JST POWER EQUIPMENT



TECHNICAL AND APPLICATION GUIDE

J100CLAD™

4.76, 8.25, AND 15 kV ANSI/IEEE®

Metal-Clad Switchgear

JST POWER EQUIPMENT

J100CLAD Switchgear – *Introduction*

PRODUCT DESCRIPTION

JST Power Equipment's type J100CLAD switchgear is an IEEE rated, non-arc-resistant, Metal-Clad product line with Type J3Mag™ vacuum circuit breakers that provides centralized control and protection of medium-voltage power equipment and circuits.

J100CLAD switchgear offers freedom of breaker and auxiliary equipment which can be assembled in various combinations to meet user application requirements. Two-high breaker arrangements are standard up to 15kV. One-high arrangements can be furnished when required. The J100CLAD switchgear is designed to be used in industrial, commercial, and utility installations involving generators, motors, feeder circuits, transmission, and distribution lines.

- PT/Fuse compartment closed door racking
- Racking mechanism in cell vs. on breaker truck
- Allows for easy addition of electric racking solution
- Easier replacement or movement of breakers
- 15kVA draw-out CPT
- TOC switch auxiliary contacts
- 8/16 pole contacts
- Positive pole indication
- Better control
- Tilt-out CPT/PT truck



ADVANTAGES

- Modular design and construction
- Galvanized steel construction
- Two-high construction
- Top and bottom cable or bus duct entry
- ISO 9001 certified manufacturing facilities

JST QUALITY ASSURANCE

JST Power Lake Mary is an ISO 9001:2015 certified manufacturing facility. Our design fully complies with IEEE C37.20.2-2015 and C37.09 for Metal Clad Switchgear. JST assures that all its products meet or exceed all applicable specifications, drawings and testing requirements prior to shipping.

This is achieved through a rigorous Quality Assurance program that monitors the development and manufacturing of our products through every phase of the production. The JST QA team prides itself on its compliance with the industry IEEE standards as well as NEC and OSHA requirements.

The J100CLAD switchgear is manufactured of hem- bent, #14-gauge galvanized steel for superior rust and scratch protection. All non-galvanized steel parts will be treated and painted ANSI #61 light gray. Using a modular and bolted design with 24-, 48- or 96-inch-high cells or compartments, J100CLAD switchgear provides highly flexible design configurations to support switchgear requirements.

COMPARTMENTS

Circuit Breaker Compartment

J100CLAD circuit breaker compartments are designed for operator safety with a viewing window and closed door racking. The circuit breaker has self-aligning, fully automatic primary and secondary contacts allowing the operators to keep the front door closed throughout the racking operation.





Breaker Compartment

J100CLAD Switchgear – *Design*

Auxillary Compartment

The potential transformers, control power transformers (CPT) and draw-out fuses will be mounted on a tilt tray assembly with a racking assembly like the circuit breaker cell; the same racking tools are used for both. The racking assembly includes three (3) positions, connected, disconnect, and tilt-out. The tilt-out position allows for easy access of the auxiliary module for inspection and primary fuse replacement. The primary connection will be via compression contacts. Stationary contacts housed within the cell will include a shutter assembly to prevent accidental contact with energized parts. Secondary contacts will connect automatically during racking via tray mounted male plug, female plug will be housed in the cell. CPT and draw-out fuse trays will employ interlocks with the secondary breaker preventing racking of the tray unless the secondary breaker is in the open position. For larger CPT's the draw-out fuse tray may use a Kirk-Key lock for safety.



CPT Compartment



PT Compartment

Main Bus Compartment

All primary phase buses will be 98% IACS C.F. copper with corona-free design, and are available in 1200, 2000, and 3000 ampere ratings. All bus joints will be silver-plated and secured with a minimum of two (2) ½"-13 UNC grade 5 steel bolts. All bolts will be torqued to



Main Bus Compartment

size and verified by calibrated tool for improved performance. The main bus is not tapered and is easily extendable at both ends for future expansion. Phase bus insulation will be baked-on epoxy compound applied with a power coating system that eliminates voids and other potential defects, resulting in a safe insulating system. All bus joints, taps and splices are covered with removable and reusable air-filled poly-vinyl boot secured in place with nylon hardware providing minimum effort during access.

Low Voltage Compartment

Auxiliary components such as fuse holders, terminal blocks, and auxiliary relays are mounted in the LV compartment. The breaker door allows mounting of relays, indicating lights and control switches.



Low Voltage Compartment

Cable Compartment

The J100CLAD cable compartment design provides adequate space for power cable stress cones and a choice of terminations and lug types. Customers also have the flexibility of top or bottom cable entry. Top connections of non-segregated phase bus duct can also be made. In two-high frame arrangements with stacked circuit breakers, steel barriers separate the compartment and isolate the primary circuits. All power cable terminations will include lug boots with cable supports as an option to make field connection more secure. Primary cable openings include a removable gland plate made of 1/8" thick aluminum used to install conduit or cable sealing glands.



Cable Termination Bus

Cable Compartment will house the following optional items:

- Zero-Sequence CT
- Cable Supports
- Surge Arresters
  - Distribution Class
  - Intermediate Class
  - Station Class
- Surge Capacitor
- Ground Studs
- Space Heaters
- Infrared Viewing Ports (rear panels)

J100CLAD Switchgear – *Components*

COMPONENTS

Racking Mechanism

The breaker racking assembly will be housed within the cell and not on the circuit breaker. This increases reliability while reducing maintenance cost and downtime. The racking assembly employs a worm-gear mechanism



Racking Mechanism

with chain-drive assist to move the circuit breaker to and from three (3) separate positions. The racking procedure can be completed with the front door closed. The assembly includes padlock provisions.

A solid ground bus contact will engage the circuit breaker grounding contact prior to the coupling of the primary and secondary contacts and is continuous during the racking operations. The three racking positions are as follows:

- Connect: Primary and secondary (control) contacts are engaged.
- Test: Primary contact are disengaged. Secondary (control) contacts are engaged for in cell breaker testing.
- Disconnect: Both primary and secondary contacts are disengaged.

Doors

J100CLAD front doors will enclose breaker compartments, auxiliary compartments, and low voltage compartments. These doors will be made of #11-gauge painted steel. All doors will have hinges on the left-side as standard (when facing the front door) and be latched by a single handle.

Additional Options:

- Right-hand hinged doors are available as an option.
- Door stop assembly.

Rear panels on J100CLAD switchgear will allow access to the high-voltage cable compartment. These are available in the following configurations:

- Full height hinged door with single handle latch
- Split panels (top & bottom) hinged with single handle latch
- Bolted panels (top & bottom), non-hinged, with two handles (weight = <50lbs. each)

All front and rear door panels will be equipped with padlock provisions. These padlock provisions are used to prevent access to the cell interior.

Breaker and auxiliary cell doors include a viewing window to observe the interior device position and status with the front door closed.



J100CLAD Door

Current Transformers

JST type J100CLAD switchgear is available with current transformer type CT101, CT-102MR, CT103, and CT104MR. Up to two CT101 or CT102MR can fit onto a single bushing for a total of twelve (12) CT's per breaker cell. High accuracy type CT103 and CT104MR can fit only one CT per bushing for a total of six (6) CT's per breaker cell.



Current Transformer

Potential Transformers

For 4.76kV rated switchgear, J100CLAD will utilize type V9.1 PT. For 8.25kV and 15kV switchgear will utilize type V21.1 PT. All PT's assemblies are available in wye-wye, open-delta, line-to-line, or line-to-ground configurations. PT's will be assembled on a draw-out tray with similar racking mechanism used for the circuit breaker.



Potential Transformer tray assembly (rear view)

Control Power Transformers

CPT, up to 15kVA, will be accessible from the front of the switchgear via draw-out tray assembly, with the same racking mechanism as the PT assembly. For higher ratings, up to 75kVA, the CPT will be mounted in the cable compartment, employing a draw-out fuse unit with interlock features. All primary connections will have current-limiting type E-fuses.



Control Power Transformer

Zero-Sequence CT's

For zero-sequence CT requirements, the J100-CLAD can offer CT355, BYZ-O or CT428 style CT's. The style of CT is determined by window size required for cables and cable bending.



Zero Sequence CT Mounted in Cable Compartment

J100CLAD Switchgear – *Tests & Standards*

J100CLAD switchgear has been tested in accordance with:

- IEEE Std C37.20.2-2015
- IEEE Std C37.54-2002
- IEEE Std C37.55-2020

The manufacturing location for J100CLAD line is ISO 9001 certified. J100CLAD is available with UL label.

J100CLAD Switchgear – *Operating & Service Conditions*

ALTITUDE

- ≤ 1000m (3300ft.) above sea level. For applications above 1000m derating according to C37.20.2 is applicable.

CLIMATE

- If in high humidity and/or rapid temperature change environments, use proper protection equipment such as heaters.

ENVIRONMENT TEMP.

- Appropriate temperature is between - 30°C and + 40°C. The average should be less or equal to +25°C

HUMIDITY

- 20-90% RH non-condensing

J100CLAD Switchgear – *Options*

MECHANICAL OPTIONS

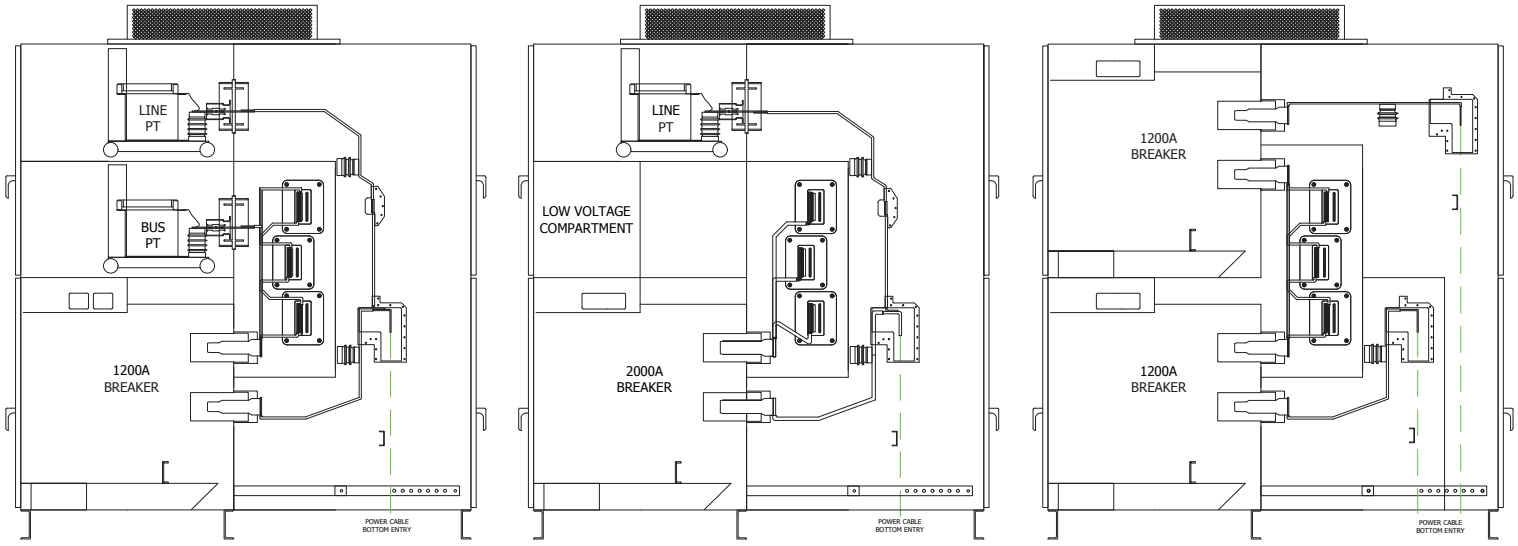
- Tin-plated phase bus
- Mimic bus
- Cable supports
- Infrared port windows
- Channel sills
- Roll-on-the-floor
- Surge arresters
- Ground studs
- Utility metering cabinets
- Outdoor non-walk-in enclosure
- E-House building
- Anchoring options
  - Bolted
  - Channel sills

ELECTRICAL OPTIONS

- Separate or common pull-safe fuse block or MCCB for close-open circuit protection
- Phase bus marking labels
- Instrument door ground strap
- Arc flash mitigation relays
- Electric Racking for J3Mag Breaker

J100CLAD Switchgear – *Drawings*

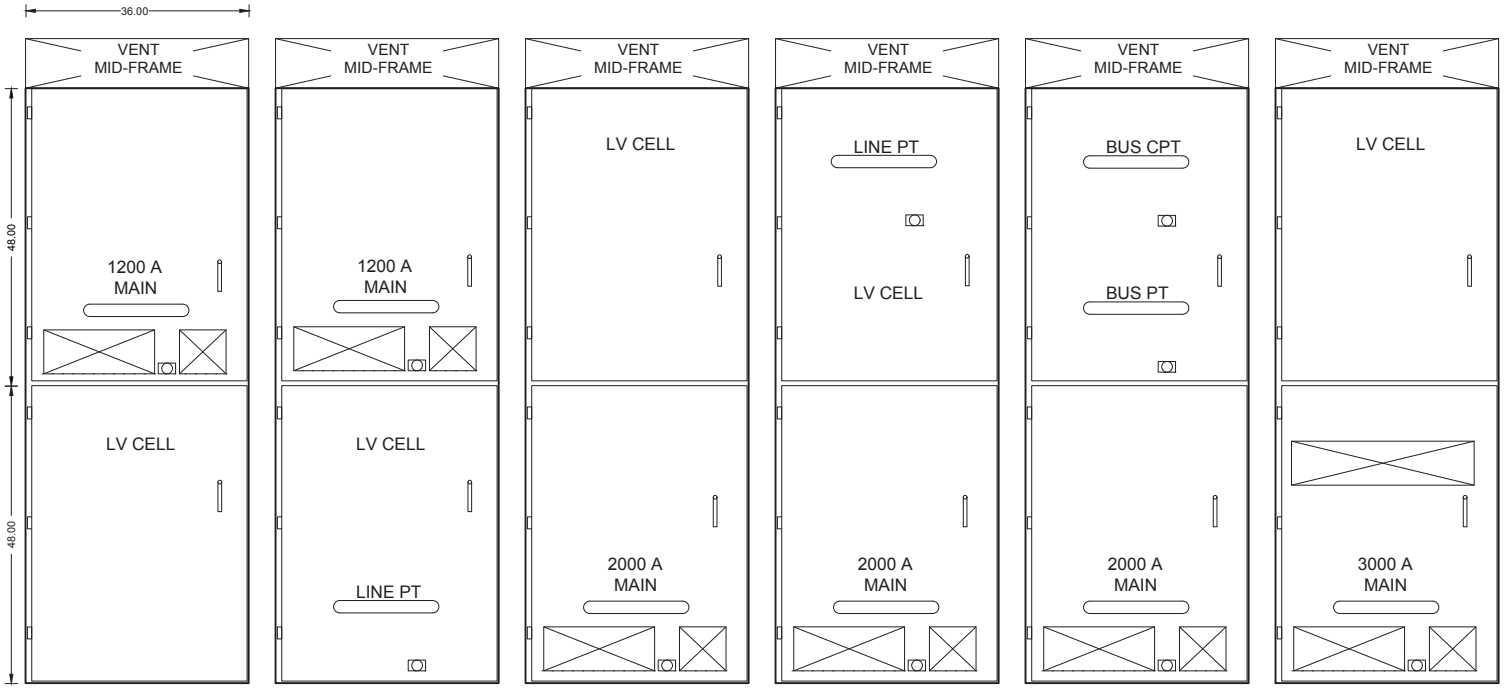
TYPICAL SIDE VIEWS



FRAME DESIGNS

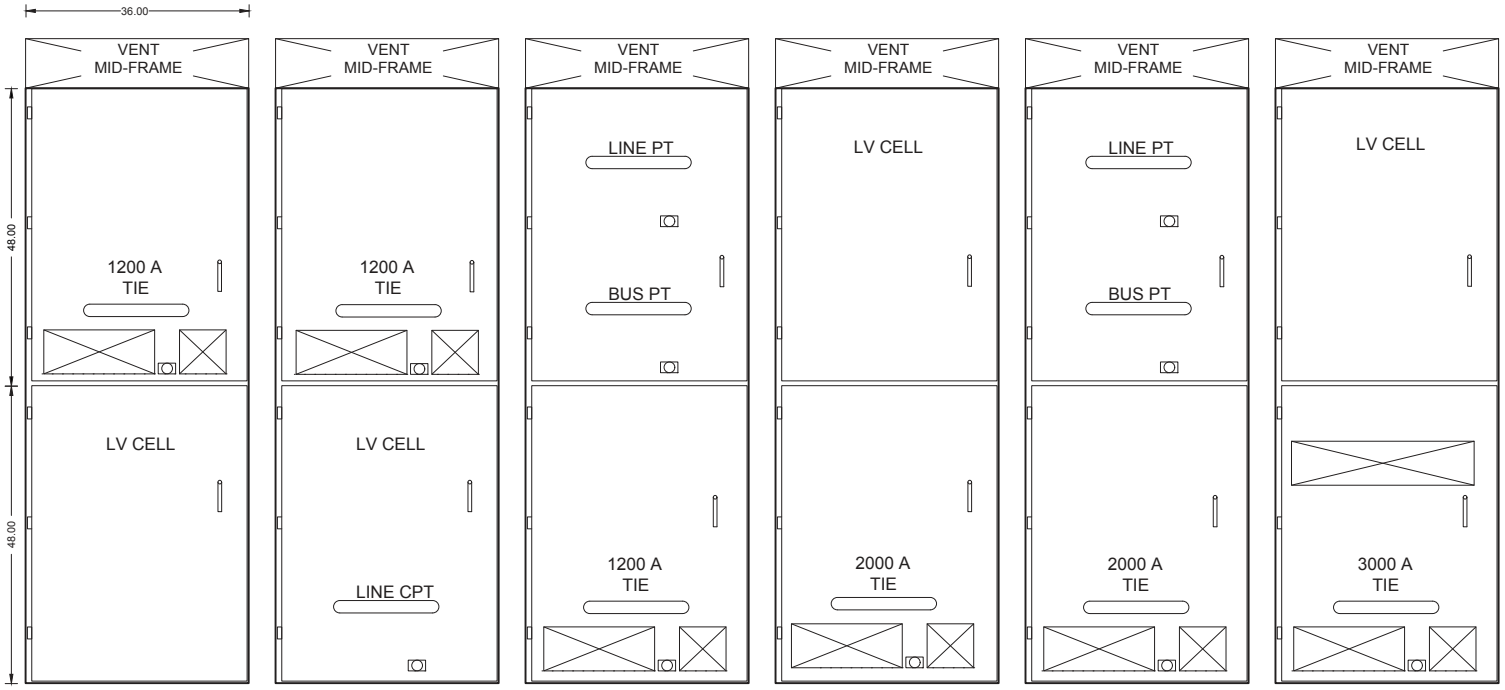
JST provides the customer with specific configurations to attend to different needs. Some examples of frame configurations are illustrated below.

MAIN BREAKER FRAMES

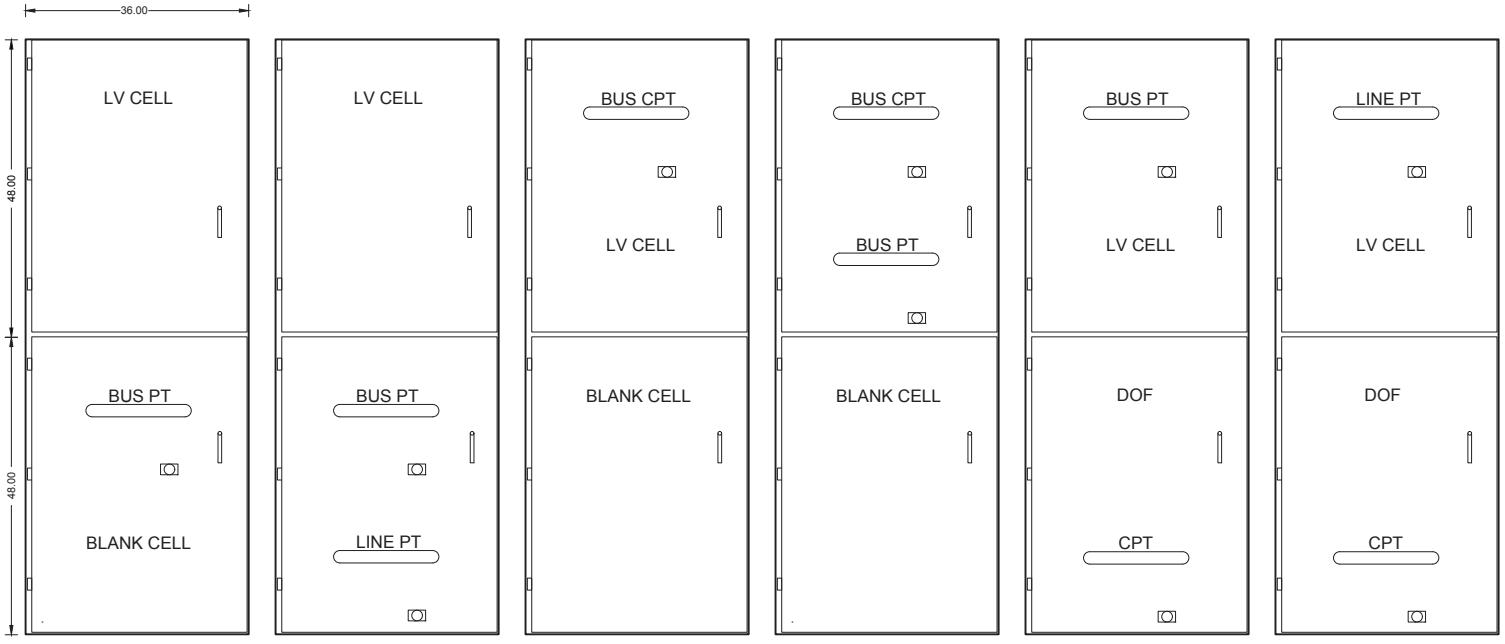


J100CLAD Switchgear – *Drawings*

TIE BREAKER FRAMES

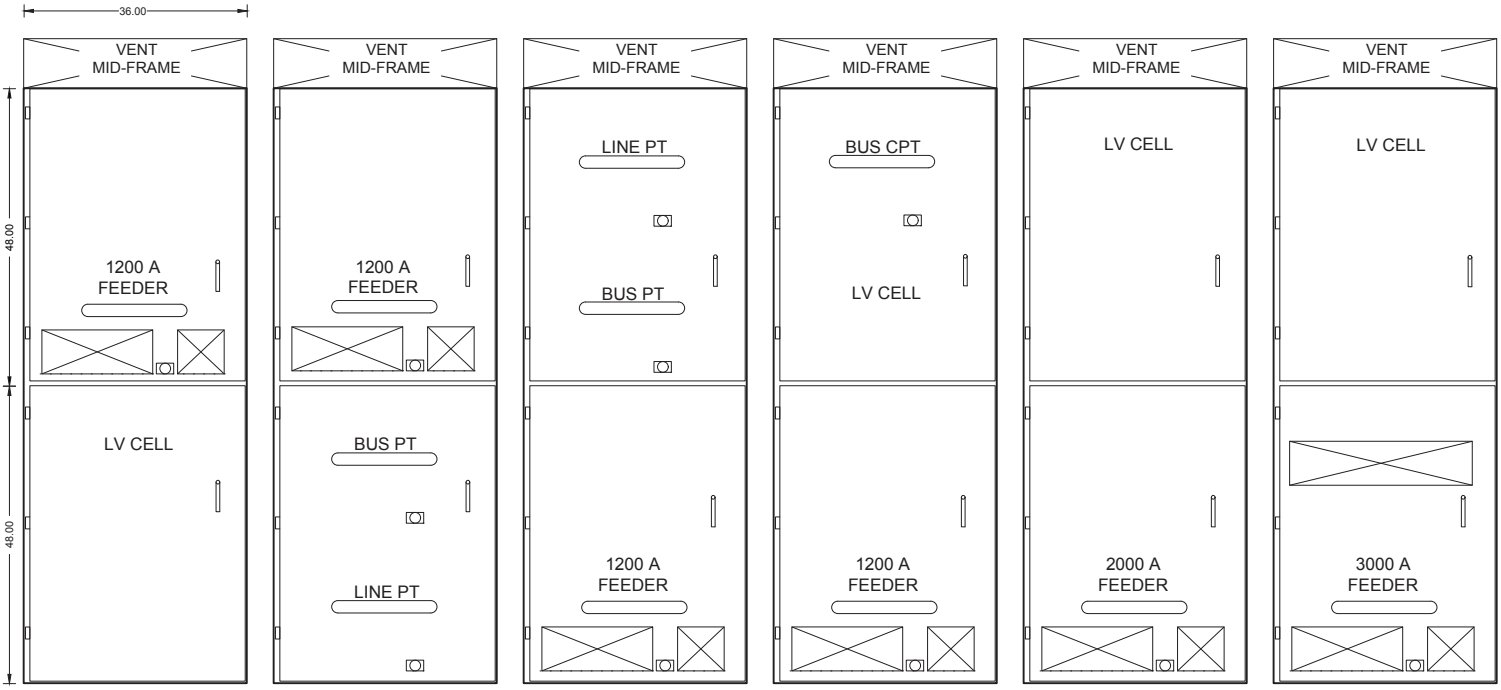


AUXILIARY FRAMES

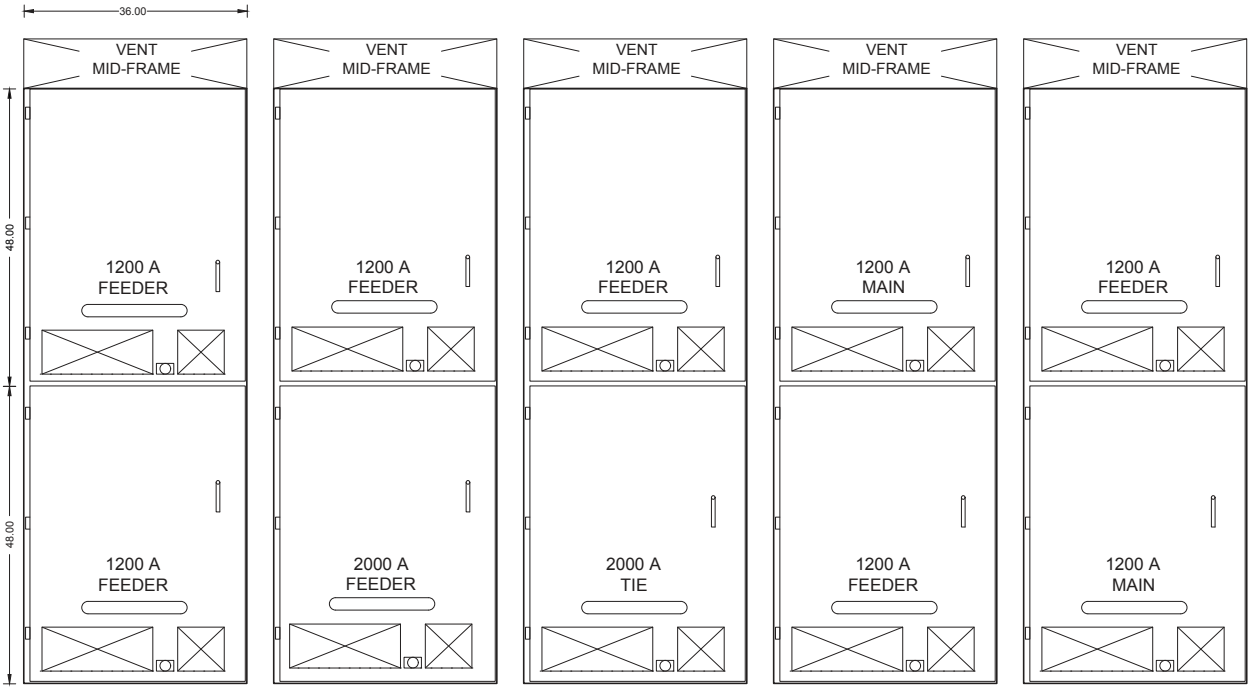


J100CLAD Switchgear – *Drawings*

FEEDER BREAKER FRAMES

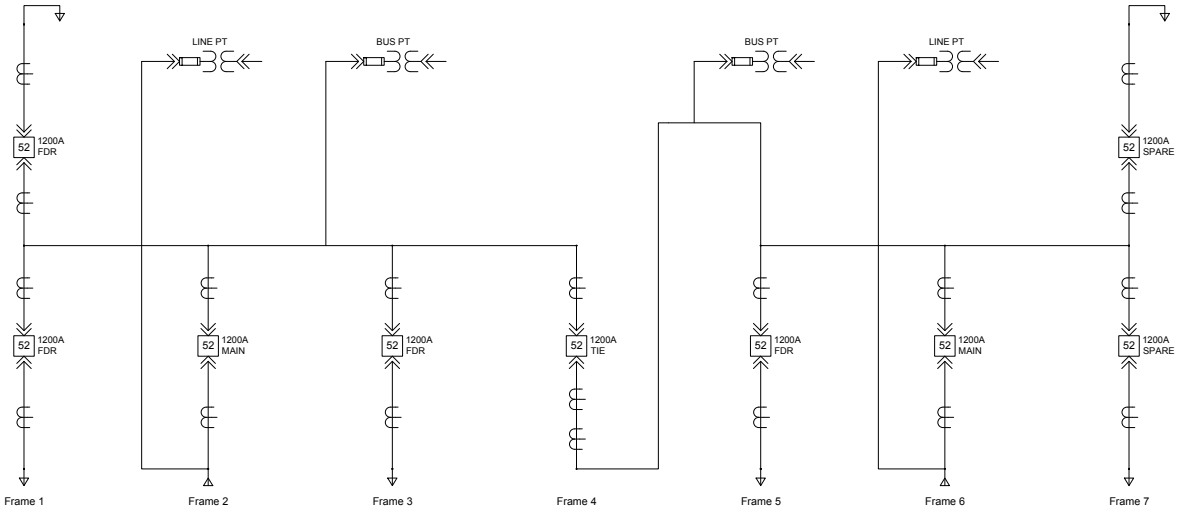


TWO-HIGH BREAKER FRAMES

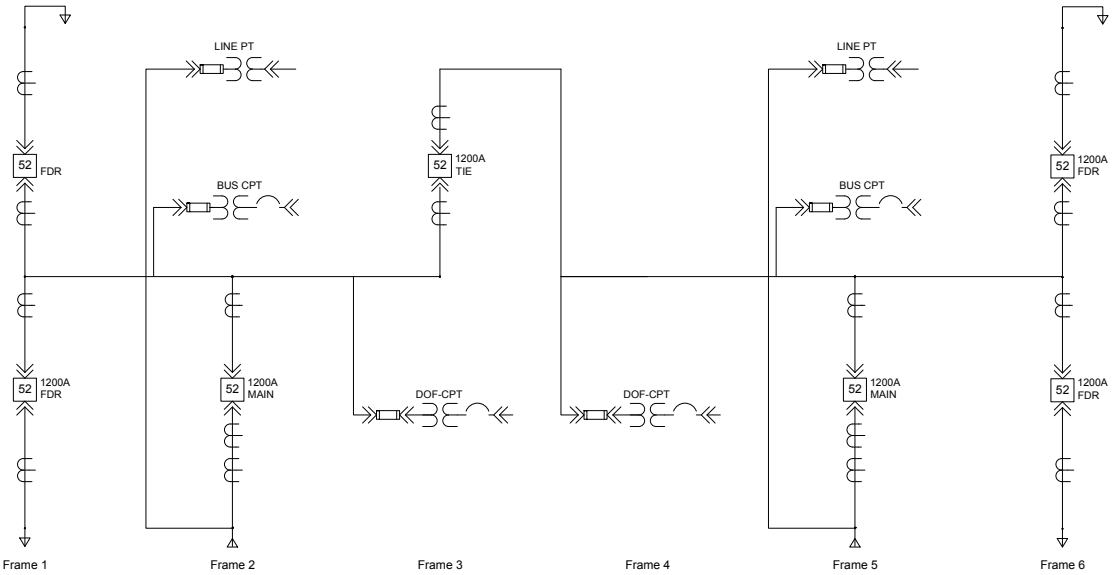


J100CLAD Switchgear – *Drawings*

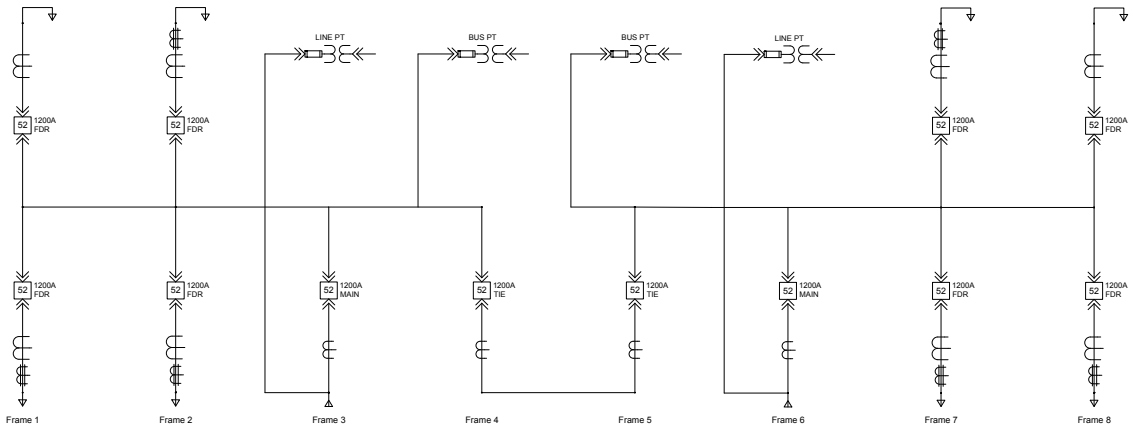
MAIN TIE



UPPER TIE

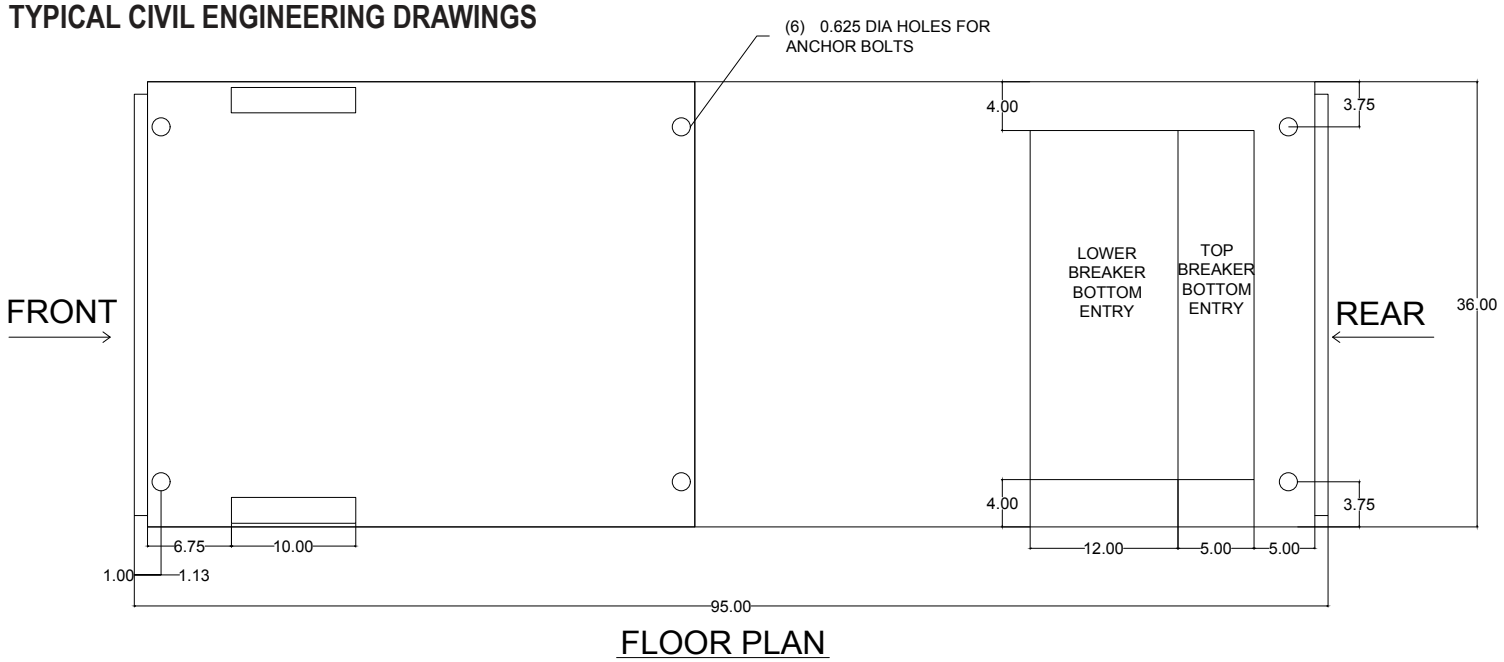


DOUBLE TIE



J100CLAD Switchgear – *Drawings*

TYPICAL CIVIL ENGINEERING DRAWINGS



FLOOR PLAN

CLEARANCES

Front Aisle Space

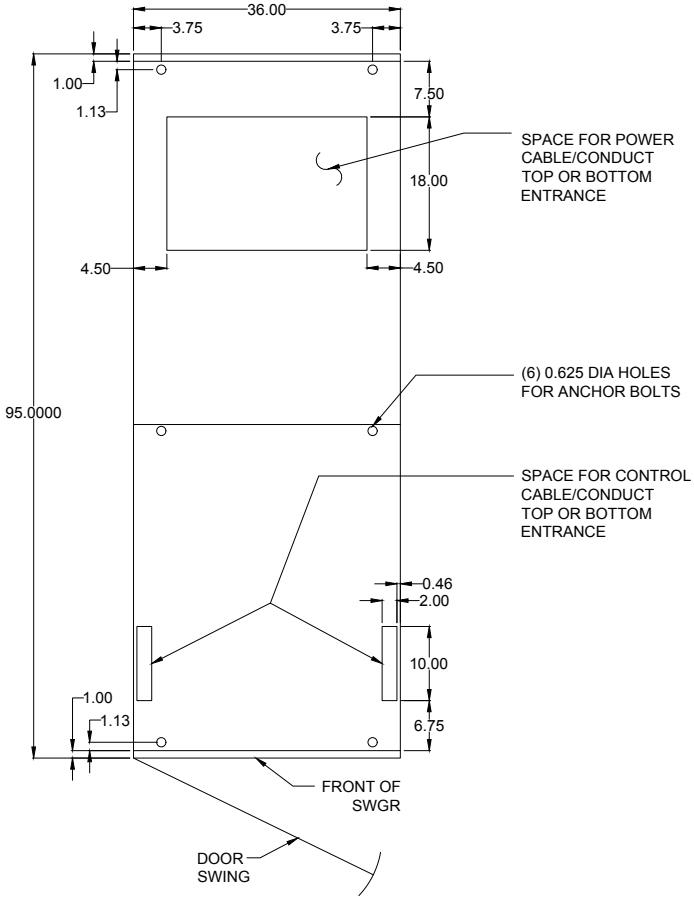
- 72” recommended, 60” minimum (for breaker insertion and withdrawal)

Rear Aisle Space

- 48” recommended, 38” minimum

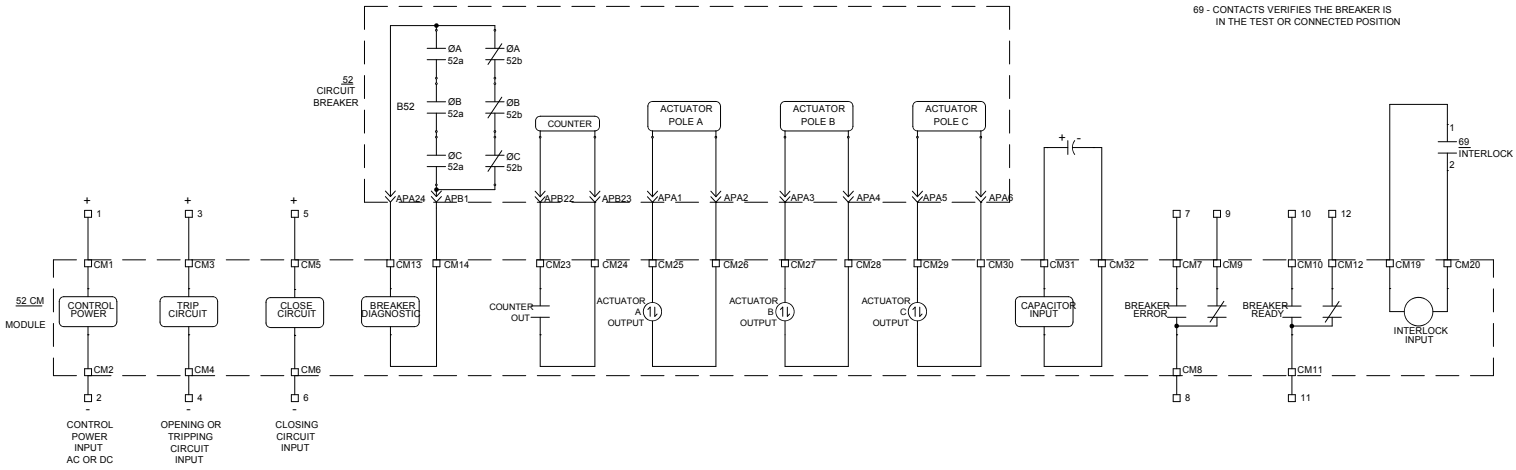
Ceiling Height (from floor)

- 120” recommended, 110” minimum

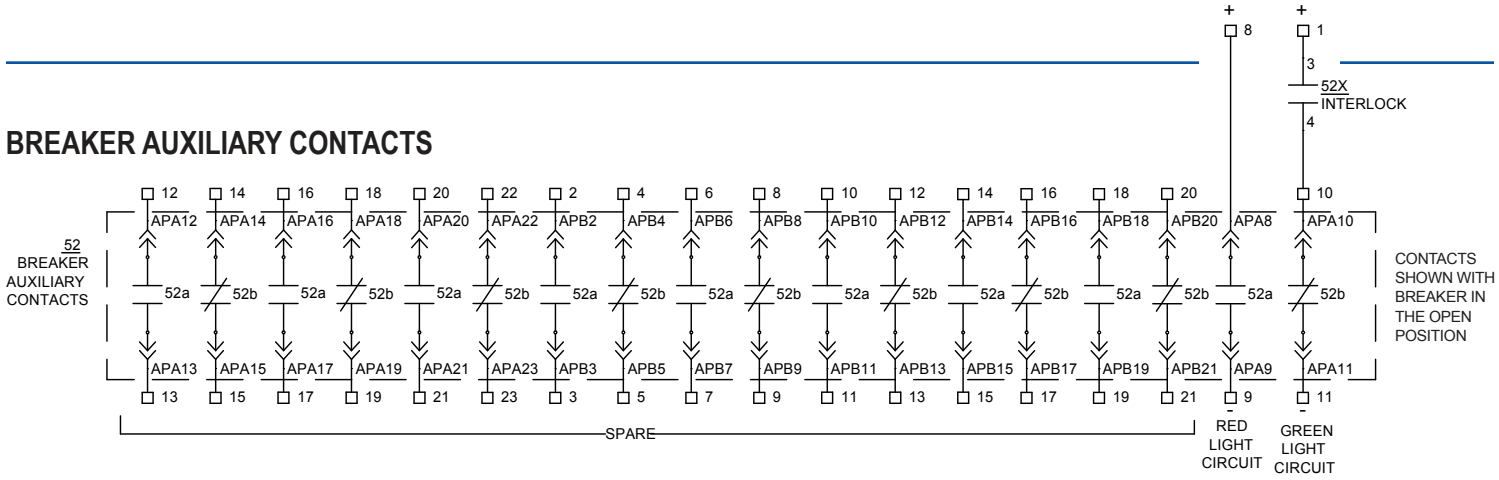


J100CLAD Switchgear – *Sample Drawings*

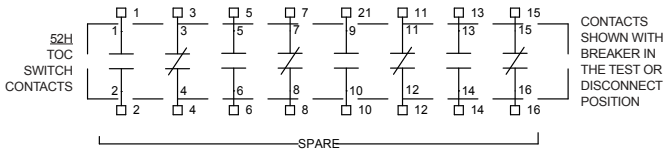
SAMPLE CONTROL MODULE SCHEMATIC



BREAKER AUXILIARY CONTACTS



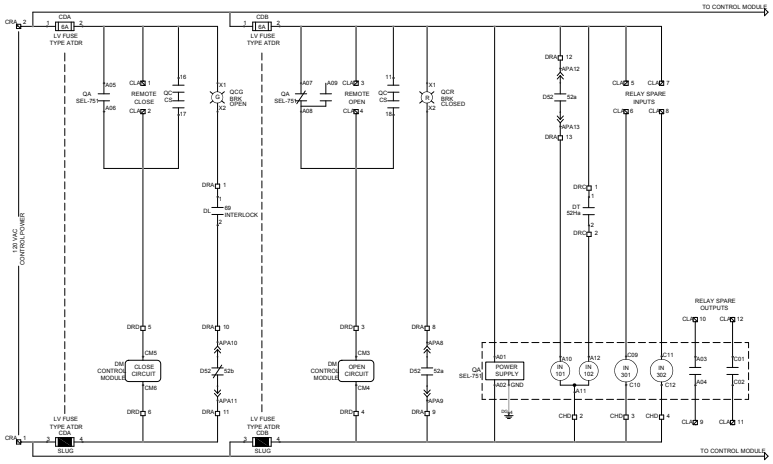
TOC SWITCH CONTACTS



*16-POLE TOC OPTION AVAILABLE

52H/TOC Switch,
8-Pole (4)a (4)b
16-Pole (8)a (8)b

SAMPLE SCHEMATIC DIAGRAM



J100CLAD Switchgear – *Technical Data*

Standard J100CLAD Ratings

Rated Max Voltage (at 60Hz)	Rated Volt. Range Factor	Power Frequency Withstand Voltage 60Hz, 1 Minute	Lightning Impulse Withstand Voltage (BIL)	Rated Main Bus Continuous Current	Rated Short-Circuit and Short-Time Current Withstand (2 Seconds)	Rated Momentary Short-Circuit Current Withstand (10 Cycles)
kV rms	K	kV rms	kV Peak	Amperes	kA rms, Sym.	kA rms, Asym.
4.76	1	19	60	1200, 2000 3000	25	39
					31.5	49
					40	62
					50	78
8.25	1	36	95	1200, 2000 3000	40	62
15	1	36	95	1200, 2000 3000	25	39
					31.5	49
					40	62
					50	78

- The switchgear assembly is designed for use with type J3Mag circuit breakers.
- Switchgear assemblies can be supplied with UL-label.
- Continuous current de-rated by 10% when filters installed over louvered openings.
- 50 Hz available upon request

J100CLAD Switchgear Weights

Continuous Current (amps)	Approx. Weight (lbs)	Approx. Weight (kgs)
1200	3550	1610
2000	5200	2359
3000	5200	2359

- This is approximation of switchgear weight without a breaker. True weight of the frame will depend on the configuration and components of each project.
- For the approximate weight of a frame with a circuit breaker, add the weight of the respective switchgear and breaker per frame.
- Switchgear impact loading is the same as switchgear weight.

Auxiliary Module Weights

Aux. Module	Weight (Lbs)	Weight (Kg)
PT	361	163
CPT	218	99

- 5 kV potential transformers unit with 3 PTs. Subtract 35 lbs for each PT not required.
- 15 kV potential transformers unit with 3 PTs. Subtract 90 lbs for each PT not required.
- Weight for CPT is for 15 kVA.

J3Mag Circuit Breaker Weights

Rated Short-Circuit & Short-Time Curr. (kA rms)	Cont. Current (amps)	Approx. Weight (lbs)	Approx. Weight (kgs)
31.5	1200	321	146
	2000	321	146
	3000	546	248
50	1200	531	241
	2000	546	248
	3000	546	248

- Breaker impact loading is twice the breaker weight.

Main Bus Design Details

Cont. Current (amps)	Short Circuit Rating (kA)	Qty. Per Phase	Bus Size
1200	25, 31.5	1	1/4" x 4"
1200	40, 50	1	3/8" x 6"
2000	up to 50	1	3/8" x 6"
3000	up to 50	2	3/8" x 6"

Capacitive current switching ratings, class C2, Back-to-back

Rated Max Voltage	Rated Cont. Current	Rated Cable Charging Current	Rated Capacitor Bank Current	Alt. 1 Rating Peak Value	Testing Freq.
kV, rms	A, rms	A, rms	A, rms	kA, peak	kHz
4.76, 8.25, 15	1200, 2000, 3000	25	630	6	0.8

Number of Operations

Rated Max. Volt.	Rated Cont. Current	Short-Circuit Current	No Load Mech. Oper.
kV, rms	A, rms	kA	Operations
4.76, 8.25, 15	1200, 2000, 3000	31.5, 50	10,000

CPT Ratings

CPT ratings, single phase
5, 10, 15 kVA, up to 15kV (draw-out tray assembly) 25, 37.5, 50, 75 kVA, up to 15kV (stationary mount in the rear)

CPT ratings, three-phase
15, 30, 45, 75 kVA, up to 15kV (stationary mount in the rear)

J100CLAD Switchgear – *Technical Data*

Type CT101 – Standard Accuracy

Current Ration	Relay Class	ANSI Metering Class (60Hz)	
		B0.1	B1.8
50:5	-	4.8	-
75:5	C10	4.8	-
100:5	C10	2.4	-
150:5	C20	1.2	4.8
200:5	C20	0.6	4.8
250:5	C20	0.6	2.4
300:5	C20	0.3	2.4
400:5	C50	0.3	2.4
500:5	C50	0.3	1.2
600:5	C100	0.3	0.6
800:5	C100	0.3	0.3
1000:5	C100	0.3	0.3
1200:5	C200	0.15	0.3
1500:5	C200	0.15	0.15
1600:5	C200	0.15	0.15
2000:5	C200	0.15	0.15
2500:5	C200	0.15	0.15
3000:5	C200	0.15	0.15
3200:5	C200	0.15	0.15
3500:5	C200	0.15	0.15
4000:5	C200	0.15	0.15
5000:5	C200	0.15	0.15

Type CT102 – Standard Accuracy

Current Ration	Relay Class	ANSI Metering Class (60Hz)	
		B0.1	B1.8
600:5MR	C100		0.6
1200:5MR	C200		0.3
2000:5MR	C200		0.15
3000:5MR	C200		0.15
4000:5MR	C200		0.15

Type CT103 – High Accuracy

Current Ration	Relay Class	ANSI Metering Class (60Hz)	
		B0.1	B1.8
50:5	C10	4.8	-
75:5	C20	2.4	-
100:5	C20	1.2	-
150:5	C50	0.6	4.8
200:5	C50	0.6	2.4
250:5	C50	0.3	2.4
300:5	C100	0.3	1.2
400:5	C100	0.3	1.2
500:5	C100	0.3	0.6
600:5	C200	0.3	0.6
800:5	C200	0.3	0.3
1000:5	C200	0.3	0.3
1200:5	C400	0.15	0.3
1500:5	C400	0.15	0.15
1600:5	C400	0.15	0.15
2000:5	C400	0.15	0.15
2500:5	C400	0.15	0.15
3000:5	C400	0.15	0.15
4000:5	C400	0.15	0.15

Type CT104 – High Accuracy

Current Ration	Relay Class	ANSI Metering Class (60Hz)	
		B0.1	B1.8
600:5MR	C200		0.6
1200:5MR	C400		0.3
2000:5MR	C400		0.15
3000:5MR	C400		0.15
4000:5MR	C400		0.15

Ratings (all CT types)
Insulation Level = 600 V, 10 kV BIL full wave
Thermal = up to 3000:5 – 2.0 at 30° C ambient

PT type V21.1 for 8.25 & 15kV switchgear

Primary Volt.	Ratio	Secondary Volt.
Two Bushing / Fuse Model		
4800	40:1	120
7200	60:1	120
8400	70:1	120
12000	100:1	120
12470	104:1	120
13200	110:1	120
13800	115:1	120
14400	120:1	120
One Bushing / Fuse Model		
4800	40:1	120
7200	60:1	120
8400	70:1	120
12000	100:1	120
12470	104:1	120
13200	110:1	120
13800	115:1	120
14400	120:1	120

Ratings: Insulation level = 15.5kV, 110kV BIL full wave
Frequency = 60 Hz
Thermal Rating = 1500 VA at 30° C ambient
Accuracy Class = 0.3WXMYZ, 1.2ZZ at 120V burden

PT type V9.1 for 4.76kV switchgear

Primary Volt.	Ratio	Secondary Volt.
Two Bushing / Fuse Model		
2400	20:1	120
4200	35:1	120
One Bushing / Fuse Model		
2400	20:1	120
4200	35:1	120

Ratings: Insulation level = 15.6kV, 60kV BIL full wave
Frequency = 60 Hz
Thermal Rating = 750 VA at 30° C ambient

ZSCT Application

Cable Size	# Term. Per Phase	ZSCT Type	Cable Size	# Term. Per Phase	ZSCT Type	Cable Size	# Term. Per Phase	ZSCT Type
#2 AWG	4	CT355	500 MCM	4	CT355	1000 MCM (2-hole)	2	BYZ-O
#2 AWG	8*	CT355	500 MCM	8*	BYZ-O	1000 MCM (2-hole)	4*	BYZ-O
#4/0 AWG	4	CT355	750 MCM	4	BYZ-O	1000 MCM (4-hole)	2	BYZ-O
#4/0 AWG	8*	BYZ-O	750 MCM	8*	CT428	1000 MCM (4-hole)	4*	CT428

* Dual lug pad will limit to one-high configurations

JST POWER EQUIPMENT

HEADQUARTERS

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Sales@jstpower.com
www.jstpower.com

MANUFACTURING FACILITIES



Lake Mary, Florida



Nogales, Mexico



Haikou, Hainan



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