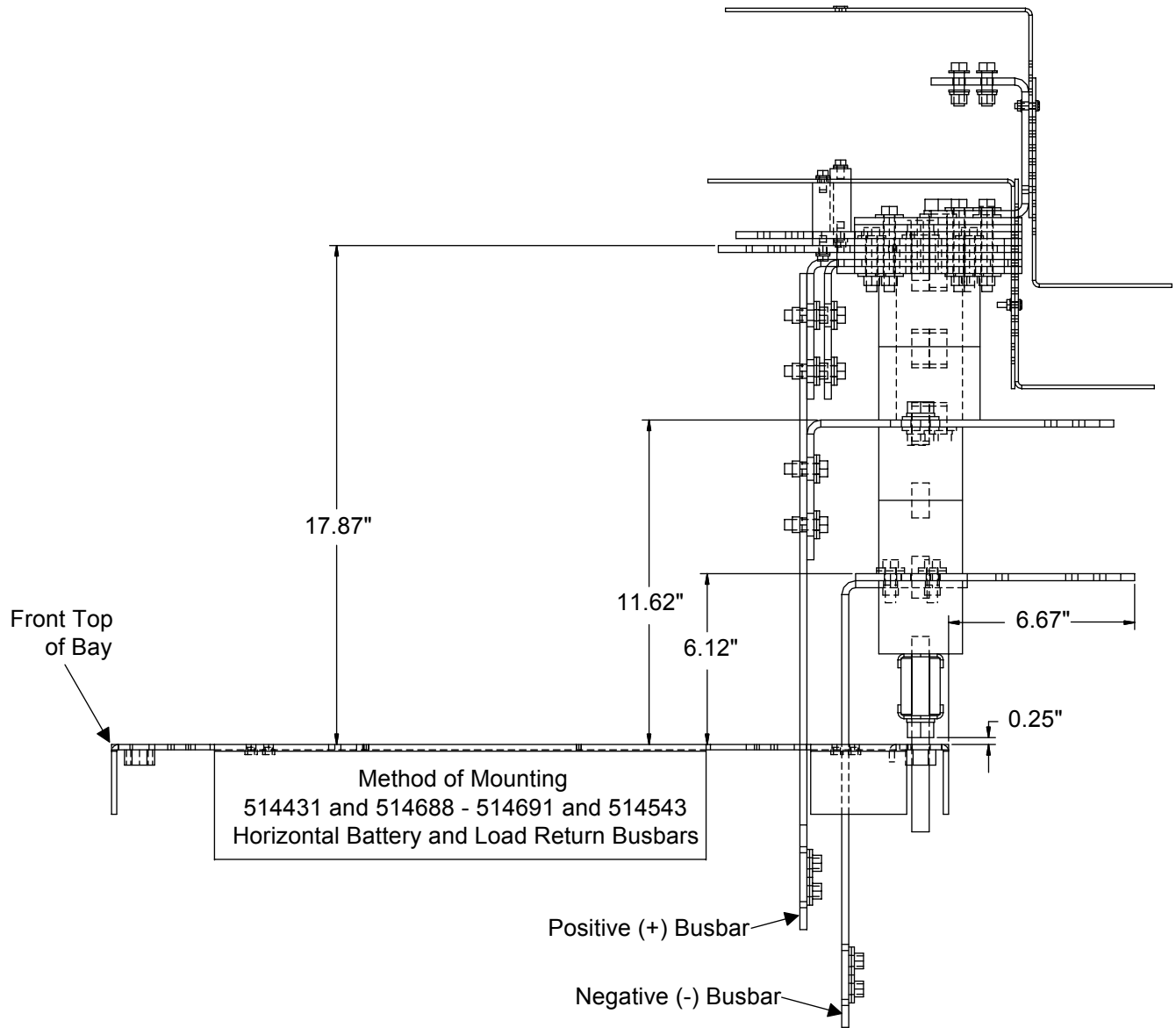


**Detail A**  
**Positive and Negative Battery Busbars**  
**Hole Size and Spacing Dimensions**  
(for installation of customer provided two-hole lugs with 3/8" clearance holes on 1" centers)

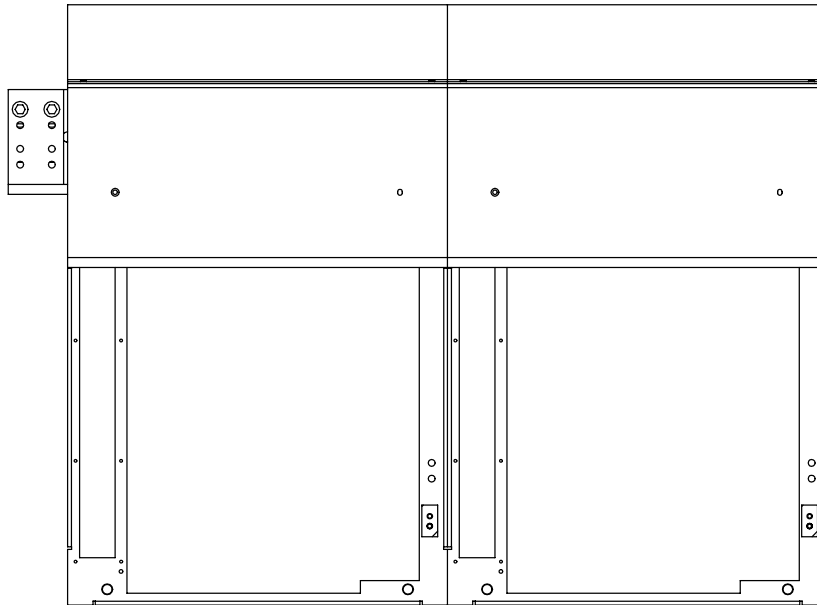


**Detail B**  
**Load Return Busbars**  
**Hole Size and Spacing Dimensions**  
(for installation of customer provided two-hole lugs with 3/8" clearance holes on 1" centers)

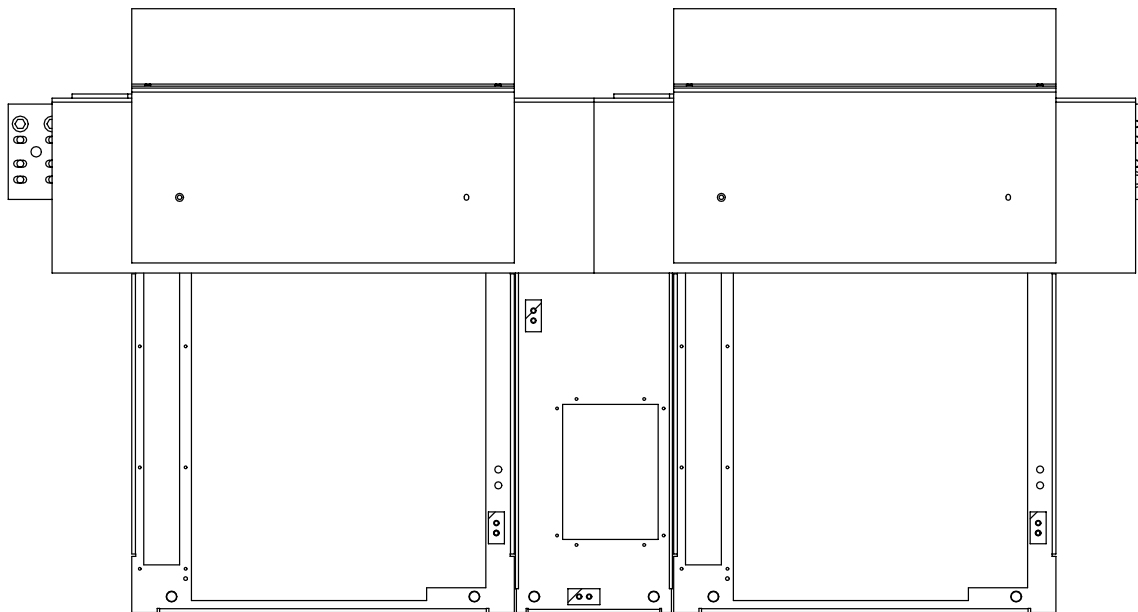




Detail C (cont'd on next page)  
Busbar Assemblies  
Mounted On Top of  
Power/Distribution Bay



Top View  
Expansion Bay  
Ground Bar Mounting  
P/N 514688 - 614689



Top View  
Expansion Bay  
Ground Bar Mounting  
P/N 514690 - 614691

Detail C (cont'd from previous page)  
Busbar Assemblies  
Mounted On Top of  
Power/Distribution Bay

## Recommended Wire Sizes, Branch Circuit Protection, and Lugs

### Distribution (Load) Wire Sizes and Lugs

#### Features

- ◆ Distribution (load) leads are connected as described in the section titled [Distribution Devices](#) under "Accessory Information".
- ◆ For lug mounting hole size and spacing dimensions, refer to the illustrations in the section titled [Distribution Devices](#) under "Accessory Information".

#### Restrictions

All lugs for customer connections must be ordered separately.

#### Ordering Notes

- 1) The type of distribution device determines the load lug hole size and spacing requirements. The rating of the distribution device determines the wire size requirements. For wire size and lug selection; refer to Tables 6 and 7 (Load Side). (Load return leads are terminated either inside the bay if equipped with the optional internal ground busbar, or outside the bay if equipped with the optional external ground busbar mounted on top of the bay. For load return lug requirements, refer to the [internal](#) and [external](#) ground bar accessory options.)
- 2) For other available lugs and hardware, refer to drawings 031110100 through 031110300.

[Home](#)

Fuse/Circuit Breaker Amperage	Recm 90°C Wire Size <sup>(1)</sup>						
	14 AWG	12 AWG	10 AWG	8 AWG	6 AWG	4 AWG	2 AWG
	Loop Length (feet) <sup>(2)</sup>						
1, 3, 5, 6, 10A	37 <sup>(3, 4)</sup>	58 <sup>(3, 4)</sup>	93 <sup>(3, 4)</sup>	--	--	--	--
15A	24 <sup>(3, 4)</sup>	39 <sup>(3, 4)</sup>	62 <sup>(3, 4)</sup>	--	--	--	--
20A	--	29 <sup>(3, 4)</sup>	46 <sup>(3, 4)</sup>	74 <sup>(3, 4)</sup>	--	--	--
25A	--	--	37 <sup>(3, 4)</sup>	59 <sup>(3, 4)</sup>	94 <sup>(3, 4)</sup>	--	--
30A	--	--	31 <sup>(3, 4)</sup>	49 <sup>(3, 4)</sup>	78 <sup>(3, 4)</sup>	--	--
35A	--	--	--	42 <sup>(3, 4)</sup>	67 <sup>(3, 4)</sup>	107 <sup>(3, 4)</sup>	--
40A	--	--	--	37 <sup>(3, 4)</sup>	59 <sup>(3, 4)</sup>	94 <sup>(3, 4)</sup>	--
45A	--	--	--	33 <sup>(3, 4)</sup>	52 <sup>(3, 4)</sup>	83 <sup>(3, 4)</sup>	--
50A	--	--	--	29 <sup>(3, 4)</sup>	47 <sup>(3, 4)</sup>	75 <sup>(3, 4)</sup>	--
60A	--	--	--	--	39 <sup>(3, 4)</sup>	62 <sup>(3, 4)</sup>	99 <sup>(3, 4)</sup>
70A	--	--	--	--	33 <sup>(3)</sup>	53 <sup>(3, 4)</sup>	85 <sup>(3, 4)</sup>
75A	--	--	--	--	31 <sup>(3)</sup>	50 <sup>(3, 4)</sup>	79 <sup>(3, 4)</sup>
80A	--	--	--	--	--	47 <sup>(3, 4)</sup>	74 <sup>(3, 4)</sup>
90A	--	--	--	--	--	41 <sup>(3)</sup>	66 <sup>(3, 4)</sup>
100A	--	--	--	--	--	--	59 <sup>(3, 4)</sup>
Recommended Crimp Lug <sup>(5)</sup>							
Lug	245342300	245342300	245342300	245390200	245346700	245346800	245346900

- <sup>1</sup> Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at 90°C conductor temperature operating in ambients of 30°C and 40°C was used. For other operating ambient temperatures, refer to the NEC. For operation in countries where the NEC is not recognized, follow applicable codes.
- <sup>2</sup> Recommended wire sizes are sufficient to restrict voltage drop to 1.0 volt or less at listed branch current for the loop lengths shown. Loop length is the sum of the lengths of the positive and negative leads.
- <sup>3</sup> Wire Size / Loop Length Combination Calculated using 30°C Ambient Operating Temperature.
- <sup>4</sup> Wire Size / Loop Length Combination Calculated using 40°C Ambient Operating Temperature.
- <sup>5</sup> Two-hole lug, 1/4" bolt clearance hole, 5/8" centers. Refer to drawing 031110100 for lug crimping information.

Table 6  
Recommended Distribution (Load) Wire Size and Lug Selection for  
TLS/TPS Fuse and Bullet Nose-Type Circuit Breaker (Load Side)

Fuse/ Circuit Breaker Amperage	Recm 90°C Wire Size <sup>(1)</sup>									
	6 AWG	4 AWG	2 AWG	1/0 AWG	2/0 AWG	3/0 AWG	4/0 AWG	250 kcmil	300 kcmil	350 kcmil
	Loop Length (feet) <sup>(2)</sup>									
<b>70A</b>	33 <sup>(3)</sup>	53 <sup>(3, 4)</sup>	85 <sup>(3, 4)</sup>	135 <sup>(3, 4)</sup>	--	--	--	--	--	--
<b>80A</b>	--	47 <sup>(3, 4)</sup>	74 <sup>(3, 4)</sup>	118 <sup>(3, 4)</sup>	--	--	--	--	--	--
<b>100A</b>	--	--	59 <sup>(3, 4)</sup>	95 <sup>(3, 4)</sup>	119 <sup>(3, 4)</sup>	--	--	--	--	--
<b>125A</b>	--	--	47 <sup>(3)</sup>	76 <sup>(3, 4)</sup>	95 <sup>(3, 4)</sup>	120 <sup>(3, 4)</sup>	--	--	--	--
<b>150A</b>	--	--	--	63 <sup>(3, 4)</sup>	79 <sup>(3, 4)</sup>	100 <sup>(3, 4)</sup>	--	--	--	--
<b>175A</b>	--	--	--	--	68 <sup>(3, 4)</sup>	86 <sup>(3, 4)</sup>	108 <sup>(3, 4)</sup>	--	--	--
<b>200A</b>	--	--	--	--	--	75 <sup>(3, 4)</sup>	95 <sup>(3, 4)</sup>	112 <sup>(3, 4)</sup>	--	--
<b>225A</b>	--	--	--	--	--	67 <sup>(3)</sup>	84 <sup>(3, 4)</sup>	100 <sup>(3, 4)</sup>	120 <sup>(3, 4)</sup>	--
<b>250A</b>	--	--	--	--	--	--	76 <sup>(3)</sup>	90 <sup>(3, 4)</sup>	108 <sup>(3, 4)</sup>	126 <sup>(3, 4)</sup>
Recommended Crimp Lug <sup>(5)</sup>										
Lug	2453- 49900	2453- 50000	2453- 48200	2453- 47100	2453- 47200	2453- 47300	2453- 47400	2453- 47500	2453- 47600	2453- 47700

- <sup>1</sup> Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at **90°C** conductor temperature operating in ambients of **30°C** and **40°C** was used. For other operating ambient temperatures, refer to the National Electrical Code. For operation in countries where the NEC is not recognized, follow applicable codes.
- <sup>2</sup> Recommended wire sizes are sufficient to restrict voltage drop to 1.0 volt or less at listed branch current for the loop lengths shown. Loop length is the sum of the lengths of the positive and negative leads.
- <sup>3</sup> Wire Size / Loop Length Combination Calculated using 30°C Ambient Operating Temperature.
- <sup>4</sup> Wire Size / Loop Length Combination Calculated using 40°C Ambient Operating Temperature.
- <sup>5</sup> Two-hole lug, 3/8" bolt clearance hole, 1" centers. Refer to drawing 031110100 for lug crimping information.

Table 7 (cont'd on next page)  
 Recommended Distribution (Load) Wire Size and Lug Selection for  
**TPL Fuse and 218 Circuit Breaker** (Load Side)

Fuse/ Circuit Breaker Amperage	Recm 90°C Wire Size <sup>(1)</sup>						
	2/0 AWG	3/0 AWG	4/0 AWG	250 kcmil	300 kcmil	350 kcmil	400 kcmil
	Loop Length (feet) <sup>(2)</sup>						
300A	--	--	--	150 <sup>(3,4)</sup> (2) Wires	90 <sup>(3)</sup>	105 <sup>(3,4)</sup>	120 <sup>(3,4)</sup>
350A	68 <sup>(3,4)</sup> (2) Wires	86 <sup>(3,4)</sup> (2) Wires	108 <sup>(3,4)</sup> (2) Wires	128 <sup>(3,4)</sup> (2) Wires	--	90 <sup>(3)</sup>	103 <sup>(3)</sup>
400A		75 <sup>(3,4)</sup> (2) Wires	95 <sup>(3,4)</sup> (2) Wires	112 <sup>(3,4)</sup> (2) Wires	--	--	--
450A	--	67 <sup>(3)</sup> (2) Wires	84 <sup>(3,4)</sup> (2) Wires	100 <sup>(3,4)</sup> (2) Wires	120 <sup>(3,4)</sup> (2) Wires	--	--
500A		--	76 <sup>(3)</sup> (2) Wires	90 <sup>(3,4)</sup> (2) Wires	108 <sup>(3,4)</sup> (2) Wires	126 <sup>(3,4)</sup> (2) Wires	--
600A		--	--	--	90 <sup>(3)</sup> (2) Wires 135 <sup>(3,4)</sup> (3) Wires	105 <sup>(3,4)</sup> (2) Wires	120 <sup>(3,4)</sup> (2) Wires
800A	--	--	--	84 <sup>(3)</sup> (3) Wires	101 <sup>(3,4)</sup> (3) Wires	118 <sup>(3,4)</sup> (3) Wires	135 <sup>(3,4)</sup> (3) Wires
Recommended Crimp Lug <sup>(5)</sup>							
Lug	245347200 (per cable)	245347300 (per cable)	245347400 (per cable)	245347500 (per cable)	245347600 (per cable)	245347700 (per cable)	245347800 (per cable)

- <sup>1</sup> Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at 90°C conductor temperature operating in ambients of 30°C and 40°C was used. For other operating ambient temperatures, refer to the National Electrical Code. For operation in countries where the NEC is not recognized, follow applicable codes.
- <sup>2</sup> Recommended wire sizes are sufficient to restrict voltage drop to 1.0 volt or less at listed branch current for the loop lengths shown. Loop length is the sum of the lengths of the positive and negative leads.
- <sup>3</sup> Wire Size / Loop Length Combination Calculated using 30°C Ambient Operating Temperature.
- <sup>4</sup> Wire Size / Loop Length Combination Calculated using 40°C Ambient Operating Temperature.
- <sup>5</sup> Two-hole lug, 3/8" bolt clearance hole, 1" centers. Refer to drawing 031110100 for lug crimping information.

Table 7 (cont'd from previous page)  
Recommended Distribution (Load) Wire Size and Lug Selection for  
**TPL Fuse and 218 Circuit Breaker (Load Side)**

**Battery Wire Sizes and Lugs**

**Features**

- ◆ Studs (3/8-16 on 1" centers) are provided for installation of customer provided two-hole lugs. These studs are accessed from the rear of the each Power/Distribution Bay. (Overhead busbars may be furnished. Refer to the section titled [External Top-Mount Battery Input Busbar Assembly](#) under "Accessory Information" for battery lug selection.)
- ◆ For lug mounting hole size and spacing dimensions, refer to the illustration provided in this section.

**Restrictions**

All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting hardware.

**Ordering Notes**

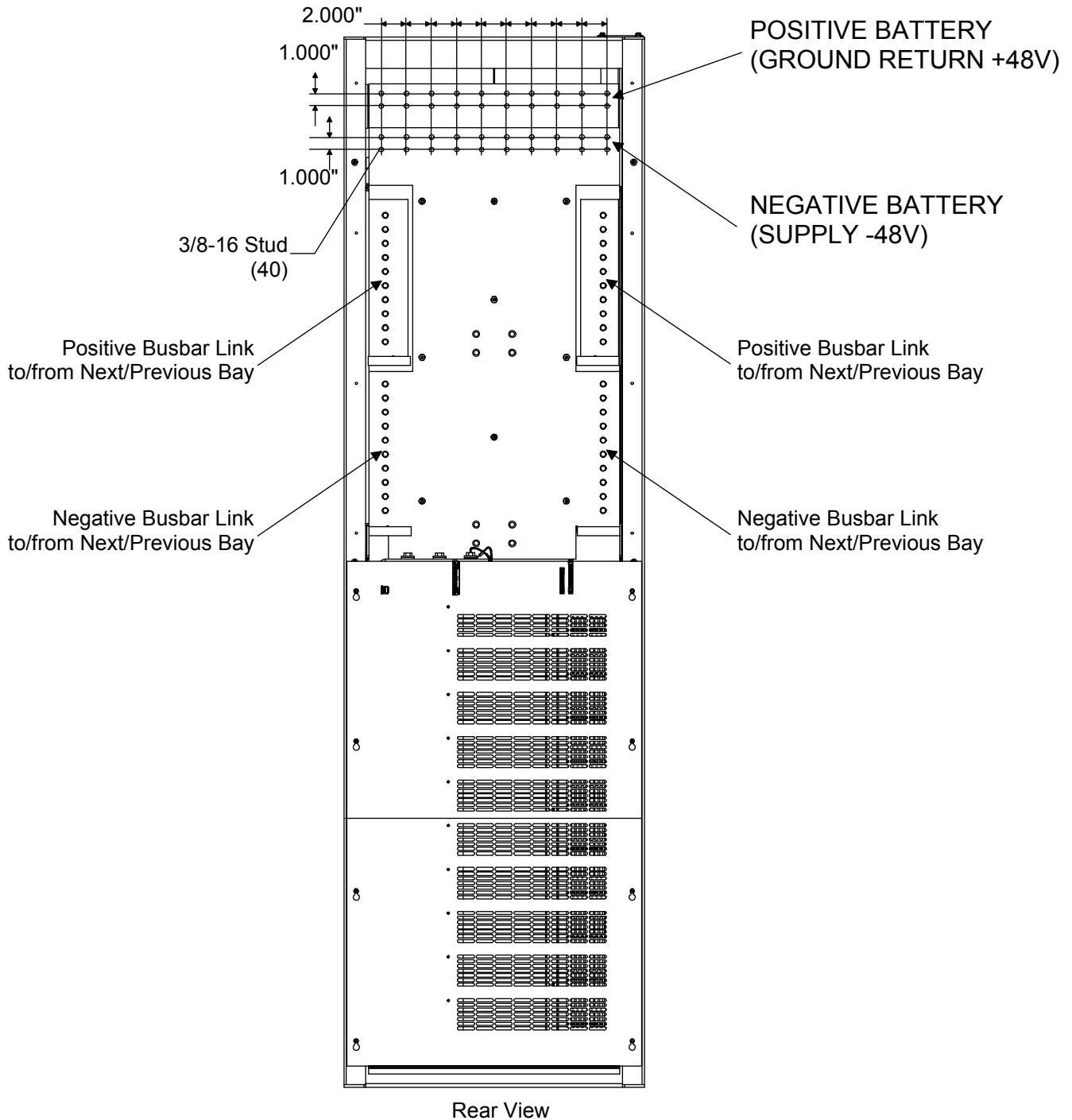
- 1) Battery wire size varies depending on load, therefore no specific information is provided for wire size. Refer to Table 8 for recommended wire sizes and lugs at rated maximum bay load (2400 amperes). When making connections, observe correct polarity.
- 2) For other available lugs and hardware, refer to drawings 031110100 through 031110300.

Ambient Operating Temperature <sup>(1)</sup>	Loop Length <sup>(2)</sup> (Ft)	Recm 90°C Wire Size <sup>(1, 2)</sup>	Recommended Crimp Lug <sup>(3)</sup>
30°C	140	(5) 750 kcmil	245348100
40°C	140	(5) 750 kcmil	
	168	(6) 750 kcmil	

- <sup>1</sup> Wire sizes are based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire rated at **90°C** conductor temperature operating in ambients of **30°C** and **40°C** was used. For other operating ambient temperatures, refer to the NEC. For operation in countries where the NEC is not recognized, follow applicable codes.
- <sup>2</sup> Recommended wire sizes are sufficient to restrict voltage drop to 1.0 volt or less at rated full load output current of the bay for the loop lengths shown. Loop length is the sum of the lengths of the positive and negative leads.
- <sup>3</sup> Two-hole lug, 3/8" bolt clearance hole, 1" centers. Refer to drawing 031110100 for lug crimping information.

Table 8  
 Recommended Battery Wire Size and Lug Selection





## **Bay Frame Grounding Wire Sizes and Lugs**

### **Features**

- ◆ Two sets of captive nuts (1/4-20 on 5/8" centers) are provided for installation of customer provided two-hole lugs.
- ◆ For lug mounting hole size and spacing dimensions, refer to the illustration provided in this section.

### **Restrictions**

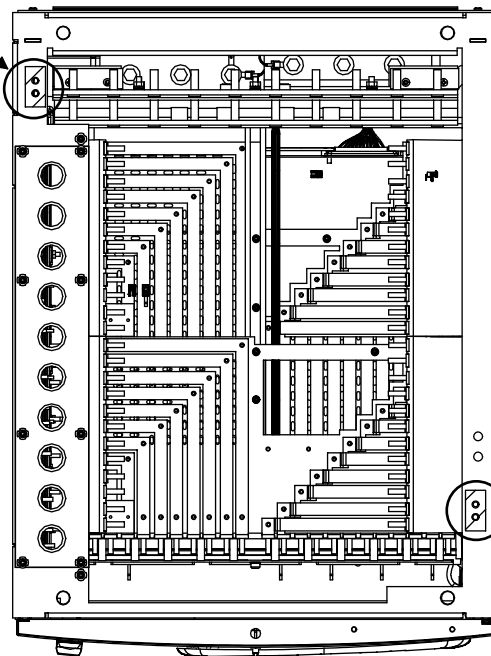
All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting bolts and hardware.

The recommended frame ground wire size is 6 AWG.

Recommended lug P/N 245346700.

Two holes with 1/4-20 captive nuts provided for installation of customer provided two-hole lug with 1/4" bolt clearance holes on 5/8" centers



Top View

Two holes with 1/4-20 captive nuts provided for installation of customer provided two-hole lug with 1/4" bolt clearance holes on 5/8" centers

**AC Input (Individual PCU Feeds) Wire Sizes, Branch Circuit Protection, and Lugs**

**Features**

- ◆ Studs (10-32 on 5/8" centers) are provided for installation of customer provided two-hole AC Input lugs. These studs are accessed from the inside top left side of the each Power/Distribution Bay.
- ◆ Studs (10-32 on 5/8" centers) are provided for installation of customer provided frame ground lugs. These studs are accessed from the inside top left side of the each Power/Distribution Bay.
- ◆ For lug mounting hole size and spacing dimensions, refer to the illustration provided in this section.

**Restrictions**

All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting hardware.

An individual feed AC input panel is provided for Lists 1 and 11 only.

**Ordering Notes**

- 1) Refer to Table 9 for recommended wire sizes, branch circuit protection, and lugs.

Ambient Operating Temperature <sup>(1)</sup>	Nominal Input Voltage (VAC)	Recm Branch Circuit Protection (Amperes) <sup>(2)</sup>	Line		Ground <sup>(5)</sup>	
			Recm 90°C Wire Size (AWG and kcmil) <sup>(1)</sup>	Recommended Crimp Lug <sup>(3)</sup>	Recm 90°C Wire Size (AWG and kcmil) <sup>(4)</sup>	Recommended Crimp Lug <sup>(3)</sup>
30°C and 40°C	480	20	12	245390100	12	245390100
	240	40	8	245346600	8	245346600
	208	50	6	245346500	6	245346500

<sup>1</sup> Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at 90°C conductor temperature, operating in ambients of 30°C and 40°C was used. For other operating ambient temperatures, refer to the National Electrical Code. For operation in countries where the NEC is not recognized, follow applicable codes.

<sup>2</sup> The AC input branch circuit protective device should be of the time-delay or high inrush type.

<sup>3</sup> Two-hole lug, #10 bolt clearance hole, 5/8" centers. Refer to drawing 031110100 for lug crimping information.

<sup>4</sup> Equipment grounding conductor size based on recommendations of the NEC 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. For operation in countries where the NEC is not recognized, follow applicable codes.

<sup>5</sup> Equipment grounding conductors must be provided with the AC input conductors supplied to the Bay. Frame ground terminals must be connected to earth ground, not power system neutral.

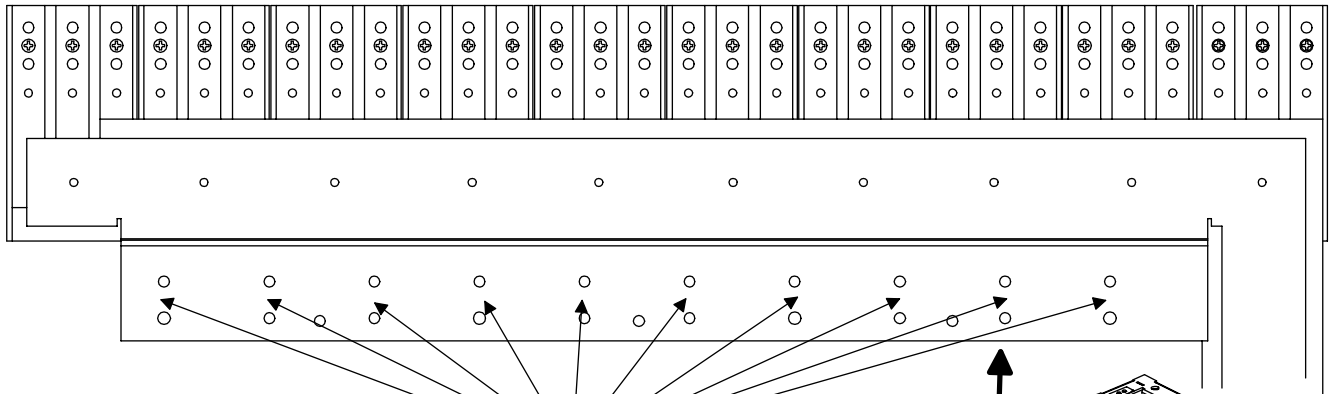
Table 9  
Recommended AC Input Wire Size and Lug Selection  
**Individual PCU Feeds - Up to Ten AC Input Branch Circuits**

480VAC (List A) or 208/240VAC (List B), 3 Phase, 60Hz

Separate Feed per PCU

PCU AC INPUT: 10-32 Studs on 5/8" Centers for Installation of Customer Provided Two-Hole Lugs

PCU #1			PCU #2			PCU #3			PCU #4			PCU #5			PCU #6			PCU #7			PCU #8			PCU #9			PCU #10					
A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C



Frame Ground Studs  
 (10-32 Studs on 5/8" Centers  
 for Installation of Customer Provided Lugs)

- PCU #1
- PCU #2
- PCU #3
- PCU #4
- PCU #5
- PCU #6
- PCU #7
- PCU #8
- PCU #9
- PCU #10

Front View

**AC Input (Dual PCU Feeds) Wire Sizes, Branch Circuit Protection, and Lugs**

**Features**

- ◆ Studs (3/8-16 on 1" centers) are provided for installation of customer provided two-hole AC Input lugs. These studs are accessed from the rear of the PDSC (AC Input 'Power Distribution Service Cabinet').
- ◆ Captive nuts (3/8-16 on 1" centers) are provided for installation of customer provided frame ground lugs. These studs are accessed from the rear of the PDSC (AC Input 'Power Distribution Service Cabinet').
- ◆ For lug mounting hole size and spacing dimensions, refer to the illustration provided in this section.

**Restrictions**

All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting hardware.

Requires optional bolt-on PDSC (AC Input 'Power Distribution Service Cabinet') (List 30 or 31).

For use with List 2 and 12 only.

**Ordering Notes**

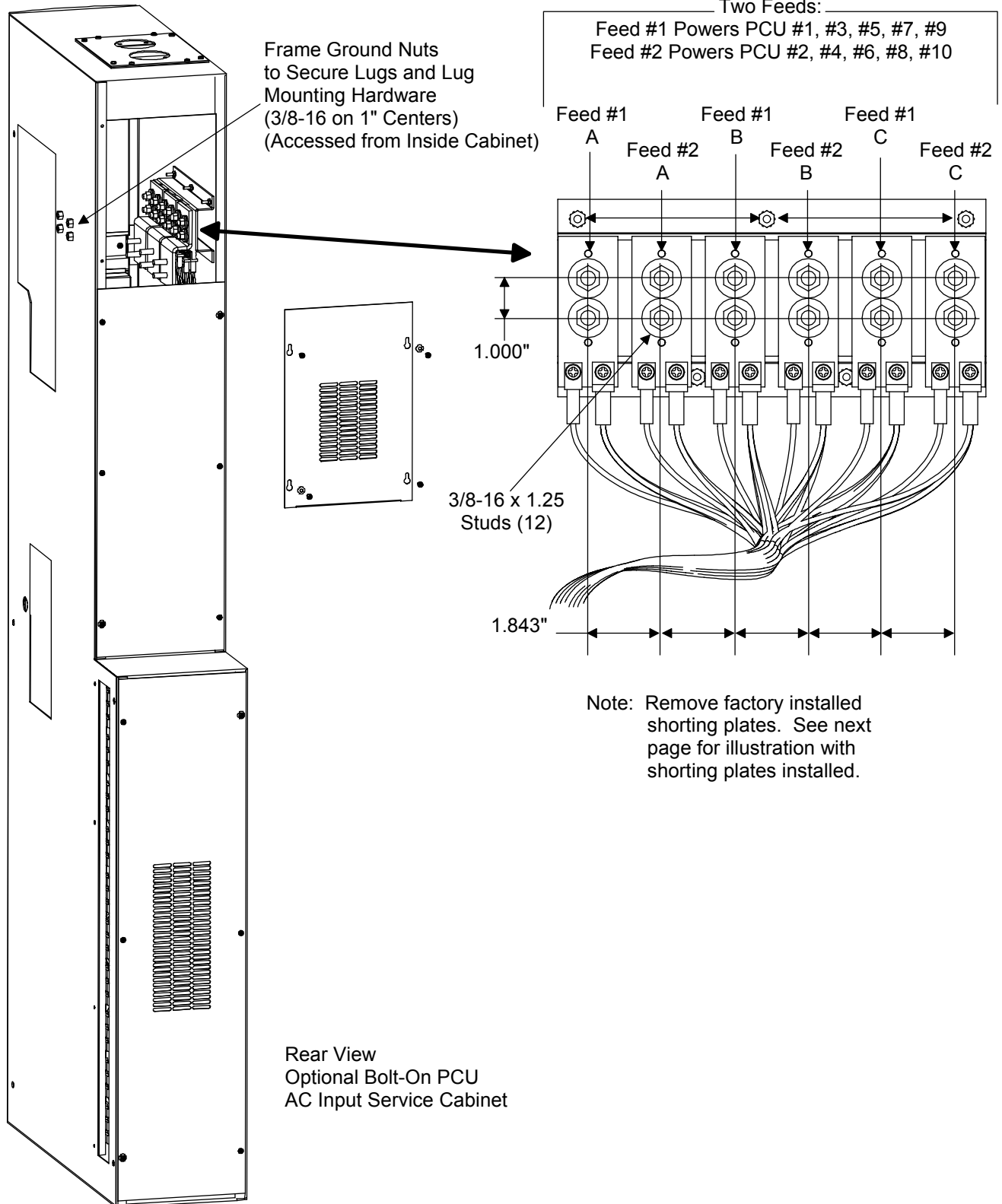
- 1) Refer to Table 10 for recommended wire sizes, branch circuit protection, and lugs.

Ambient Operating Temperature <sup>(1)</sup>	Nominal Input Voltage (VAC)	Feed	Recm Branch Circuit Protection (Amperes) <sup>(2)</sup>	Line		Ground <sup>(5)</sup>	
				Recm 90°C Wire Size (AWG and kcmil) <sup>(1)</sup>	Recommended Crimp Lug <sup>(3)</sup>	Recm 90°C Wire Size (AWG and kcmil) <sup>(4)</sup>	Recommended Crimp Lug <sup>(3)</sup>
30°C and 40°C	480	#1	100	2	245348200	2	245348200
		#2					
	240	#1	200	3/0	245347300	3/0	245347300
		#2					
	208	#1	250	250	245347500	250	245347500
		#2					

- <sup>1</sup> Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at **90°C** conductor temperature, operating in ambients of **30°C** and **40°C** was used. For other operating ambient temperatures, refer to the National Electrical Code. For operation in countries where the NEC is not recognized, follow applicable codes.
- <sup>2</sup> The AC input branch circuit protective device should be of the time-delay or high inrush type.
- <sup>3</sup> Two-hole lug, 3/8" bolt clearance hole, 1" centers. Refer to drawing 031110100 for lug crimping information.
- <sup>4</sup> Equipment grounding conductor size based on recommendations of the NEC 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. For operation in countries where the NEC is not recognized, follow applicable codes.
- <sup>5</sup> Equipment grounding conductors must be provided with the AC input conductors supplied to the Bay. Frame ground terminals must be connected to earth ground, not power system neutral.

Table 10  
Recommended AC Input Wire Size and Lug Selection  
**Dual PCU Feed - Two AC Input Branch Circuits**

480VAC (List A) or 208/240VAC (List B), 3 Phase, 60Hz



**AC Input (Single PCU Feed) Wire Sizes, Branch Circuit Protection, and Lugs**

**Features**

- ◆ Studs (3/8-16 on 1" centers) are provided for installation of customer provided two-hole AC Input lugs. These studs are accessed from the rear of the PDSC (AC Input 'Power Distribution Service Cabinet').
- ◆ Captive nuts (3/8-16 on 1" centers) are provided for installation of customer provided frame ground lugs. These studs are accessed from the rear of the PDSC (AC Input 'Power Distribution Service Cabinet').
- ◆ For lug mounting hole size and spacing dimensions, refer to the illustration provided in this section.

**Restrictions**

All lugs for customer connections must be ordered separately.

Customer needs to supply lug mounting hardware.

Requires optional bolt-on PDSC (AC Input 'Power Distribution Service Cabinet') (List 30 or 31).

For use with List 2 and 12 only.

**Ordering Notes**

- 1) Refer to Table 11 for recommended wire sizes, branch circuit protection, and lugs.

Ambient Operating Temperature <sup>(1)</sup>	Nominal Input Voltage (VAC)	Recm Branch Circuit Protection (Amperes) <sup>(2)</sup>	Line		Ground <sup>(5)</sup>	
			Recm 90°C Wire Size (AWG and kcmil) <sup>(1)</sup>	Recommended Crimp Lug <sup>(3)</sup>	Recm 90°C Wire Size (AWG and kcmil) <sup>(4)</sup>	Recommended Crimp Lugs <sup>(3)</sup>
30°C and 40°C	480	200	3/0	245347300	3/0	245347300
	240	400	600	245348000	600	245348000
	208	500	750	245348100	750	245348100

<sup>1</sup> Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at 90°C conductor temperature, operating in ambients of 30°C and 40°C was used. For other operating ambient temperatures, refer to the National Electrical Code. For operation in countries where the NEC is not recognized, follow applicable codes.

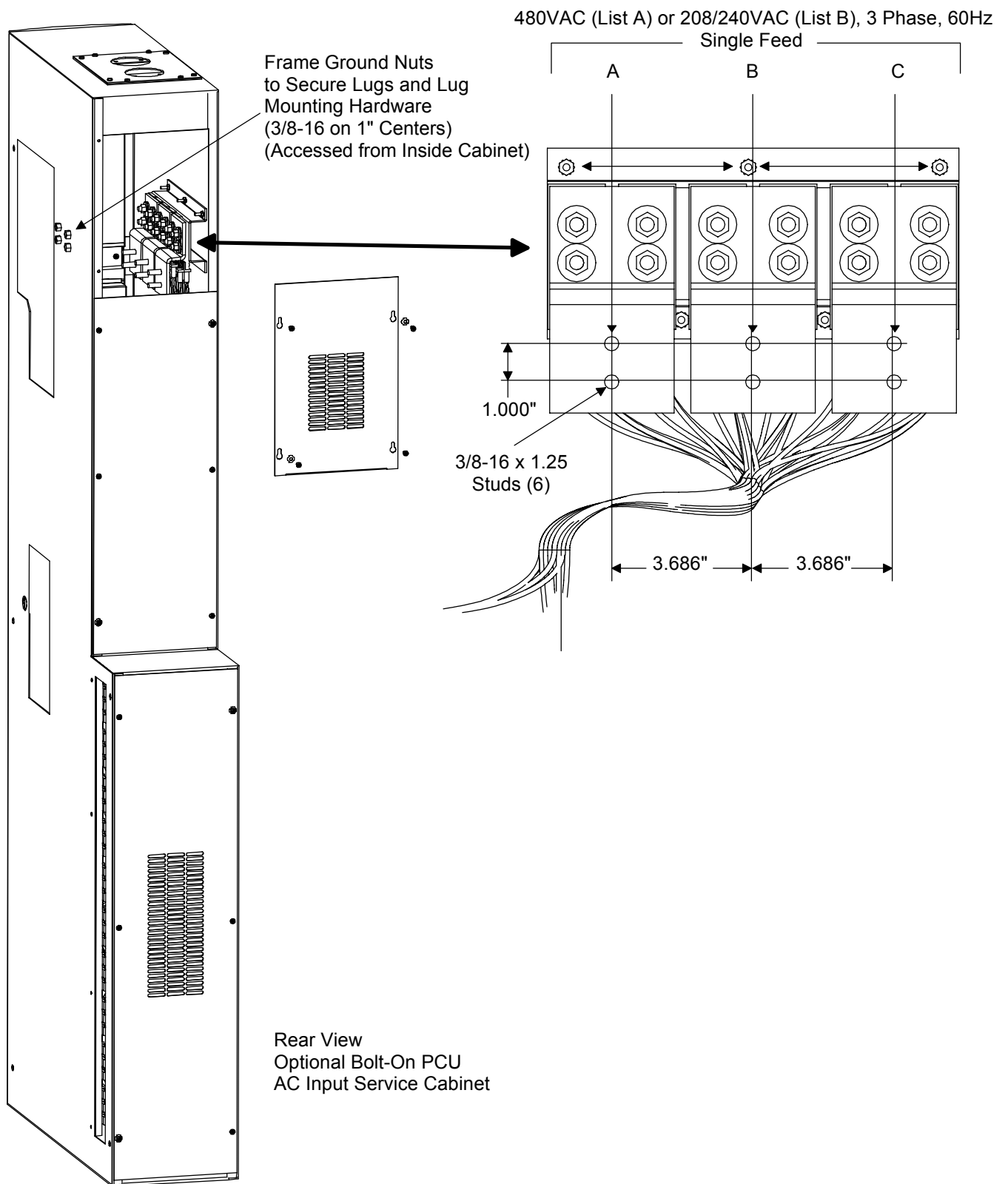
<sup>2</sup> The AC input branch circuit protective device should be of the time-delay or high inrush type.

<sup>3</sup> Two-hole lug, 3/8" bolt clearance hole, 1" centers. Refer to drawing 031110100 for lug crimping information.

<sup>4</sup> Equipment grounding conductor size based on recommendations of the NEC 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. For operation in countries where the NEC is not recognized, follow applicable codes.

<sup>5</sup> Equipment grounding conductors must be provided with the AC input conductors supplied to the Bay. Frame ground terminals must be connected to earth ground, not power system neutral.

Table 11  
Recommended AC Input Wire Size and Lug Selection  
Single PCU Feed - One AC Input Branch Circuit





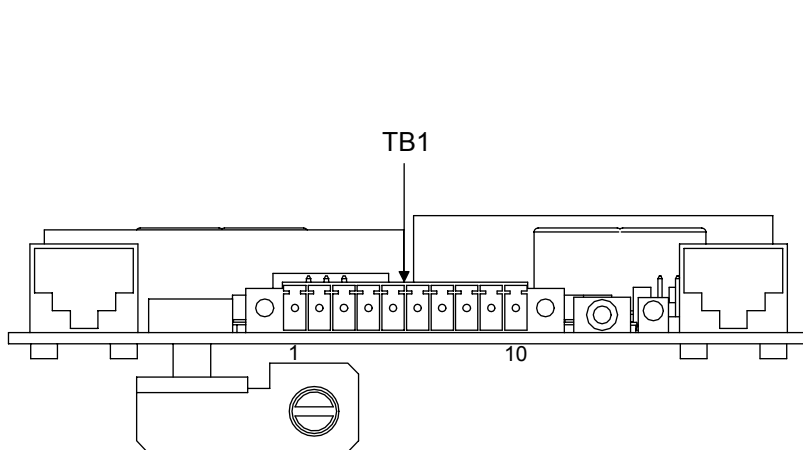
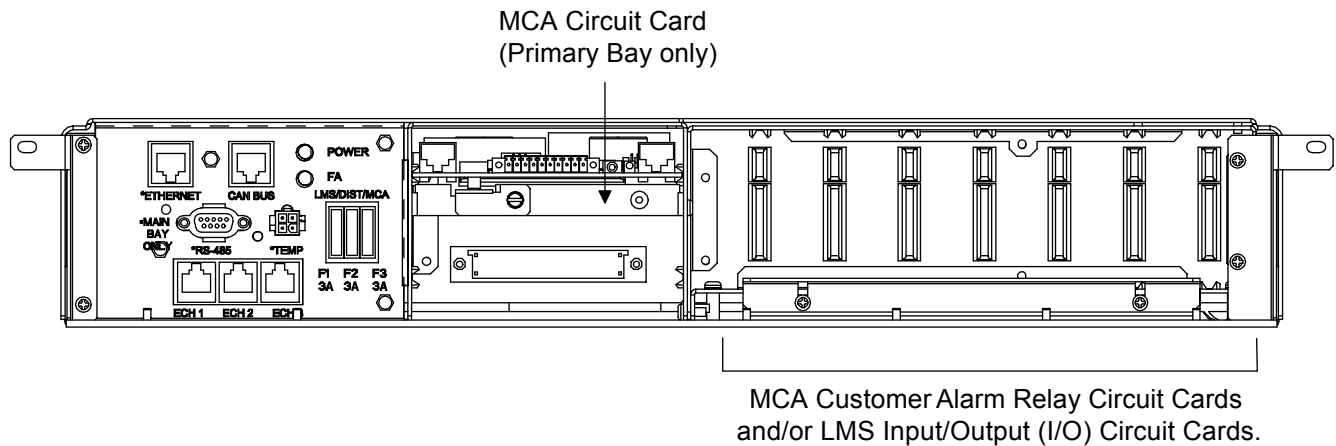
**External Alarm, Reference, and Control Wire Sizes**

**Features**

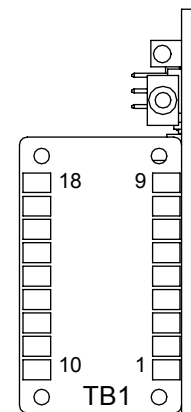
- ◆ External Alarm, Reference, and Control connections are made to TB1 on the MCA circuit card and TB1 on the MCA Customer Alarm Relay Circuit Cards.

Terminals		Recm Wire Size
Capacity	Type	
28 to 16 AWG	Screw Clamp	22 AWG for Loop Lengths Up to 200 ft. 18-20 AWG for Loop Lengths Over 200 ft.

Table 12  
Recommended Alarm, Reference, and Control Wire Size  
(TB1 on MCA Circuit Card)  
(TB1 on MCA Customer Alarm Relay Circuit Card)



MCA Circuit Card P/N 509478  
(Primary Bay)



MCA Customer Alarm  
Relay Circuit Card P/N 514348  
(Primary and/or Secondary Bays)

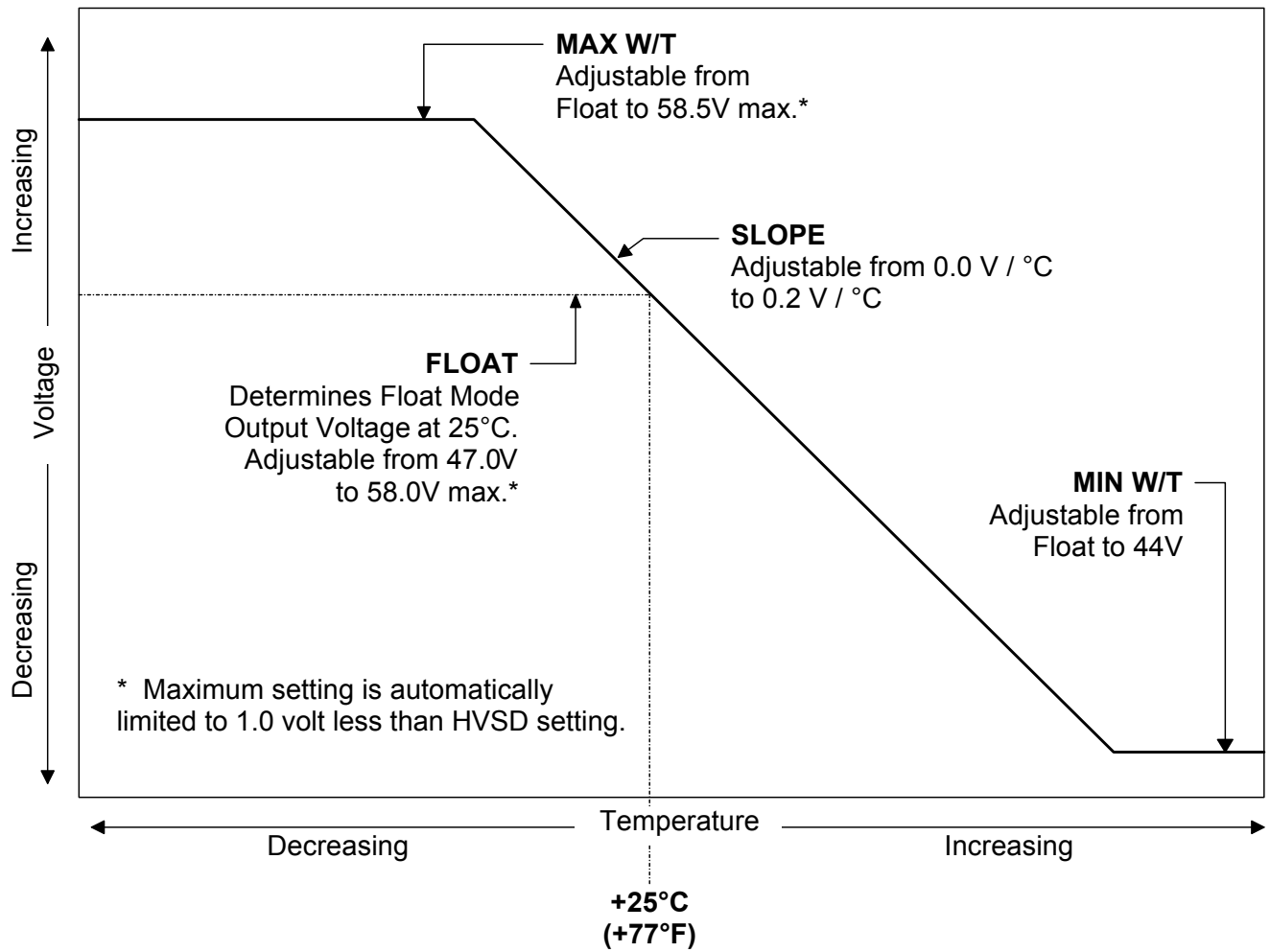
## Optional Battery Charge Temperature Compensation Probe for Digital Compensation

### Features

- ◆ This system can be used with a Battery Charge Temperature Compensation Probe. This probe must be mounted near the battery to sense battery ambient temperature. The probe connects to and allows the MCA to automatically increase or decrease the output voltage of the system to maintain battery float current as battery ambient temperature decreases or increases, respectively. Battery life can be extended when an optimum charge voltage to the battery with respect to temperature is maintained.
- ◆ Refer to the "[Specifications](#)" section of this document for further information.
- ◆ **Temperature Curve:** The following figure details a user defined, via the MCA, Temperature Compensation Probe Curve.

### Ordering Notes

- 1) Order one Battery Charge Temperature Compensation Probe per power system. Part No. 107021 has a 25-foot long cord. Part No. 106824 has a 100 foot-long cord.



Typical Float Charge Thermal Characteristics  
 Using Optional Battery Charge Digital Temperature Compensation Probe

## Replacement/Additional MCA Network Cable

### Features

- ◆ MCA bay-to-bay interconnect cable. Connects between bay expansion ports located on the bay's MCA (Primary Bay) and Router (Secondary Bays) circuit cards.
- ◆ Cable identification color is **yellow**.

### Restrictions

Maximum combined cable length must not exceed 125 feet.

### Ordering Notes

- 1) For a replacement or additional cable, order the proper length cable from those listed below.
  - P/N 514642 (3 feet) (factory provided with List 11)
  - P/N 514643 (4 feet) (factory provided with List 12)
  - P/N 514645 (6 feet)
  - P/N 514646 (50 feet)
  - P/N 514647 (100 feet)

## Replacement/Additional LMS Network Cable

### Features

- ◆ LMS bay-to-bay interconnect cable. Connects between the bay's LMS Echelon expansion ports. Also connects the LMS System to LMS Expansion Assemblies, if furnished.
- ◆ Cable identification color is **blue**.

### Restrictions

Refer to SAG586505000 (LMS System Application Guide) for maximum LMS network cabling length.

### Ordering Notes

- 1) For a replacement or additional cable, order the proper length cable from those listed below.
  - P/N 509070 (6 inches)
  - P/N 514639 (3 feet) (factory provided with List 11)
  - P/N 509900 (4 feet) (factory provided with List 12)
  - P/N 514640 (25 feet)
  - P/N 514641 (150 feet)

## Replacement Circuit Cards

### Ordering Notes

- 1) **PCU:** Order via [List 20](#) or [List 21](#).
- 2) **MCA Circuit Card (Primary Bay):** P/N 509478.
- 3) **Router Circuit Card (Secondary Bay):** P/N 509509.
- 4) **Distribution Monitoring Circuit Card:** P/N 509525.
- 5) **MCA Customer Alarm Relay Circuit Card:** Order via [List 70](#).
- 6) **MCA I/O Circuit Card:** Order per [Optional MCA Input/Output \(I/O\) Cards](#).
- 7) **LMS Primary CPU Circuit Card (Primary Bay):** Order via [List 50](#).
- 8) **LMS Expansion CPU Circuit Card (Secondary Bay):** Order via [List 50](#).

[Home](#)

**LIST OF PARTS**

(This Stocklist may not list every component contained in each List.)

List Number	Qty.	Part Number	Description
<u>1</u>	1	247145300	Banana Jack
	4	425140100	Pigtail Assy.
	1	425140400	Pigtail Assy.
	1	513697	Bracket
	1	513698	Bracket
	1	513892	Rear Shield
	1	514387	Distribution Designation Label Card
	10	514579	Panel
	4	514728	Insulator
	1	514764	Nameplate
	1	520333	Hardware Kit
	10	520334	Pigtail Assy.
	10	520447	Pigtail Assy.
	1	520539	Box Framework Assy.
	1	520684	Distribution Label
	1	520809	Insulator
	2	520897	Rear Offset Cover
	1	520898	Busbar Shield
	20	113594	Busbar Connector Terminal
	1	317535300	Static Discharge Label
	2	513708	Bracket
	1	513709	Plate
	1	513710	Plate
	2	513746	Distribution Assembly
	1	513905	ECU Shelf Assy.
	1	514440	Wire Harness
	1	514447	Busbar
	1	514448	Busbar
	1	514449	Busbar
	1	514450	Busbar
	1	514454	Bracket
	2	514482	Cover
	2	514484	Cover
	6	514492	Bracket
	2	514493	Bracket
	1	514494	Door
	10	514536	Pin Guide
	1	514729	Cover
	1	514730	Shield
	1	515867	Cover
1	515869	Lamination	
1	516023	Lamination	
1	516024	Lamination	
<u>2</u>	1	247145300	Banana Jack
	4	425140100	Pigtail Assy.
	2	425140300	Pigtail Assy.
	1	425140400	Pigtail Assy.
	1	513697	Bracket
	1	513698	Bracket

List Number	Qty.	Part Number	Description
	1	513892	Rear Shield
	1	514387	Distribution Designation Label Card
	1	514482	Cover
	1	514483	Cover
	1	514484	Cover
	10	514579	Panel
	1	514762	Nameplate
	1	520333	Hardware Kit
	10	520334	Pigtail Assy.
	1	520421	Shield
	10	520447	Pigtail Assy.
	1	520539	Box Framework Assy.
	1	520684	Distribution Label
	2	520897	Rear Offset Cover
	1	520898	Busbar Shield
	20	113594	Busbar Connector Terminal
	1	317535300	Static Discharge Label
	2	513708	Bracket
	2	513746	Distribution Assembly
	1	513905	ECU Shelf Assy.
	1	514440	Wire Harness
	1	514447	Busbar
	1	514448	Busbar
	1	514449	Busbar
	1	514450	Busbar
	1	514454	Bracket
	6	514492	Bracket
	2	514493	Bracket
	1	514494	Door
	10	514536	Pin Guide
	4	514728	Insulator
	1	516023	Lamination
	1	516024	Lamination
	1	247145300	Banana Jack
	4	425140100	Pigtail Assy.
	2	425140300	Pigtail Assy.
	1	425140400	Pigtail Assy.
	1	513697	Bracket
	1	513698	Bracket
	1	513892	Rear Shield
	1	514387	Distribution Designation Label Card
	1	514639	Jumper
	1	514642	Jumper
	1	514764	Nameplate
	1	520333	Hardware Kit
	10	520334	Pigtail Assy.
	1	520336	Interconnect Busbar Kit
	10	520447	Pigtail Assy.
	1	520539	Box Framework
	1	520684	Distribution Label
	1	520809	Insulator
	2	520897	Rear Offset Cover
	1	520898	Shield

11

List Number	Qty.	Part Number	Description
	20	113594	Busbar Connector Terminal
	1	317535300	Static Discharge Label
	2	513708	Bracket
	1	513709	Plate
	1	513710	Plate
	2	513746	Distribution Assy.
	1	514440	Wire Harness
	1	514447	Busbar
	1	514448	Busbar
	1	514449	Busbar
	1	514450	Busbar
	1	514454	Bracket
	6	514492	Bracket
	2	514493	Bracket
	1	514495	Door
	10	514536	Pin Guide
	10	514579	Panel
	4	514728	Insulator
	1	514729	Cover
	1	514730	Shield
	1	514755	MCA Expansion Bay Shelf Assy.
	1	515867	Cover
	1	515869	Lamination
	1	516023	Lamination
	1	516024	Lamination
	1	247145300	Banana Jack
	4	425140100	Pigtail Assy.
	2	425140300	Pigtail Assy.
	1	425140400	Pigtail Assy.
	1	509900	Jumper
	1	513697	Bracket
	1	513698	Bracket
	1	513892	Rear Shield
	1	514387	Distribution Designation Label Card
	1	514643	Jumper
	1	514762	Nameplate
	1	520333	Hardware Kit
	10	520334	Pigtail Assy.
	1	520337	Interconnect Busbar Kit
	1	520421	Shield
	10	520447	Pigtail Assy.
	1	520539	Box Framework Assy.
	1	520684	Distribution Label
	2	520897	Rear Offset Cover
	1	520898	Shield
	20	113594	Busbar Connector Terminal
	1	317535300	Static Discharge Label
	2	513708	Bracket
	2	513746	Distribution Assembly
	1	514440	Wire Harness
	1	514447	Busbar
	1	514448	Busbar
	1	514449	Busbar

[12](#)

List Number	Qty.	Part Number	Description
	1	514450	Busbar
	1	514454	Bracket
	6	514492	Bracket
	2	514493	Bracket
	1	514495	Door
	10	514536	Pin Guide
	10	514579	Panel
	4	514728	Insulator
	1	514755	MCA Expansion Bay Shelf Assy.
	1	516023	Lamination
	1	516024	Lamination
<a href="#">20</a>	1	486532600	PCU (200 Ampere / -48 Volt) (480VAC Input) LPS200E50
<a href="#">21</a>	1	486534000	PCU (200 Ampere / -48 Volt) (208/240VAC Input) LPS200D50
<a href="#">30</a>	1	513849	PDSC (AC Input 'Power Distribution Service Cabinet')
	1	514763	Nameplate
<a href="#">31</a>	1	513850	PDSC (AC Input 'Power Distribution Service Cabinet')
	1	514763	Nameplate
<a href="#">32</a>	1	524443	PDSC (AC Input 'Power Distribution Service Cabinet')
	1	524440	Nameplate
<a href="#">35</a>	2	126628	Surge Suppressor
<a href="#">36</a>	2	126627	Surge Suppressor
<a href="#">50</a>	as reqr'd	521185	LMS Main CPU Circuit Card (Primary Bay)
		506153	LMS Expansion CPU Circuit Card (Secondary Bays)
<a href="#">70</a>	1	514348	MCA Customer Alarm Relay Circuit Card
<a href="#">71</a>	1	524550	MCA Analog Input/Output and Binary Input Circuit Card
<a href="#">72</a>	1	524551	MCA Binary Input Circuit Card

[Home](#)

## SPECIFICATIONS

### 1. SYSTEM

#### 1.1 Environmental Ratings

- 1.1.1 Operating Ambient Temperature Range:** 0°C to +40°C (+32°F to +104°F).
- 1.1.2 Storage Ambient Temperature Range:** -40°C to +65°C (-40°F to +149°F).
- 1.1.3 Humidity:** This system is capable of operating in an ambient relative humidity range of 0% to 95%, noncondensing.
- 1.1.4 Altitude:** The maximum operating ambient temperature should be derated by 10°C at an elevation of 10,000 feet above sea level. For elevations between 3,000 feet and 10,000 feet, derate the maximum operating ambient temperature linearly.
- 1.1.5 Heat Dissipation:** With PCU output adjusted to 54.00 volt DC at rated full load and nominal input voltage.

No. of PCUs	Bay Output Current (Amperes)	BTU/Hr (Typical)
1	0 (PCU no load)	0
1	100 (PCU half load)	1900
1	200 (PCU full load)	4400
2	400	8800
3	600	13200
4	800	17600
5	1000	22000
6	1200	26400
7	1400	30800
8	1600	35200
9	1800	39600
10	2000	44000

- 1.1.6 Ventilation Requirements:** The PCUs are fan cooled and utilize front to back forced ventilation. The Power/Distribution Bays must be mounted so ventilating openings are not blocked and temperature of the air entering the PCU shelf does not exceed the Operating Ambient Temperature Range stated above.

Also, the distance from the rear of a Power/Distribution Bay to a wall or other solid structure must not be less than 6 inches. This will assure proper air flow through the PCUs. See also Paragraph 1.1.12 (Mounting).

- 1.1.7 Audible Noise:** The audible noise does not exceed the following when measured at any point two feet from any vertical surface of a Power/Distribution Bay and five feet from the floor using a Sound Level Meter conforming to ANSI S1.4.

No. of PCUs	Audible Noise
1	65 dBA
10	75 dBA

- 1.1.8 EMI/RFI Suppression:** PCUs operating in a Power/Distribution Bay conform to the requirements of FCC rules Part 15, Subpart B, Class A for Radiated and Conducted emissions limits.



### 1.1.9 Surge Protection

**(A) Standard:** Compliance with EN61000-4-5 Installation Class 4, and capable of withstanding surges per ANSI/IEEE C 62.41-1991 Category B across the input terminals.

**Note:** *This level of protection is a widely used standard for telecommunications power equipment. As with all such equipment, it is the end user's responsibility to provide an adequately sized Surge Suppression Device at the commercial power service entrance of the building that reduces all incoming surges to levels below the classes/categories stated for the equipment.*

**(B) When Equipped with List 35 or List 36:** Compliance with EN61000-4-5 Installation Class 4, and capable of withstanding surges per ANSI/IEEE C62.41-1991 Category A, Category B, and Category C, and ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100KA 8/20us, 10KA 10/350us.

**1.1.10 ESD Protection:** Complies with EN61000-4-2 Level 4 (8kV contact).

**1.1.11 Electrical Fast Transient / Burst Immunity:** Complies with EN61000-4-4 Level 4.

**1.1.12 Mounting:** Rear access is required for wiring. Recommended minimum aisle space clearance is 2'6" for the front of the Power/Distribution Bay and 2' for the rear of the Power/Distribution Bay.

## 1.2 Compliance Information

**1.2.1 Safety Compliance:** This power board is UL Listed ("c UL") as a DC Power Distribution Center for Communications Equipment. This unit meets the requirements of CSA 22.2, No. 225 and is tested and Certified by UL ("c UL") as a Custom Built Power Distribution Center for Communications Equipment.

**1.2.2 NEBS Compliance:** Compliance verified by a Nationally Recognized Testing Laboratory (NRTL) per GR-1089-CORE and GR-63-CORE. Contact Emerson Network Power for NEBS compliance reports.

## 1.3 Local Controls and Indicators

**1.3.1 "Bay Alarm" Indicator:** Located at the top center of each bay.

Green = OK  
Red = Bay Failure  
Yellow (flashing) = Identified by the MCA

**1.3.2** See also specifications for PCU, MCA, and LMS.

## 2. DC DISTRIBUTION

### 2.1 Ratings

**2.1.1 Power/Distribution Bay:** 2400 amperes, maximum, per bay.  
10,000 amperes, maximum, per system.

**2.1.2 Distribution Row:** 1200 amperes, maximum.  
Each Power/Distribution Bay has two (2) Distribution Rows.

**2.1.3 Fuse/Circuit Breaker Mounting Positions:** Each Distribution Row contains 24 fuse/circuit breaker mounting positions which provides 48 fuse/circuit breaker mounting positions per bay. Note that some fuse/circuit breaker combinations require more than one fuse/circuit breaker mounting position. Refer to [Distribution Devices](#) under *ACCESSORY INFORMATION* for details.

### 2.2 Local Controls and Indicators

**2.2.1 MCA Component Identification Indicator:** Each MCA component (i.e. PCU, Row Monitoring Circuit Card, Bay Router Circuit Card, MCA Relay Circuit Card) contains an ID LED Indicator.

The ID indicator illuminates Green when the component is OK, Red when the component has failed, and flashing yellow when the component is identified by the MCA.

**2.2.2 "Distribution Row" Indicators:** Each distribution row contains an indicator located on a hinged door panel covering the row's MCA Monitoring circuit card.

- Green = OK
- Red = Card Failure
- Yellow (flashing) = Identified by the MCA

### 3. PCU

#### 3.1 Output Ratings

**3.1.1 Voltage:** Nominal -48 volts DC, Positive Ground.

**(A) Without Battery Charge Temperature Compensation:** Float voltage is adjustable from 47.00 to 58.00 volts DC. Test/equalize voltage is adjustable from 45.00 to 58.00 volts DC. Both float and test/equalize voltages are factory set at 52.00 volts, unless otherwise specified. The output voltage temperature coefficient does not exceed 0.01% per degree centigrade from 0°C to +40°C.

**(B) With Battery Charge Digital Temperature Compensation Probe:** With an optional battery charge digital temperature compensation probe installed, the MCA automatically increases or decreases the output voltage as battery ambient temperature decreases or increases, respectively. Float voltage is factory set at approximately 54.48 volts at 25°C battery ambient. The float and test/equalize voltage range is the same as without battery charge temperature compensation. Using battery and equipment manufacturers' recommendations, the user selects the following temperature compensation curve parameters via the MCA. Refer to "Typical Float Charge Thermal Characteristics Using Optional Battery Charge Digital Temperature Compensation Probe" in *Battery Charge Temperature Compensation Probe for Digital Compensation* under *ACCESSORY INFORMATION*.

- (1) The temperature compensation slope in volts/°C. Adjustable from zero to 200 millivolts/°C. Factory set at 0V/°C (DIGITAL TC OFF).
- (2) The maximum voltage limit in volts DC. Adjustable from float up to 58.5 volts DC, but automatically limited to one volt below the High Voltage Shutdown setting. Factory set at 56.5 volts DC.
- (3) The minimum voltage limit in volts DC. Adjustable from float down to 44 volts DC. Factory set at 50.0 volts DC.

**3.1.2 Current:** Two hundred (200) amperes per PCU, up to a total of 2,000 amperes per Power/Distribution Bay with ten (10) PCUs installed, and up to a total of 10,000 amperes per system when equipped with 50 PCUs.

#### 3.1.3 Regulation

**(A) Static:** The MCA controls the steady state output voltage to within ±0.05% of any voltage setting within the range of 44.0 to 58.0 volts DC for any and all combinations of load from no load to full load, input voltage, and input frequency at a constant ambient temperature. If the MCA's regulation feature is disabled for any reason, steady state regulation is ±1.0% as controlled within the PCUs.

**(B) Dynamic Response:** For any step load change from 10% to 90% or from 90% to 10% of full rated load within 250 microseconds, shall not cause the voltage measured at the output to overshoot or undershoot more than 5% of the regulated output level within 1 millisecond. The output voltage must return and stay within the ±1% regulation band within 4 milliseconds and within the ±0.5% regulation band within 3 seconds.

Any step change of the line voltage within the limits specified in Paragraph 3.2.1 shall not cause the output voltage to deviate outside the  $\pm 0.5\%$  regulation band.

**3.1.4 Filtering (with or without battery):** Typical readings were taken at nominal input voltage, nominal output voltage, 50% load, and 25°C (77°F) ambient.

**(A) Voice Band Noise:** Complies with Telcordia GR-947-CORE.

(1) Typically 13 dBm with C-message weighting. Does not exceed 32 dBm C.

(2) Typically 0.100 millivolt psophometric. Does not exceed 1 millivolt psophometric.

**(B) Wide Band Noise:** Complies with Telcordia GR-947-CORE.

(1) Typically 150 millivolt peak-to-peak. Does not exceed 200 millivolt peak-to-peak.

(2) Typically 10 millivolts rms. Does not exceed 100 millivolt rms.

**3.2 Input Ratings (480VAC – List 20)**

**3.2.1 Voltage:** Nominal 480 volts AC, three phase, 60 Hz, with an operating range of 408 to 528 volts. Acceptable input frequency range is 57 to 63 Hz.

**3.2.2 Harmonic Content:** Complies with IEEE-519-1992. Voltage harmonic distortion of less than 5% when operating on a line impedance of 0.104 ohms or less.

**3.2.3 Inrush Current:** Peak does not exceed 6 times the RMS input current at full load, under any conditions of input voltage within the rated input voltage range stated in Paragraph 3.2.1 and for any duration of AC input interrupts. Under the above conditions, standard AC distribution circuit breakers will not trip.

**3.2.4 Typical Input Data:** 60 Hz input.

**(A)** System output is initially adjusted to 54.48 volts DC as measured at the output bus at 50% of full load and nominal input.

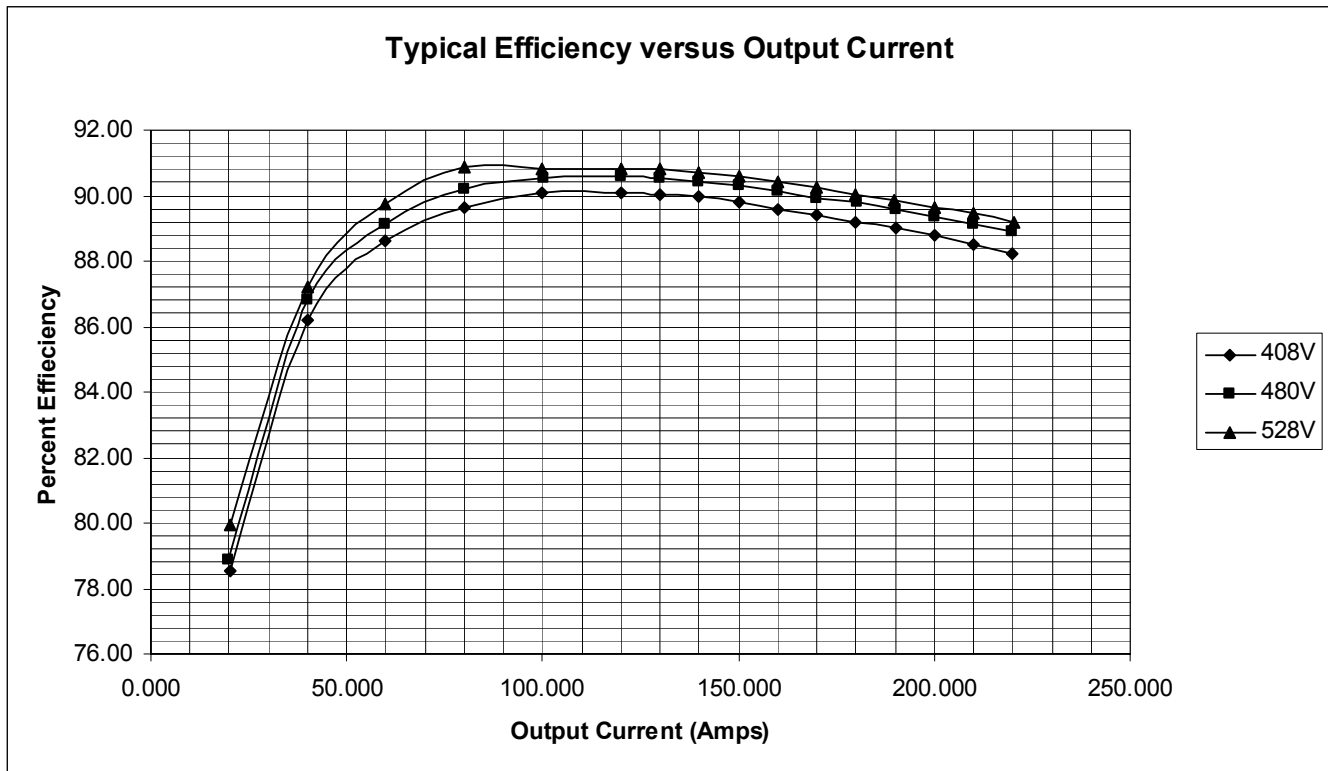
Number of PCUs Installed	Nominal Input Voltage	Percent of Full Load	Input Current (Amperes)	Input VA	Input Watts	Power Factor	Efficiency %
1	480	0	0.155	129	90	0.700	--
		25	3.811	3169	3061	0.966	89.00
		50	7.293	6071	5968	0.983	90.55
		75	10.858	9030	8958	0.992	90.30
		100	14.562	12121	12048	0.994	89.33

Number of PCUs Installed	Nominal Input Voltage	Percent of Full Load	Input Current (Amperes)	Input VA	Input Watts	Power Factor	Efficiency %
5	480	0	0.775	645	450	0.700	--
		25	15.055	15845	15305	0.966	89.00
		50	36.465	30355	29840	0.983	90.55
		75	54.290	45150	44790	0.992	90.30
		100	72.810	60605	60240	0.994	89.33

[Home](#)

Number of PCUs Installed	Nominal Input Voltage	Percent of Full Load	Input Current (Amperes)	Input VA	Input Watts	Power Factor	Efficiency %
10	480	0	1.550	1290	900	0.700	--
		25	38.110	31690	30610	0.966	89.00
		50	72.930	60710	59080	0.983	90.55
		75	108.580	90300	89380	0.992	90.30
		100	145.620	121210	120980	0.994	89.33

**(B) Typical Efficiency versus Output Current:**



(C) Maximum input current at 100% of full load with output adjusted to 58 volts DC as measured at the output bus.

Nominal Input Voltage	Input Voltage	Number of PCUs Installed	Input Current (Amperes)
480	408	1	18.44
		2	36.89
		3	55.32
		4	73.77
		5	92.20
		6	110.64
		7	129.08
		8	147.55
		9	165.96
		10	184.40

**3.3 Input Ratings (208/240VAC – List 21)**

**3.3.1 Voltage:** Nominal 208/240 volts AC, three phase, 60 Hz, with an operating range of 176 to 264 volts. Acceptable input frequency range is 47 to 63 Hz.

**3.3.2 Harmonic Content:** Complies with IEEE-519-1992. Voltage harmonic distortion of less than 5% when operating on a line impedance of 0.104 ohms or less.

**3.3.3 Inrush Current:** Peak does not exceed 6 times the RMS input current at full load, under any conditions of input voltage within the rated input voltage range stated in Paragraph 3.2.1 and for any duration of AC input interrupts. Under the above conditions, standard AC distribution circuit breakers will not trip.

**3.3.4 Typical Input Data:** 60 Hz input.

(A) System output is initially adjusted to 54.48 volts DC as measured at the output bus at 50% of full load and nominal input.

Number of PCUs Installed	Nominal Input Voltage	Percent of Full Load	Input Current (Amperes)	Input VA	Input Watts	Power Factor	Efficiency %
1	208	0	0.100	120	84	0.700	--
		25	8.720	3149	3078	0.977	88.30
		50	16.855	6075	6032	0.992	89.97
		75	25.720	9163	9132	0.996	89.03
		100	34.480	12398	12371	0.997	87.51
1	240	0	0.080	109	82	0.750	--
		25	7.702	3209	3115	0.970	88.88
		50	14.590	6074	6004	0.988	90.41
		75	22.070	9157	9106	0.994	89.42
		100	29.610	12335	12294	0.996	88.06

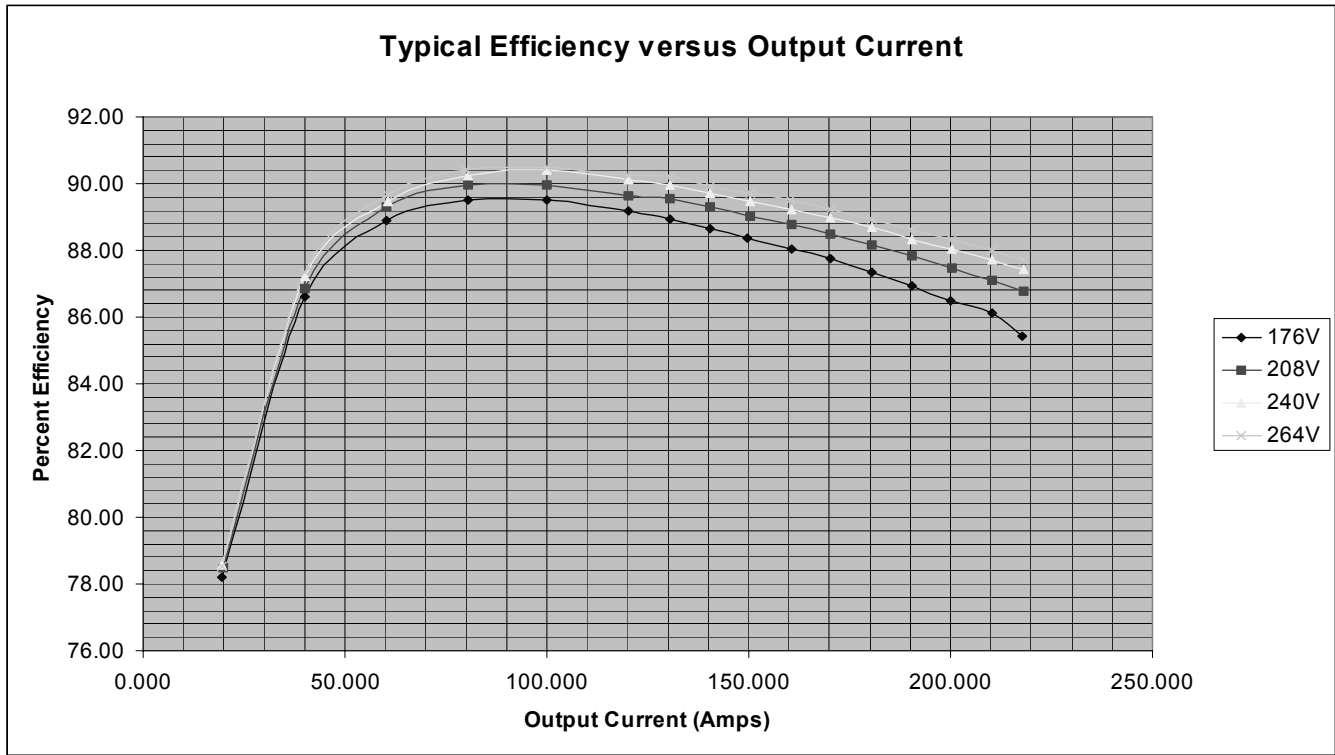
[Home](#)

Number of PCUs Installed	Nominal Input Voltage	Percent of Full Load	Input Current (Amperes)	Input VA	Input Watts	Power Factor	Efficiency %
5	208	0	0.50	600	420	0.700	--
		25	43.60	15745	15390	0.977	88.30
		50	84.28	30375	30160	0.992	89.97
		75	128.60	45815	45660	0.996	89.03
		100	172.40	61990	61855	0.997	87.51
5	240	0	0.40	545	410	0.750	--
		25	38.51	16045	15575	0.970	88.88
		50	72.95	30370	30020	0.988	90.41
		75	110.35	45785	45530	0.994	89.42
		100	148.05	61675	61470	0.996	88.06

Number of PCUs Installed	Nominal Input Voltage	Percent of Full Load	Input Current (Amperes)	Input VA	Input Watts	Power Factor	Efficiency %
10	208	0	1.00	1200	840	0.700	--
		25	87.20	31490	30780	0.977	88.30
		50	168.55	60750	60320	0.992	89.97
		75	257.20	91630	91320	0.996	89.03
		100	344.80	123980	123710	0.997	87.51
10	240	0	0.80	1090	820	0.750	--
		25	77.02	32090	31150	0.970	88.88
		50	145.90	60740	60040	0.988	90.41
		75	220.70	91570	91060	0.994	89.42
		100	296.10	123350	122940	0.996	88.06

[Home](#)

**(B) Typical Efficiency versus Output Current:**



**(C) Maximum input current at 100% of full load with output adjusted to 58 volts DC as measured at the output bus.**

Nominal Input Voltage	Input Voltage	Number of PCUs Installed	Input Current (Amperes)	Nominal Input Voltage	Input Voltage	Number of PCUs Installed	Input Current (Amperes)
208	208	1	36.78	240	240	1	31.71
		2	73.56			2	63.42
		3	110.34			3	95.13
		4	147.12			4	126.84
		5	183.90			5	158.55
		6	220.68			6	190.26
		7	257.46			7	221.97
		8	294.24			8	253.68
		9	331.02			9	285.39
		10	367.80			10	317.10

### 3.4 Standard Features

**3.4.1 Type of Power Conversion Circuit:** High frequency.

**3.4.2 Float Charging Output Mode:** In this mode of operation, system output voltage is constant and output current does not exceed the current limit setting. During normal operation, the battery is not required to furnish load current and remains in a fully charged condition.

The float voltage setting can be checked and/or adjusted without removing a PCU or affecting the load. One adjustment changes the output of all PCUs.

*Note: If the current demanded by the load exceeds the current limit setting of the system, the battery is required to furnish the difference in load current and begins discharging.*

*Note: If the system is used with a digital battery charge temperature compensation probe, the MCA automatically adjusts system output. This ensures proper voltage to the battery as battery ambient temperature fluctuates.*

**3.4.3 Test/Equalize Charging Output Mode:** This mode of operation is used if higher output voltage is required for equalizing the charge on all battery cells of a conventional flooded cell battery, or for recharging the battery following a commercial power failure.

If the installation site does not require system equalize mode of operation, the equalize feature can be used as a test feature. System equalize voltage can be adjusted to a test voltage value. Placing the system into the test/equalize mode causes system output voltage to increase or decrease to this test voltage value.

The test/equalize voltage setting can be checked and/or adjusted without removing a PCU or affecting the load. One adjustment changes the output of all PCUs.

*Note: If the system is used with a battery charge temperature compensation probe, typical equalize mode of operation is not used.*

**3.4.4 Output Mode of Operation Selection:** There are four methods of placing the system from the float mode to the test/equalize mode.

**(A) Method 1 (Manual Test/Equalize):** A user manually places the system into the test/equalize mode via the MCA interface. A user must manually return the system to the float mode via the MCA interface.

**(B) Method 2 (Manually Initiated Timed Test/Equalize):** A user manually places the system into the test/equalize mode via the MCA interface. The system automatically returns to the float mode after a preset programmable time period (1-99 hours, in increments of one hour).

**(C) Method 3 (Automatic Test/Equalize):**

THE AUTOMATIC EQUALIZE FEATURE IS INTENDED FOR USE ONLY WITH WET CELL BATTERIES. USING THIS FEATURE WITH VALVE REGULATED BATTERIES IS NOT RECOMMENDED.

This feature can be enabled or disabled by a user via the MCA. The default state is disabled.

The Automatic Equalize feature is a time based function that is controlled by a customer selectable multiplier and by the Battery on Discharge (BOD) alarm setpoint. The MCA's default setting is for a multiplier of zero, which disables the Automatic Equalize feature.

When the Automatic Equalize feature is enabled, if system voltage drops to less than the BOD alarm setpoint, the MCA initiates a timing cycle to measure the discharge time period. The MCA requires at least 15 minutes of continuous BOD alarm in order to prevent nuisance equalization cycles. When system voltage rises to above the BOD alarm setpoint, the MCA ends the discharge timing cycle and (assuming a minimum of 15



minutes has elapsed) places the PCUs into the equalize mode for a customer selectable multiple of the discharge time period (the discharge time period includes the initial 15 minutes).

The equalize time period can be set for 0 to 15 times the discharge time period, up to a maximum of 300 hours. A zero (0) setting disables the feature.

**(D) Method 4 (External Test/Equalize):** A user (or external equipment) places the system into the test/equalize mode by applying an external signal to the system. The system returns to the float mode when the external signal is removed. This method overrides the other three methods.

**3.4.5 Input Protection:** Lists 1 and 11 provide connections for up to ten AC input branch circuits, one per PCU mounting position. Customer to provide AC input branch circuit protection.

Lists 2 and 12 must be used with a PDSC (AC Input 'Power Distribution Service Cabinet'). This cabinet provides connections for one or two AC input branch circuits. A 30 ampere AC input circuit breaker with an interrupting capacity of 22kA ([List 30](#)) or 65kA ([List 31](#)) amperes at 480 volts AC is provided for each PCU mounting position.

**(A) Low AC Input Voltage Inhibit:** If AC input voltage decreases to a preset non-adjustable value, the PCU's power conversion circuitry inhibits, disabling system output. When AC input voltage increases to another preset non-adjustable value, the system automatically restarts.

**(1) 480VAC Input:** Designed to inhibit at approximately 385 volts AC, and to restart at approximately 400 volts AC.

**(2) 208/240VAC Input:** Designed to inhibit at approximately 160 volts AC, and to restart at approximately 166 volts AC.

**(B) High AC Input Voltage Inhibit:** If AC input voltage increases to a preset non-adjustable value, the PCU's power conversion circuitry inhibits, disabling system output. When AC input voltage decreases to another preset non-adjustable value, the system automatically restarts.

**(1) 480VAC Input:** Designed to inhibit at approximately 550 volts AC, and to restart at approximately 535 volts AC.

**(2) 208/240VAC Input:** Designed to inhibit at approximately 278 volts AC, and to restart at approximately 274 volts AC.

**(C) Phase Loss:** If any of the three phases of the AC input voltage decreases below the lower limit or increases above the upper limit in Paragraph 3.2.1, the PCU's power conversion circuitry inhibits, disabling system output. When the phase is restored, the system automatically restarts.

### 3.4.6 Output Protection

**(A) Current Limiting:** The maximum current delivered by the system can be programmed from 10% to 110% of total system capacity. The MCA automatically adjusts the current limit circuit on each PCU so that this value is not exceeded. If a PCU fails, the MCA automatically resets each remaining PCU's current limit point to maintain this value. The MCA also insures that the current limit circuit on any PCU is not set above 110% of its capacity. The default current limit setting is the sum of each installed PCU's output rating. If an additional PCU is added to the system, the system current limit is automatically increased by the rating of the new PCU and the new current limit value is displayed.

The current limiting point can be adjusted without removing a PCU. One adjustment changes the setting of all PCUs.

The current limit is factory set at 100% of rated full load, unless otherwise specified.

[Home](#)

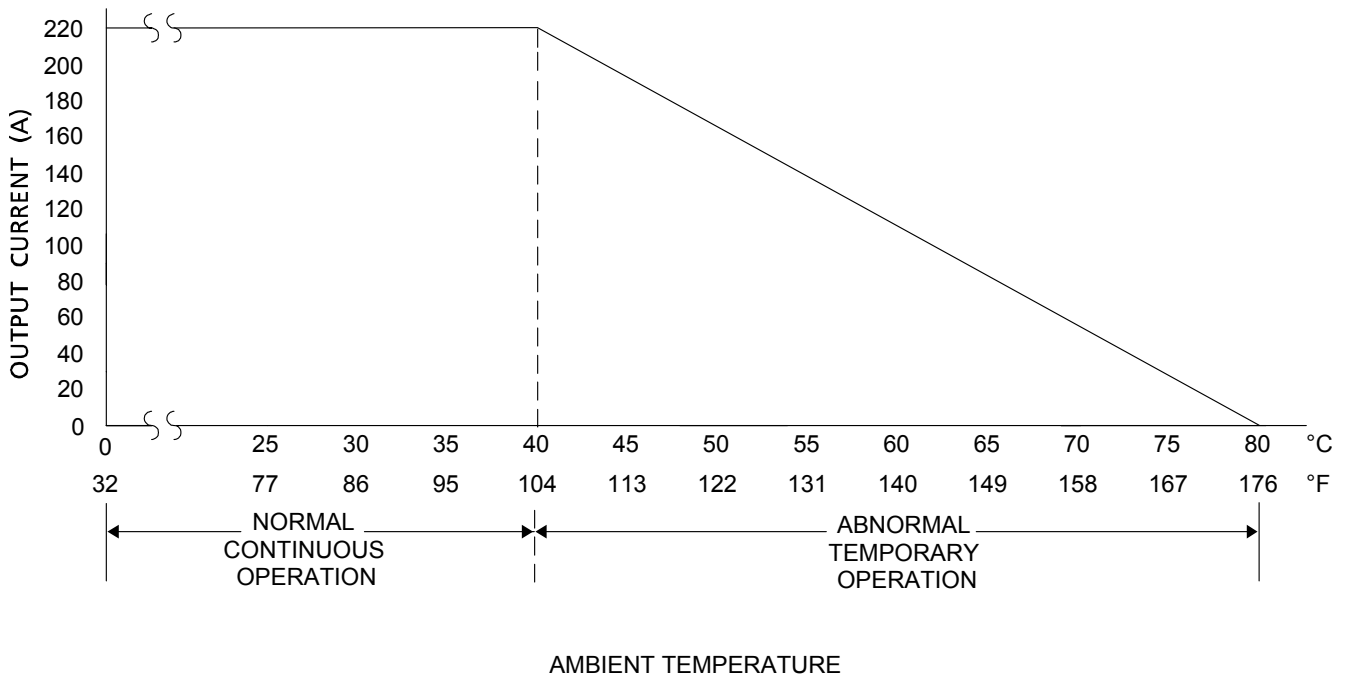
- (B) Output Fusing:** Output fusing is provided in each PCU. If a fuse opens, local and remote PCU Fail Alarms activate. This fusing is not customer replaceable.
- (C) Thermal Current Limiting:** Each PCU continuously monitors the ambient temperature surrounding the power conversion unit circuit. If this temperature for any reason (such as a high ambient office temperature) increases above approximately +40°C (+104°F), the PCU will not shut down. Rather, the PCU will limit its maximum output current to maintain the temperature of the power conversion circuit within design parameters. Full current capability is restored when the temperature decreases to below approximately +40°C (+104°F). The following figure illustrates typical operating parameters.

**Note:** *If the current limit setting is greater than the maximum allowable output current for the existing room ambient temperature, the current limit setting will automatically be reduced. Refer to the following figure. Local and external indications will be given.*

**Warning:** *The PCU is rated for continuous operation at full output current up to +40°C (+104°F). Operation between +40°C and +80°C (+104°F and +176°F) is considered abnormal and should be used on a temporary<sup>1</sup> basis only.*

<sup>1</sup> **Temporary Operation at Abnormal Temperature:** Temporary operation refers to a period of not more than eight consecutive hours per day, and a total of not more than 15 days in a year. (This refers to a total of 120 hours in any given year, but no more than 15 occurrences in that one year period.)

PCU THERMAL CURRENT LIMIT CURVE  
(TYPICAL)



Typical Thermal Current Limit Curve

- (D) High Temperature Inhibit:** A thermal switch present in each PCU continuously monitors the temperature of the power conversion circuit. If the temperature of the power conversion circuitry exceeds the design limits a circuit will inhibit the PCU. Manual restart is then required.

## (E) High Voltage Shutdown

- (1) **Internal:** If PCU output voltage exceeds an adjustable preset value and is delivering more than 10% of its rated current, the PCU shuts down.

After approximately 3 seconds, the PCU automatically restarts. If PCU output voltage again exceeds the high voltage shutdown value within 5 minutes, the PCU shuts down and locks out. Manual restart is then required. If the PCU does not experience a high voltage condition within the 5 minute time period, the restart circuit is reset.

If two or more PCUs are installed in the Power/Distribution Bay, or if the Power/Distribution Bay is paralleled with other Power/Distribution Bays, only the PCU causing the high voltage condition shuts down.

The high voltage shutdown point can be checked and/or adjusted without removing a PCU. One adjustment changes the setting of all PCUs.

Adjustable from 48.00 to 59.50 volts DC. Factory set at 57.50 volts, unless otherwise specified.

- (2) **Remote:** See Paragraph 4.1.13 (B).

- (3) **Backup:** If PCU output voltage exceeds a second (non-adjustable) value, the PCU shuts down and locks out regardless of load. Manual restart is then required.

- 3.4.7 DC/DC Converter Failure:** If a PCU's DC/DC converter fails, the PCU shuts down. After approximately 3 seconds, the PCU automatically restarts. If a DC/DC converter failure condition occurs again within 5 minutes, the PCU shuts down and locks out. Manual restart is then required. If the PCU does not experience a DC/DC converter failure condition within the 5 minute time period, the restart circuit is reset.
- 3.4.8 Power Factor Corrector Converter Failure:** If a PCU's power factor corrector converter fails, the PCU shuts down. After approximately 3 seconds, the PCU automatically restarts. If a power factor corrector failure condition occurs again within 5 minutes, the PCU shuts down and locks out. Manual restart is then required. If the PCU does not experience a power factor corrector failure condition within the 5 minute time period, the restart circuit is reset.
- 3.4.9 Thermal Shutdown:** If the internal temperature of a PCU exceeds the over temperature protection threshold, the PCU shuts down. After approximately 3 minutes, the PCU automatically restarts. If the internal temperature of the PCU again exceeds the over temperature protection threshold within 30 minutes, the PCU shuts down and locks out. Manual restart is then required. If the internal temperature of the PCU does not exceed the over temperature protection threshold within the 30 minute time period, the thermal shutdown lockout circuit is reset.
- 3.4.10 Paralleling:** This system may be connected in parallel with any rectifier of the same polarity and adjusted to the same output voltage.
- 3.4.11 Load Sharing:** The MCA load sharing feature automatically balances the load to within  $\pm 1\%$  of the PCUs rated output currents. If the MCA's load sharing feature is disabled for any reason, pre-programmed slope control in each PCU balances the load to within  $\pm 10\%$  of their rated output currents. The MCA will balance a system of up to 50 PCUs within 5 minutes. The MCA's load sharing feature is disabled whenever the system is in current limit, the system is delivering more than 97% capacity, or the system is delivering less than 3% capacity.

[Home](#)

**3.4.12 Output Current Walk-In:** Output current gradually increases after the system is switched on, or AC service is supplied or restored as indicated below.

Load Current %	Minimum Elapsed Time (seconds)
20	-
50	2.5
75	5.0
100	8.0

**3.4.13 Cooling:** Each PCU contains six (6) fans for forced convection cooling. If one fan in a PCU fails, the PCU continues to operate but at reduced output current (maximum output current is reduced to 50% of rated output current). If two or more fans fail, the PCU's power conversion circuitry inhibits.

**3.4.14 Local Controls:** See Operation section of the User Manual for complete descriptions.

Location	NAME / Description	Type
PCU	Standby/Operate Switch	Rocker Switch

**3.4.15 Local Status and Alarm Indicators:** See Operation section of the User Manual for complete descriptions.

Location	NAME / Description	Type
PCU	AC/Identification	LED Green = AC OK Yellow (blinking) = Being ID'd
	PCU Fail/Minor	LED Red = PCU Fail Red (blinking) = PCU in low voltage inhibit mode Yellow = Minor Alarm Yellow (blinking) = communications with MCA lost
	Output Current	10-Segment Green LED Indicator Bar (blinks when in overload condition)

## 4. MCA

### 4.1 Standard Features

**4.1.1 MCA Interface:** You interface with the MCA locally via the MCA Control Panel located on the outside of the primary Power/Distribution Bay's front door.

You can also interface with the MCA via the LMS, if furnished.

**4.1.2 MCA Local Display:** Provides digital metering of system load voltage and current, individual PCU output, and individual load shunts. Also displays system alarm messages and adjustment information, as detailed in Paragraph 4.1.12 (*MCA Display*).

**4.1.3 MCA Meter Accuracy:**  $\pm 0.01$  V,  $\pm 0.005\%$  / °C

**4.1.4 MCA Universal Adjustment Circuit:** Provides single point control of float output voltage, test/equalize output voltage, high voltage shutdown, and current limit adjustments.

**Note:** *If the MCA should fail, the PCUs remember the float and high voltage shutdown settings last delivered by the MCA. The current limit setting of each PCU goes to 100% of rated full load.*

Provides adjustments for all MCA alarm and control circuits. Adjustment ranges and factory settings as follows.

All adjustments can be performed locally via the MCA Control Panel, and most can be performed remotely via the LMS (if furnished).

- (A) **System High Voltage #1 Alarm:** Adjustable from 48.00 to 59.00 volts DC. Factory set at 55.5 volts, unless otherwise specified.
- (B) **System High Voltage #2 Alarm:** Adjustable from 48.00 to 59.00 volts DC. Factory set at 56.5 volts, unless otherwise specified.
- (C) **Battery On Discharge Alarm:** Adjustable from 40.00 to 56.00 volts DC. Factory set at 51.0 volts, unless otherwise specified.
- (D) **Very Low Voltage Alarm:** Adjustable from 40.00 to 56.00 volts DC. Factory set at 47.0 volts, unless otherwise specified.
- (E) **Total Distribution Load Alarm:** Adjustable from 0 to 60000 amperes. Factory set at 2000 amperes, unless otherwise specified.
- (F) **Distribution Group A Load Alarm:** Adjustable from 0 to 60000 amperes. Factory set at 2000 amperes, unless otherwise specified.
- (G) **Distribution Group B Load Alarm:** Adjustable from 0 to 60000 amperes. Factory set at 2000 amperes, unless otherwise specified.
- (H) **High Battery Ambient Temperature #1 Alarm (if battery charge digital temperature compensation probe installed):** Adjustable from -50°C to +99°C. You disable the feature by selecting the setting above +99°C. Factory set to off, unless otherwise specified.
- (I) **High Battery Ambient Temperature #2 Alarm (if battery charge digital temperature compensation probe installed):** Adjustable from -50°C to +99°C. You disable the feature by selecting the setting above +99°C. Factory set to off, unless otherwise specified.
- (J) **Low Battery Ambient Temperature #1 Alarm (if battery charge digital temperature compensation probe installed):** Adjustable from -49°C to +100°C. You disable the feature by selecting the setting below -49°C. Factory set to off, unless otherwise specified.
- (K) **Low Battery Ambient Temperature #2 Alarm (if battery charge digital temperature compensation probe installed):** Adjustable from -49°C to +100°C. You disable the feature by selecting the setting below -49°C. Factory set to off, unless otherwise specified.
- (L) **Audible Alarm Cutoff Reset Feature:** Adjustable from 0 to 15 minutes, in one minute intervals. A zero setting disables the feature. Factory set at 15 minutes, unless otherwise specified.
- (M) **PCU Sequencing:** The time delay between turning individual PCUs on is adjustable from 1 to 20 seconds, or feature disabled. The PCU Sequencing feature is factory set to 'disabled'.
- (N) **Timed Test/Equalize Period (also enables/disables the manually initiated timed test/equalize feature):** Adjustable from 1 to 99 hours, in one hour intervals. When a value is set, the feature is enabled. You disable the feature by selecting the setting above 99. Factory set at 1 (one) hour, unless otherwise specified.
- (O) **Automatic Test/Equalize Period (also enables/disables the automatic test/equalize feature):** Adjustable from 0 to 15 times the discharge time period, up to a maximum of 300 hours. A zero (0) setting disables the feature. Factory set at zero (0), unless otherwise specified.

[Home](#)

**(P) Relay Test Seconds:** Adjustable from 5 to 120 seconds, in one second intervals.  
 Factory set at 45 seconds, unless otherwise specified.

**4.1.5 MCA Audible Alarm and Audible Alarm Cutoff:** The MCA contains an Audible Alarm, which is located on the MCA Control Panel. The audible alarm sounds when any alarm condition monitored by the MCA occurs. The alarm can be manually silenced (cutoff) by pressing a local pushbutton. A local indicator illuminates when the audible alarm has been cutoff. The alarm remains silenced for the current alarm condition only. If another alarm condition occurs, the audible alarm again sounds.

A programmable audible alarm cutoff reset feature is provided. Once an audible alarm has been cutoff, it automatically resets (and sounds if the alarm condition is still present) after the time period programmed expires. If another alarm condition occurs, the audible alarm again sounds.

**4.1.6 Remote On/Off (TR):** The operation of any or all PCUs can be inhibited (TR) via the MCA Control Panel or from the LMS (if furnished). A PCU fail alarm is NOT issued.

**4.1.7 MCA Alarm Logging:** The MCA logs (with a date/time stamp) up to 500 recordable events.

**4.1.8 PCU Sequencing:** The MCA can be set to provide PCU Sequencing. When the MCA senses an "AC Power is OFF to All PCUs" alarm, it turns off all PCUs. When the "AC Power is OFF to All PCUs" alarm clears, the MCA turns on PCU #1, then turns on the other PCUs starting with PCU #2 every *n* seconds (*n* is user programmable from 1 to 20 seconds). If the MCA fails or the communication link is broken during a PCU Sequencing routine, all PCUs turn on immediately.

**4.1.9 Local Controls:** See Operation section of the User Manual for complete descriptions.

Location	NAME / Description	Type
MCA Control Panel	Function Select Up	Pushbutton Switch
	Function Select Down	Pushbutton Switch
	Function Set Enter / Move Left / Move Right	Pushbutton Switch
	Function Set Yes / + / i	Pushbutton Switch
	Function Set No / -	Pushbutton Switch
	Alarm Cutoff	Pushbutton Switch

**4.1.10 Local Status and Alarm Indicators:** See Operation section of the User Manual for complete descriptions.

Location	NAME / Description	Type
MCA Control Panel	Message Display, Shows... <ul style="list-style-type: none"> <li>Active Alarms or "SYSTEM OK"</li> <li>Various Measurement Items and Values</li> <li>Various Inventory Items</li> <li>Various Adjustment Items and Values</li> <li>Various Operation Items</li> <li>Various Configuration Items and Settings</li> </ul> See Paragraph 4.1.12 "MCA Display"	---
	Alarm Cutoff	LED - yellow
	Major	LED - flashing red
	Minor	LED - red
	AC	LED - green/red
	Test/EQ	LED - yellow

**4.1.11 MCA Numbering Scheme:** The MCA identifies (numbers) the components of the system as follows.

COMPONENT	MCA IDENTIFICATION NUMBER		
	MCA NUMBERING SCHEME (note that each line shown below is separated with a dash in the MCA display)	NOTES	EXAMPLE
MCA/Router	Bay #	Primary Bay is #1, other bays are numbered consecutively, following the bay-to-bay cabling scheme.	Main Bay <b>1</b> Second Bay <b>2</b> Fifth Bay <b>5</b>
PCU	Bay #  PCU # w/in the Bay	Primary Bay is #1, other bays are numbered consecutively, following the bay-to-bay cabling scheme.  PCU #1 = Top, PCU #10 = Bottom.	Main Bay, First PCU <b>1-01</b> Second Bay, Third PCU <b>2-03</b> Fifth Bay, Tenth PCU <b>5-10</b>



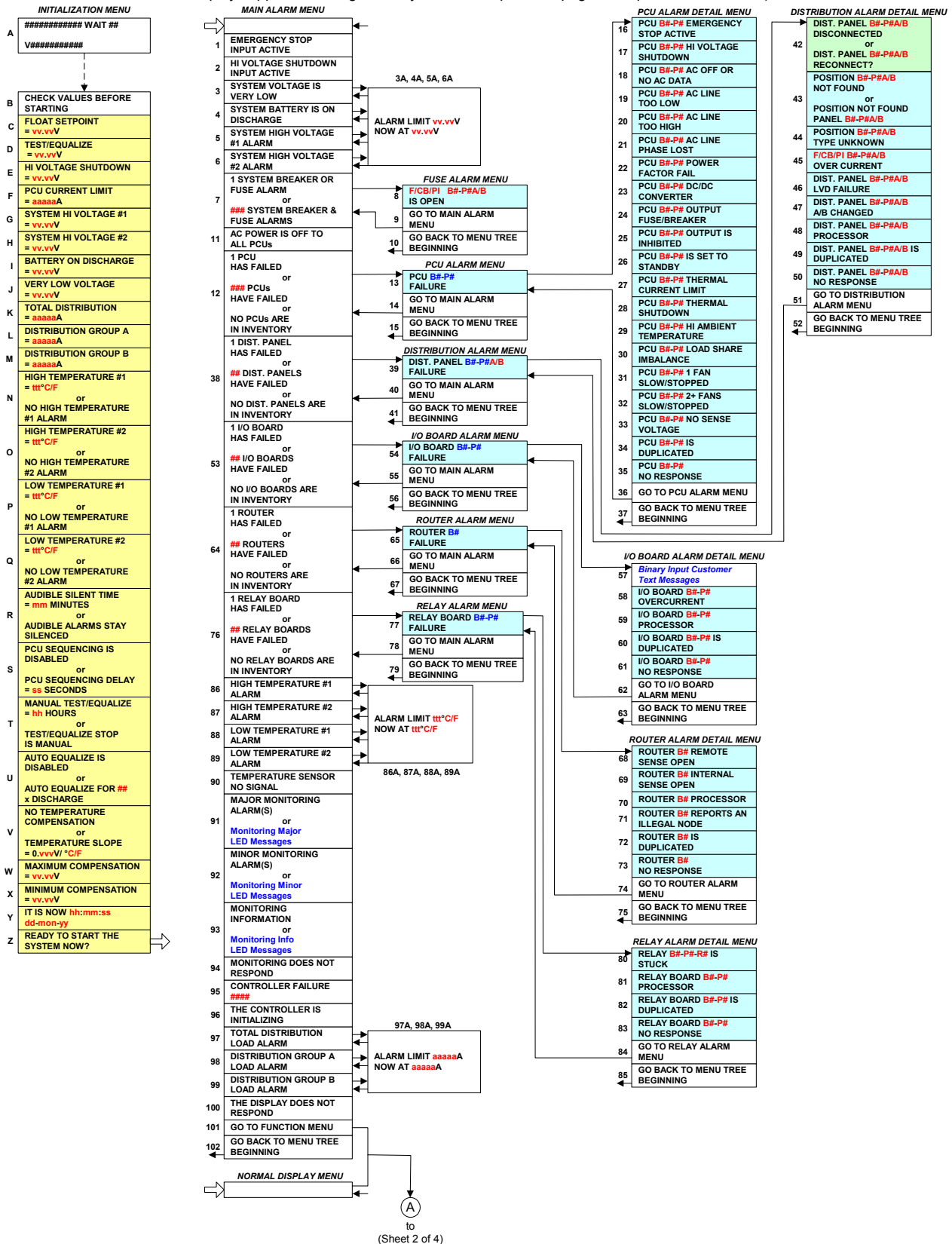
COMPONENT	MCA IDENTIFICATION NUMBER		
	MCA NUMBERING SCHEME (note that each line shown below is separated with a dash in the MCA display)	NOTES	EXAMPLE
<b>Distribution Row</b>	Bay #  Distribution Row # w/in Bay (A or B Designation)	Primary Bay is #1, other bays are numbered consecutively, following the bay-to-bay cabling scheme.  Distribution Row #1 = Top, Distribution Row #2 = Bottom. A or B as set by jumper on MCA Distribution Row Monitoring Circuit Card.	Main Bay, Top Row, Set for A Designation <b>1-1A</b>  Second Bay, Bottom Row, Set for B Designation <b>2-2B</b>  Fifth Bay, Top Row, Designation Not Set <b>5-1</b>
<b>Distribution Device</b>	Type Bay #  Distribution Point # w/in Bay	Type = Breaker, Fuse, or Plug-In.  Primary Bay is #1, other bays are numbered consecutively, following the bay-to-bay cabling scheme.  Distribution Point = 1-12 (left – right, Left Side, Row #1). 13-24 (left – right, Right Side, Row #1). 25-36 (left – right, Left Side, Row #2). 37-48 (left – right, Right Side, Row #2). Note that distribution components may take more than one mounting position, designation number is the left most mounting position.	Main Bay, Circuit Breaker Mounted in Position One, Row 1 Set for A Designation <b>Breaker 1-01A</b>  Second Bay, Fuse Mounted in Position Sixteen, Row 1 Designation Not Set <b>Fuse 2-16</b>  Fifth Bay, Plug-In Mounted in Position Twenty-Six, Row 2 Set for B Designation <b>Plug-In 5-26B</b>
<b>MCA Relay Circuit Card</b>	Bay #  Card Position # w/in Bay Relay # w/in Card	Primary Bay is #1, other bays are numbered consecutively, following the bay-to-bay cabling scheme.  Card #1 = left slot, Card #7 = right slot.  Relay # (see illustration in <i>System Overview</i> Chapter)	Main Bay, Relay Card in First Slot, Relay One on Card <b>1-1-1</b>  Second Bay, Relay Card in Third Slot, Relay Four on Card <b>2-3-4</b>  Fifth Bay, Relay Card in Seventh Slot, Relay Six on Card <b>5-7-6</b>
<b>MCA I/O Circuit Card</b>	Bay #  Card Position # w/in Bay	Primary Bay is #1, other bays are numbered consecutively, following the bay-to-bay cabling scheme.  Card #1 = left slot, Card #7 = right slot.	Main Bay, I/O Card in First Slot <b>1-1</b>  Second Bay, I/O Card in Third Slot <b>2-3</b>  Fifth Bay, I/O Card in Seventh Slot <b>5-7</b>

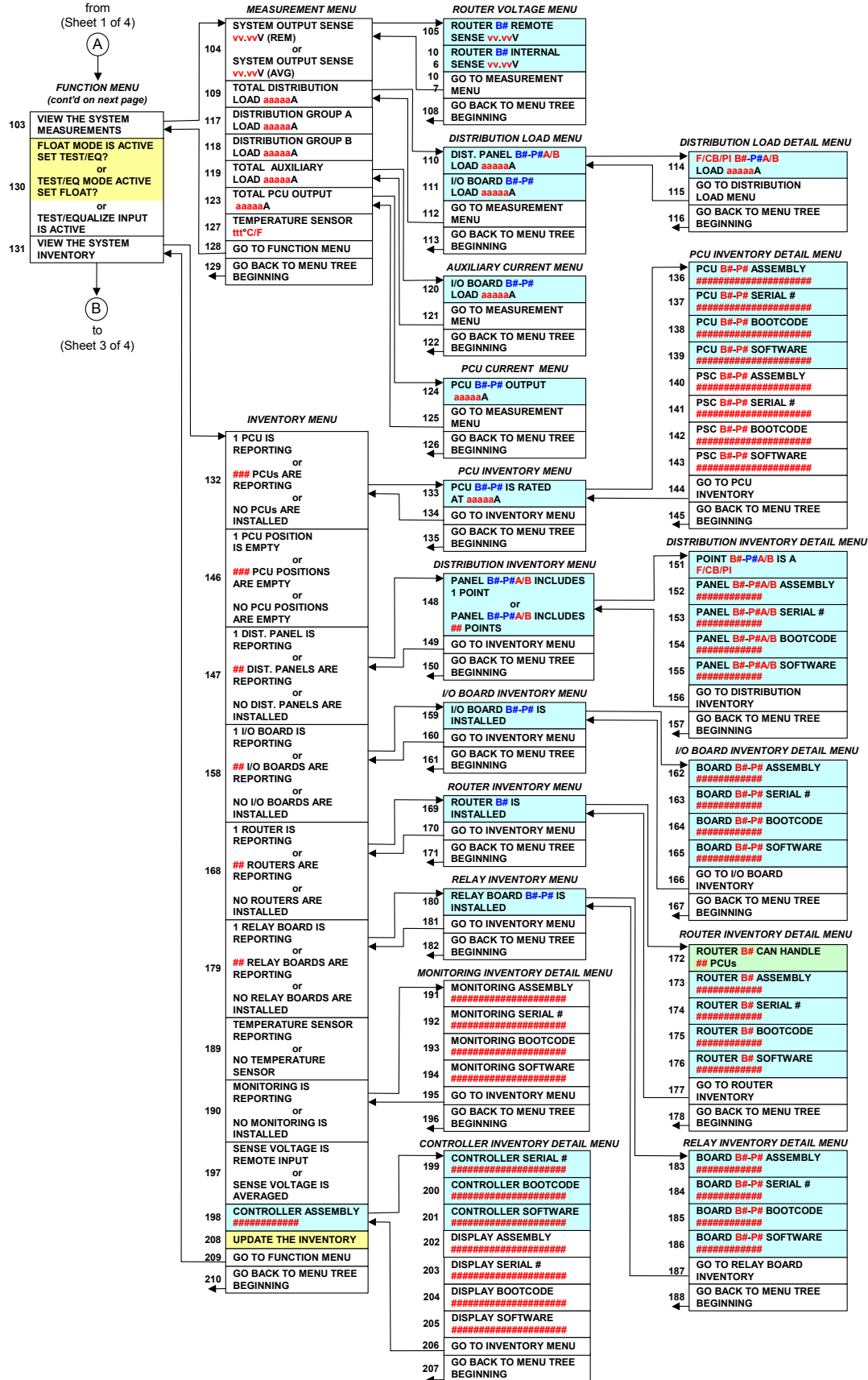


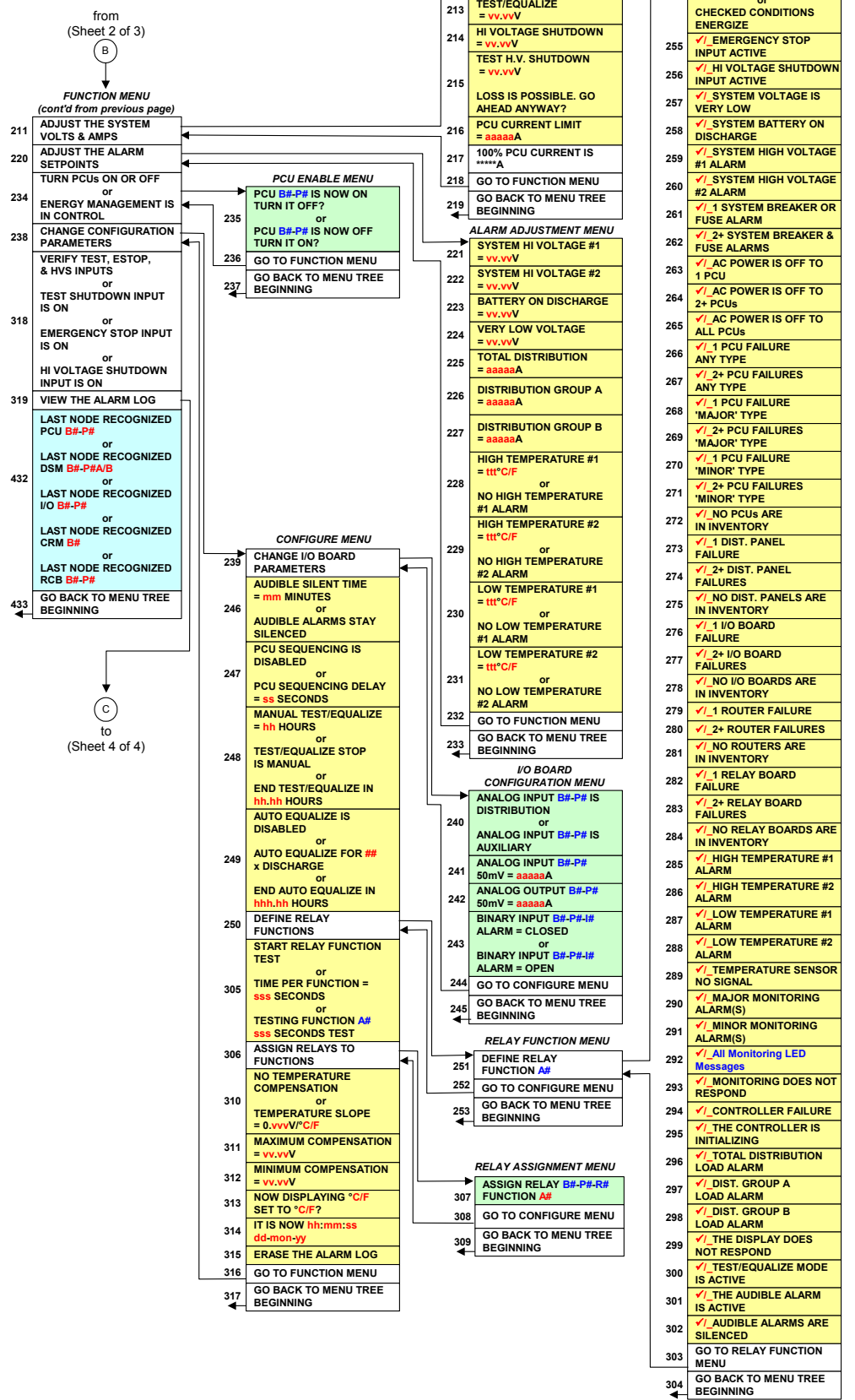
[Home](#)

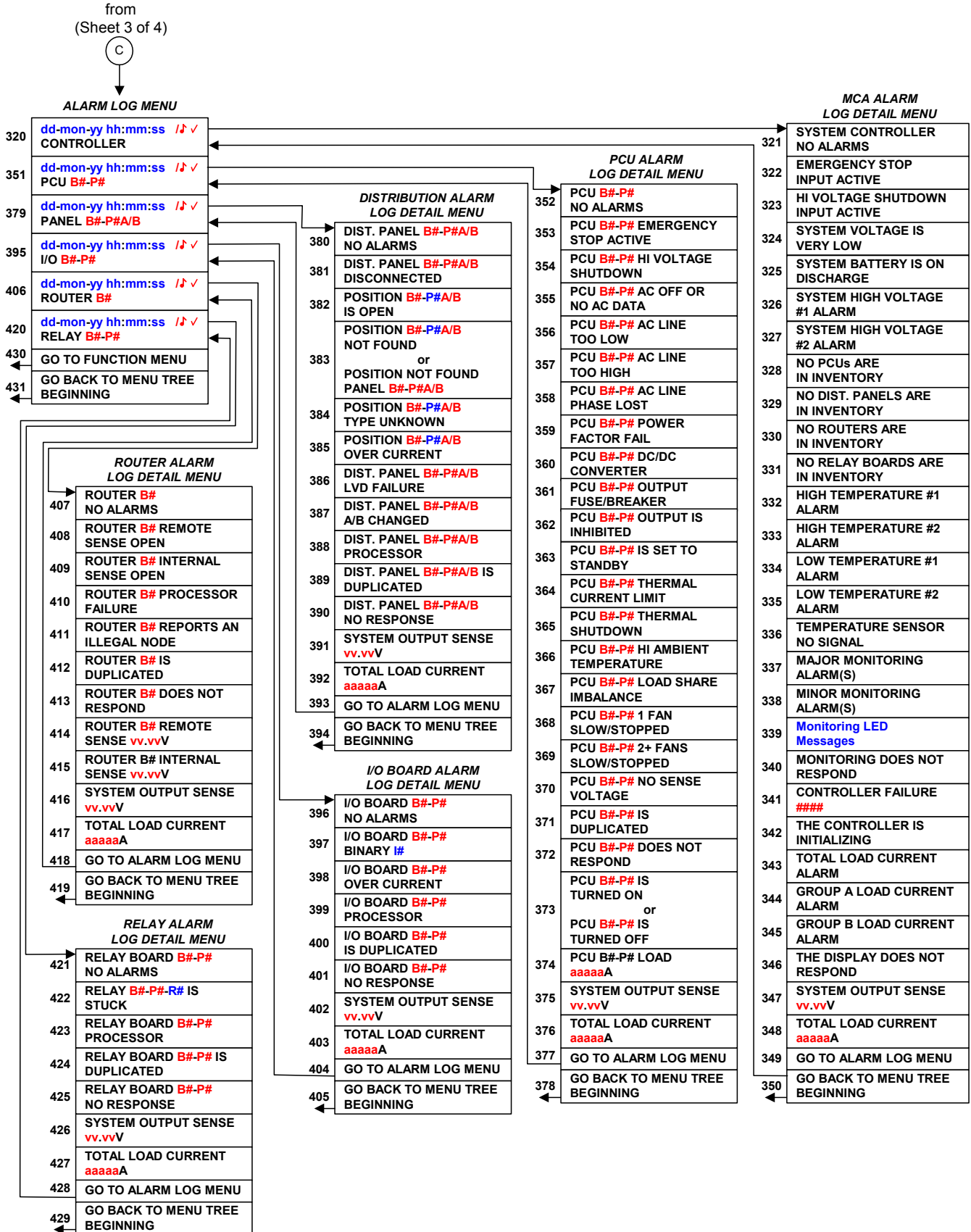
**4.1.12 MCA Display:** Presented next are illustrations from the MCA Menu Tree (Section 5886). Refer to the latest version of Section 5886 for the most recent MCA Menu Tree. See Operation section of the System's User Manual for complete descriptions of menu items.

The User navigates **Lines 3 and 4** of the MCA Display using the Keypad on the MCA Control Panel.  
(The following indicates the actual text shown on each line of Lines 3 and 4 of the MCA Display, Line 4 also displays applicable navigation key codes, see previous page for explanation of codes.)









#### 4.1.13 External Control Circuits

- (A) **Remote Test/Equalize:** All PCUs can be placed into the test/equalize mode by applying a loop closure signal. The PCUs operate in the float mode when the loop closure signal is absent.
- (B) **Remote High Voltage Shutdown:** The high voltage shutdown circuit on all PCUs, as described in Paragraph 3.4.6 (E), can be activated by applying a loop closure signal.
- (C) **PCU Emergency Shutdown and Fire Alarm Disconnect:** The PCUs can be inhibited by applying a loop closure signal. Manual restart is required.
- (D) **External "System Voltage" Meter Reading:** Leads can be extended from the MCA to an external voltage source. This is the voltage source the MCA monitors for system alarms and displays as "System Output Voltage".
- (E) **Test Input:** The High Voltage Shutdown and/or PCU Emergency Stop circuits can be tested without affecting the system by applying a test loop closure signal before applying the Remote High Voltage Shutdown or PCU Emergency Shutdown loop closure signal.

#### 4.1.14 External Alarm Circuits

- (A) **Optional MCA Relay Circuit Card, Part No. 514348:** Each circuit card adds six (6) Form-C external alarm relay contacts to the system.
  - (1) Plugs into seven-slot card cage provided in each bay for optional MCA and LMS I/O cards.
  - (2) **Contact Rating:** 2A at 30 VDC.
  - (3) **Description of Operation:** The MCA provides 25 programmable function channels. Program each function channel to alarm for selected conditions, then program each external alarm relay to activate if a specific function channel alarms.

MCA relays can also be programmed to activate if an LMS LED channel activates.

#### 4.1.15 Optional MCA Input/Output (I/O) Cards

##### (A) P/N 524550

- (1) Plugs into seven-slot card cage provided in each bay for optional MCA and LMS I/O cards.
- (2) **Binary Inputs:** Contact Closure.
- (3) **Analog Inputs and Outputs:** 50mv DC.
- (4) Provides 1 analog input, 1 analog output (for remote plant output current monitoring), and 4 binary inputs.

##### (B) P/N 524551

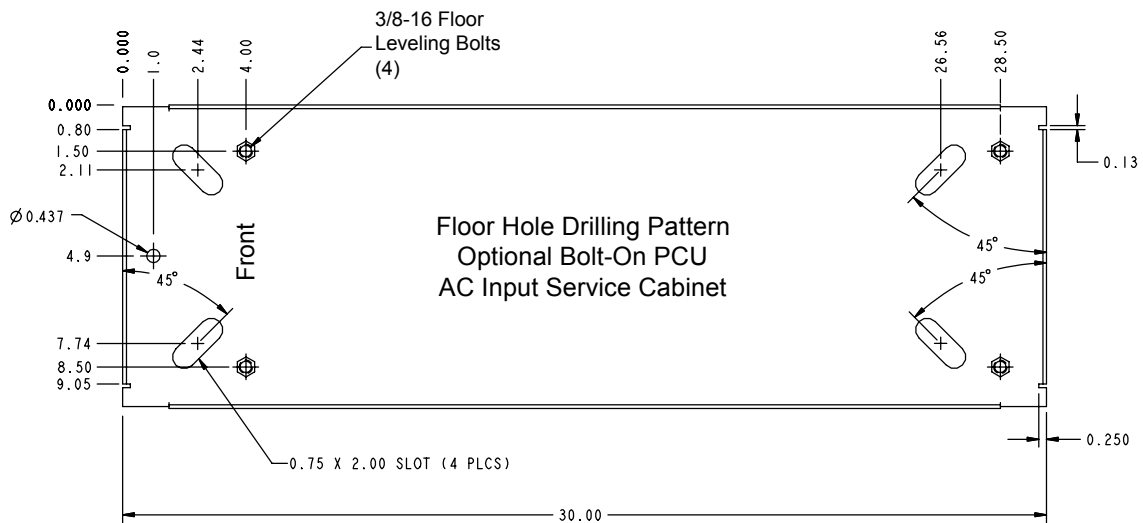
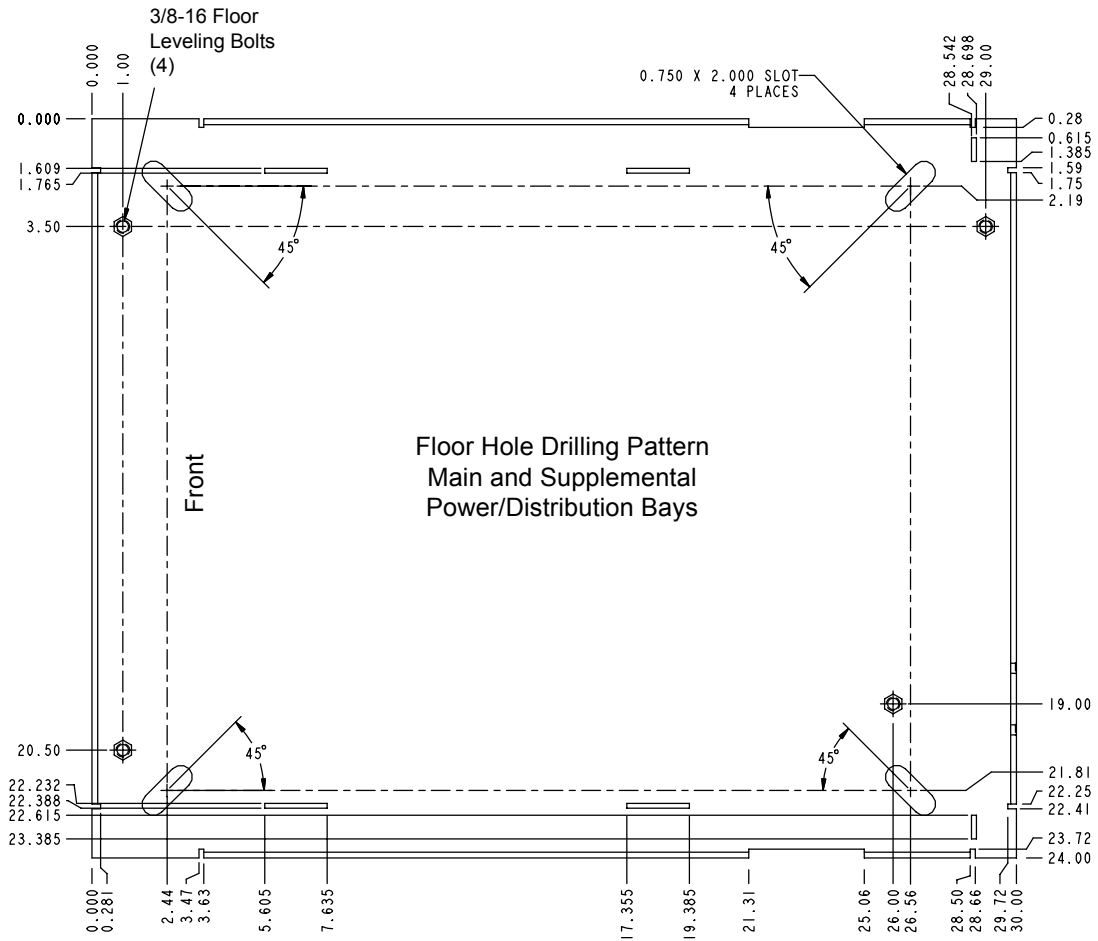
- (1) Plugs into seven-slot card cage provided in each bay for optional MCA and LMS I/O cards.
- (2) **Binary Inputs:** Contact Closure.
- (3) Provides 4 binary inputs.

## 5. OPTIONAL LMS MONITORING SYSTEM

Refer to SAG586505000

**PHYSICAL SIZE INFORMATION**

**Primary and Secondary Bays  
 Floor Hole Drilling Pattern Dimensions**

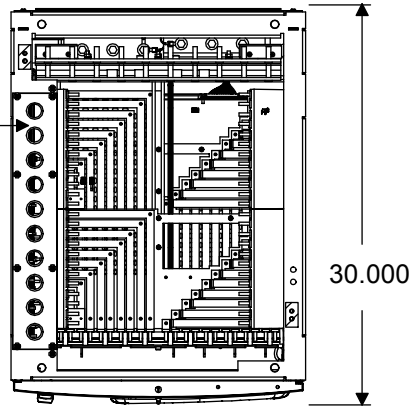




**Overall Dimensions - Primary and Secondary Power/Distribution Bays**

AC Input Wiring Access Opening(s)

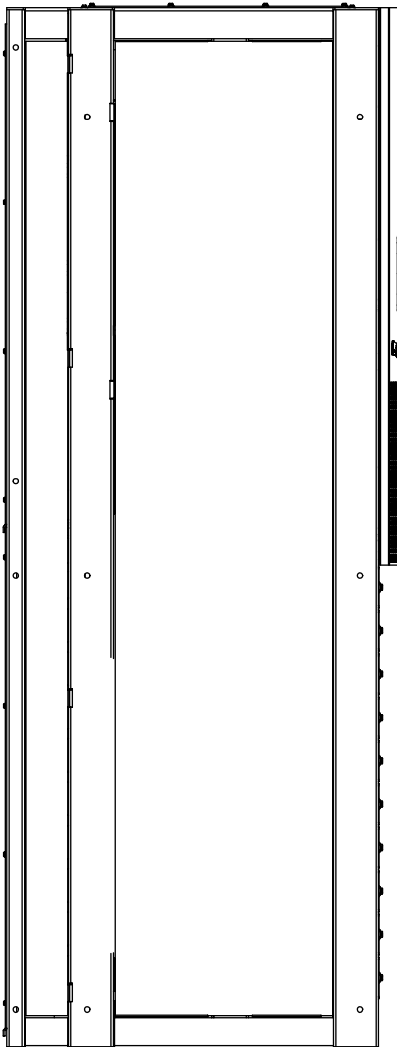
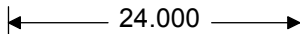
Choose either the supplied access plate with ten 3/4" conduit openings, or ten 1" conduit openings.



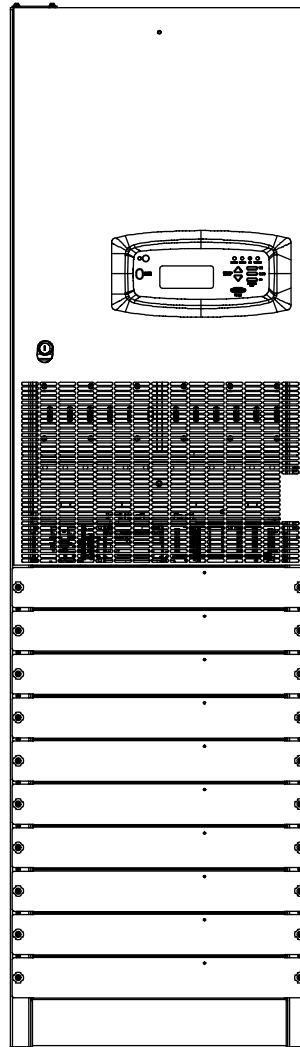
Top View

Notes:

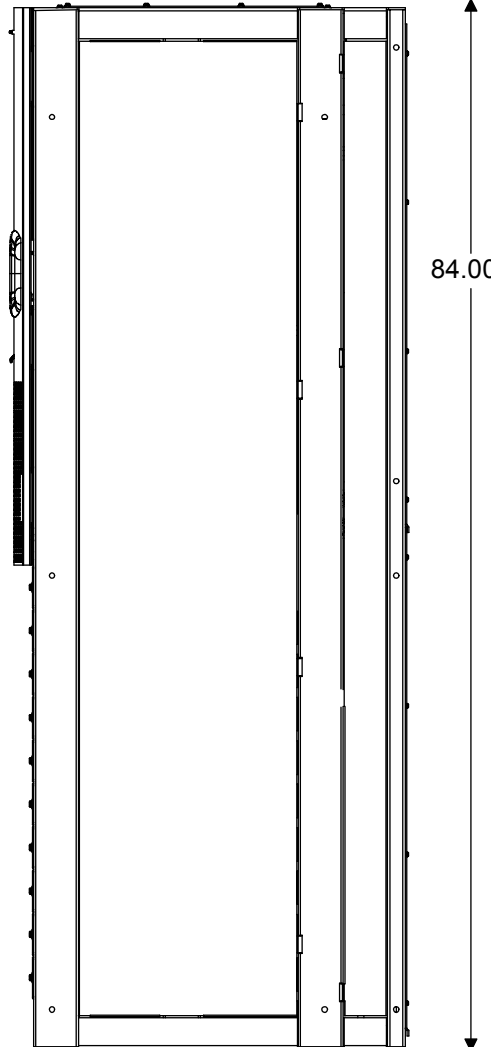
1. All dimensions are in inches, unless otherwise specified.
2. Weight in LBS.  
 Bay  
 Net:  
 Shipping:  
 PCU  
 Net: 40  
 Shipping:
3. Finish: Silver (M500-142).



Left Side View



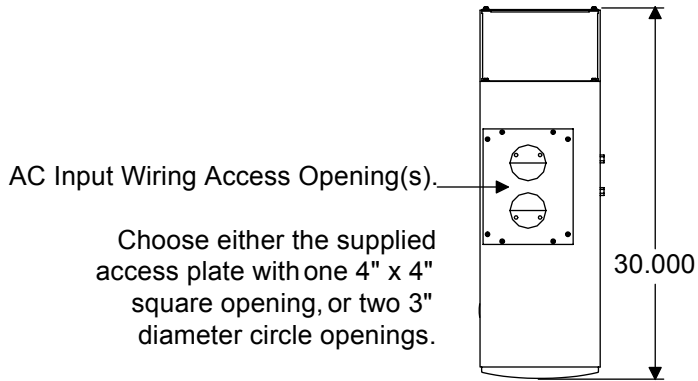
Front View



Right Side View

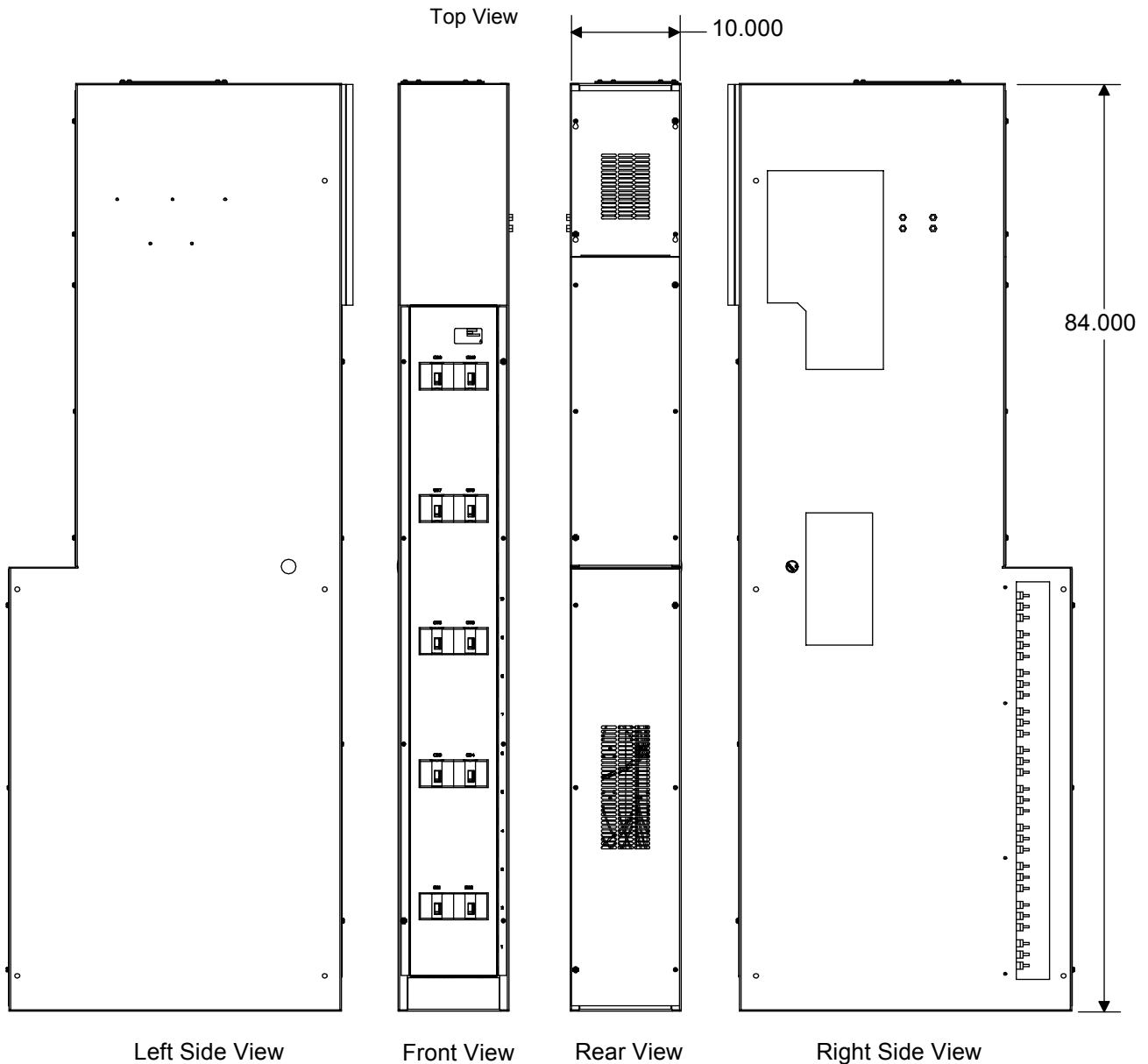


**Overall Dimensions – Optional PDSC  
 (AC Input 'Power Distribution Service Cabinet')**

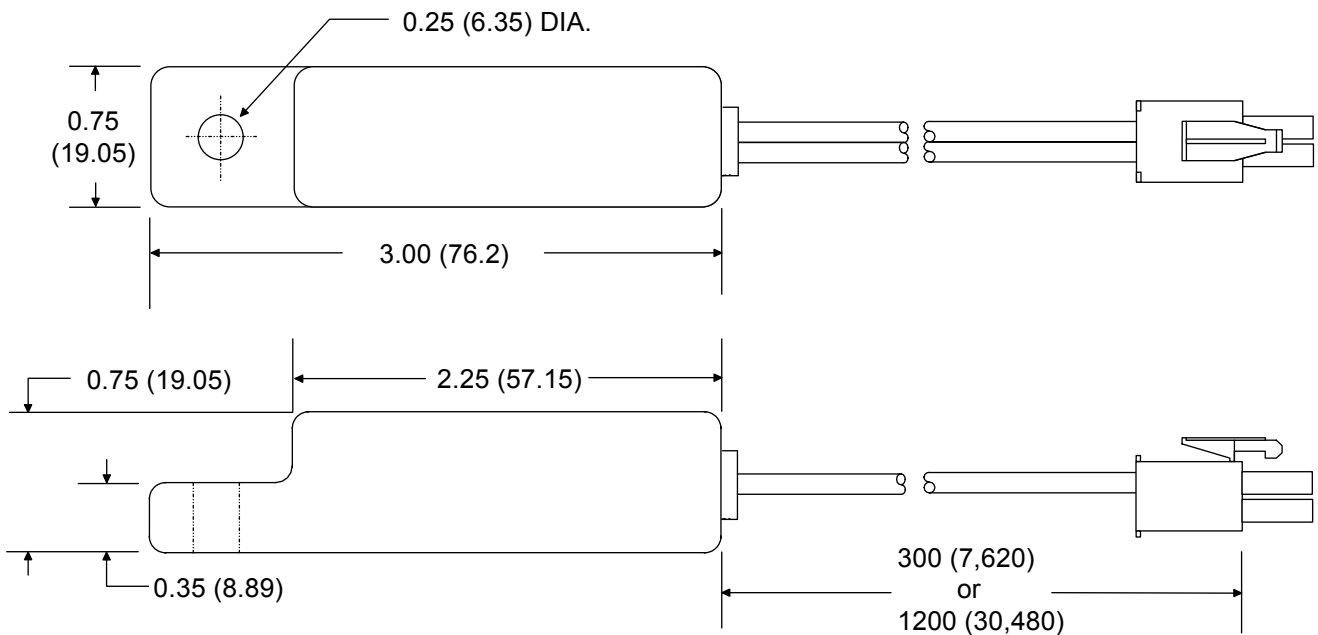


**Notes:**

1. All dimensions are in inches, unless otherwise specified.
2. Weight in LBS.  
 Net:  
 Shipping:
3. Finish: Silver (M500-142).



**Overall Dimensions – Optional Battery Charge  
Digital Temperature Compensation Probes  
P/N 107021 (25 feet) and P/N 106824 (100 feet)**



**NOTE:** All dimensions are in inches and (millimeters).

[Home](#)

## RELATED DOCUMENTATION

<b>System Installation Guide:</b>	Section 5957
<b>System Installation Instructions:</b>	Section 5876
<b>System User Instructions:</b>	Section 5877
<b>Color MCA Menu Tree:</b>	Section 5886
<b>System Equipment and Assembly Drawing:</b>	J582140000
<b>System Schematic Diagram:</b>	SD582140000
<b>System Wiring Diagram:</b>	T582140000
<b>Load and Battery Lug Detail Drawings:</b>	031110100 through 031110300
<b>LMS Installation Instructions:</b>	Section 5879
<b>LMS User Instructions:</b>	Section 5847
<b>LMS System Application Guide:</b>	SAG586505000
<b>LMS I/O Circuit Card Label Sheet:</b>	520538
<b>LMS Expansion Assembly Schematic Diagram:</b>	SD507606

[Home](#)

**APPENDIX (a record of changes made to this document)**

Issue	Change Number (ECO)	Description of Change	Date	Approved
AA	LLP035201	New	01/14/04	John Jasko
AB	LLP201789	MCA Tree updated in Specifications section. Ordering Note for non-standard MCA Network cable added to Lists 11 and 12 descriptions. MCA version 1.2.0.1 features added. Ordering Note for side panels added to Lists 11 and 12 descriptions. 208/240VAC Input Option Added. MCA I/O Cards Added. Surge Suppression Lists added.	01/18/05	John Jasko
AC	LLP203086	Added List 71 and 72 (MCA I/O Cards). MCA I/O card removed from surge suppression List options. NEBS statement added.	02/11/05	John Jasko
AD	LLP203842	Busbar Shield Kit P/N 528482 added.	07/05/05	John Jasko
AE	LLP203895	Replacement Alarm, Reference, and Control Fuses section updated. Populating distribution device restrictions added to DISTRIBUTION DEVICES section.	07/28/05	John Jasko

**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

