

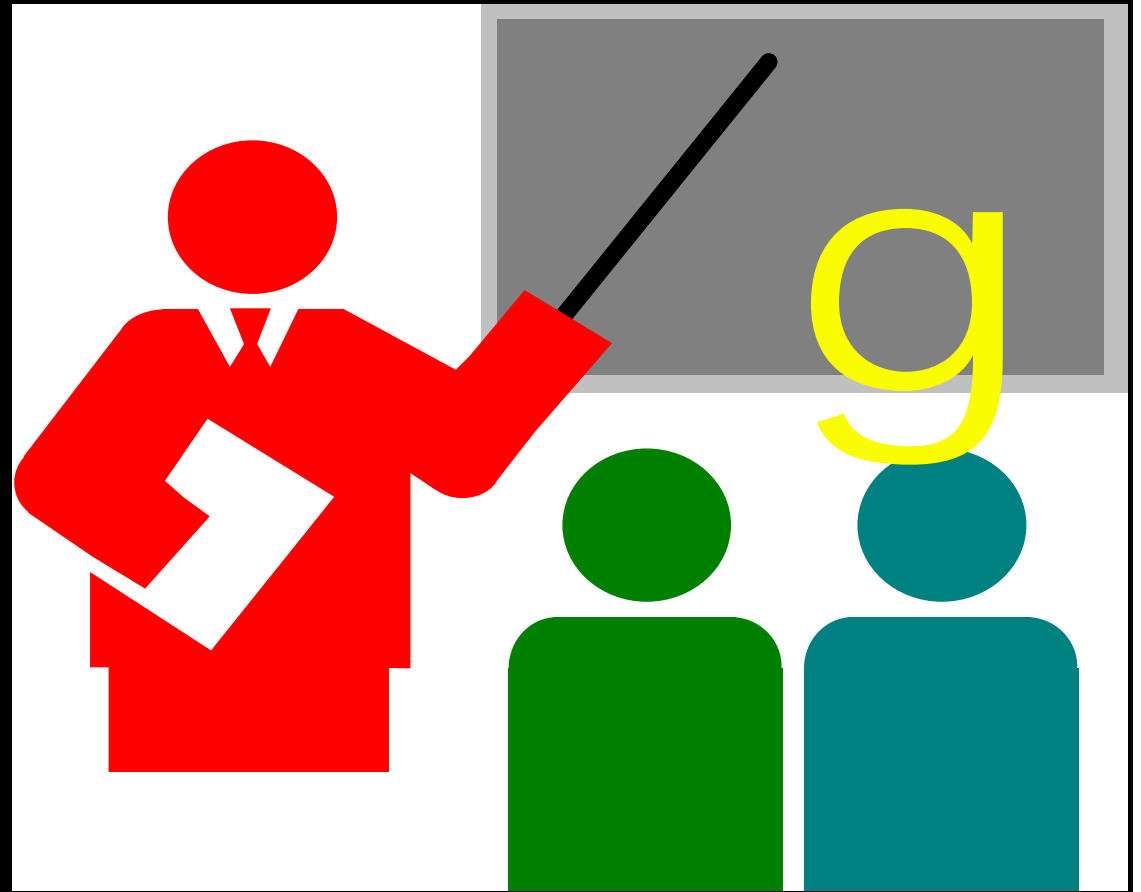
Panelboards

Environmental Systems Design

By

Shahid K. Sheikh

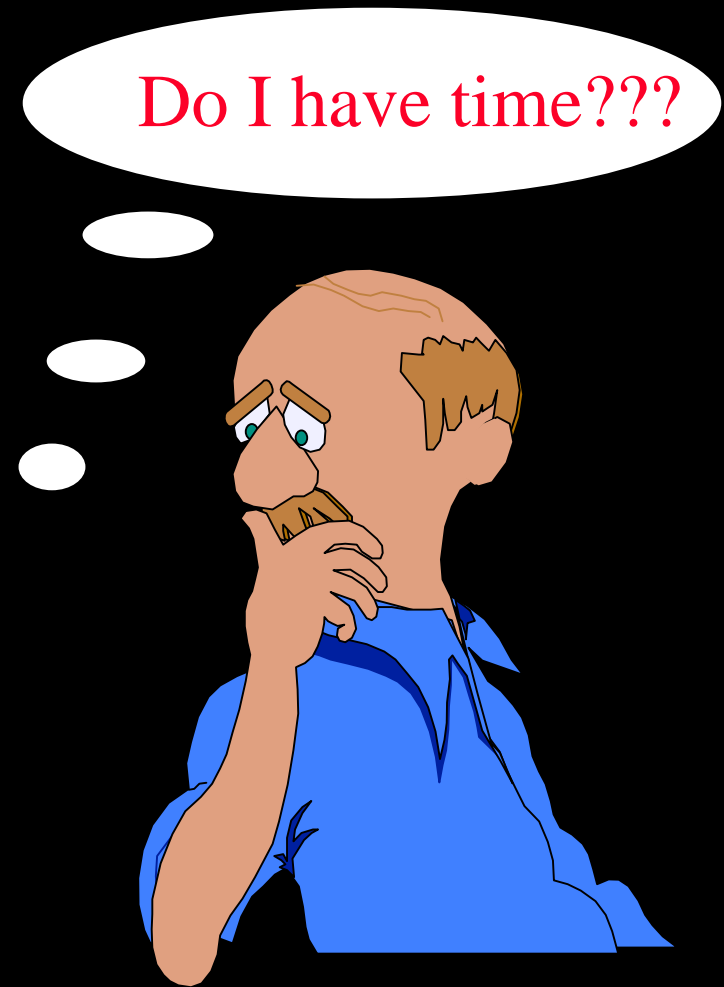
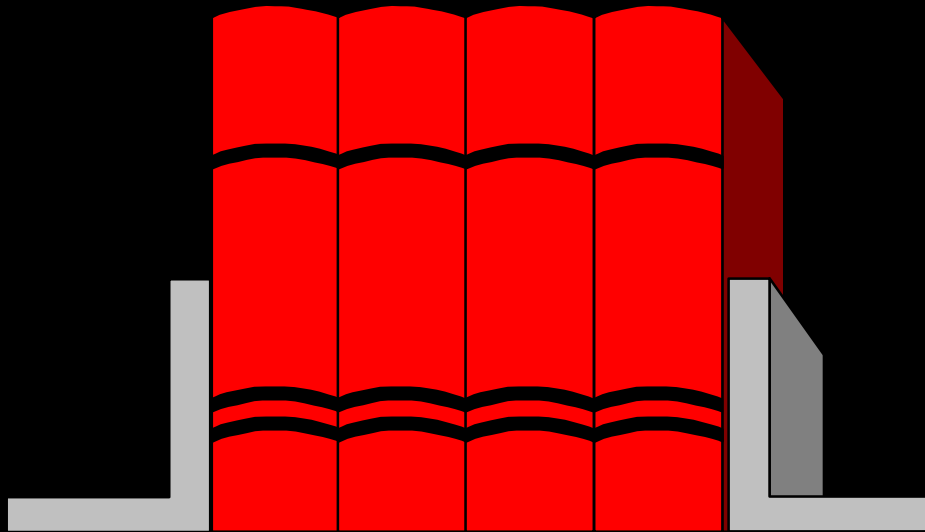
February 25, 1997



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GE Products

***NEW PRODUCTS
CATALOGS!!!!!!***



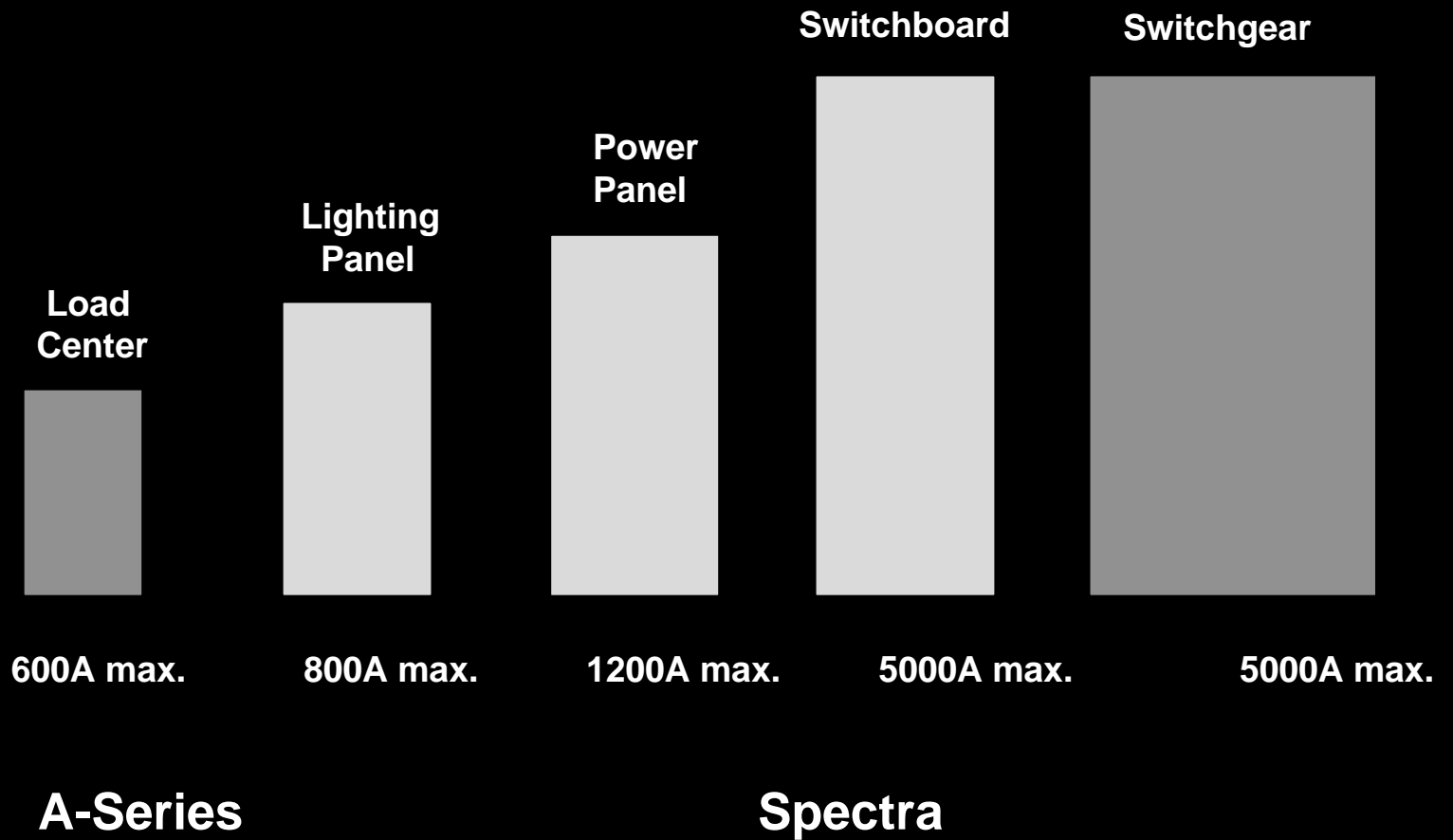
Panelboards

*NEC**Art.100*

A single panel or group of panel units designed for assembly in the form of a single panel; including busses and automatic overcurrent devices and equipped with or without switches for the control of light, heat or power circuits; designed to be placed in a cabinet or cutout box **placed in or against a wall or partition**, and accessible only from the front

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Power Distribution History



Standards

- UL 67 Panelboards
- UL 50 Cabinets and boxes
- NEMA PB 1

All GE panelboards are designed to meet the latest revision of Underwriters Laboratories UL-67, National Electrical Code and National Electrical Manufacturers Association PB-1 standards.

Service Entrance Rating

NEC

- Must be located near the point of entrance of building supply conductors.
- Lighting / Appliance Panels must have one but not more than two main disconnects with current rating equal to or less than panelboard rating.
- Distribution Panels may have up to six operating handles.
- Must include connector for bonding and grounding neutral conductor.
- A service entrance type UL label must be factory installed.

Art. 384

Basic Components

ENCLOSURE: Protective metal box for interior.

INTERIOR: Side rails, bus bars & insulation system.

DEAD FRONT: Metal protective shield for interior.

TRIM / FRONT: Metal pieces used to seal enclosure.

PROTECTIVE DEVICES: Circuit breakers or fusible switches.

NEMA Enclosures

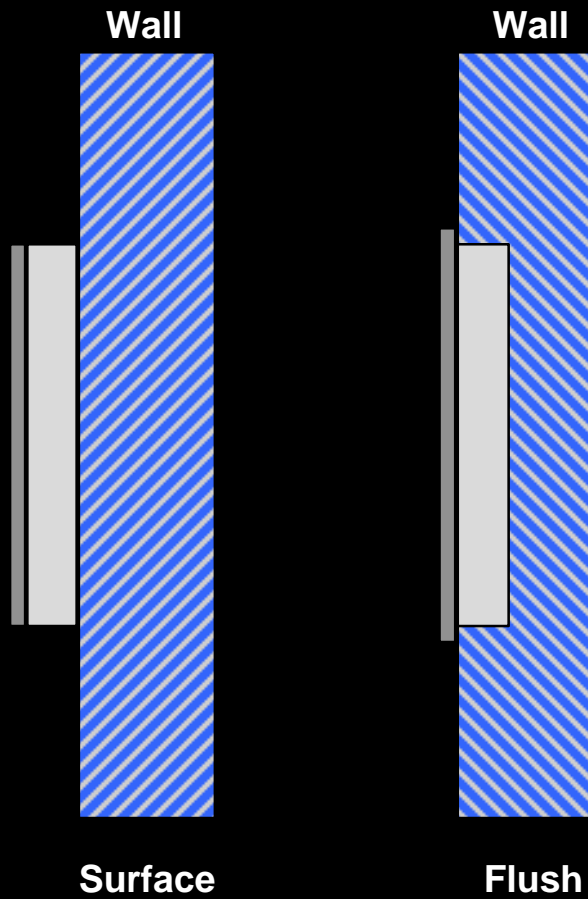
Type 1:

Indoor general purpose.

Type 3R/12:

Outdoor / Indoor drip-tight /
dust-tight.

Trim Types



Service Voltages

1-phase 3-wire:

120/240v.

3-phase 3-wire:

480v Delta.

240v Delta.

3-phase 4-wire:

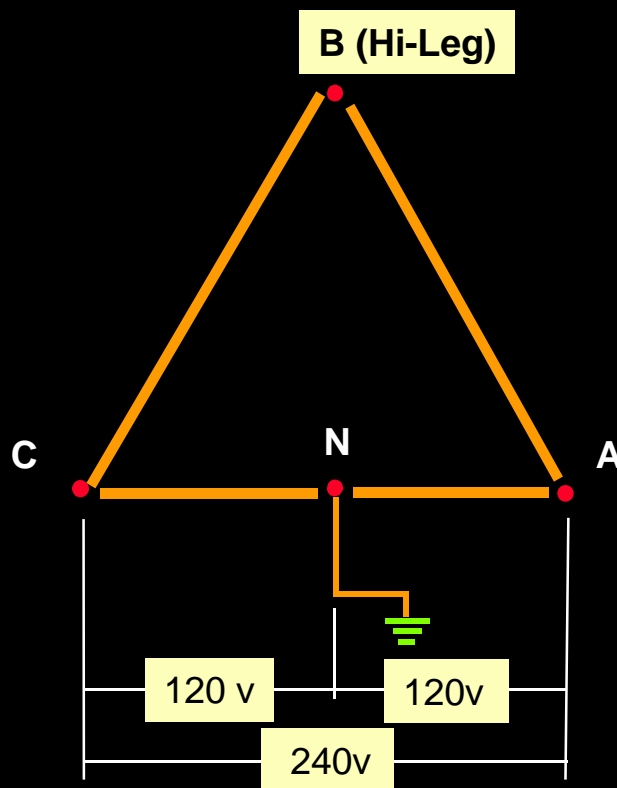
480Y/277v.

208Y/120v.

240/120v Delta Hi-leg.

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3p 4w 240/120v Delta Hi-leg



Circuit Breakers

1 Pole = 120/240v

2 Pole = 240v

3 Pole = 240v

200% Rated Neutrals

Panelboards with 200% neutrals provide a reliable, solution to the harmonic issues associated with data processing and other switching mode loads.

Provides (2) neutrals of equal amperage rating.

UL listed for non-linear (electronic) loads.

Use with K-factor rated transformers (K4 = 50% & K13 = 100%).

Panelboards - Short-circuit Ratings

Fully Rated:

When the short-circuit rating of the panelboard is that of its
LOWEST RATED DEVICE.

Series Connected Rated:

Series connected ratings are based on the short- circuit ratings given to (2) or more devices connected in series (non-motor loads).

Device - Continuous Current

The continuous device load current shall not exceed 80% of the device rating, unless, the panelboard including the protective device, is UL listed for continuous operating at 100%.

In general group mounted devices (circuit breakers & fusible switches) are standard 80% rated.

Continuous Load:

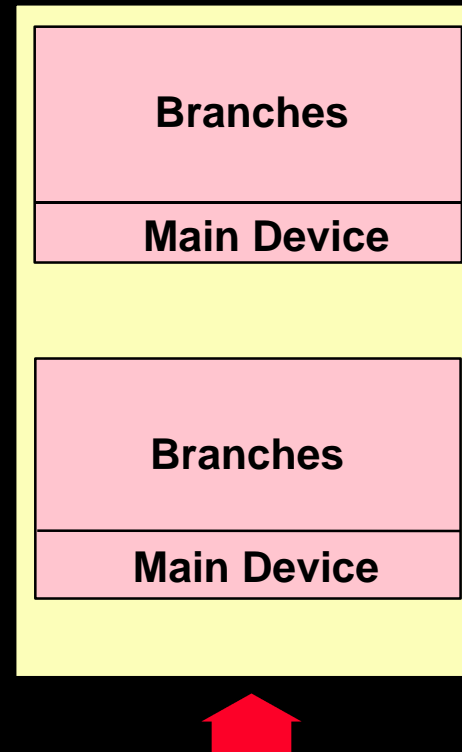
NEC

Art.100

A load where the maximum current is expected to continue for three hours or more.

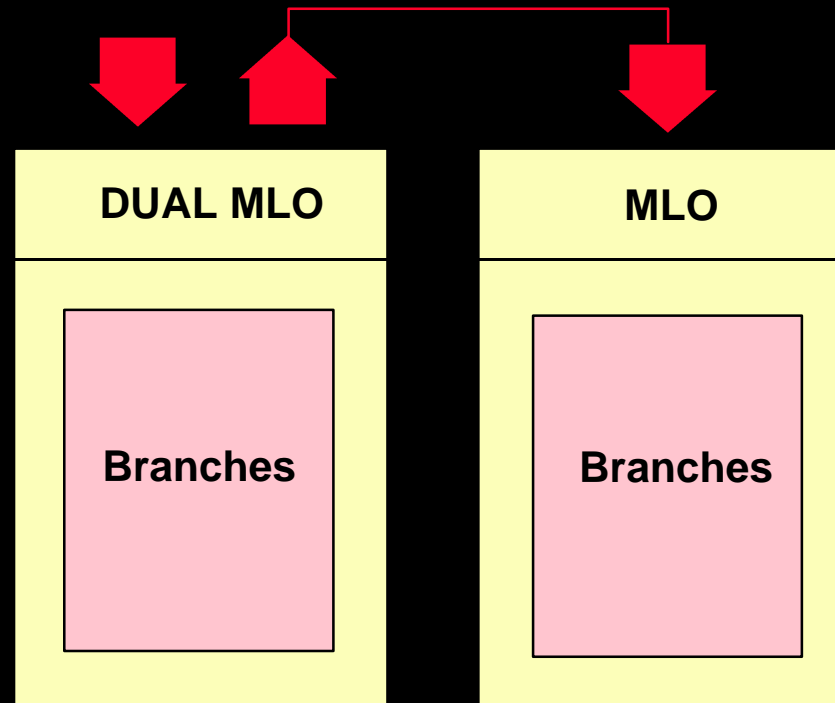
Split-bus Panelboards

A panelboard with (1) common enclosure, but with (2) separate interiors.



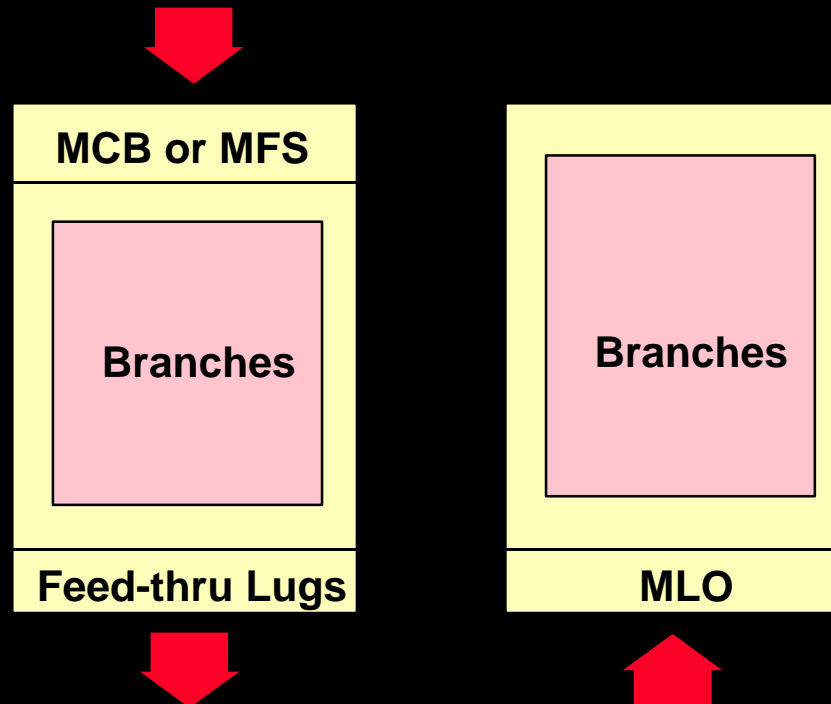
Dual Main Lugs

MLO panelboard with dual main lugs in the first section.



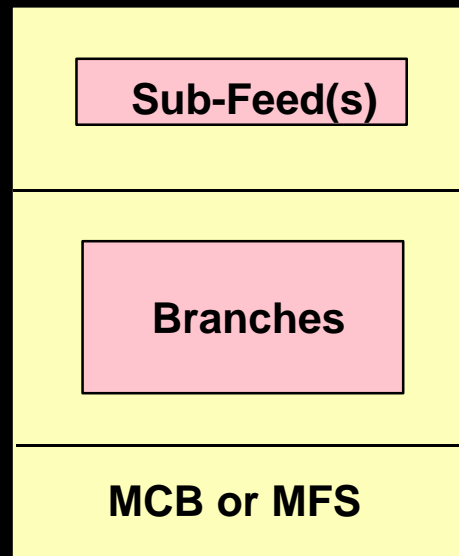
Feed-thru Lugs

MCB or MFS panelboards that disconnect (2) or more sections.



Sub-feed Breaker(s)

MCB or MFS panelboard that contains 225A or smaller, sub-feed breaker(s).

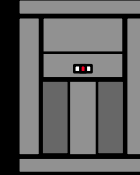
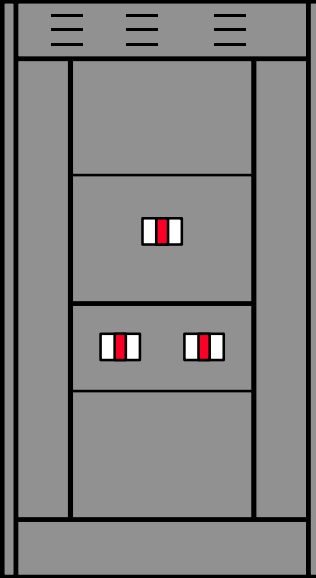


*Lighting
Panelboards*



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Panelboards



Distribution Panelboard

Lighting Panelboard

The NEC classifies according to the number of circuits they serve with overcurrent rating of 30 amperes or less.

Distribution panelboards: < 10% of circuits rated 30 amps or less.

Lighting panelboards: at least 10% of circuits rated 30 amps or less with no more than 42 circuits total.

Lighting - AL Series

AL

- **240/120V** maximum; 1 & 3-phase construction.
- **125 thru 800a** main bus.
- Fully rated **10, 22, 65, 85 and 200KAIC**.
- **Plug-in THQL, THHQL & TXQL** branch breakers.
- **225A** maximum, **TQD or THQD sub-feed** breaker(s).

Lighting - AQ Series

AQ

- **240V** maximum; 1 & 3-phase construction.
- **125 thru 800a** main bus.
- Fully rated **10, 22 or 65KAIC**.
- **Bolt-on THQB, THHQB & TXQB** branch breakers.
- **225A** maximum, **TQD or THQD sub-feed** breaker(s).

Lighting - AE Series

AE

- **480Y/277V** maximum; 3-phase construction.
- **125 thru 800A** main bus.
- Fully rated **14, 65, 85, 100 (@ 480V)** and **200KAIC (240V)**.
- **Bolt-on** TEY branch breakers.
- **225A** maximum, TED or TFJ **sub-feed** breaker(s).

Lighting - AD Series

AD

- **600v** maximum, 3-phase construction.
- **125-600A** main bus.
- Fully rated **25, 65 or 150KAIC**.
- **Bolt-on TED & THED** branch breakers.
- **225A** maximum, (3) poles **TFJ sub-feed** breaker.

Bus Bar Current Density

750 amps/sq. inch Aluminum:

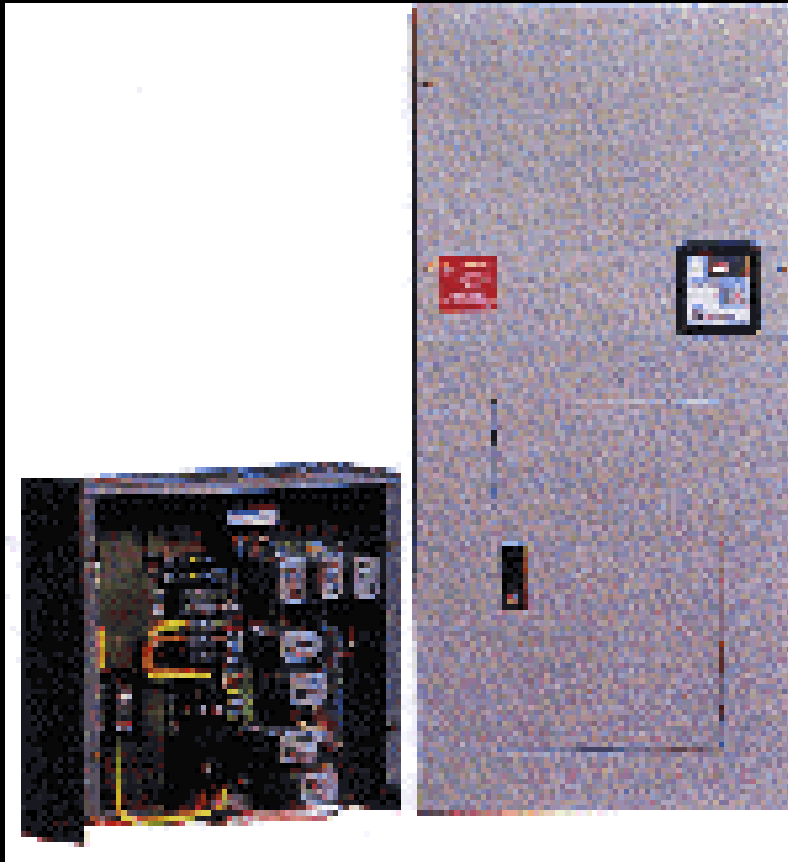
Standard.

1000 amps/sq.. inch Copper:

Optional.

(Rated current is divided bus cross-section area.)

A-Series TVSS



- Modular Construction mounts to all Standard A-Series Panels
- 240,000A Surge Dissipation
- Monitor Panel
- UL 1449, IEEE C62.45 & C62.41 Performance Ratings
- New or Retrofit Apps.

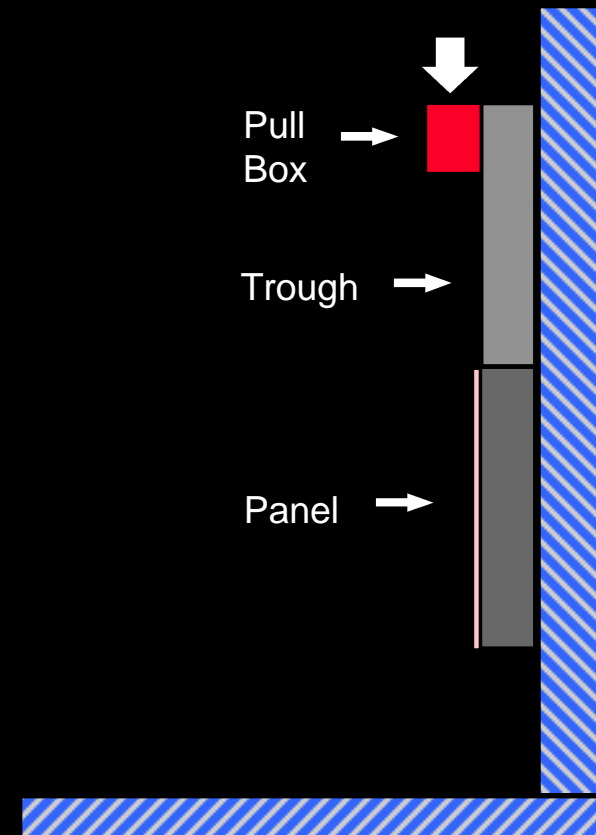
Notes:

- **AL** replaces old NLTQ.
- **AQ** replaces old NLAB.
- **AE** replaces old NAB / NHB.
- **AD** replaces old NHB.

*Column
Panelboards*

Column Panels' Features

- 8.62" w x 5.81" d standard enclosures.
- 1ft thru 6ft extension troughs.
- 12" h x 20" w x 5.88" d Pull box.
- 37.5" thru 76.5" box heights.



Column - ALC, AQC Series

- **240v** maximum; 1 & 3-phase construction.
- **125 & 225A** main bus.
- Fully rated **10, 22 or 65k AIC**.
- **Plug-in, Bolt-on** THQL, THHQL or TXQL and THQB or THHQB branch breakers.
- **150A** maximum, (3) poles TQD or THQD **sub-feed** breaker.

Column - AEC Series

- **480Y/277v** maximum; 3-phase construction.
- **125 & 225a** main bus.
- Fully rated **13k AIC**.
- **Bolt-on TEY** (80a max.) branch breakers.
- **150a** maximum, (3) poles **TED4 sub-feed** breaker.

Notes:

- **ALC** replaces old **NLTQX**.
- **AQC** replaces old **NLABX**.
- **AEC** replaces old **NABX / NHBX**.

Power

Panelboards

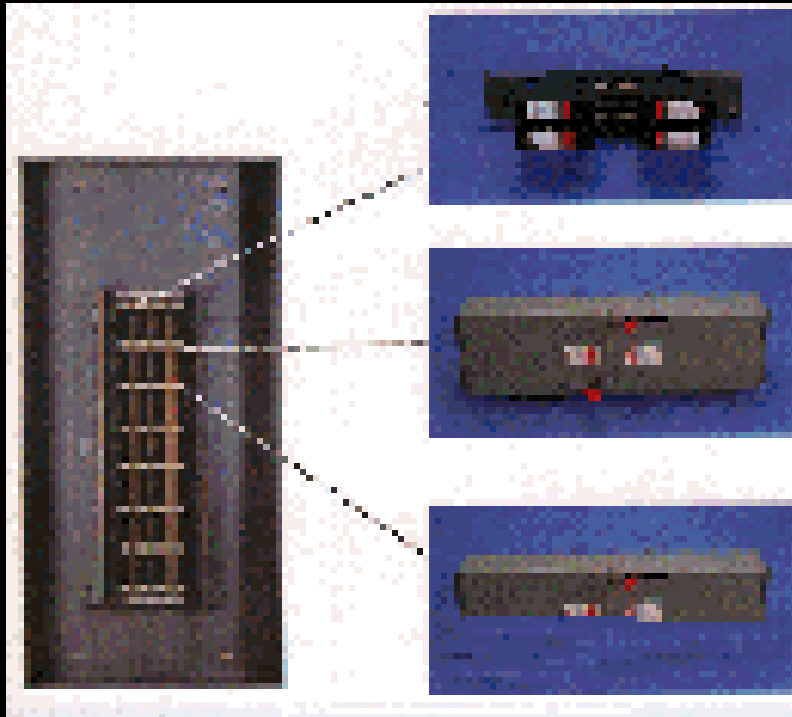
Power Panelboards

Unlike lighting panelboards, power panelboards have no limitation as to the number and rating of protective devices.

Spectra Series Power Panelboards

- **600v** max.. (480v Delta); 1 & 3-phase construction.
- **1200a** max.. MLO, MCB or MFS.
- Fully rated **10-200k AIC breakers; 200k AIC switches.**
- **Plug-in and/or bolt-on device modules.**
- **15-1200a branch breakers; 30-1200a branch switches.**

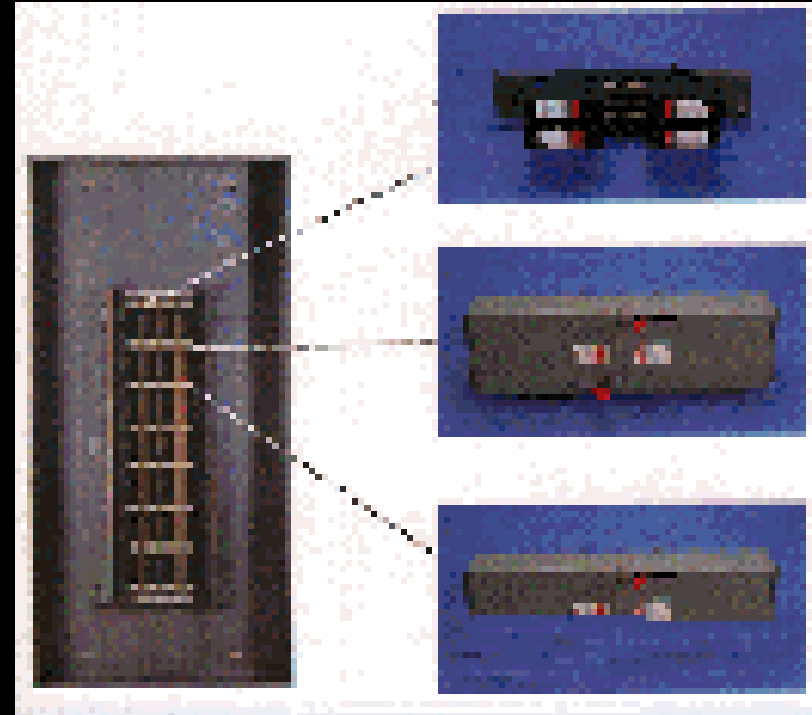
Spectra Series Panelboards



- Modular Construction
- Breakers and/or Fuses
- TVSS and PCU's
- Ratings to 600V,
1200A & 200,000A
RMS

Spectra Features

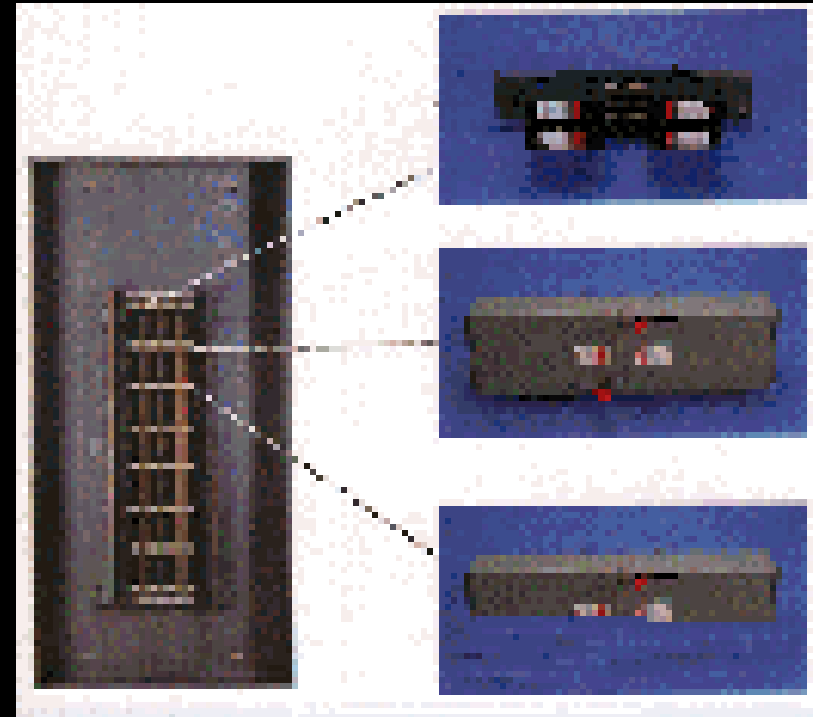
- One interior style fits all main device applications.
- 27, 36 & 40" wide; 64, 75, 89 & 96" high boxes.
- Galvanized steel box.
- 36" w T-fused 200a double-branch switch module.
- 40" w R-fused 200a double-branch switch module.

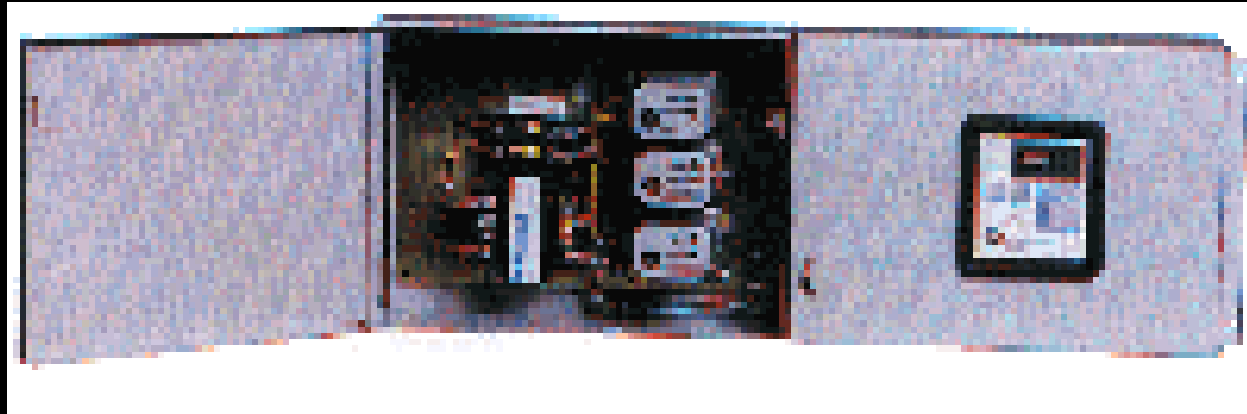


Spectra Features

When a single 30-200a branch switch module is specified, it is shipped as a double-branch unit with one side left blank.

Kits are available for converting the blank space into a switch module.

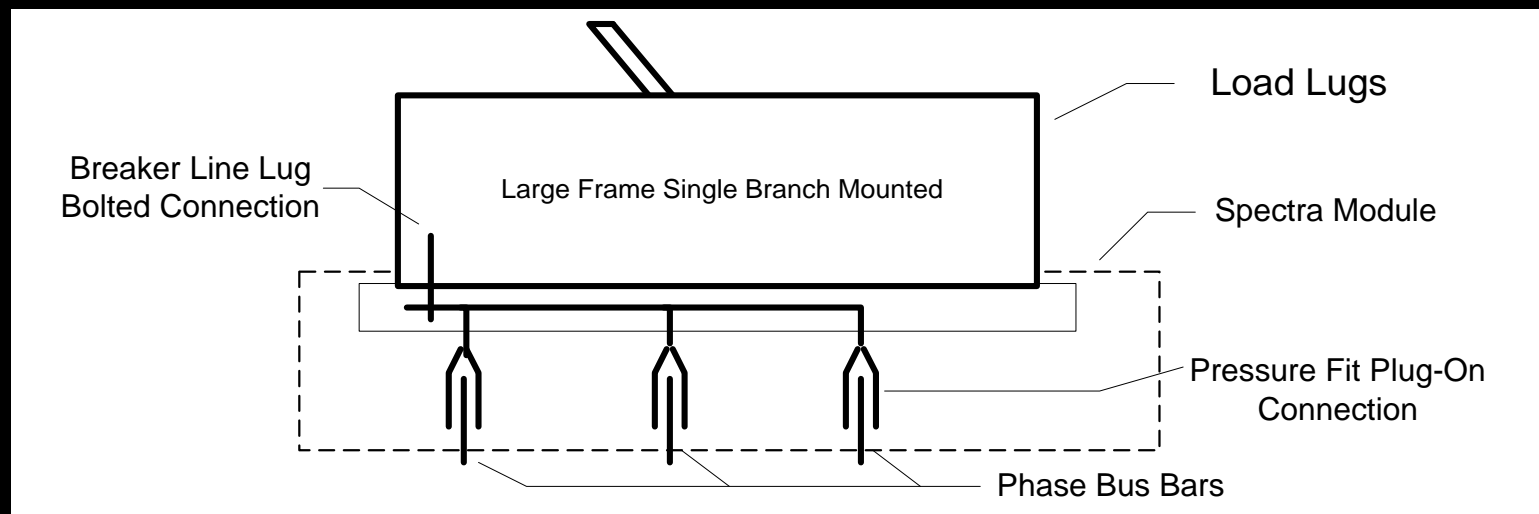




- Up to 240,000A Surge Protection
- UL 1449, IEEE C62.45, & IEEE C62.41 Ratings
- Monitoring with Visual and Audible Alarms
- Direct Bus Connection - No leads- No Wiring

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**Spectra
Connections**



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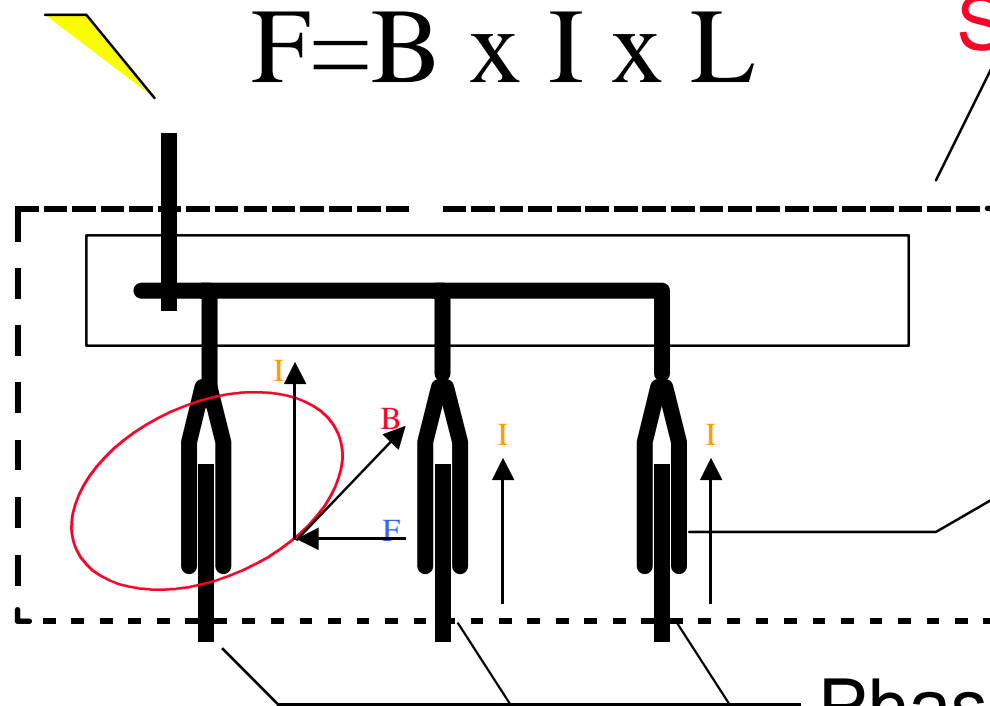
Spectra Connections

Breaker Line Lug

Bolted Connection

$$F = B \times I \times L$$

Spectra Module



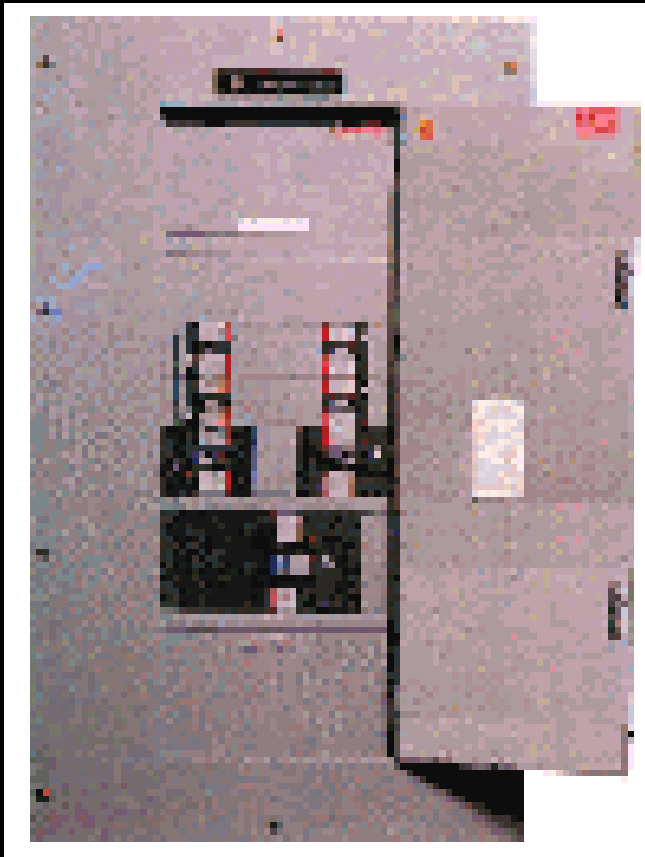
Pressure Fit Plug-On Connection

Phase Bus Bars

SCP+ Series Power Panelboards

- **600v** max. (**480v Delta**); 1 & 3-phase construction.
- **1200a** max. MLO or MCB.
- Fully-rated **10-100k AIC** breakers.
- **Bolt-on** 15-1200a branch **breakers**.

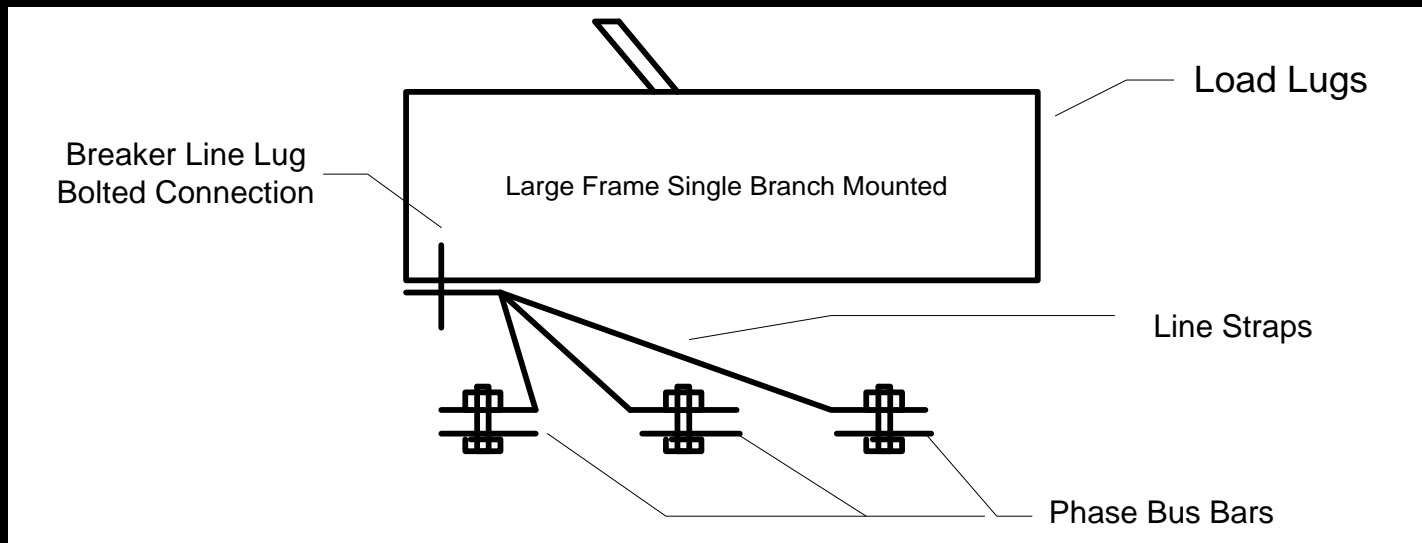
SCP+ Panelboards



- Total Bolted Construction
- Replacement for CCB Panel
- Compact Size
- Simple Construction
- Standard Door
- Circuit Breakers Only
- Ratings to 1200A @ 480V & 100,000 AIC
- Available in Swbd Const.

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SCP Connections



SCP+ Features

- **Lower cost** than Spectra power panels.
- **Bolt-on** circuit breakers - no fusible switches.
- **Full door** with semi-concealed hinges.
- Galvanized steel box with ASA61 acrylic enamel power coat front.

Distribution Panelboards

- Circuit Breakers & Fused Switches
- MCB, Main Fuse or MLO 225-1200A
- Modular Plug-in
- Widths 27", 36" or 44"
- 11.5" standard w/o door, 16.25" w/door
- Plug-in TVSS
- Plug-in PCU (starters)

Spectra VS. SCP

- Circuit Breakers only
- MCB or MLO 225-1200A
- Total Bolt-in Constr.
- Widths 31" & 40"
- 11.5" standard with door
- N/A
- N/A

Bus Bar Current Density

750 amps/sq inch Aluminum:

Standard.

1000 amps/sq. inch Copper:

Optional.

(Rated current is divided bus cross-section area.)

g *ANY QUESTION?????*

