

Power-Zone™ 4

Low-Voltage, Metal-Enclosed, Drawout Switchgear with MasterPacT™ Low Voltage Power Circuit Breakers

Catalog

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R02/22



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Power-Zone™ 4 Switchgear Features and Benefits Summary

Equipment Ratings

- Power-Zone 4 low voltage drawout switchgear is designed and built to all applicable ANSI, UL, CSA and NOM standards and are UL/cUL listed.
- Seismically qualified to IBC/ASCE7 standards and OSHPD (CA Healthcare) preapproval available as an option.
- Maximum short-circuit current ratings of up to 200 kA—without fuses
- Maximum short-time withstand ratings of up to 100 kA for 60 cycles continuous
- Maximum system voltages of up to 635 Vac
- Vertical and cross bus ratings of 2000 A, 3200 A, 4000 A, 5000 A and 6000 A, with up to 10,000 A maximum for cross bus (density-rated bus available)
- Neutral bus ratings of 50% and 100% up to 6000 A, 150% up to 3200 A, 200% up to 2500 A

Structure

- Structure frames, compartment doors, and barriers offer a complete system engineered for unmatched durability.
- Structure depths of 54 in. (1372 mm), 60 in. (1524 mm), 72 in. (1829 mm), and 80 in. (2032 mm). Arc Resistant not available in 54 in. depth.
- Structure widths of 22 in. (559 mm), 30 in. (762 mm), and 36 in. (914 mm)
- Enclosure ratings of NEMA 1 and NEMA 3R (walk-in)
- Bolted, silver-plated copper bussing provided as standard. Tin-plated copper bus available as an option for corrosive environments.
- Allows for a 4-high circuit breaker configuration for high-density applications.
- ANSI-49 paint is standard with ANSI 61 or custom colors available upon request.
- Large rear cable compartment pull area allows maximum room for power cables.
- Bus provisions for future equipment expansion
- Optional 18 in. (457 mm) pull boxes provide increased flexibility (not available in AR/PZ-4).
- Optional transitions to I-Line™ busway, Model 6 motor control centers, QED2/S and QED3/4 switchboards, transformers, and legacy Power-Zone 3 switchgear.
- Optional insulated bus offer provides additional protection against inadvertent fault conditions.

Circuit Breaker and Instrument Compartment

- MasterPacT™ circuit breakers are designed and built to ANSI C37.13, C37.16, C37.17 and C37.50 and are listed to UL1066.
- Complete family of upgradeable MicroLogic™ trip units are compatible with optional market-leading advanced PowerLogic™ metering and EcoStruxure™ Power data communications features.
- Through-the-door circuit breaker access allows for complete visual inspection of both circuit breaker and trip unit.
- Circuit breaker cradles provide four different circuit breaker positions of drawout, connected, test, disconnected, and removed.
- Circuit breaker cradle offers protection during circuit breaker rack-in/rack-out by isolating the user from contact with live parts.
- Remote racking device is also available.
- Front access to control and communications wire connections
- Flexible, SIS #14 stranded control wire, provided as standard.
- Control and communication wiring is installed and connected from the front of the switchgear. The secondary wiring design allows for circuit breaker compartment wiring without removing the circuit breaker from its compartment.
- Optional circuit breaker cell shutters are available to offer increased isolation from bus compartment.
- Direct Ethernet (Modbus TCP/IP) and Modbus Serial communications are available to circuit breakers and other intelligent devices to satisfy users who desire maximum flexibility and capability for automation and control.
- 3-pole are standard with optional 4-pole breakers available.

Power-Zone 4 Arc Resistant Switchgear with ArcBlok™ Technology (AR/PZ-4)

NOTE: For complete details on AR/PZ-4, see the Power-Zone 4 Arc Resistant Switchgear with ArcBlok Technology, page 69 section.

Power-Zone 4 Low Voltage Drawout Switchgear Structures

Introduction

Power-Zone 4 switchgear with MasterPacT circuit breakers provides the optimal switchgear solution in an industrial environment. The switchgear is designed for ease of use, system selectivity, system uptime, and low maintenance. The switchgear is easy to operate and maintain due to the technological advances in communications, power quality monitoring, and measuring capabilities.

The switchgear with drawout MasterPacT circuit breakers provide overload, short-circuit, and ground fault protection for circuits up to 635 Vac maximum. All trip unit and circuit breaker functions are operational from the front without opening the circuit breaker compartment door. MasterPacT circuit breakers carry the highest available interruption ratings without fuses, and require minimal space.

All MasterPacT circuit breakers can be equipped with MicroLogic electronic and programmable trip units to provide a choice of expanded information, power quality measurement, protection, and communication capabilities. Additionally, the optional high-end MicroLogic trip units are compatible with the optional EcoStruxure Power communications system.

The optional PowerLogic data communications system can be used in addition to MicroLogic trip units. The PowerLogic system uses highly accurate circuit monitors that work in conjunction with its system manager software to manage and control the electrical distribution system.

Power-Zone 4 switchgear is commonly found as the electrical service in the following applications:

- Airports
- Chemical refinery
- Data centers
- Oil and gas
- Heavy assembly plants
- Hospitals
- Mining
- Manufacturing
- Semi-conductor manufacturing
- University facilities
- Wastewater and water treatment facilities

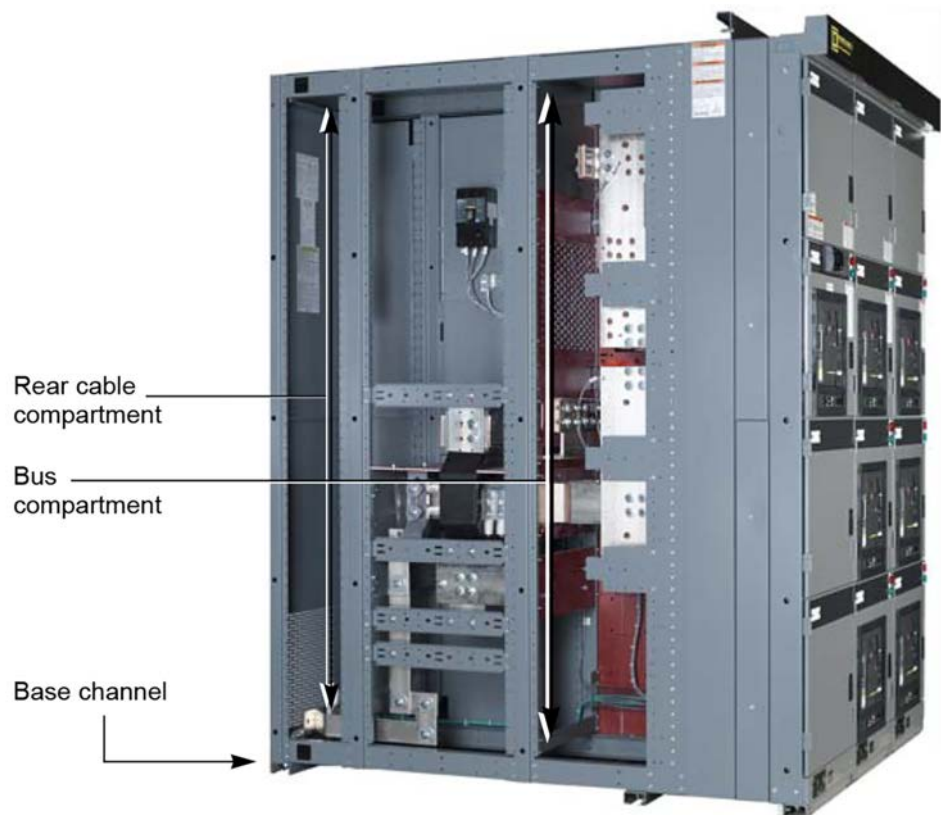


Structure Design

The switchgear assembly is composed of vertical sections arranged according to customer requirements. Each section is divided into a maximum of four compartments when using MasterPacT circuit breakers, or a maximum of eight compartments when using MasterPacT MTZ1/NT circuit breakers. One or more of these compartments can be used as an auxiliary instrument compartment containing potential transformers, meters, relays, and control devices.

A horizontal secondary wireway containing the accessory terminal blocks, is directly above each circuit breaker. A spacious vertical wireway is on the right side of each circuit breaker compartment to allow wire routing through the switchgear (see *Secondary Wiring System*, page 24). At the top and bottom on the front of each section are horizontal wireways forming a continuous path for control (top wireway) and communications (bottom wireway) along the entire lineup.

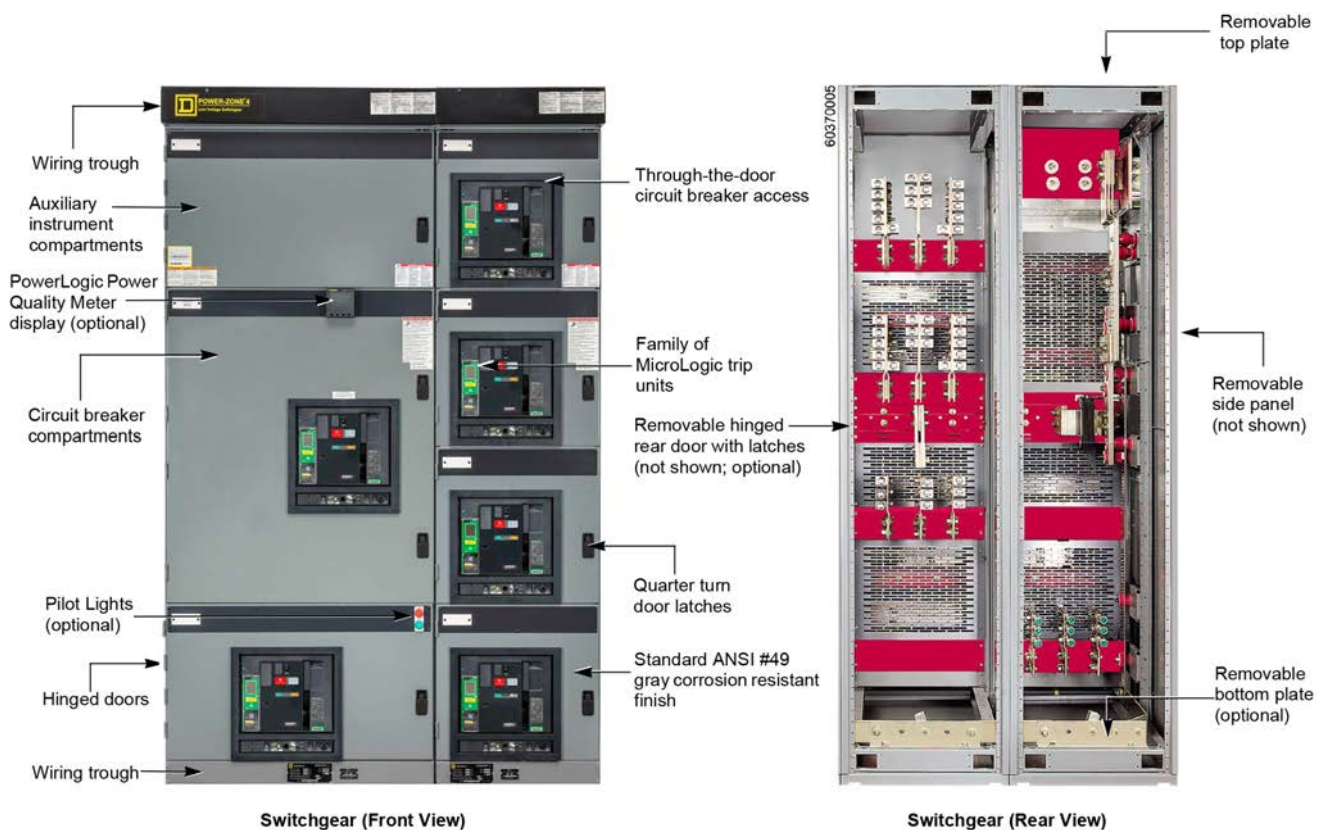
Figure 1 - Switchgear (Side View)



Power-Zone 4 switchgear offers compartmentalized construction. Each vertical section consists of three compartments: a front compartment (including secondary wireway), a bus compartment, and a rear cable compartment. The front compartment is divided into a maximum of four (MTZ2/NW) or eight (MTZ1/NT) compartments or auxiliary equipment. If desired, all compartments may be used for auxiliary equipment, circuit breakers, or a combination. The circuit breaker is positioned to allow ample room for control and communications wiring. Hinged doors on the auxiliary instrument compartment are available for mounting meters, relays, or other control equipment, when it does not contain a circuit breaker. A Power Quality Meter display may be mounted on the hinged door of a compartment containing a main circuit breaker.

Figure 2 - Power-Zone 4 Switchgear Assembly

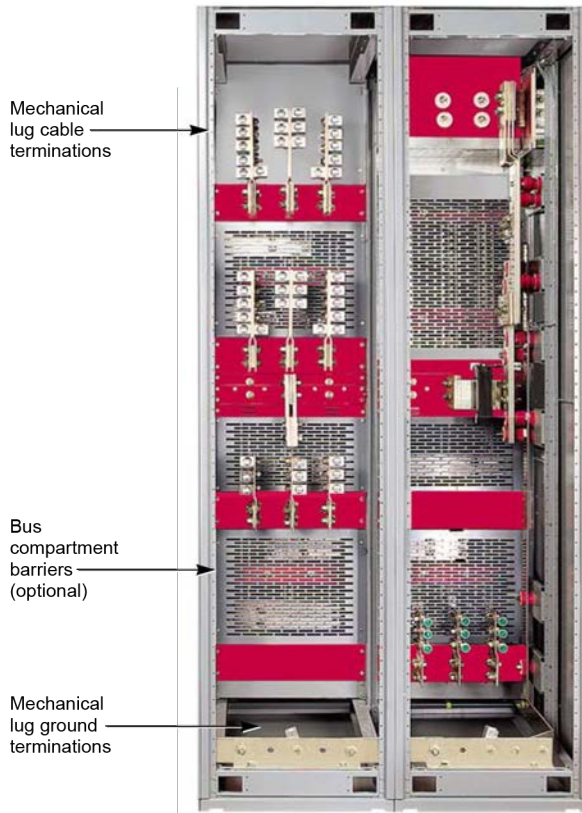
The examples below depict a typical Power-Zone 4 switchgear assembly.



Rear Cable Compartment

The rear cable compartment is located behind the bus compartment. It provides room for rear access cable installation. As standard, silver plated copper load bars extend from the load side of the circuit breaker's stationary connecting contacts into the cable compartment. Cable terminations on the load bars permit cables to exit through either the top or bottom of the vertical sections.

Figure 3 - Rear Cable Compartment



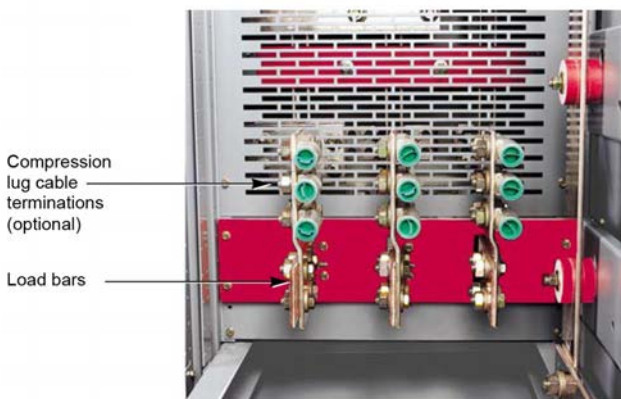
Standard Features

- Mechanical lugs provided for customer connections
- Largest conduit area in this product class
- Two-piece removable rear covers (not shown)
- 3/0–750 kcmil lugs

Available Options

- Compression lugs
- Cable supports
- Hinged full height rear door with padlock provisions
- Load connection to I-Line Busway, Model 6 Low Voltage Motor Control Centers¹, QED2/S Switchboards¹, and QED-6 Switchboards¹
- 18-inch pull box¹

Figure 4 - Lugs



Mechanical cable lugs are standard for customer cable connections. Optional compression lugs (shown) are available with Power-Zone 4 switchgear. Optional cable supports (not shown) provide additional assistance in customer wiring.

NOTE: Optional 45 degree lugs are available.

1. Not available with arc resistant sections.

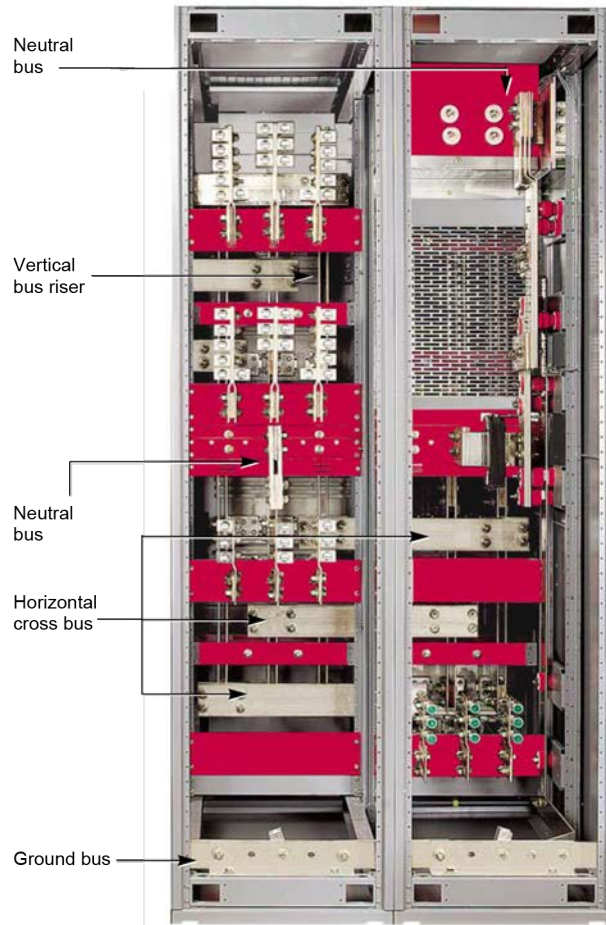
Bus Compartment

The bus compartment contains the horizontal and vertical bus, and is located between the circuit breaker compartment and the cable compartment. The bus compartment is separated from the circuit breaker compartment with grounded steel barriers. The optional side and rear barriers isolate the bus compartment from the rear cable and the bus compartment in the adjacent section. In addition, service entrance barriers provide isolation around the incoming lines to meet UL and NEC requirements. Optional insulated bus helps protect the bus in harsh environments.

On four-wire systems, a neutral bus extends the length of the line-up and includes taps for the neutral cables in each vertical section. Feeder circuit breaker neutral sensors (current transformers) are provided on these taps, when ground fault protection is supplied. A removable link to the ground bus is furnished, but not connected, in the main vertical section for grounded, four-wire systems. The ground bus is a plated copper bus bar that is bolted to the rear bottom of the cable compartment and extends the entire length of the switchgear. Standard ground bus is silver plated with tin plated available as an option.

All bus joints consist of SAE Grade 5 hardware and conical spring (e.g. Belleville) washers to withstand mechanical forces exerted during short circuits. All primary bus joints consist of a minimum of 2 bolts. The ground bus contain one bolt per joint. All horizontal bus is rated to the full ampacity of the system. The vertical bus is rated to the total ampacity of the feeder circuit breakers and prepared spaces within a given vertical section per ANSI C37.20.1. As an option, vertical bus fully rated to the system ampacity can be supplied. All vertical and cross bus ratings in Power-Zone 4 switchgear are based on a standard temperature rise of 149°F (65°C) above a maximum ambient air temperature of 104°F (40°C).

Figure 5 - Bus Compartment



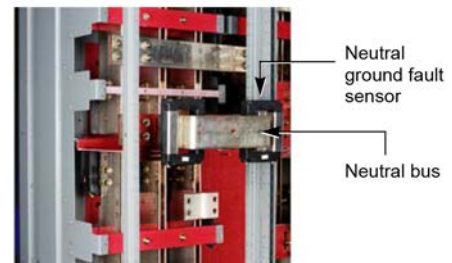
Bus Compartment (Rear View)

Standard Features

- Silver plated copper bus bars²
- All horizontal bus bars are sized for full system ampacity
- Minimum of two grade-5 bolt conical washer joints³
- Sleeve type insulated runbacks

Available Options

- Bus compartment barriers provide isolation between bus and cable compartment
- Side barriers in cable and bus compartment
- Neutral bus center for easy terminations
- Tin plated copper bus
- Bus sized to 1,000 A/in²
- Full insulated bus epoxy coated bars with boots over joints (See the Power-Zone 4 Arc Resistant Switchgear with ArcBlok Technology, page 69 section for additional protection features.)
- Up to 10,000 A continuous, 100% rated



Bus Compartment (Side View)

2. See Appendix for information on plating thicknesses.
3. All joints torqued and marked at factory.

Enclosure Types

NEMA Type 1 Indoor Enclosures

The standard Power-Zone 4 switchgear enclosure is NEMA Type 1, general purpose. NEMA Type 1 enclosures are dead front, metal-enclosed structures.

Figure 6 - Power-Zone 4 Switchgear, NEMA Type 1, Indoor Enclosure



Standard Features

- Secondary wiring areas
- Removable, steel top plates over conduit entrance
- Hinged front doors with latches
- Circuit breaker or instrument compartment
- Bus compartment
- Cable compartment
- Capability for future expansion
- Two-piece removable side and back plates
- 1 1/2-inch-high base channels
- Electro-deposition paint process on structural parts
- ANSI #49 paint color
- Customer nameplates for each compartment

Available Options

- Strip heaters in circuit breaker, bus, and cable compartments
- Overhead circuit breaker lifting device or floor crane (2 types)
- Gasketing around doors and between sections
- Filtering of doors and vents^{4, 5}
- Lockable, hinged rear doors
- Lockable, hinged front doors
- 18-inch-high pull box⁴
- Bottom plates
- Rodent barriers
- Custom paint
- White instrument mounting pans

4. Not available with arc resistant switchgear.

5. May de-rate gear. Contact local sales representative.

NEMA Type 3R Walk-In Enclosures

Power-Zone 4 switchgear is also available in a NEMA Type 3R walk-in enclosure for outdoor installation.

Figure 7 - NEMA Type 3R, Walk-In Outdoor Enclosure



Standard Features

- Exhaust fan ventilation/inside temperature control
- Exterior lighting
- Undercoating
- Inside emergency lighting
- Choice of Top or Bottom entry/exit for incoming and outgoing cables

Available Options

- Front aisle with steel entrance door equipped with panic hardware
- Lockable, hinged rear doors
- Interior fluorescent lighting
- Three-way light switch and convenience GFCI receptacles near the entrance door
- Strip heaters in circuit breaker and bus compartments
- Overhead circuit breaker lifting device (traveling lifter assembly)
- Removable gasketed steel cover plates over conduit entrance
- One-piece construction for ease of installation

NOTE: Assembly may be required if shipped split.

NOTE:

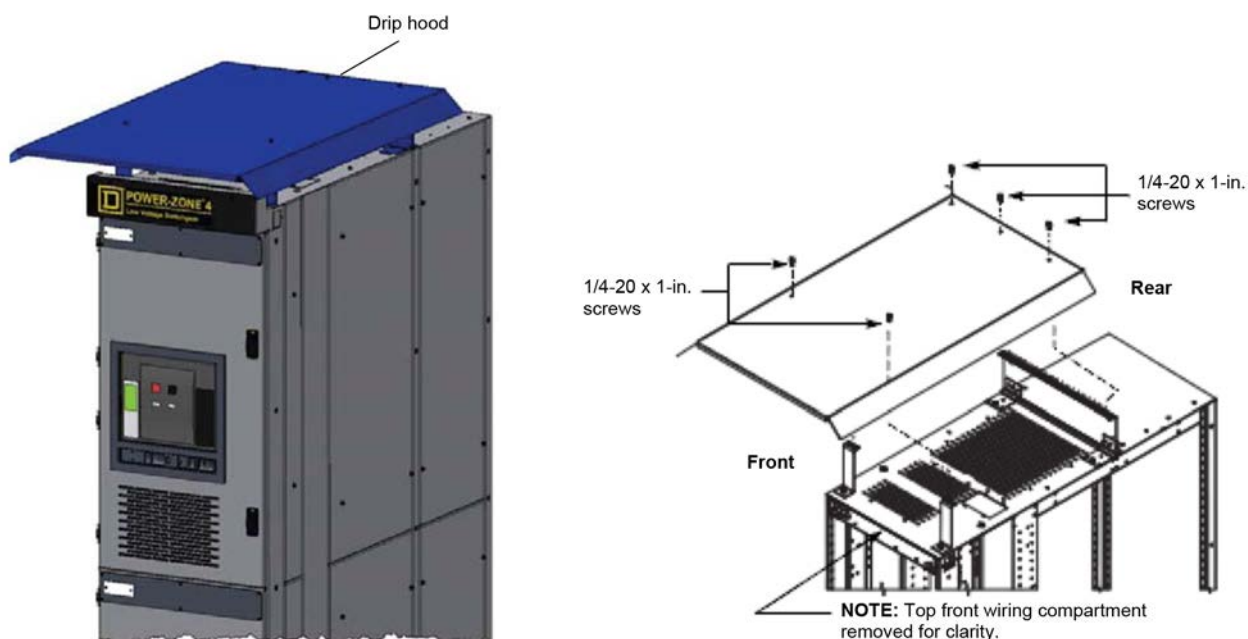
- Refer to [Special Applications](#), page 103 for elevation/altitude de-rating requirements.
- Refer to Figures 91, 92, 105 and 106 for NEMA 3R dimensions.
- Not available with arc resistant switchgear.
- From NEMA, the definition of NEMA Type 3R is: Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); and that will be undamaged by the external formation of ice on the enclosure.

For applications in high winds, barriers around the equipment or an electrical house is recommended. Contact Schneider Electric for specific application needs.

Drip Resistant Enclosures

Drip Resistant enclosures are NEMA 1 (indoor) rated enclosures supplied with an additional drip hood, which offers additional degree of protection against dripping. Drip Resistant enclosures are an add-on option to the standard Power-Zone 4 switchgear section.

Figure 8 - Drip Resistant Enclosure



Drip hood is ANSI 49 as standard.
Shown in blue for clarity.

References

- Document Number: 80298-003-02, *Drip/Sprinkler Resistant Installation for Power-Zone 4 Low Voltage Switchgear*
- Document Number: 80280-DS-006, *Drip Hood and Sprinkler Resistant Guidelines*
- 2012 Canadian Electrical Code, CEC Rule # 26-008 Sprinkler Equipment and Appendix B⁶
- 2012 CEC Code Handbook
- UL50E

NOTE:

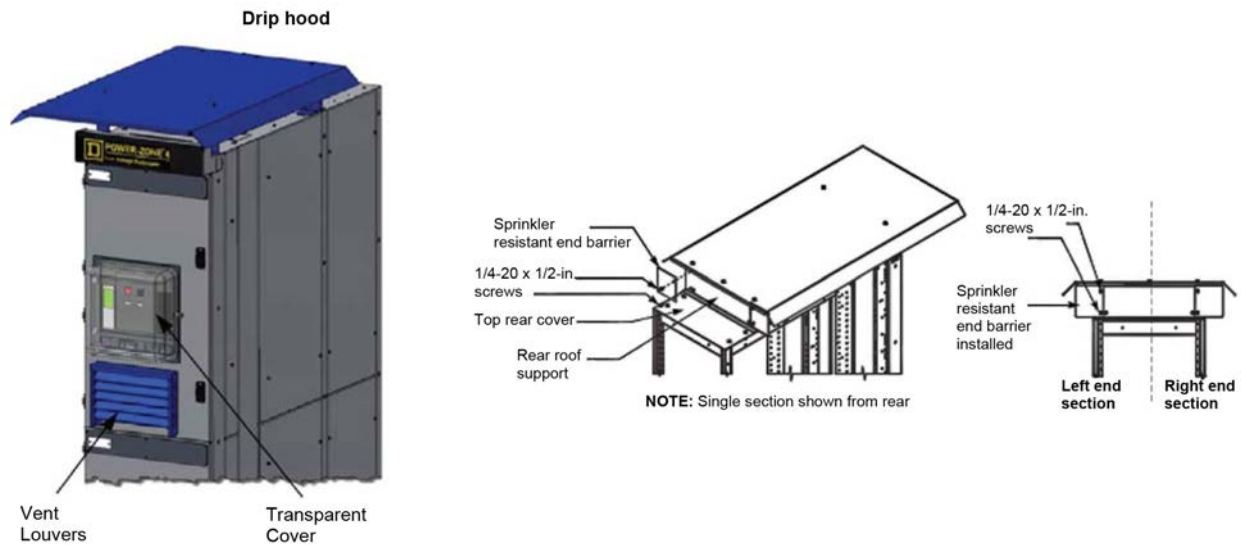
- Standard overhead lifters are not available for drip resistant design.
- Not available with arc resistant switchgear

Sprinkler Resistant Enclosures

Sprinkler resistant enclosures are NEMA 1 (indoor) rated enclosures supplied with an additional drip hood, gasketing, vent louvers, and transparent covers, which provide an additional degree of protection against dripping and light splashing of liquids. Sprinkler resistant enclosures are an add-on option to the standard Power-Zone 4 switchgear section.

6. Square D™ self-Certified through sprinkler resistant testing (see Sprinkler Resistant Enclosure, page 20).

Figure 9 - Sprinkler Resistant Enclosure



(Gasketing is behind covers and doors)
Drip hood and vent louvers are ANSI 49 as standard. Shown in blue for clarity.

References

- Document Number: 80298-003-02, *Drip/Sprinkler Resistant Installation for Power-Zone 4 Low Voltage Switchgear*
- Document Number: 80280-DS-006, *Drip Hood and Sprinkler Resistant Guidelines*
- 2012 Canadian Electrical Code, CEC Rule # 26-008 Sprinkler Equipment and Appendix B⁷
- 2012 CEC Code Handbook
- UL50E

LV Design Sprinkler Resistant Test

- Duration of one hour.
- Quantity of water applied to surface under test is at least 0.016 in./unit surface/minute (25 mm/area/hour).
- Spray angle up to 45 degrees from the vertical.
- Water Pressure of 5 psi.

NOTE:

- Standard overhead lifters are not available for drip resistant design.
- Not available with arc resistant switchgear

Indoor Water Resistant Enclosures

Indoor Water Resistant (IWR) enclosures are NEMA 1 (indoor) rated enclosures supplied with a door-over-door construction, a 12 inch additional roof, and other special features which are tested as a system to meet the ANSI C37.20.1 specification, *Rain Test for Outdoor Low Voltage Switchgear*. IWR enclosures are an add-on option to the standard Power-Zone 4 switchgear section.

7. Square D Self-Certified: Test # P000642L1 and L2.

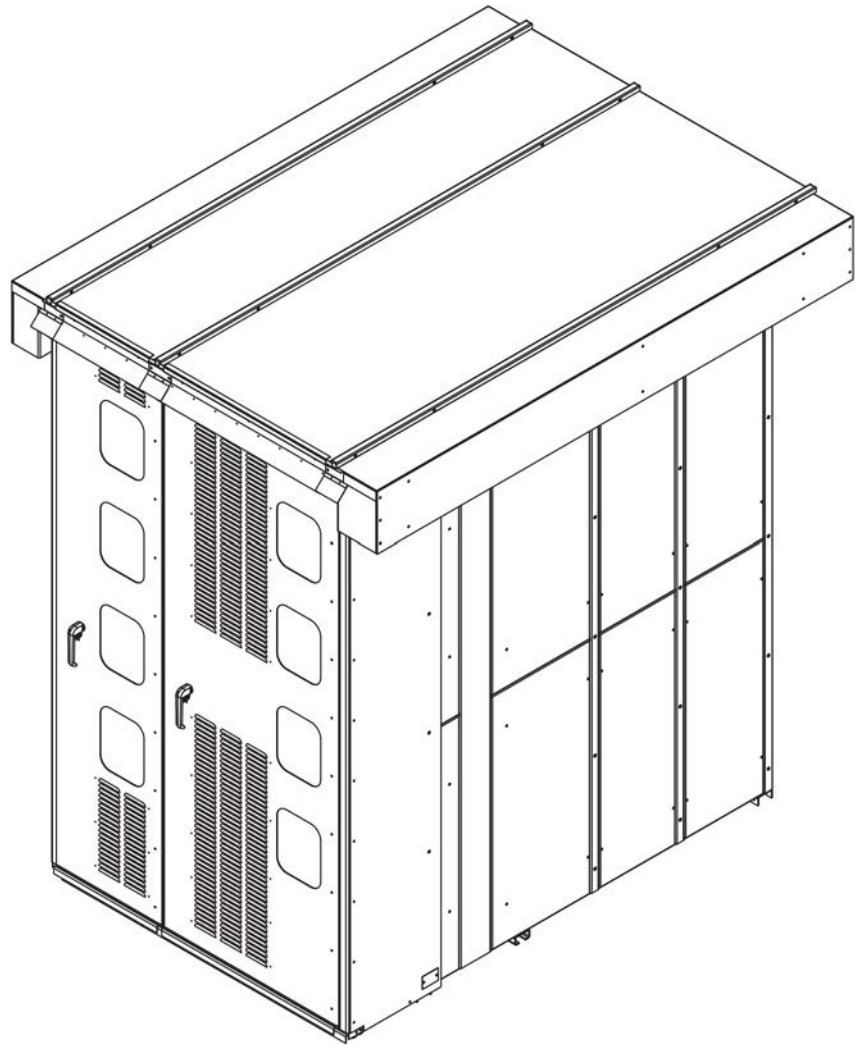
Figure 10 - Indoor Water Resistant Enclosure**References**

- Document Number: 80298-151-03, *Indoor Water-Resistant (IWR) Enclosure Installation For Use on Power-Zone 4 Low Voltage Switchgear and Power-Style QED-6 Switchboards*
- Document Number: 80280-DS-002, *Power-Zone 4 and QED-6 IWR Enclosure Mounting Pad Dimension Information*
- CSA-C22.2 No. 94-M91-Jan. 1991
- Subjected to 3R Rain Test per ANSI/IEEE C37.20.1-2002, sect. 6.2.10
- UL50E
- **Square D Self-Certified 3R Rain:** Test # P000645L2

NOTE:

- Standard overhead lifters are not available for drip resistant design.
- Special floor crane option required.
- Does not cover external icing, outdoor corrosion protection, gasket or other tests used for Type 3R enclosures.
- Not available with arc resistant switchgear.

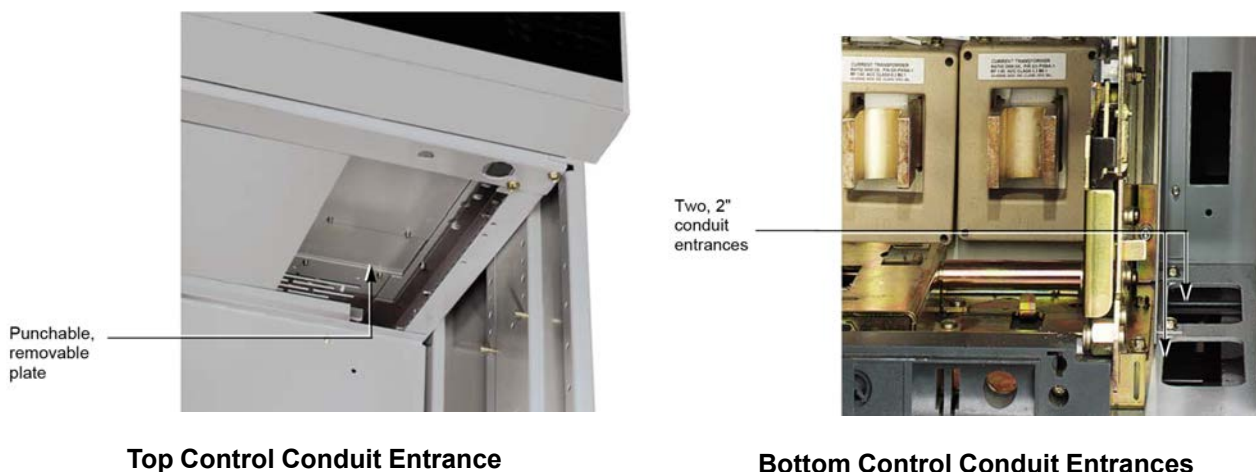
Figure 11 - Indoor Water Resistant Enclosure



Control and Communications Wiring

Control and communication wiring is installed and connected from the front of the switchgear. The secondary wiring design allows for circuit breaker compartment wiring without removing the circuit breaker from its compartment.

Figure 12 - Conduit Entrances



Control Conduit Entrances

The control wiring conduit entrance is in both the top and bottom of each section for maximum flexibility.

A removable top plate (4 inch by 5 inch) can be punched easily, up to four individual 3/4 inch control conduits per section. (Not available on Arc Resistant enclosure. All control must exit top in rear cable entry area).

Two bottom conduit entrances, in each circuit breaker compartment, permit cables to exit through the bottom of the compartment.

Horizontal Wireway

The secondary horizontal wireway (see [Secondary Wiring System, page 24](#)) is directly above each circuit breaker compartment, allowing easy access to finger-safe secondary terminals. Each secondary terminal is dedicated to a specific function, allowing standardized wiring.

The secondary disconnecting contacts are on the top front of the circuit breaker element and connect the accessories to the control power source or other control circuits. These contacts are in the connected position when the circuit breaker is in the connect and test positions.

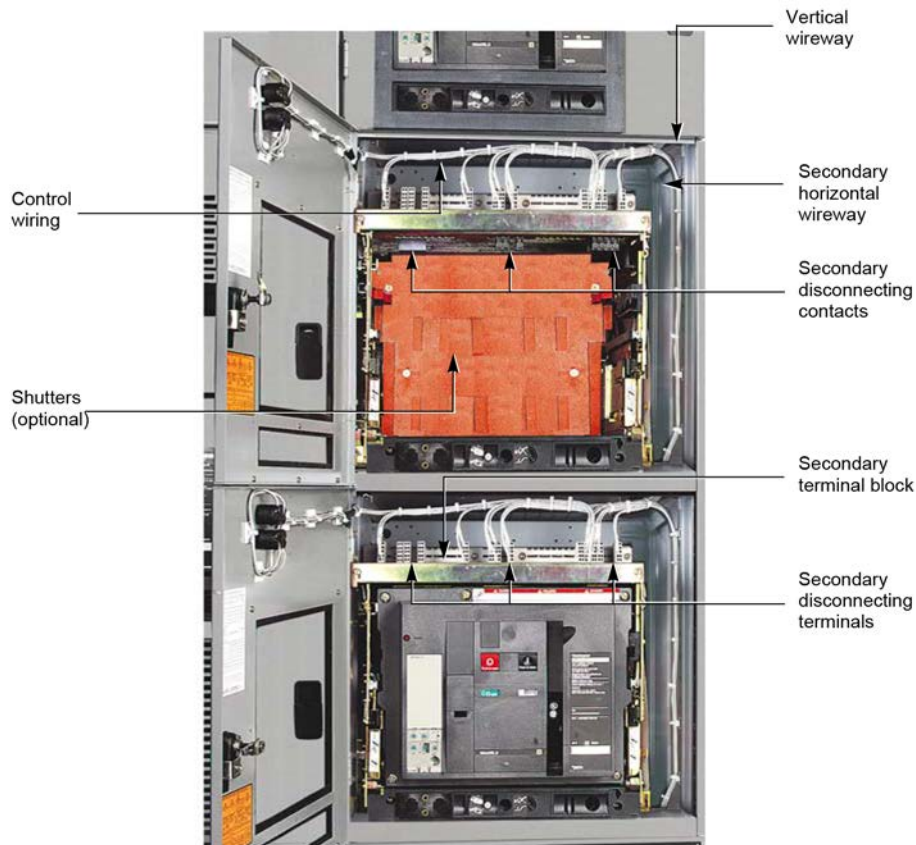
Vertical Wireway

The vertical wireway (see [Secondary Wiring System, page 24](#)) is on the right side of the circuit breaker for quick and easy wiring installation.

Control and Communications Terminals

All accessory terminals are on a connecting block (on the top front of the circuit breaker cradle) and are accessible from the front, even with the circuit breaker in the test or disconnect position. This is particularly useful for field inspection and modification. The field-installable electrical accessories are UL Listed.

Figure 13 - Secondary Wiring System



Standard Features

- Control wires in wiring trough above the circuit breaker compartment
- Secondary terminal block originates directly from the circuit breaker without the use of an intermediate terminal block for factory and customer wiring
- Snap-in wire tie provisions
- Cage clamp terminal blocks locked directly on the circuit breaker cradle
- Control wiring AWG #14 SIS
- Metering CT wiring to the shorting terminal block is #10 AWG. From the shorting block on, it becomes #12 AWG (as standard) and can be #10 AWG (as option).
- Communication wiring AWG #22 shielded
- Locking pull-apart terminal blocks at shipping splits
 - Sleeve type “destination” wire markings
 - Grommets holes between circuit breaker compartments

Available Options

- Ring tongue control wiring⁸

Auxiliary Instrument Compartments

Auxiliary instrument compartments come in one cell, two cell, three cell, or full height. Typical auxiliary instrument compartments contain control power transformers, control components, meters, relays, and other optional devices. Circuit monitor displays and other metering devices can be mounted on the door.

Figure 14 - Typical Auxiliary Instrument Compartment



8. This limits the number of terminal connections to from 102 with cage-style to 71 with ring tongue.

Auxiliary Sections

Optional, full-height, auxiliary sections with hinged front doors are available that can be bolted to feeder and main switchgear sections. In addition, auxiliary sections can be provided with through bus as needed.

Figure 15 - Auxiliary Section



Key Locks and Padlocks

Optional key locks and padlocks can be provided for the door latches on circuit breaker compartments, auxiliary instrument compartments, auxiliary sections, and the rear doors on switchgear sections.

Breaker Racking, Moving and Handling Options

Whether configured as a single unit or as multiple units, assembled together within a shipping group, Power-Zone 4 switchgear enclosures are designed to withstand the rigors of lifting, handling, shipping, and setting into place. Maximum sizes are determined by shipping dimensions required for transportation on common carrier trucks and movement through standard equipment location openings (door and portals). For ease of handling by a crane, all shipping splits 72 in. wide and less are equipped with lifting straps at each corner of the shipping split. (Single section shipping splits can be requested as an option.) Lifting straps are not furnished on shipping sections longer than 72 in. and must be handled by rollers, slings, or other means.

Circuit breaker lifter bars are used with 3-pole (see Typical Circuit Breaker Lifter Bar below), 4-pole, 6-pole and 8-pole MasterPacT circuit breakers. The size of the circuit breaker determines whether the inside or outside notches on the lifter bar will be used.

Figure 16 - Typical Circuit Breaker Lifter Bar

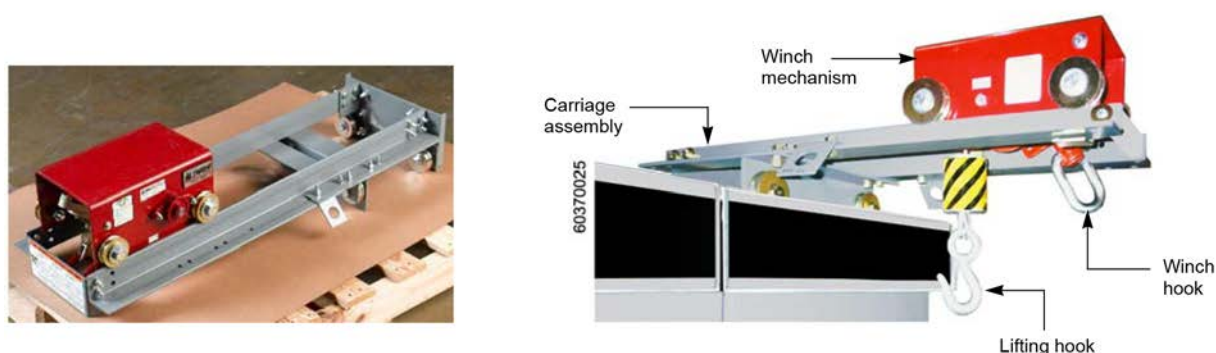


Traveling Lifter Assembly

A rail-mounted, traveling type, circuit breaker lifting device is optionally available with indoor type switchgear. The lifting device is capable of lifting MasterPacT circuit breakers into and out of any compartment. The circuit breaker is raised or lowered by manually cranking the hoisting mechanism. The manually operated traveling lifter assembly is supplied with outdoor walk-in enclosures as standard. The maximum load weight of the travel lifter assembly is 300 lbs.

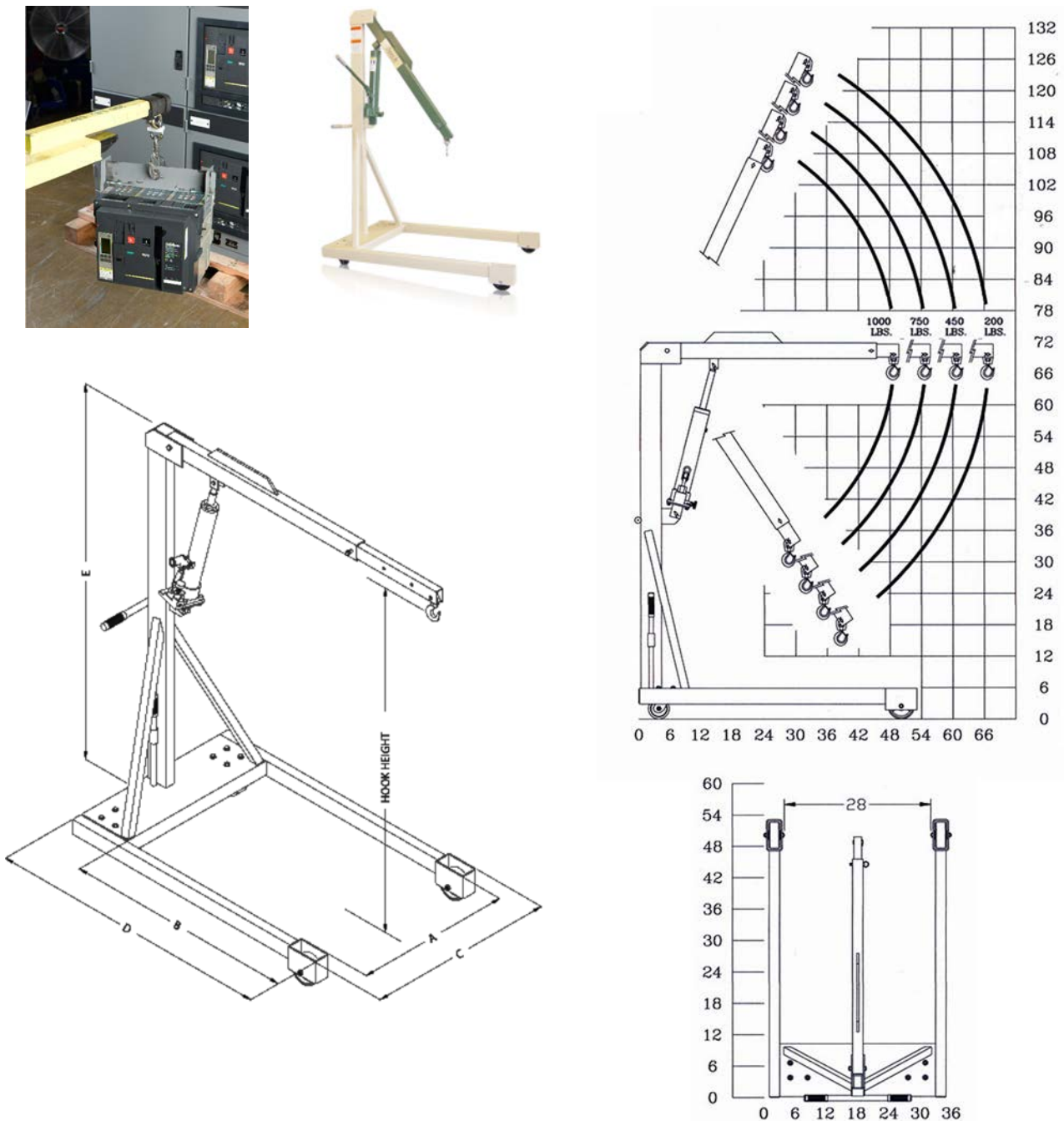
NOTE: The lifting device is not available with arc resistant or front accessible enclosures. A special version is available for enclosures with drip hoods by contacting the factory.

Figure 17 - Rail-Mounted Circuit Breaker Lifting Device



Floor Crane

Figure 18 - Standard Width, Floor Crane Specifications



A floor crane can move into and out of any compartment and can be used with the lifter bar to move a MasterPacT circuit breaker into a dedicated work area. The Standard Width Floor Crane has dimensions as shown in figure 18 above and has a rated load capacity of 1,000 lbs. It can be used to lift 3,4,6 or 8-pole breakers with the associated breaker lifter bars.

NOTE: The floor crane can not be used in the outdoor walk-in enclosures.

Figure 19 - Reduced Width Floor Crane Specifications

Designed for 36" aiseways common in electrical rooms, the reduced width floor crane allows 360-degree rotation and lifting of MasterPacT 3-pole breakers. (Not for use on 6-pole, 4-pole or 8-pole breaker construction.) Specially designed with folding legs and lifting arm to minimize storage space this is frequently ordered for Front accessible switchgear applications where space is a premium.

General Dimensions:

- Height = 96 in. max.
- Width at the base = 30 in. max.
- Depth = 38 in. max.
- Hook Lift Range = 20 in. min. to 104 in. max.

Standards:

- Adherence to C37.20.1, section 7.14
- Proof-tested to OSHA 29CFR 1926.251 (a)(4){B13}

Features:

- Load Capacity to 300 lbs. maximum
- Ability to lock lifter in stationary position
- Corrosion Resistant and life cycle minimum 25-30 years
- Front and/or Side lifting of breaker
- Ability to access 3-pole MasterPacT MTZ1,2 or NT/NW in all cell positions
- Height of housekeeping pad for gear can be up to 6 in.
- The lineup can be installed up to 5" from the front edge of the housekeeping pad

Remote Racking



MasterPacT NT/NW, MTZ1, MTZ2, MTZ3 Remote Racking Device enhances safety of maintenance personnel. Provides ability to operate racking mechanism of a low-voltage draw-out circuit breaker from a remote location. Designed to help you reduce the arc flash safety hazard for personnel during installation, startup and maintenance procedures by allowing maintenance personnel the ability to “rack” a low voltage draw-out circuit breaker from a location outside of the arc flash boundary. The compact, portable, and simple design enhances the effective use of the remote racking device. The remote racking device allows the operator to perform circuit breaker racking operations from a distance of up to 9.1 m (30 ft.) away from the circuit breaker using the controller. This distance exceeds the arc flash boundary described in the arc flash safety guidelines outlined in NFPA 70E.

Overview

Features and Benefits

- Significantly reduce the risk of exposure to direct blast or projectiles during an arc flash event
 - Personnel can operate the racking mechanism of circuit breakers from a distance of 30 ft. allowing operators to be outside of the arc flash boundary area
- Enhance operator peace of mind with multiple safety features:
 - Self-test for correct operation gives visual indication that the device is working properly
 - Through-the-door design allows the equipment door to remain closed while the device is installed
 - Visual indication notifies the operator when the racking mechanism has completed its cycle
- Improve efficiency of maintenance and installation teams with a lightweight and portable design:
 - Device is easily connected and operated by one person
 - Easily transferred from one circuit breaker to another during maintenance or installation procedures
 - No application limitations based on height or position of circuit breaker
 - Compact protective case with retractable handle and wheels can be easily maneuvered even in tight spaces
- Aid in user compliance with arc flash personnel protection as listed in NFPA 70E and CSA Z462 safety standards

Lightweight, Portable Device



1. Drive Unit

- Portable, compact unit weighing just 15 lbs.
- Simple attachment to the front of the circuit breaker while the door is closed

2. Control Unit

- Designed for safety and operator peace-of-mind
- Visual indication when the circuit breaker has successfully changed positions
- Self-test indication that device is working properly
- Large push buttons to operate the motorized racking mechanism with or without gloves

3. Control Cable

- 30 ft. length allows operator to move outside of the arc flash boundary area during rack-out and rack-in procedures
- Additional distance can be achieved by connecting multiple cables

4. Power Cable

- Can be used with any 120 Vac power source

Other items also included with portable device: alignment and drive installation tools, mounting bracket and drive shaft.



Control Unit



1. **LED Check**
Safely identify the control unit is in working order before operation
2. **Stop Release**
Safety feature that must be pressed before operation of motor. Notifies operator of cycle completion when light is extinguished
3. **Insert Circuit Breaker LED**
Notifies operator when racking mechanism is operating in insert mode
4. **Operate Motor**
To enhance safety, this button must be continuously pressed for the motor to operate
5. **Selector Switch for Racking Direction**
Simple selection of motor direction (shown in rack-out mode)
6. **Over-torque Reset**
Indicates over-torque condition by illuminating this yellow push button. The push button allows simple reset of device once condition is cleared
7. **Withdraw Circuit Breaker LED**
Notifies operator when racking mechanism is operating in withdraw mode
8. **Power (On/Off)**
Red illuminated button clearly indicates control unit is powered on



Circuit Breakers

The primary components of the Power-Zone 4 switchgear are the MasterPacT circuit breakers. The drawout circuit breaker design allows easy access to circuit breaker controls, indicators, and the trip unit without opening the circuit breaker compartment door.

The Masterpact MTZ is the latest circuit breaker offer for Power-Zone 4 LV Switchgear providing enhanced digital features while offering the same footprint and ratings as the Masterpact NW/NT. Masterpact MTZ additional features include:

- Increased access to monitoring/metering data for breaker health and power conditions
- Smart Ethernet connectivity for full integration into EcoStruxure Power Edge Software or Asset Management solutions
- Future Ready capability to upgrade & customize your MTZ breaker for increased protection, diagnostic and energy management functions via Digital Modules without shutting down.

See Masterpact MTZ catalog ([0614CT1701](#)) and [website](#) for more information.

MasterPacT Circuit Breaker Features and Benefits

Figure 20 - MasterPacT MTZ Circuit Breaker (upper photo) and MasterPacT NW (lower photo)



- Through-the-door construction with front-accessible key interlocks
- Open/close buttons
- Open/close indication
- Individually-mounted MTZ1 or NT circuit breakers can be mounted 2 per cell
- ANSI rated and certified to ANSI C37 (UL 1066) and CSA C22.2 No. 268
- Four-position (Connected, Test, Disconnected, Withdrawn)
- Low voltage power circuit breakers
- Maximum 200 kA interrupting rating without fuses (MTZ2, 3 or NW)
- Maximum of 42 kA interrupting rating at 480 Vac (MTZ1 or NT)
- 100% rated
- Two-step stored energy mechanism
- 800 A – 5000 A frame (MTZ2,3 or NW)
- 800 A frame (MTZ1 or NT)
- MicroLogic trip units with optional Ethernet communications and monitoring features
- Enhanced functionality with low maintenance requirements

Through-the-Door Construction

The closing and opening push buttons, racking handle, and racking mechanism are accessible through the front door cutout, allowing circuit breaker operation, testing, and disconnection without opening the door. Optional shutters (see *Secondary Wiring System*, page 24) can be provided, covering live parts when the circuit breaker is removed.

MasterPacT circuit breakers meet ANSI interlock requirements, including closing spring interlocking.



Circuit Breaker Compartment

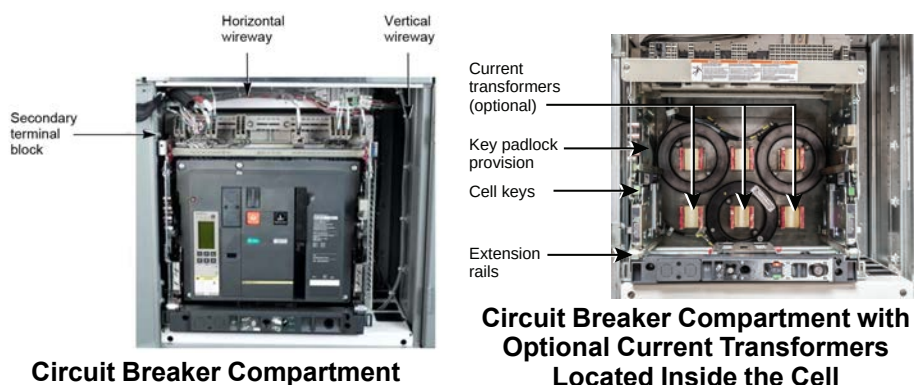
The circuit breaker compartment consists of the circuit breaker cradle, a horizontal secondary terminal block on top of the cradle, and a vertical wireway on the right side of the compartment, allowing for top and bottom customer wiring. The cradle structure is a bolted-in assembly that supports the circuit breaker. Integrated into the cradle are the circuit breaker interference interlocks or cell keys.

Cell keys are steel pins on the left side of the cradle. As the circuit breaker is pushed into the compartment, the keys on the circuit breaker move past corresponding key slots on the cradle. This feature prevents circuit breakers with greater continuous current ratings from being placed in circuit breaker compartments with lesser continuous current ratings. This feature also prevents circuit breakers with lesser short circuit current ratings from being placed in circuit breaker compartments with greater short circuit current ratings.

The racking handle storage space, racking handle insertion opening, and “Stop Release” button are on the bottom of the cradle. Circuit breaker racking is achieved with the circuit breaker compartment door closed.

NOTE: As standard, a minimum of one breaker racking handle is provided per lineup and for each main(s)/tie(s). As an option, racking handles can be provided for every breaker in the lineup. A **remote racking kit, page 30** is also available for racking breakers at a 30 ft. distance.

When required for metering, optional current transformers are positioned around the stationary main contacts or in the bus compartment behind the cell.



MasterPacT Circuit Breaker Ratings

This section contains basic MasterPacT circuit breaker interrupting, sensor, operating time, control power requirements, and switch ampere ratings. In addition, an overview of [Key Interlock Operation](#), page 48 is described. Most MasterPacT accessories, trip units, and trip unit options are available in Rear Accessible, Front Accessible and Arc Resistant switchgear.

All MasterPacT circuit breakers are 100% rated and are assembled and tested in an ISO 9001 facility to applicable standards including:

ANSI C37.13	Low voltage ac power circuit breakers used in equipment
ANSI C37.16	Preferred rating, related requirement and application recommendations for low voltage power circuit breakers and ac power circuit breakers
ANSI C37.17	Trip devices for ac and general-purpose dc low voltage power circuit breakers
ANSI C37.50	Testing of low voltage ac circuit breakers
NEMA SG-3	Low voltage circuit breakers
UL 1066	Low voltage circuit breakers

Power-Zone 4 switchgear with MasterPacT circuit breakers has the highest interrupting and short-time (withstand) ratings for low voltage switchgear in the smallest physical size. The small switchgear footprint and the elimination of limiters reduces cost. The circuit breaker's improved coordination with downstream devices increases system uptime.

Power-Zone 4 switchgear using MasterPacT MTZ1/NT circuit breakers allows the use of up to eight (8) 800 A frame circuit breakers in a single, 30-inch wide section. This lets the user maintain a high concentration of power protection devices in a small physical size. MasterPacT MTZ1/NT circuit breakers are not available in Arc Resistant Switchgear.

MasterPacT MTZ2/3, NW circuit breakers are available in various levels of interrupting ratings (AIR) as listed in Ratings for ANSI C37 Certified MasterPacT MTZ2/3 or NW Circuit Breakers below.

Table 1 - Ratings for ANSI C37 Certified MasterPacT MTZ2/3 or NW Circuit Breakers

Frame Rating		800/1600 A						2000 A						3200 A				4000/5000 A			
Interrupting Rating Code		N1	H1	H2	H3	L1 ^{9, 10}	L1F ¹⁰	H1	H2	H3	L1 ^{9, 10}	L1F ¹⁰	H1	H2	H3	L1 ^{9, 10}	H2	H3	L1 ^{9, 10}		
Interrupting Current (k AIR)	254 Vac 50/60 Hz	42	65	85	100	200	200	65	85	100	200	200	65	85	100	200	85	100	200		
	508 Vac 50/60 Hz	42	65	85	100	200	200	65	85	100	200	200	65	85	100	200	85	100	200		
	635 Vac 50/60 Hz	42	65	85	85	130	130	65	85	85	130	130	65	85	85	130	85	85	130		
Short-Time Withstand Current (kA)	Vac 50/60 Hz, 0.5 s	42	65	85	85	30	22	65	85	85	30	22	65	85	85	100	85	85	100		
Built In Instantaneous Override (Peak kA ±10%)		— ¹¹	— ¹¹	— ¹¹	190	80 ¹¹	55	—	—	190	80	55	—	—	190	270	—	—	270		
Close and Latch Ratings (Peak kA)	Vac 50/60 Hz	90	150	90	90	55	50	150	90	90	55	50	150	90	90	90	170	170	90		
Tested to show arc flash hazard risk category as referenced by NFPA70E		—	—	—	—	—	Yes	—	—	—	—	Yes	—	—	—	—	—	—	—		
Breaking Time		25 to 30 ms (with no intentional delay) 9 ms for L1 and L1F																			
Closing Time		70 ms																			
Sensor Rating		100–250 A / 400–800 A for NW / 400–800 A for MTZ2						1000–2000 A						1600–4000 A				2000–4000 A			
		800–1600 A																2500–5000 A			
Endurance Rating (C/O Cycles) (with no maintenance)	Me- chanical	12,500						10,000						10,000				5000	5000		
	Electri- cal	2800						1000						1000				1000	1000		

9. Interrupting ratings at 50 Hz: 200 k Air (254 Vac), 150 k Air (508 Vac), 100 k Air (635 Vac).

10. The interrupting ratings L1 and L1F are available only in 3P, drawout construction.

11. 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.

Table 2 - Ratings for ANSI C37 Certified MasterPacT MTZ1 or NT Circuit Breakers

Frame Rating		800 A
Interrupting Rating Code		N1
Interrupting Current (kAIR)	254 Vac 60 Hz	42
	508 Vac 60 Hz	42
	635 Vac 60 Hz	NA
Short-Time Withstand Current (kA)	ac 60 Hz, 0.5 s	42
Built-In Instantaneous Override (Peak kA ±10%)		—
Close and Latch Ratings (Peak kA)	ac 60 Hz	90
Tested to show arc flash hazard risk category as referenced by NFPA70E		—
Breaking Time		25 to 30 ms (with no intentional time delay)
Closing Time		< 50 ms
Sensor Rating		100 to 250 A / 400 to 800 A
Endurance Rating (C/O Cycles) (with no maintenance)	Mechanical	12,500
	Electrical	2800

Correction Factors

Table 3 - Temperature Correction Factors per ANSI C37.20.1 par. 8.4

	Maximum Ambient Temperature										
°F	140	122	104	86	77	68	50	32	14	−4	−22
°C	60	50	40	30	25	20	10	0	−10	−20	−30
Current	0.83	0.92	1	1.07	1.11	1.14	1.21	1.27	1.33	1.39	1.44

Table 4 - Altitude Correction Factors per ANSI C37.20.1 par. 8.1.3

	< 6600 ft. (2000 m)	8500 ft (2600 m)	13,000 ft. (3900 m)
Voltage	1	0.95	0.8
Current	1	0.99	0.96

Table 5 - MasterPacT MTZ2/3 Circuit Breaker Approximate Operating Time Ratings

Action	Time
Spring charging motor (MCH) Charging time	3–4 seconds (max)
Shunt trip (MX)	55 milliseconds ± 10
Shunt close (XF)	70–80 milliseconds ± 10

Table 6 - Control Power-MTZ2/3 Circuit Breakers and PZ-4 Switchgear Equipment

Action		Power Consumption
Spring Charging Motor Current (electrically operated circuit breakers)		180 VA
Closing coil (XF)		4.5 VA
Shunt trip coil (MX)		4.5 VA
Undervoltage with delay unit (MN)		4.5 VA
Status indicating lights (each)		2 VA
Power Quality Meter (PM8000/ION9000)		40 VA/80 VA
Strip heater (each)	Bus Compartment	125 VA @ 120 Vac
	Cable Compartment	125 VA @ 120 Vac
	Breaker Compartment	50 VA @ 120 Vac

Table 7 - Approximate Ampere Ratings for MasterPacT MTZ2/3 Circuit Breaker Switches¹²

Action	Ampere (240 V)
Auxiliary switch (OF) ¹³	10 A
Overcurrent trip switch (SDE)	5 A
Combined (connect/close) switch (EF)	6 A
Cradle cell switch	8 A

NOTE: See MasterPacT MTZ Catalog (0614CT1701).

12. Standard version contact ratings are shown above for relay applications. Low level contact versions are also available that will perform better with PLC's with low level signals.

13. 4 OF contacts supplied as standard. Options available for up to 8 additional.

Circuit Breaker Types

Family of MasterPacT MTZ Circuit Breakers (800–6000 A)

Table 8 - Current Ratings¹⁴

ANSI CB Model Number	Frame Amperes	Sensor Rating	PZ-4 Trip Setting Range	Device Application
MTZ2-08N1	800 A	400-800 A	175-800 A	Feeder
MTZ2-08H1				
MTZ2-08H2				
MTZ2-08H3				
MTZ2-08L1 ¹⁵				
MTZ2-08L1F ¹⁵				
MTZ2-16N1	1600 A	800-1600 A	350-1600 A	Mains/Ties & Feeders
MTZ2-16H1				
MTZ2-16H2				
MTZ2-16H3				
MTZ2-16L1 ¹⁵				
MTZ2-16L1F ¹⁵				
MTZ2-20H1	2000 A	1000-2000 A	400-1600 A	Mains/Ties & Feeders
MTZ2-20H2				
MTZ2-20H3				
MTZ2-20L1 ¹⁵				
MTZ2-20L1F ¹⁵				
MTZ2-32H1	3200 A	1600-3200 A	700-3200 A	Mains/Ties & Feeders
MTZ2-32H2				
MTZ2-32H3				
MTZ2-32L1 ¹⁵				
MTZ3-40H2	4000 A	2000-4000 A	800-4000 A	Mains/Ties & Feeders
MTZ3-40H3				
MTZ3-40L1 ¹⁵				
MTZ3-50H2	5000 A	2500-5000 A	1000-5000 A	Mains/Ties
MTZ3-50H3				
MTZ3-50L1 ¹⁵				
MTZ1-08N1	800 A	400-800 A	175-800 A	Feeders



MTZ1



MTZ2



MTZ3

14. For 6000 A Mains/Ties, contact factory.

15. The interrupting ratings L1 and L1F are available only in 3 pole construction.

Interrupting and Short-Time (Withstand) Capability

Power-Zone 4 switchgear with MasterPacT circuit breakers has the highest interrupting (200,000 A at 480 V without using fuses) and highest short-time (withstand) ratings for low voltage switchgear, in the smallest physical size. The small switchgear footprint and the elimination of limiters reduces cost. The MasterPacT circuit breakers' wide range of coordination with downstream devices increases system uptime.

MasterPacT circuit breakers are available in various levels of interrupting ratings (AIR).

See .

NOTE: Circuit breakers of like frame sizes and interrupting ratings are interchangeable. Also, MasterPacT MTZ breakers can be retrofitted into MasterPacT NW/NT cradles with minimal secondary terminal modifications (See retrofit guide QGH31931).

Circuit Breaker Parts

The MasterPacT circuit breaker has fewer parts than conventional circuit breakers while performing the same functions.

Figure 21 - Typical MasterPacT Circuit Breaker (Front and Side View of NW shown; MTZ is similar)



The main disconnecting contacts on the rear of the circuit breaker are spring loaded and self-aligning. These contacts are designed so the pressure at the point of contact, on the stationary connectors, becomes greater under short-circuit conditions.

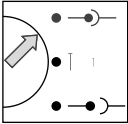
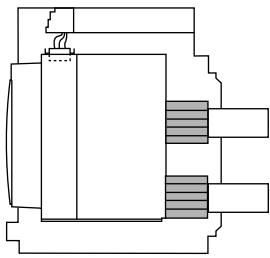
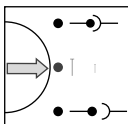
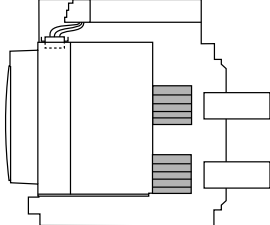
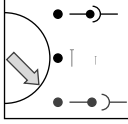
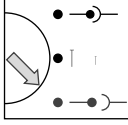
Figure 22 - MasterPacT Circuit Breaker (Rear View)



Circuit Breaker Operation

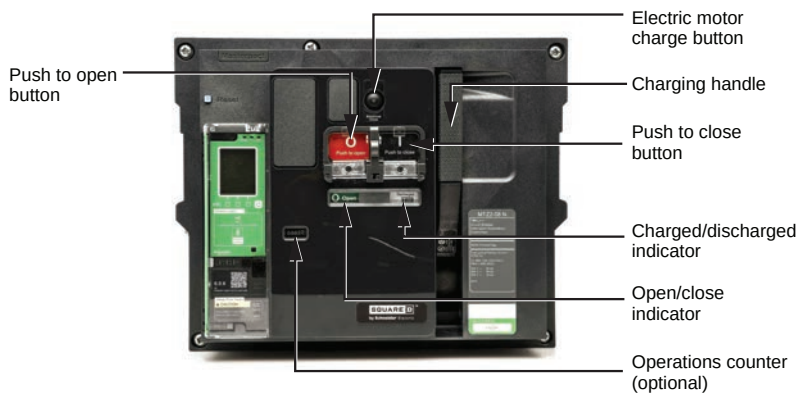
Power-Zone 4 switchgear with MasterPacT circuit breakers has through-the-door circuit breaker racking. The connect, test, and disconnect positions can be made with the circuit breaker compartment door closed.

Table 9 - Circuit Breaker Positions

Through-the-Door Circuit Breaker Position (side view)		Primary Connectors	Secondary (Control) Connectors	Circuit Breaker Functionality	Circuit Breaker Door Position
Connect 		Engaged	Engaged	A. Can be operated mechanically and electrically. B. Ready for service (operation).	Closed
Test 		Disengaged	Engaged	A. Can be operated mechanically and electrically. B. Can have operation and control systems tested.	Closed
Disconnect 		Disengaged	Disengaged	A. Can not be operated remotely. B. Can not be removed from circuit breaker compartment.	Closed
Remove 		Disengaged	Disengaged	A. Can not be operated remotely. B. Can be removed from circuit breaker compartment.	Open Circuit breaker is fully extended on rails.

Two-Step Stored Energy Mechanism

Figure 23 - Charging the Closing Springs



MasterPacT circuit breakers are stored energy devices with a two-step operating mechanism.

Electrically operated circuit breakers have a motor to charge the stored energy mechanism, electric close feature, and electric open feature.

On manually operated circuit breakers, the closing springs are charged by hand. For electrically operated circuit breakers, the springs are charged by an internal electric motor, but can also be manually charged if no control power is available.

Status indicators on the front of the circuit breaker indicate when the closing springs are charged or discharged.

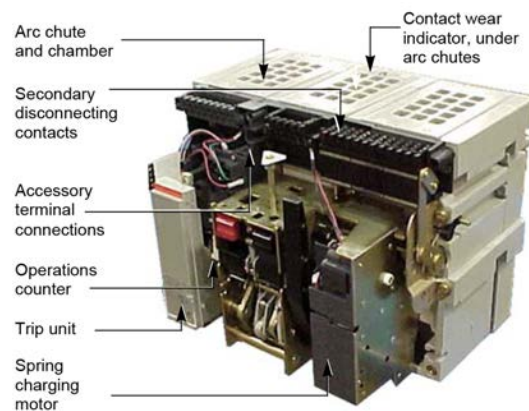
Circuit Breaker Inspection

When a MasterPacT circuit breaker is withdrawn on its rails, the circuit breaker is accessible for visual inspection. It is easy to remove the arc chutes and visually inspect the contacts and wear indicator. The operations counter can also indicate when inspections and possible maintenance should be done. Health indication for the breaker is also available via front HMI display, mobile device or remote network monitoring. See *MicroLogic X/Xi*, page 50 for more information.

Figure 24 - MasterPacT Circuit Breaker



MasterPacT Circuit Breaker on Its Rails



MasterPacT Circuit Breaker Front Plate Removed¹⁶

Removable, replaceable, and upgradeable circuit breaker parts include:

- Arc chutes
- Main disconnecting contacts or clusters
- Internal movable contacts
- Spring charging motor
- Trip unit

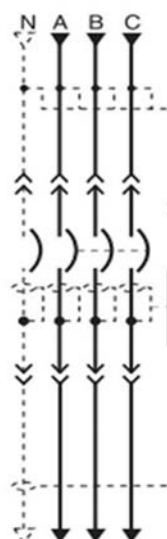
16. The contact wear indication is available on MasterPacT MTZ 2,3 and MasterPacT NW P and H trip units.

Optional 4-Pole Breaker

4-pole MasterPacT Drawout Circuit Breaker is an optional feature for the following:

- 1600–4000 A Feeders
- 1600–5000 A Mains/Ties

In some electrical systems the user may choose to switch the neutral on and off along with the 3-phases of power to isolate the neutral in multi-source systems. In a 3-pole breaker solution the source neutrals landed at the gear may be connected to multiple sources at the same time which some users wish to avoid by switching the neutral via 4-pole circuit breaker.



3 Pole = Phases A, B & C switched

4 Pole = Phases A, B, C + Neutral switched

The 4-Pole Breaker in LV Drawout equipment opens and closes the phase bus connections as well as the neutral bus connection.

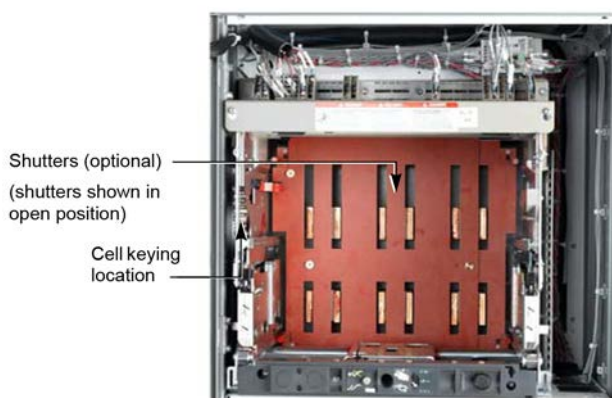
4-pole breakers are available for 1600–5000 A Mains/Ties and 1600–4000 A Feeders (NW, MTZ2 and MTZ3) up to 100 kAIC @ 480 V and 85 kA @ 600 V. Front Accessible and Arc Resistant construction is not available.

NOTE: 4-pole construction are mounted in wider sections than 3-pole breaker construction per below:

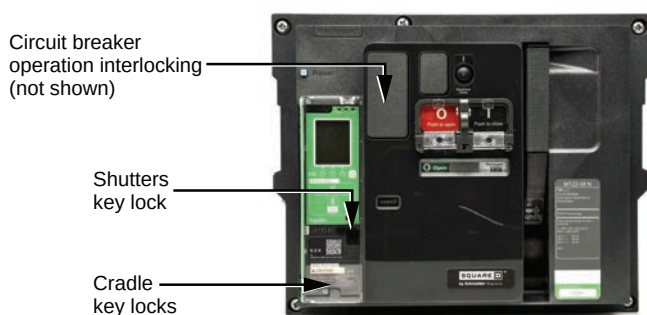
- 1600–2000 A = 30" wide section (up to 4 breakers per section)
- 3200 A = 30" wide section (single 3200 A breaker per section)
- 4000–5000 A = 48" wide section (single breaker per section only)

Circuit Breaker and Equipment Accessories

A number of MasterPacT circuit breaker accessories are available with Power-Zone 4 switchgear. A few of the most common accessories are listed below.



Circuit Breaker Compartment



MasterPacT MTZ2 Circuit Breaker

Shutters

Optional shutters in the cradle automatically block access to the main disconnects when the circuit breaker is in the disconnect, test, or remove position. An optional padlock attachment to lock shutters closed is also available.

Key Interlocks, Key Locks, and Padlocks

Optional key interlocking can be provided with MasterPacT circuit breakers. Key interlocking capability is available for circuit breaker operation and the cradle.

Key interlock operation is outlined in the Power-Zone 4 switchgear order assembly drawings. To facilitate installation procedures, a key is supplied with each lock. After installation, only the necessary keys called out on the key interlock diagrams should be present on the switchgear.

Cell Keying

Cell keying, a standard feature on Power-Zone 4 switchgear, is provided to avoid insertion of circuit breakers with similar dimensions, but insufficient interrupting ratings, or incorrect frame sizes into an inappropriate circuit breaker compartment.

Auxiliary Switches

A family of auxiliary switches that include:

- Open and close position switches (OF)
- Connected and closed position switches (EF), also known as cell switches
- Cradle position switch (CE, CD, CT)

Field-installable and Upgradeable Options

A family of field-installable coils, buttons, motors, connectors, and trip units that include, but are not limited to:

- Communications via Ethernet (Modbus TCP/IP) or Modbus Serial capabilities
- Opening and closing coils (MX, XF)
- Additional shunt trip unit (MX)
- Undervoltage release (MN)
- Spring charging motor (MCH)
- Sensor plug

Ready-to-close contact (PF):

The ready-to-close position switch indicates that the following conditions are met and the circuit breaker can be closed:

- The circuit breaker is open.
- The closing springs are charged.
- There is no standing closing or opening order.

Diagnostic and communicating Shunt Trip (MX), Shunt Close (XF), Undervoltage Trip (MN,diagnostics only)

These type of coils bring added functionality with diagnostic and communication capabilities and are only available on MasterPacT MTZ breakers:

- Identify the type of the coil, MX diag&com, XF diag&com or MN diag.
- Detect if the coil is functioning properly by comparing the device order and the opening/closing status of the circuit breaker.
- Check for wire breakage in the coil periodically (every 30 seconds).
- Identify if the order comes from the BPFE option.
- Identify if the order is a permanent order.
- Count the operating cycles of the coils.
- When a communication system is present, the Masterpact MTZ device can be opened and closed from a remote control system such as a SCADA, through the communication network.
- Diagnostic results can be read through all the different ways of retrieving information from the Micrologic X control unit including the embedded HMI, wireless communication, and Ecoreach software through a USB connection.
- In addition to the diagnostic function, these devices feature a continuous-type release; the release can be maintained as long as the order is maintained. This feature allows the MX diag&com to lock the circuit breaker in the OFF position when the order is maintained.
- **Digital Modules** (MTZ only)

Digital Modules

Upgrade with Digital Modules

Customize MicroLogic X control unit anytime—Digital modules make it easy to upgrade and tailor your system.

- The 3 main categories of digital module functions are protection, metering, and diagnostics and maintenance
- Enhanced energy management, power quality management, and crisis management
- Update digital modules at any stage of the product's life cycle: during configuration, commissioning, or operation
- For the latest digital modules visit <http://godigital.schneider-electric.com/>.
- Upload modules without interrupting power, using Ecoreach software and a USB cable



Optional digital modules to customize MicroLogic 24/7

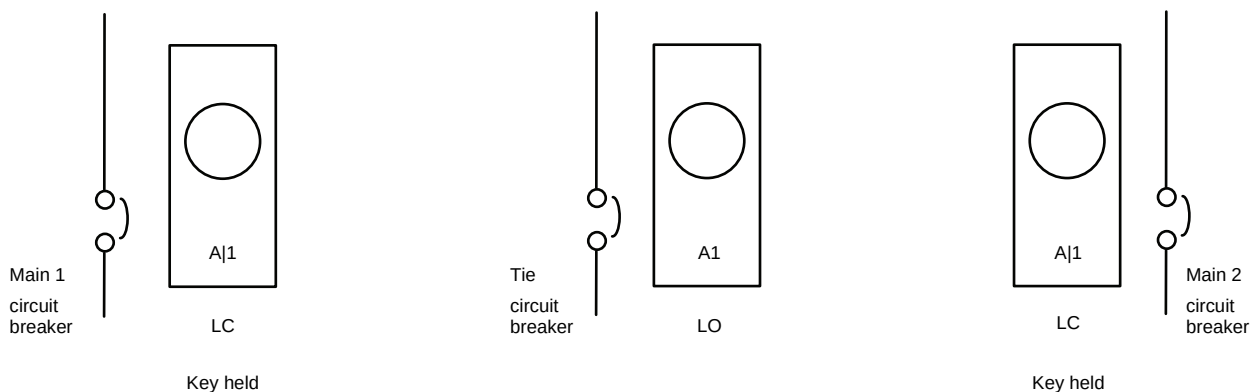
 Protection Modules	 Measurement Modules	 Diagnostic Modules
Customized Protection • ANSI 27/59 – Under/Over voltage • ANSI 32P – Reverse active power • ANSI 51N/51G – Ground fault alarm • ERMS – Energy Reduction Maintenance Settings • ANSI 81 – Under/Over frequency • ANSI 67 – Directional overcurrent • ANSI 51 – IDMTL overcurrent	Cost Management • Energy per Phase Power Quality • Individual harmonics analysis	Power Outage and Maintenance • Power restoration assistant • MasterPacT operation assistant • Wave form capture on trip event Communication • Modbus legacy dataset • IEC 61850 Data Model

NOTE: Refer to the *MasterPacT MTZ Circuit Breakers and Switches* catalog (0614CT1701) or *MasterPacT NT and NW Universal Power Circuit Breakers* catalog (0613CT0001) for additional information.

Key Interlock Operation

As shown in the example below, a main-tie-main manual key interlock scheme is designed to keep all three circuit breakers from being closed simultaneously. Only two of the three circuit breakers can be closed simultaneously.

NOTE: Spare keys should be removed and kept safely stored and under the control of responsible supervision.

Figure 25 - Main-Tie-Main Key Interlocking

Main 1 and main 2 circuit breakers are closed with their keys placed in the lock cylinders. The tie circuit breaker is locked open; a key is required to unlock it and put the circuit breaker into service.

The main 1 circuit breaker is opened and taken out of service. It is locked open, permitting key A1 to be removed to operate the lock associated with the tie circuit breaker. Then the main 1 circuit breaker cannot be put into service and closed until either the tie circuit breaker, or the main 2 circuit breaker, is opened and locked out of service. This would free one key for use in unlocking the main 1 circuit breaker.

MasterPacT MTZ Trip Units

MicroLogic X/Xi

The MasterPacT MTZ breaker offers the latest technology in connectivity, usability and maintainability thanks to the MicroLogic X trip unit and is built on the legendary performance and reliability of the MasterPacT line and MicroLogic P & H trip units. MasterPacT MTZ circuit breakers prepare you for the future of reliable and sustainable power distribution with the following features:

- IIoT Ethernet connectivity.
- Easy customization via digital modules.
- Intuitive MicroLogic X control unit
- Robust performance, even in harsh environments
- Seamless integration with building and energy management systems via EcoStruxure™ Power architecture
- Mobile device connectivity for wireless alerts and maintenance.

NOTE: Note: Wireless features can be removed by ordering optional Xi trip unit in place of the standard X trip unit.

- Precision Class 1 power meter built in for energy-saving capabilities

Protection Functions

MicroLogic X is available in 3 trip function types: LI (3.0X), LSI (5.0X) and LSIG (6.0X) as shown below:

Table 10 - Protection Functions

	MicroLogic 3.0 X	MicroLogic 5.0X	MicroLogic 6.0 X
Long-time overcurrent protection (L)	X	X	X
Short-time overcurrent protection (S)	—	X	X
Instantaneous overcurrent protection (I)	X	X	X
Ground-fault protection (G)	—	—	X
Earth-leakage protection (V)	—	—	—
Neutral protection	X	X	X
Dual settings	X	X	X
Overcurrent and trip cause indicators	X	X	X
Zone selective interlocking	—	X	X
Trip history	X	X	X
Setting change traceability	X	X	X
Embedded power meter class ¹⁷	X	X	X
Embedded diagnostics	X	X	X

- Long-Time setting is adjustable from 40% to 100% of sensor value. A time setting, time delay and thermal memory feature is included.
- Short Time setting is adjustable from 1.5 to 10 times the long-time trip current setting. A time setting and operating time setting are included.

17. Ground Fault alarm only (LSIA) is available by ordering the 5.0X and Ground Fault Alarm (ANSI 51N/51G) Digital Module.

- Instantaneous Trip setting is adjustable from 2 to 15 times the sensor value. Operating time is 50 ms in Standard Trip mode or 30 ms in Fast Trip mode which is an adjustable setting in the trip unit.
- Ground Fault Trip setting is adjustable from 20% of sensor value to 1200 A (30% of sensor value to 400 A for 400 A sensor). A time setting and operating time setting are included.

The MicroLogic X control unit is also equipped with dual protection settings which allow the user to have a second set of protection settings. This allows users to easily switch between settings. A typical application is to adjust the short-circuit protection when an installation can be supplied by two sources (grid / generator set) with different levels of available short circuit current. The settings can be selected by one of the following means:

- MTZ App
- by a digital input through the IO module
- via Ethernet
- from the embedded HMI

Measurement Features

Based on the measurement of line currents, neutral current, phase-to-phase voltages and phase-to-neutral voltages, a MicroLogic X control unit calculates and displays parameters required to monitor any AC electrical power system. MasterPacT MTZ device with embedded current sensors and MicroLogic X control unit is a power metering device complying with IEC/EN 61557-12, Class 0.5 accuracy for voltage and current and Class 1 accuracy for active power and energy measurements.

- RMS values of current and voltage
- Active, reactive and apparent power
- Active, reactive and apparent energy
- Power factor
- Frequency
- Phase sequence
- Voltage unbalance, current unbalance
- Current demand
- Total active, reactive and apparent power demand
- THD of voltage and current

For the complete list of measurements and min / max values, see the MicroLogic X User Guide (DOCA0102EN).

Maintenance and Diagnostic Features

The MicroLogic X control unit performs a high level of diagnostics in real time on MasterPacT MTZ circuit breakers. They generate and store appropriate warnings, alarms, and messages to help the users with maintenance and power restoration.

These diagnostics:

- Prevent interruption of the power supply to maintain continuity of operation, preserve assets from damage, and support the safety of personnel.
- Reduce downtime resulting from an unexpected outage in the electrical distribution system by facilitating a restart as quickly as possible after a trip.
- Keep devices in good operating condition and aid qualified personnel when repairs are required.
- Build the history and traceability of all interventions to improve preventive maintenance and secure daily operation.

Monitored Functions and Logs for Circuit Breaker Operation

- XF (shunt close) coil circuit continuity
- MCH (spring charging motor) charging time
- “Time stamped” closing log
- MCH counter
- Alarm fail closing order
- MX (shunt trip) coil circuit continuity
- MN (undervoltage trip) coil circuit continuity
- Opening counter
- “Time stamped” opening log (Electrical/ mechanical)
- Alarm fail opening order
- Tripping chain continuity (Ready LED)
- Trip counter (SDE)
- Time stamped event log with notifications/reset. All events are time stamped and logged in non-volatile memory so they are maintained if control power is lost. (For the complete list of events see the MicroLogic X control unit user guide (DOCA0102EN))

Monitored Functions and Logs Fault Detection on MicroLogic X

- Internal Current Transformers [T]
- External Neutral CT
- ASIC over temp [T]
- ASIC problem [T]
- Error reading perform / Sensor rating
- Internal battery
- Trip solenoid is not connected, default is to trip the circuit breaker
- Bluetooth error
- Ethernet Error communication (IFE)
- IO module

Communication Features

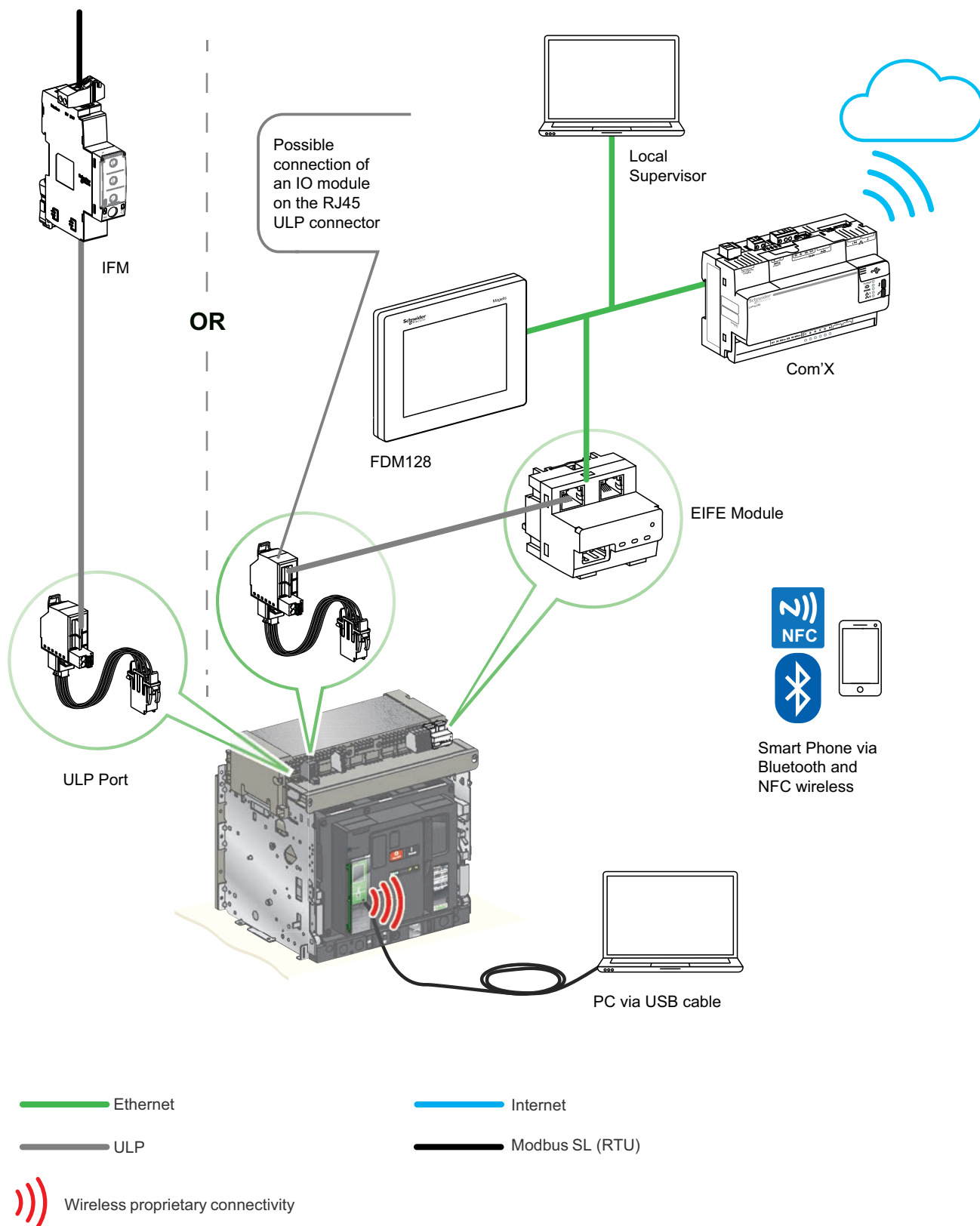
MicroLogic X control units and interfaces offers multiple communication channels:

- Connection to an Ethernet network through either an EIFE or an IFE interface module. The EIFE and IFE modules are connected to the MicroLogic X control unit by means of a ULP port and a prefabricated ULP cord mounted on the cradle of the MTZ breaker.
- Connection to a Modbus SL (RTU) RS 485 bus is through an IFM interface module. The IFM module is connected to the MicroLogic X control unit by means of a ULP port and a prefabricated ULP cord installed in the MTZ breaker cell within the switchgear
- Communication with a smartphone via a wireless powered Bluetooth channel or a self-powered NFC channel.

NOTE: Specifying the MicroLogic Xi version of the trip unit removes the wireless features.

- Communication with a PC via a USB port.
- Connection to Internet-based servers or cloud platform. The connection to Internet can be performed through a Panel Server module connected to internal Ethernet network.

The figure below illustrates the connectivity capability of the MasterPacT MTZ with MicroLogic X trip unit. See **MasterPacT MTZ MicroLogic X Control Unit User Guide (DOCA0102EN)** for more information.

Figure 26 - Drawout Circuit Breaker

The following control orders, information and data, are made available on Ethernet and Modbus SL (RTU):

Control orders:

- MX diag & com shunt trip opening order
- XF diag & com shunt close closing order

Events:

- All the events logged in the MicroLogic X control unit event logbooks

Status indications:

- ON/OFF O/F
- Spring charged CH
- Ready to close
- Overcurrent trip SDE
- Connected / disconnected / test position CE/CD/CT

Measurements:

- Instantaneous measurement information
- Averaged measurement information
- Max/Min values
- Energy metering
- Power quality

Operating assistance:

- Protection settings and alarm
- Histories
- Maintenance indicators

Availability:

- Access control by password, to be initialized by the user

See [Communications Options in Power-Zone 4 Switchgear](#), page 86 section of this catalog for communication configurations available for MasterPacT within Power-Zone 4 LV Switchgear.

Power Supply Requirements

The basic functions of protection performed by the MicroLogic X control unit (LSIG: long-time overload protection, short-time short-circuit protection, instantaneous short-circuit protection, ground-fault protection) do not require an external power supply. They are self-powered by the currents delivered by the current transformers embedded in the MTZ circuit breaker.

In Power-Zone 4 LV Switchgear standard control schemes provide 24 Vdc power to the trip unit via main (lineside) voltage taps or (optionally) a user supplied voltage.

- The MicroLogic X HMI and display screen.
- The metering functions with accuracies in accordance with IEC 61557-12.
- The maintenance and diagnostic functions.
- Communication through Bluetooth low energy technology.
- Communication through ULP modules below:
 - The IFE module.
 - The IFM module.
 - The IO module.
 - The M2C programmable contact.
 - The ESM - ERMS switch module.
 - The optional protections provided by the optional digital modules.

The 24 Vdc power supply maintains the operation of all functions of the MicroLogic X control unit in all circumstances, even when the circuit breaker is open and not energized. The 24 Vdc power supply maintains the functions of the MicroLogic X control unit in low load conditions (load below 20%).

More information on Micrologic X trip unit functions and power supply requirements can be found in MasterPact MTZ MicroLogic X Control Unit User Guide (DOCA0102EN).

MasterPacT NW/NT Trip Units

The MicroLogic S, A, P and H, field-installable trip units are available with MasterPacT NW and NT circuit breakers. The circuit breaker overcurrent protection consists of a solid-state, microprocessor-based tripping device that requires no external power source. The complete tripping system has three main components: the molded sensors, the trip device (with rating plug), and the trip actuator. The microprocessor-based trip unit uses true RMS current level sensing. For additional information, refer to the trip unit functionality matrix [Trip Unit Comparison](#), page 57.

When a MasterPacT NW or NT circuit breaker is closed, no external power is required for the protection system. The trip unit is powered by current signal levels and current sensors integrally mounted in the MasterPacT NW or NT circuit breaker. All trip units are UL Listed for use in MasterPacT NW or NT circuit breakers.

Figure 27 - MicroLogic Basic Trip Unit



Standard Features

- True RMS sensing
- LI trip configuration
- Field interchangeable long-time rating plugs
- LED long-time pickup indication
- Thermal imaging

Available Options

- LSI trip configuration
- Test kits

Standard Features

- True RMS sensing
- LI trip configuration
- Field interchangeable long-time rating plugs
- LED long-time pickup indication LSI trip configurations
- Digital ammeter—phase and neutral
- Phase loading bar graph
- LED trip indication
- Zone selective interlocking (ZSI) with short-time and ground fault
- Thermal imaging

Available Options

- LSI trip configuration
- LSI (ground fault trip)
- Test kits

Available PowerLogic Features

- Current metering
- Circuit breaker open/close trip status
- Tripping curves

Figure 28 - MicroLogic Type A (Ammeter) Trip Unit



**Figure 29 - Type P
(Power Metering) Trip
Unit**



Standard Features

- All standard features of MicroLogic Type A trip unit
- LSI trip configuration
- Incremental “fine tuning” of L, S, I, and, when selected, G pickup and delay settings
- LCD dot matrix display and LED
- trip indication
- Advanced user interface
- Advanced user protection (includes, but not limited to):
 - over/under voltage
 - over/under frequency
- IDMTL: selectable long-time
- delay bands
- Thermal imaging
- Power measurement
- Contact wear indication
- Zone selective interlocking (ZSI) with short-time and ground fault

Available Options

- LSIG (ground fault trip with programmable ground fault alarm)
- Test kits

Available Monitoring Features

- Current metering
- Volts metering
- Energy accumulation
- Remote operation
- Circuit breaker open/close trip status
- Date/time stamping

**Figure 30 - MicroLogic
Type H (Harmonics)
Trip Unit**



Standard Features

- All standard features of MicroLogic Type P trip unit
- Advanced power measurements functions
- Fault waveform capture-locking (ZSI) with short-time and ground fault
- Thermal imaging

Available Options

- LSIG (ground fault trip) with programmable ground fault alarm
- Zone selective interlocking (ZSI) with short-time and ground fault
- Test kits

Available Monitoring Features

- Current metering
- Volts metering
- Energy accumulation
- Remote operation
- Waveform capture
- Data logging
- Circuit breaker open/close trip status
- Power quality measurements
- Harmonics measurements through 51st
- Date/time stamping

NOTE: Refer to the *MasterPacT NT and NW Universal Power Circuit Breakers* catalog (0613CT0001) for detailed information about the family of MicroLogic S, A, P and H trip units.

Trip Unit Comparison

The table below lists the standard (X) and optional (O) trip unit features for Trip Unit types Standard, Ammeter, Power, Harmonic and MicroLogic X/Xi for use in Power-Zone 4 Switchgear. If the feature is tagged in the table with the letters "DM" then that indicates that a separate MicroLogic X Digital Module must be selected in order to get that specific trip unit functionality (see [Upgrade with Digital Modules](#)).

Table 11 - Trip Unit Comparison

Features	Standard			Ammeter				Power		Harmonics		X/Xi
	2.0	3.0	5.0	2.0A	3.0A	5.0A	6.0A	5.0P	6.0P	5.0H	6.0H	
LI		X			X							X
LS0	X			X								X
LSI			X			X		X		X		X
LSIG/Ground Fault Trip							X		X		X	X
Ground Fault Alarm/No Trip								X		X		DM
Ground Fault Alarm and Trip									X		X	DM
Adjustable Rating Plugs	X	X	X	X	X	X	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X	X	X	X	X	X	X
UL listed		X	X		X	X	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X	X	X	X	X	X	X
Phase-Loading Bar Graph				X	X	X	X	X	X	X	X	X
LED for Long-Time Pick-Up	X	X	X	X	X	X	X	X	X	X	X	X
LED for Trip Indication				X	X	X	X	X	X	X	X	X
Digital Ammeter				X	X	X	X	X	X	X	X	X
ZSI				X		X	X	X	X	X	X	X
Communications				◇	◇	◇	◇	X	X	X	X	X
LCD								X	X	X	X	X
Advanced User Interface								X	X	X	X	X
Protective Relay Functions								X	X	X	X	DM
Neutral Protection								X	X	X	X	X
Contact Wear Indication								X	X	X	X	X
Incremental Fine Tuning of Settings								X	X	X	X	X
ERMS								X	X	X	X	DM
Power Measurement								X	X	X	X	X
Power Quality Measurements total										X	X	X
Power Quality Measurements per phase										X	X	DM
Waveform Capture										X	X	DM

Front Accessible Power-Zone 4 Switchgear

Space has become a scarce commodity in today's growing urban landscapes yet demand for reliable energy continues to grow. Square D™ Power-Zone™ 4 front-accessible ANSI switchgear by Schneider Electric enables critical facilities to meet layout space challenges without sacrificing reliability.

Power-Zone 4 front accessible switchgear offers the optimum solution for reliable electrical protection and control with an alternative flexible footprint. Customer power connections in the cable compartment have been relocated to the front, removing the need for rear access aisleway as shown below.



Typical Power-Zone 4 Rear Accessible Switchgear Section
(72 – 80" deep)



Typical Power-Zone 4 Front Accessible Switchgear Section
(42" deep)

Features and Benefits

Flexibility

- 42" depth allows Power-Zone 4 switchgear to be used in more applications
- Suitable to mount against a wall or back to back
- Excellent for e-house applications as it removes the need for outer doors/work platforms resulting in cost savings for the building
- Expand into areas where switchgear previously would not fit
- Wide range of drawout circuit breaker arrangements to optimize footprint

Quality and Reliable Construction

- High short circuit/withstand ratings to support critical facilities
- Compartmentalized, maintenance-friendly switchgear with options for arc flash mitigation
- Captive splice and front accessibility speed installation and maintenance
- Industry leading MasterPacT drawout, stored-energy circuit breaker
- Standard, repeatable designs are factory wired, programmed, and tested in an ISO9001 facility

Advanced Technology

- Direct Ethernet circuit breaker connectivity for growing data communication needs
- EcoStruxure Power solutions from Schneider Electric to meet energy control and monitoring needs at every level
- Ability to retrofit aging infrastructure with latest smart technology

Technical Features

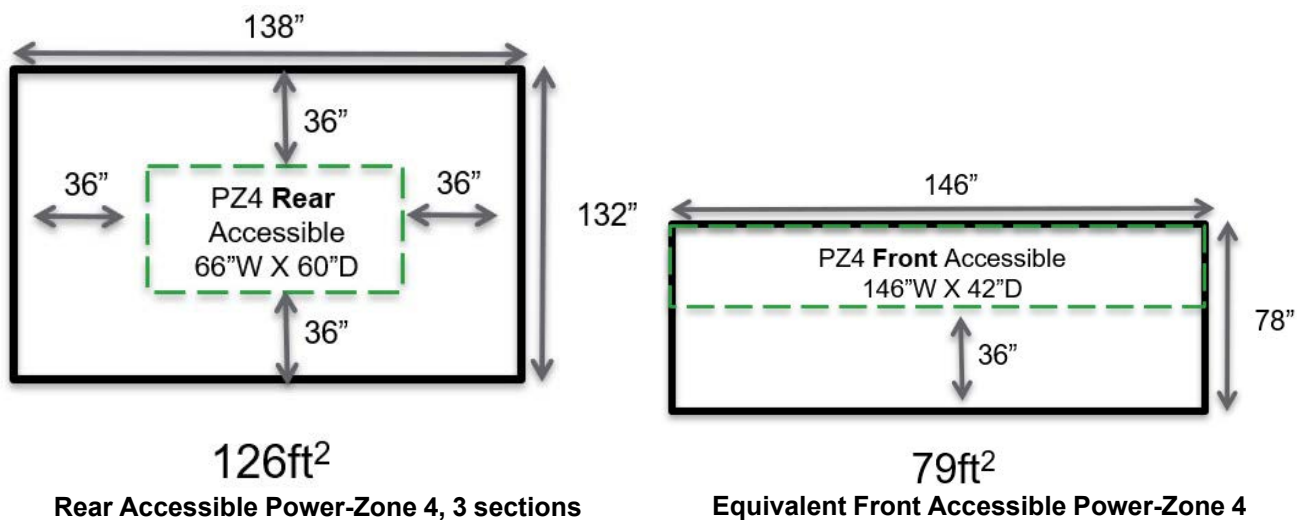
- ANSI C37.20.1 Rated. Listed to UL 1558 & CSA C22.2, No. 31
- MasterPacT stored energy, drawout circuit breaker rated per ANSI C37 and Listed to UL 1066
- Sections rated to 3200 A horizontal bus, 3200 A vertical bus
- Incoming mains or tie breakers up to 3200 A
- Feeder circuit breakers to 2000 A
- Bus short circuit ratings up to 100 kA, 635 Vac
- Bus short time withstand rating (60 cycle) up to 100 kA, 635 Vac
- Circuit breaker short circuit ratings up to 100 kA @ 508 Vac and 85 kA @ 635 Vac.
- Breaker short time ratings up to 85 kA, 635 Vac
- NEMA Type 1 enclosures
- Single or multiple main options
- 42-inch deep footprint
- Main sections with incoming cable provisions are 26 inches wide
- Main/Tie sections combined with feeders begin at 44 inches wide
- Feeder sections begin at 44 inches wide
- Silver plated bus (tin plated or insulated bus is optional)
- SPDs, high resistance grounding resistor/controls, communication networking and PowerLogic power meters/monitors are available
- A circuit breaker floor crane is available.
- NEMA Type 1 and Drip/Sprinkler Resistant Enclosures available

Economics of Front Accessible Power-Zone 4 Switchgear

Floor space can be a premium in a number of ways:

- Additional construction cost of electrical room square footage
- Loss of building space for production (i.e. hospital beds, process lines, storage, etc.)
- Additional conditioned space costs

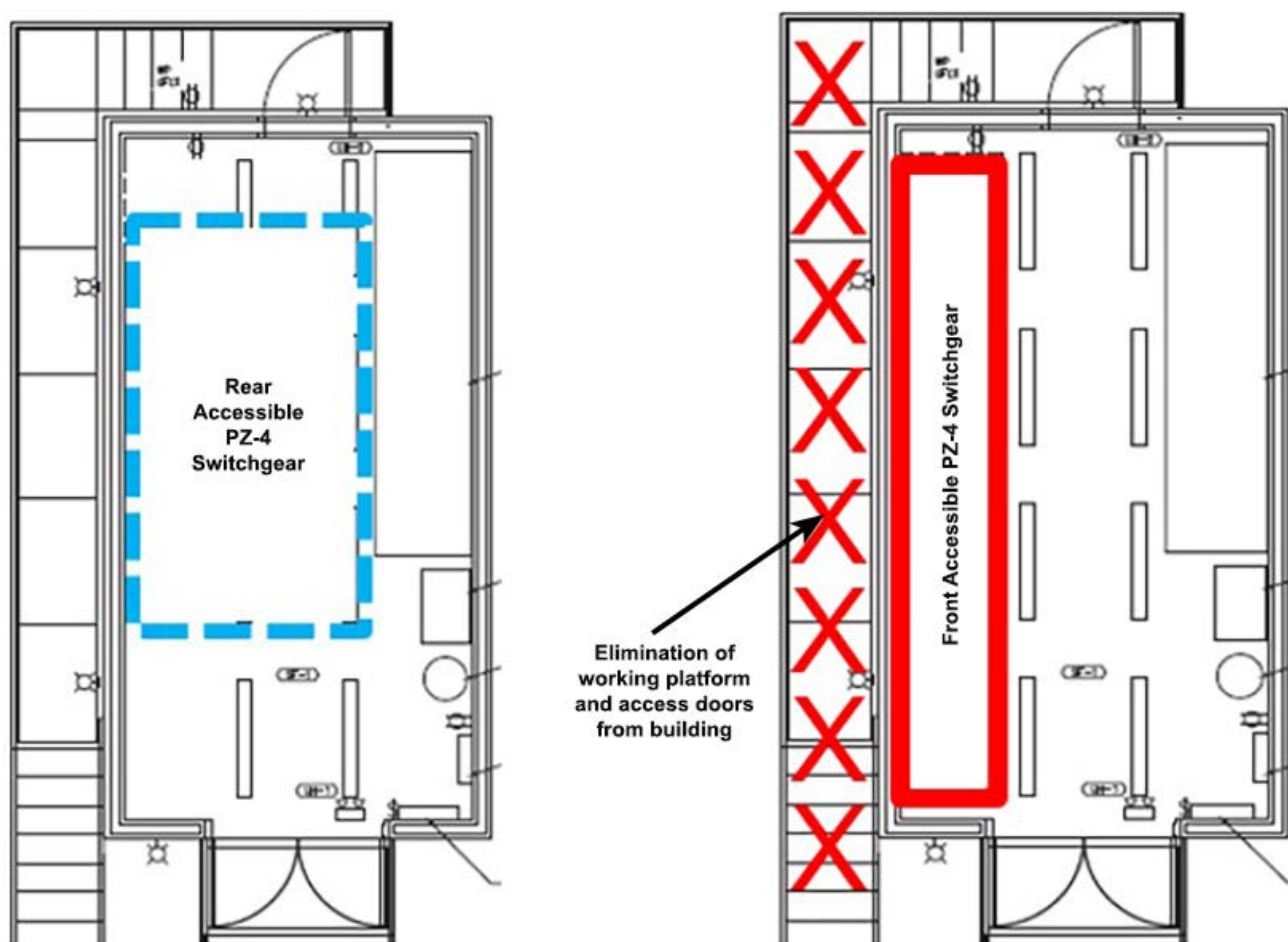
An example of Space savings is shown below. Front accessible lineups are wider than rear accessible lineups but have the advantage of eliminating the need for rear/side aiseways. The aisleway depth (front or rear) is mandated by NEC/CEC and is typically from 36-42 in. deep. Front Accessible switchgear shown requires only front aisleway as all breakers and cable access is in front.



The results on this typical example saved 37% of the original rear accessible footprint when considering the rear aisleway. This can present significant savings considering construction costs per square foot.

Significant savings in outdoor Electrical Houses (E-house) construction can be achieved when using Power-Zone 4 Front Accessible Switchgear. Traditional rear accessible switchgear requires a large interior footprint as shown above; or if the lineup is placed against one of the building's walls, an additional working platform and access doors are needed on the outside of the building to gain access to the switchgear rear compartments. Front accessible switchgear only requires access from the front, eliminating the cost and need for these outside provisions as shown in eHouse, page 61.

Figure 31 - eHouse



Layout Flexibility of Front Accessible Power-Zone 4 Switchgear

The ability to reshape the switchgear lineup and eliminating the need for rear access can make front accessible switchgear the only choice for some room layouts. The ability to place Power-Zone 4 drawout switchgear against a wall or back to back with other equipment is possible as shown below. This allows switchgear to still be a viable solution in more places.

Figure 32 - Back-To-Back

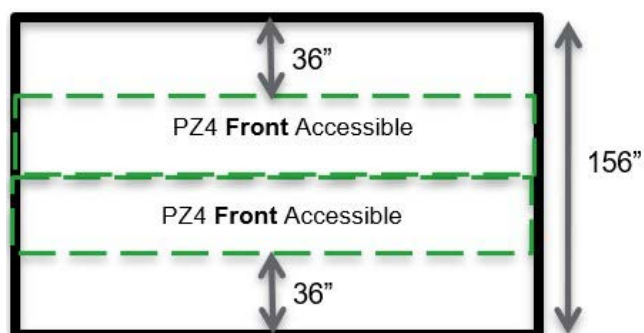
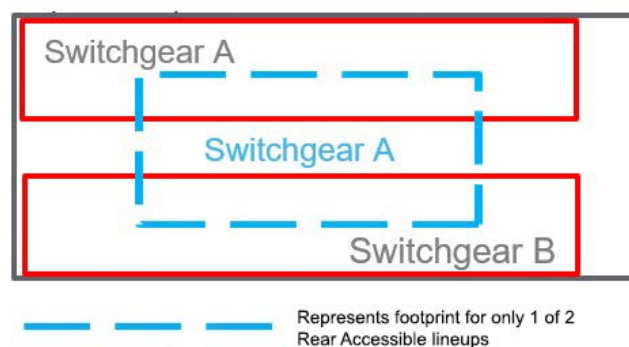


Figure 33 - Against Electrical Room Wall



Structure Design

Power-Zone 4 Front Accessible Switchgear is based on the same rugged ANSI structure design as rear accessible Power-Zone 4 for critical applications. Each section has steel barriers separating the breaker from bus/cable compartments. Main sections can be offered in 2 types: Main Only or Main with Feeders. On the left end of the lineup shown in *Front Accessible Single Main, Top Incoming Cable* 70 in. W X 42 in. D total, page 62 is a Mains Only section. These must always be shipped with a corresponding Feeder section in a shipping split. Main Circuit breakers can also be provided in the same section as a Feeder section as shown in *Front Accessible Bottom Incoming Main with Feeders* 58in. W X 42 in. D, page 63. These 2 main designs allow optimization of footprint based on feeder count. For more layout details, see *Layout Arrangements and Section Widths*, page 135 section of this catalog.

Sections can be provided with optional barriers between them and between the cable and bus compartments to provide a fully compartmentalized lineup.

Figure 34 - Front Accessible Single Main, Top Incoming Cable 70 in. W X 42 in. D total

- 26 in. W 3200 A Main
- 44 in. W (3) 800 A Feeder Sections

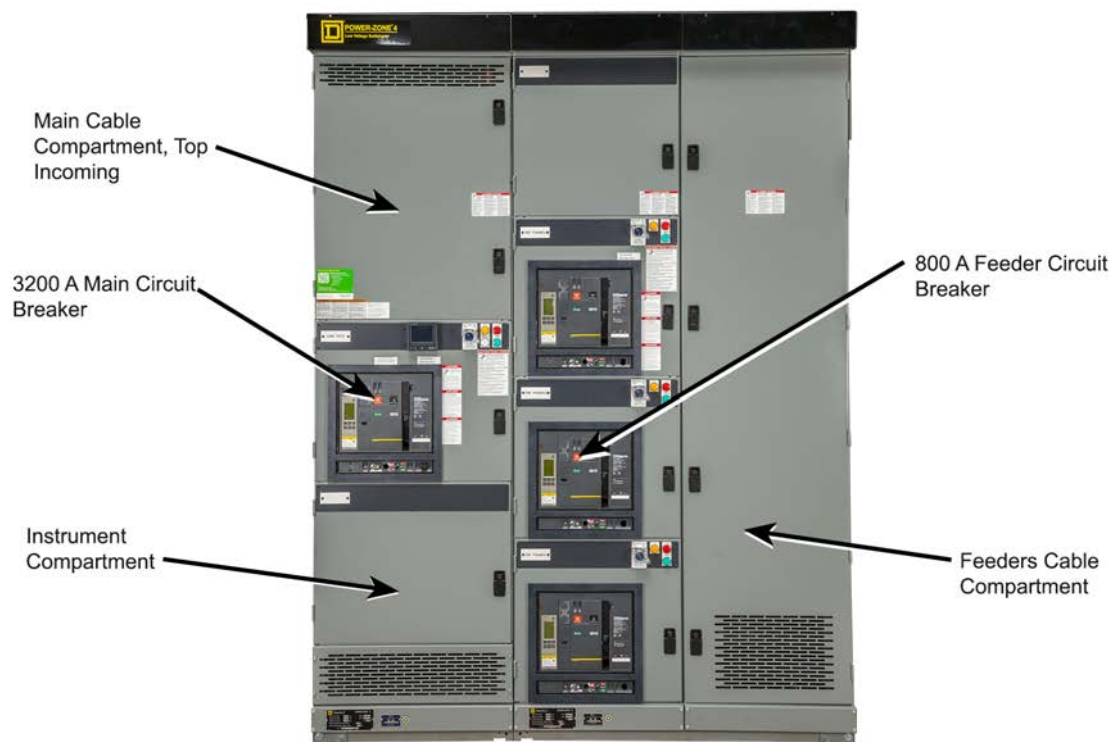
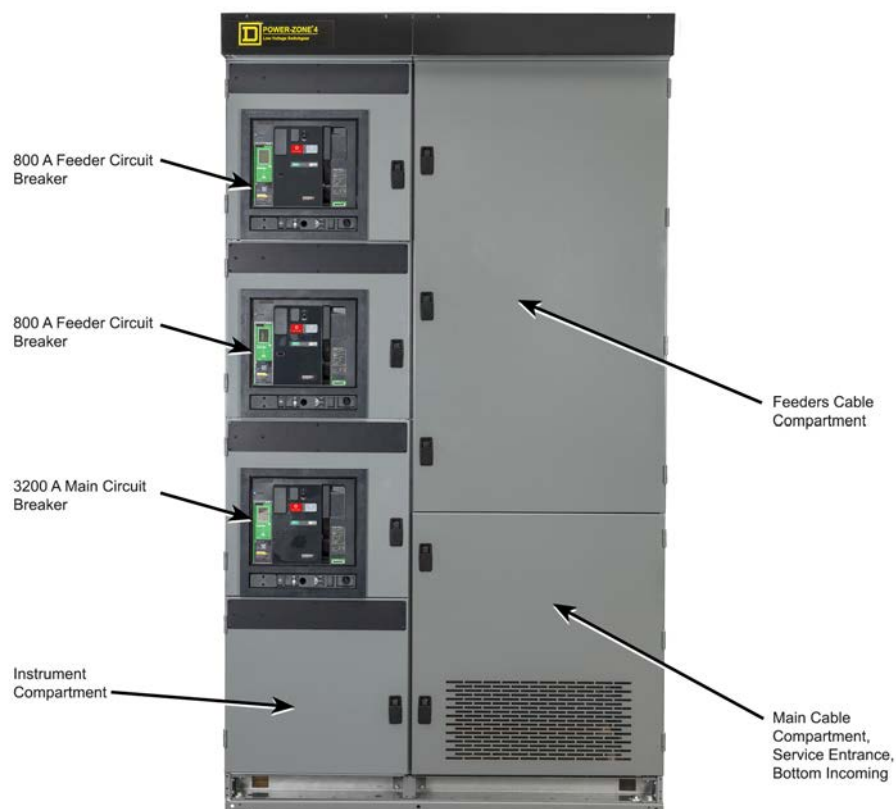


Figure 35 - Front Accessible Bottom Incoming Main with Feeders
58in. W X 42 in. D



Horizontal wireway, top and bottom allow for control cabling requiring only front accessibility as shown in Front Accessible Single Main Section + Feeders Section, Doors Open, page 64. Shipping split terminal blocks and pluggable communication cables are provided for reconnection of shipping split wiring at site. When running wires vertically down the section, ample room to the right of each breaker compartment is provided. Thanks to front-facing cable compartments wiring is not needed to the rear and virtually all control wiring can be accessed from the front.

Figure 36 - Front Accessible Single Main Section + Feeders Section, Doors Open (as shown in Front Accessible Single Main, Top Incoming Cable 70 in. W X 42 in. D total, page 62)



Front Accessible Power-Zone 4 Switchgear is available in NEMA Type 1 enclosures only. Ventilation of the enclosure is necessary to cool bus, breaker and cable compartments to meet stringent ANSI C37.20.1 UL temperature rise tests. Vents are included on rear of enclosure and on top and front of cable compartments as shown in Rear View of Front Accessible PZ-4 showing vents, page 64:

Figure 37 - Rear View of Front Accessible PZ-4 showing vents

NOTE: Spacing flange is provided to maintain necessary 1.5 in. air gap to wall.



Figure 38 - Top View of Front Accessible PZ-4 showing vent boxes

NOTE: Conduit plates are removable and boxes are shipped on gear. Front accessible gear is 1 in. taller than rear accessible gear.

**Figure 39 - Front View of Front Accessible PZ-4 showing front ventilation on sections with cable compartments**

The overhead lifter is not available on Front Accessible PZ-4 due to top conduit areas overlapping the lifter rail. A floor crane is available in 2 styles for lifting the breaker out of the section and transporting away from the gear for maintenance. See Breaker Racking, Moving and Handling Options, page 27 section for further information

Other enclosure options for front accessible include Drip Hoods and Sprinkler Resistant design which includes drip hoods, transparent breaker covers, ventilation louvers, and cover/door gasketing (See Sprinkler Resistant Enclosures, page 19 section for more details)

Breaker Compartment

Each feeder section is divided into 4 cells containing MasterPacT MTZ2 or NW standard width breakers. The breaker compartment for the feeder section is always on the left with its corresponding cable compartment always on the right. Auxiliary and Instrumentation Compartments are also available in place of breaker compartments. Breaker cells are contained in steel compartments to barrier them from bus or cable areas. Other features of rear accessible Power-Zone 4 switchgear are featured on front access construction.

Figure 40 - Breaker Compartment, Door Closed



Figure 41 - Breaker Compartment, Door Open



Circuit Breaker Types:

Mains/Ties are available from 1600 – 3200 A. Feeder are available from 800 – 2000 A. MicroLogic X (MTZ) and MicroLogic S, A, P, H (NW) are available.



MTZ2-08, MTZ2-16 (800 A – 1600 A) N1, H1, H2, H3
MTZ2-20, MTZ2-32 (2000 A–3200 A) N1, H1, H2, H3



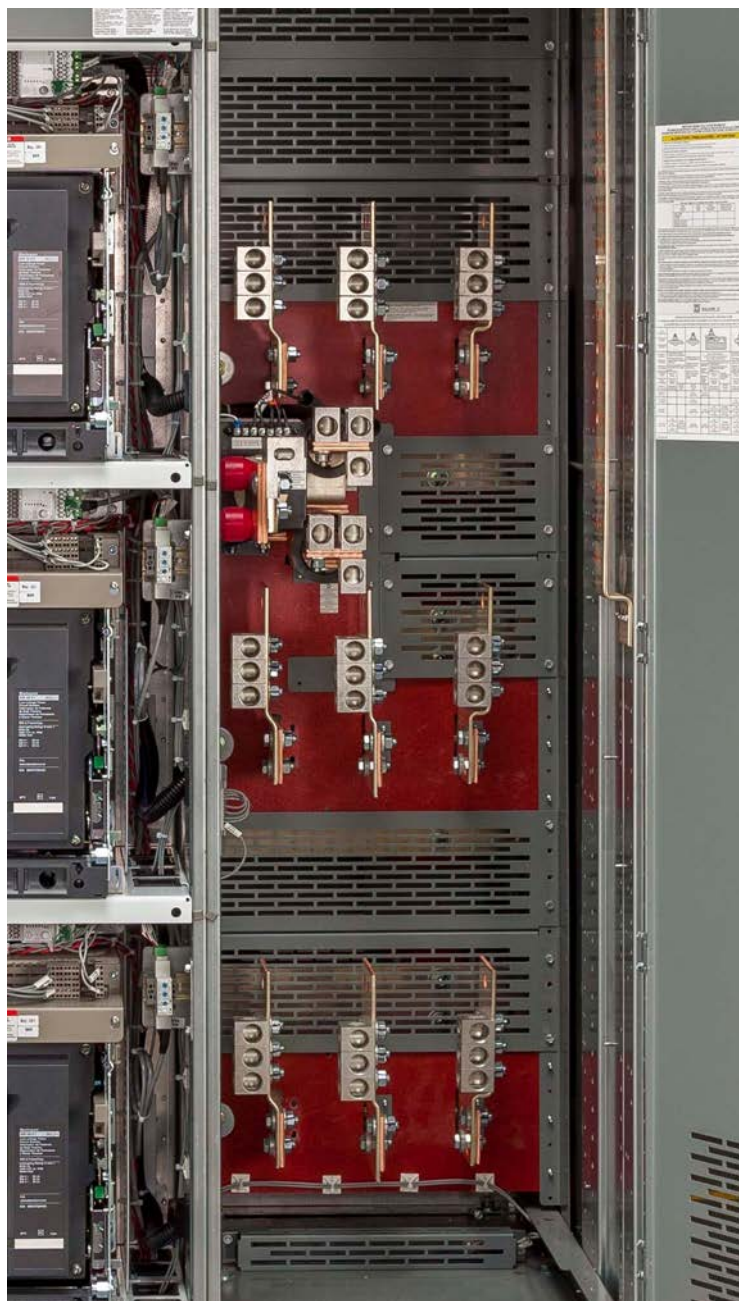
NW08, NW16 (800 A – 1600 A) N1, H1, H2, H3
NW20, NW32 (2000 A–3200 A) H1, H2, H3

Breaker features, accessories, and performance in the front accessible offering are the same as featured in the rear accessible offering. See [Circuit Breakers](#), page 33 section for details on breakers.

Front Facing Cable Compartment

The front facing cable compartment in front accessible Power-Zone 4 provides the same function for cables entering the lineup as rear accessible. However, the accessibility from the front can provide an easier maintenance process. Covers are standard on the cable compartment with optional padlockable doors available. Cables can be routed for top or bottom entry. In the case of a main in the same section as feeders the feeders must exit the opposite direction of the main. Conduit entry areas are similar to rear accessible and are shown in *Front Facing Conduit Entry Area*, page 67.

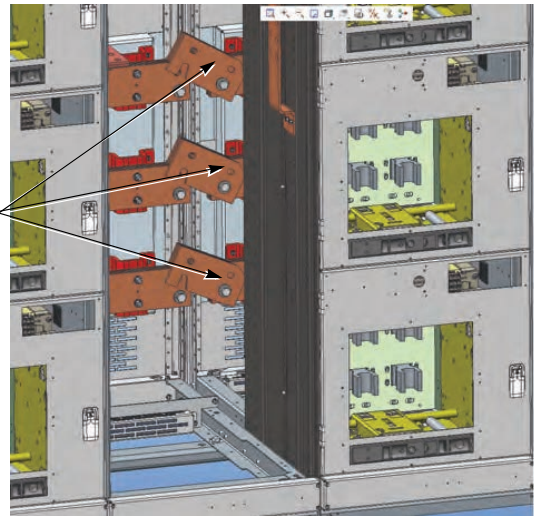
Figure 42 - Front Facing Conduit Entry Area



One key feature provided by the cable compartment in front accessible Power-Zone 4 is the ability to access splice connections from the front via the cable compartment. This allows for completion of the horizontal cross bus installation from the front of the gear. A unique rotating splice design is used to provide a captive splice bar which rotates counterclockwise to create the splice between sections (see *Rotating Splice Bus*, page 68).

Figure 43 - Rotating Splice Bus

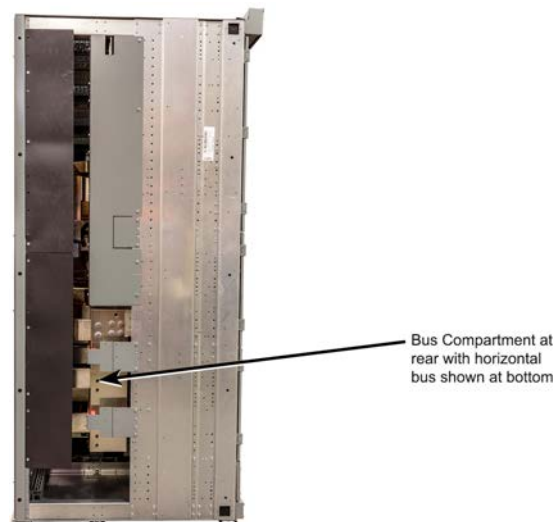
Rotate splice bus towards left and align with through-bus hole pattern



Bus Compartment

In front accessible PZ-4, the vertical bus and horizontal bus are contained in the rear compartment separated from the breakers by steel barriers. As shown in [Bus Compartment at Rear](#), page 68 the rear is not accessible as all splicing and maintenance can occur from the front. As in rear accessible all bus joints consist of SAE Grade 5 hardware and conical spring (e.g. Belleville) washers to withstand mechanical forces exerted during short circuits. These are considered maintenance free joints. Horizontal cross bus is mounted at the bottom or top depending on incoming main power direction.

Sectional Side barriers between bus and cable compartments can be added optionally for further isolation. A neutral bus can be added up to 150% capacity of the main phase bus. In addition, a full-length ground bus is provided with front splicing capability. Optional bus mounted CT's can be mounted in the compartment and wired to front accessible shorting terminal blocks.

Figure 44 - Bus Compartment at Rear

Power-Zone 4 Arc Resistant Switchgear with ArcBlok Technology

Power-Zone 4 Arc Resistant Low Voltage, Metal-Enclosed Drawout Switchgear with MasterPacT ArcBlok Low Voltage Power Circuit Breakers

As the Occupational Safety and Health Administration (OSHA) continues to impose more stringent worker safety practices through the National Fire and Protection Agency's NFPA 70E, the market has seen a major shift towards arc resistant solutions. Dangerous electrical events, such as an arc flash, can cause injury or even death to personnel in addition to tremendous equipment damage resulting in substantial financial consequences. Reducing the occurrence of these incidents, as well as containing the effects of an arc flash event once it occurs, is essential to reducing risk to personnel.

What is an arc flash?

An arc flash occurs when insulation or isolation between electrified conductors is breached or can no longer withstand the applied voltage. As employees work on or near energized conductors or circuits, movement near or contact with the equipment may cause a phase-to-ground and/or a phase-to-phase fault. Temperatures of more than 5,000 degrees Fahrenheit and a powerful explosion can be produced in an arc flash incident. OSHA has begun to enforce the NFPA 70E safety guidelines for arc flash safety. The guidelines:

- provide analysis detailing arc flash incident energy, boundary distances, and the Personal Protective Equipment (PPE);
- state that PPE must be provided;
- mandate proper worker training;
- provide procedures for safe work practices;
- state that tools for a safe work environment must be provided; and
- state that equipment be installed in accordance with the safety requirements of the *National Electrical Code* (NEC).

Protecting Your Personnel and Equipment from an Arc Flash

Power-Zone 4 arc resistant switchgear with MasterPacT MTZ2, 3 and NW ArcBlok technology offers patented, superior arc flash protection for operators and maintenance personnel. Power-Zone 4 arc resistant switchgear offers arc flash containment features unique to the industry in both the circuit breaker compartment and the structure.

This offer is engineered with an internal arc gas management system designed to channel dangerous arc flash energy through a pressure relief mechanism in the top of the equipment. This mechanism is comprised of either top mounted baffles (standard) or plenums (as option). The standard top mounted baffles contain roof flaps, which open to relieve pressure and allow for ejection of harmful gasses and plasma away from personnel and equipment. Optional plenums can be provided as an option to safely isolate and exhaust these gasses to a user specified location either internal or external to the facility.



MasterPacT with ArcBlok technology helps quench and transfer an arc before it propagates inside the circuit breaker compartment. This patented technology provides improved protection from the consequences of internal arcing faults and does not increase the footprint of the equipment. Arc flash energy containment occurs on the front, back, and sides, even when the instrument compartment door is open¹⁸, providing ANSI Type 2B rating. This simple, stand-alone circuit breaker solution features a space-saving design and offers an improved level of protection for personnel and equipment. Plus, Power-Zone 4 arc resistant switchgear features easy installation and reduced maintenance and inspection requirements.

MasterPacT Circuit Breakers with Arc Flash Technology

Breakthrough technology was used to design the MasterPacT circuit breakers to interrupt large amounts of fault current without being protected by fuses. The same technology and design that allows the MasterPacT circuit breakers to interrupt large fault currents without fuses also provides very good arc flash limitation. The decision to design the MasterPacT to eliminate the need for fuse protection was based on the following:

- Requirements for smaller footprints and space-saving installations;
- Avoidance of fuse installation, maintaining supplies, and the need to enter the equipment, in order to check and change fuses;
- The need to be adjustable, to provide coordination with downstream products and better arc flash protection.

Advantages of using MasterPacT circuit breakers and Power-Zone 4 switchgear, when there are arc flash concerns:

- Arc flash limiting feeder circuit breakers up to 2000 A can reduce arc incident energy on downstream equipment such as motor control centers (MCCs) and power distribution panels (PDPs).
- Through-the-door circuit breaker operation allows unit to be operated/racked while door is closed; this reduces NFPA 70E PPE category by one level.
- Optional rear hinged doors allow easy access to cables; this reduces NFPA 70E PPE category by one level.
- MasterPacT arc flash circuit breaker equations are easily inserted into software packages such as SKM Analysis to get these testing results. For further information on applying MasterPacT circuit breakers for arc flash protection, refer to data bulletins 0613DB02XX and 0100DB04XX.

Helpful Definitions:

An **Arc Flash** is a through-air short circuit event that occurs as a result of a fault condition in an electrical distribution system.

Arc resistant refers to the equipment rating achieved by meeting the ANSI C37.20.7 Standard for arc resistant switchgear.

ArcBlok is a Schneider Electric patented technology applied inside of PZ-4 switchgear which is designed to rapidly quench and transfer an internal arcing fault before it propagates inside the circuit breaker compartment.

18. ANSI recommends doors remain closed.

Codes and Standards

- Power-Zone 4 Arc Resistant Switchgear with ArcBlok Technology: is certified to comply with *ANSI C37.20.7 IEEE Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults*, and third-party (UL) witnessed as arc resistant switchgear. Refer to Data Bulletin 6037DB1302 for complete UL Witness Certification Summary.
- All arc resistant switchgear sections meet ANSI C37.20.1, C37.51, C37.20.7 standards, and CSA C22.2 No. 31 standards. UL/cUL third party certifications has been achieved to document successful arc flash tests per the criteria of these standards up to 500 milliseconds (30 cycles).
- Rated Type 2B per ANSI C37.20.7 definitions—from 208 Vac to 635 Vac, 3-phase 3-wire or 3-phase 4-wire with 50% or 100% neutral. Type 2B is the accessibility rating of the equipment. Type 2 designates arc resistant protection on the front, sides, and rear of the equipment. The "B" suffix designates that the equipment maintains the arc resistant rating even with the instrument compartment door open.
- MasterPacT ArcBlok circuit breakers: meet ANSI C37.13, C37.16, C37.17, and C37.50
- Arc resistant switchgear can be applied as UL Service Entrance Equipment (option)
- Option to meet the seismic requirements of the IBC, ICC Edition, ASCE7, and OSHPD (California Healthcare) Special Seismic Certifications.

Features and Benefits

Standard



- MasterPacT MTZ2, 3 or NW circuit breakers with patented ArcBlok technology (up to 5000 A)
- 60 in. (1524 mm) deep x 22 in. (559 mm) wide (smallest arc resistant footprint in the industry)
- 22 in. (559 mm), 36 in. (914 mm) section widths (30 in./762 mm section width not available)
- 60 in. (1524 mm), 72 in. (1829 mm), 80 in. (2032 mm) section depths
- Internal arc gas management system for optimized cooling
- ANSI C37.20.7 Type 2B Rating when racking into Disconnected, Test or Connected position with door closed.
- NEMA 1 enclosures
- Bus ratings up to 5000 A
- MicroLogic trip units
- Baffles (roof and floor)
- Bottom plates
- Floor dampers
- Rodent barriers
- Ground bus
- Up to 100 kAIC, 635V short circuit ratings are available
- 4 high per section breaker construction available. (Arc Resistant construction does not lower continuous current rating from standard Power-Zone 4 Switchgear ratings.)

Optional

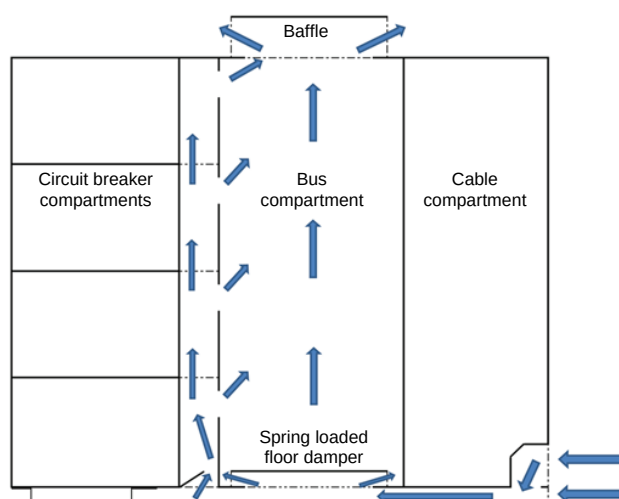
- Insulated copper bus
- Zone selective interlocking
- High-resistance grounding
- Energy reduction maintenance switch
- Section barriers (rear, cable, and side)
- Overhead circuit breaker lifter
- Circuit breaker remote racking
- Rear covers, hinged doors
- ANSI Type 2B rated arc plenum exhaust
- Arc resistant prepared spaces
- ANSI Type 2B rated instrument compartments
- Front Door Gasketing (gasketing for side and rear covers or doors are standard)
- Arc Resistant Power-Zone 4 Switchgear is not available in NEMA Type 3R Walk-In or Front Accessible Enclosures

Arc Resistant Structure



Power-Zone 4 arc resistant switchgear structures are tested to the *ANSI/IEEE C37.20.7 Guide for Testing Metal-Enclosed Switchgear Rated up to 38 kV for Internal Arcing Faults* and are third-party, UL witness tested. Built to withstand an internal arcing event up to 635 V and at interrupt ampacities of up to 100,000 A, Power-Zone 4 arc resistant switchgear offers the best-in-class protection and performance characteristics with the smallest footprint in the industry. Each vertical section can be configured with up to 4 cells which can contain all existing cell options including MasterPacT MTZ2,3 or NW low voltage power circuit breakers with ArcBlok technology, instrument compartments with ANSI/IEEE C37.20.7 Type 2B ratings, and prepared spaces for future expansion. As with standard Power-Zone 4 switchgear, vertical sections are divided into three compartments: the circuit breaker compartment, bus compartment, and rear cable compartment. Each section can be fitted with optional isolation barriers to further reduce the likelihood of an internal arcing event from propagating section to section or compartment to compartment. Structures are rear accessible, NEMA Type 1 with available widths of 22 in. (559 mm) and 36 in. (914 mm), and depths of 60 in. (1524 mm), 72 in. (1829 mm), 80 in. (2032 mm). ANSI #49 Grey is standard, but other color options are available.

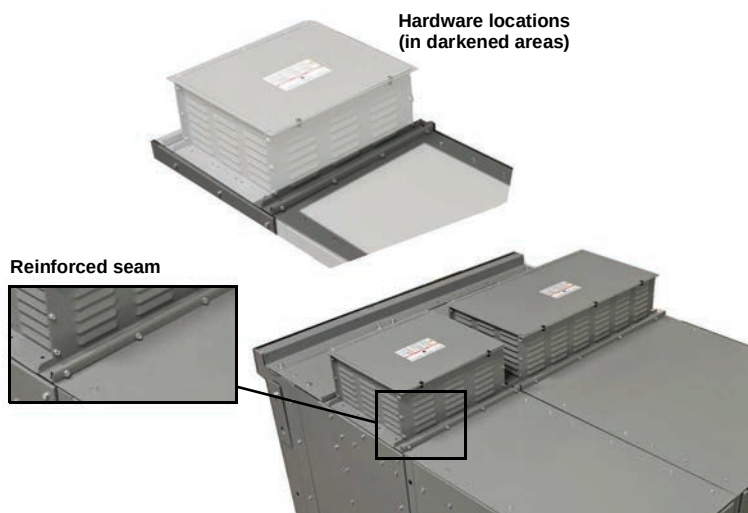
Internal Arc Gas Management System



Power-Zone 4 arc resistant switchgear employs an innovative, internal arc gas management system utilizing newly designed structure, circuit breaker and cell components, which both quench arc faults and redirect dangerous energies and debris through the roof and away from personnel, while allowing for exceptional ventilation and cooling under normal operation. This system includes roof baffles with pressure-relief flaps, additional hardware and reinforced seams in equipment covers for added strength and support, and spring-loaded floor mechanisms in each bus compartment, which allow for ventilation and then closure in the event of an internal arcing fault. Finally, circuit breaker cells are modified to include control cable glands, as well as the patented ArcBlok technology to increase arc flash performance and protection.

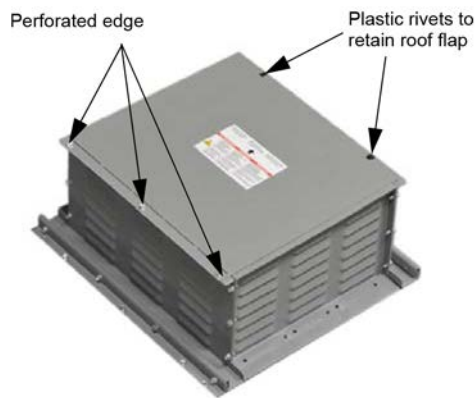
Arc Resistant Roof Design

Power-Zone 4 arc resistant roof comprised of specific designed top covers with reinforced seams and additional hardware for additional strength and support. The roof comprises of three separate pieces: the cell roof, the bus compartment roof, which contains either a top-mounted baffle (standard) or plenum (optional), and the cable compartment roof.



Arc Resistant Baffles

Each arc resistant section comes standard with top-mounted baffles containing pressure-relief flaps, which prevent pressure build-up on front, back, and the sides of the enclosure and allow for venting of arc fault gasses out of the top of the equipment and away from personnel. The pressure relief flaps have perforated edges that are designed and calibrated to open within 5-15 milliseconds of the initiation of the arc fault and the exhausted plasma is directed up and towards the rear of the equipment. The perforated edges allow the pressure-relief flaps to remain open to prevent secondary pressure build-up. Baffles are also a critical component to the thermal ventilation system, which allow for continuous airflow and should not be obstructed. Rail-mounted, circuit breaker lifters are compatible with arc resistant baffles. Baffles ship separately and are to be installed on site. Conduit entry space is not sacrificed with arc resistant baffle assemblies.



Note for room layout: The switchgear requires a minimum switchgear base to ceiling height of 10 ft. (3 m) with no obstructions above the supplied equipment. The roof baffle must be inspected to assure it is in place and is free of damage. The temporary shipping cover must be removed to install the roof baffle before applying power to the equipment. Refer to Figure above for typical roof baffle construction. To maintain the Arc Resistant rating, the switchgear requires a minimum clearance of 3 inches from the front, rear or sides to the nearest wall or obstruction (see note below for Code required aisleways for equipment). Equipment directly coupled to the switchgear is allowed. A close coupled transformer, such as in a unit substation, is acceptable and all sections in the Power-Zone 4 Switchgear will retain their Type 2B arc resistant rating. The transformer equipment connected adjacent to the switchgear through a direct bus connection is not covered by the arc resistant rating of the switchgear. When installing the equipment, consider the aisle space required at the front and rear of the equipment, as well as space at the ends of the lineup.

NOTE: Required minimum clearances around switchgear are given in Article 110.26 of the National Electrical Code® (NEC®) or Rule 2-308 of the Canadian Electrical Code (CEC®). These clearances are only a minimum. Additional space may be required for insertion and withdrawal of circuit breakers and to transfer to other compartments with a hoist or floor crane.

Arc Resistant Plenums

As an option, UL witnessed, ANSI Type 2B rated plenums can be added to redirect and exhaust arc fault gasses and explosive energy to a secure, customer-specified location, away from equipment and personnel. Plenums can be configured to exit the top of the gear in rear or sides and modular extensions are available for custom routing up to and flush with any wall, but not through the wall. Because ventilated plenums require a complex, maintenance intensive design with dampers that can fail in the event of an arc fault, eliminating them provides users with clear benefits of reduced maintenance and increased safety. Power-Zone 4 Arc Resistant Plenums are the only non-ventilated plenums in the industry, minimizing arc fault debris, gasses, or soot from escaping into unwanted areas. Baffles are not available to be used in conjunction with plenums. Plenums are required to exit every other section to facilitate normal state heat exhaust and cannot contain bends (i.e. must be straight runs to exhaust to prevent back pressure).

Figure 45 - Plenum Assembly Components

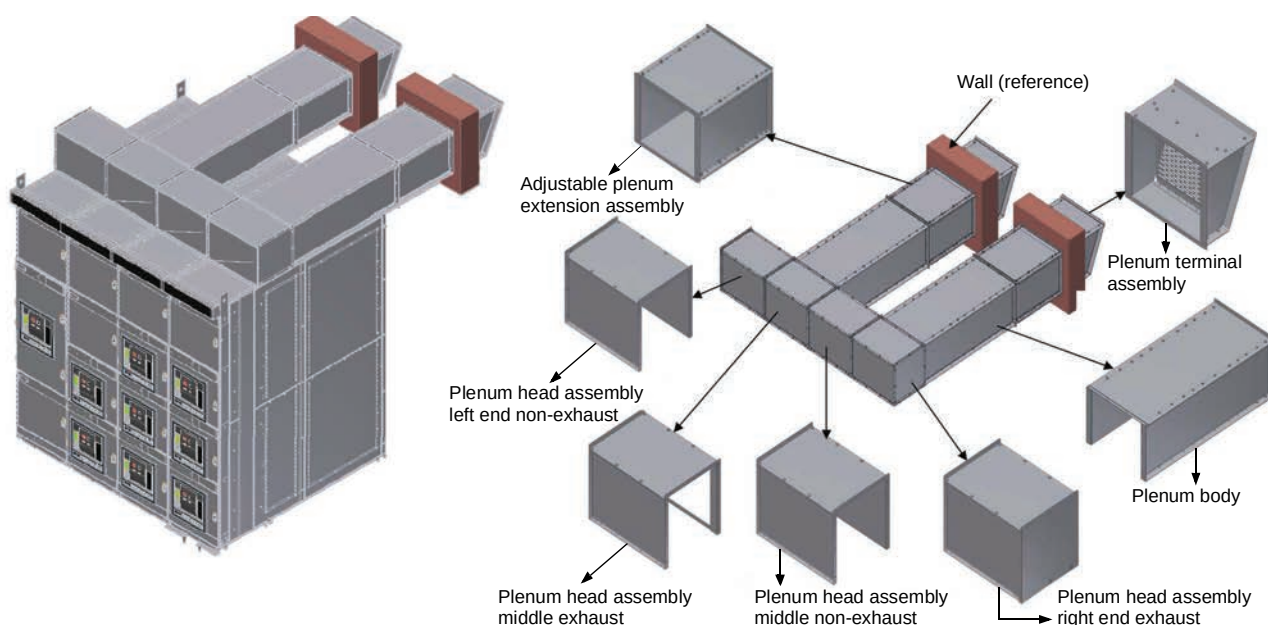
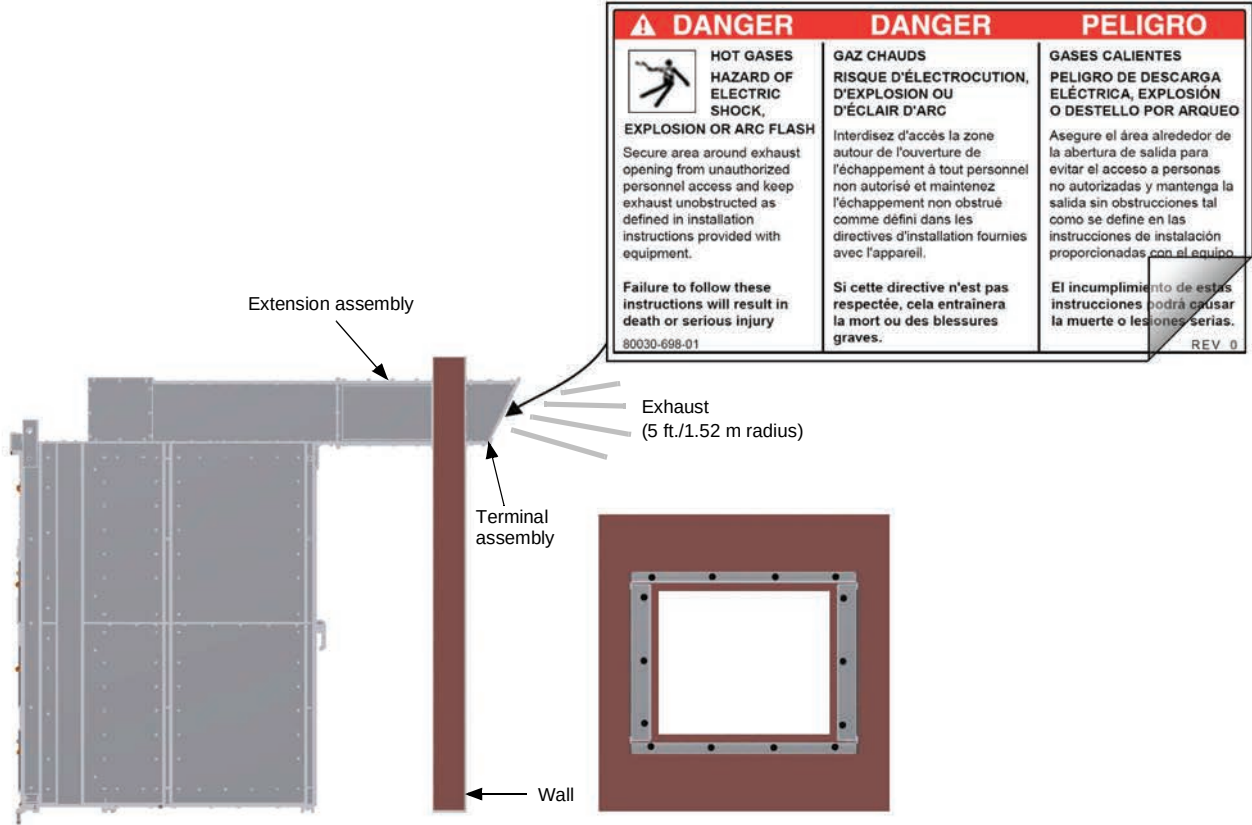


Figure 46 - Plenum Elevation Drawing

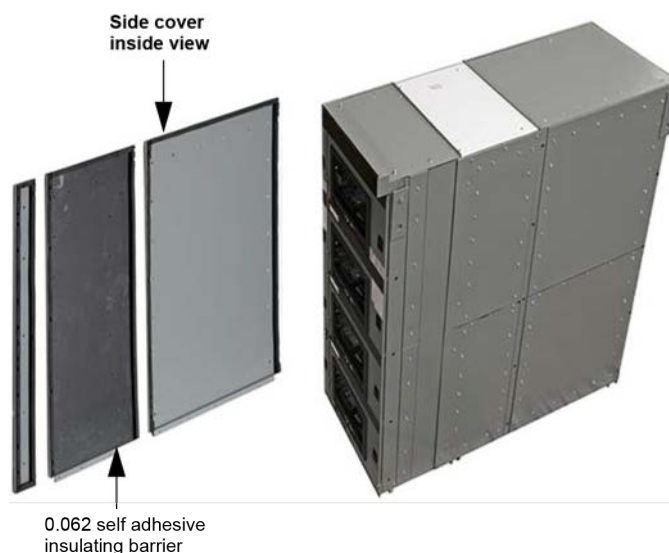
NOTE: 10 ft./3 m minimum unobstructed ceiling height from base of switchgear required to install plenum and exhaust duct.



Arc Resistant Side Covers/Plates

Side covers are 14 gauge steel and are designed with interlocking flanges and seams around the perimeter and in the middle of the equipment to provide additional structural integrity and improved strength. Multiple L-brackets are installed to overlap the top and side covers for added support. Insulating barriers are installed on the inside of the end covers to protect against phase-to-ground faults within the bus compartments. These insulating barriers cover the entire bus compartment end cover preventing faults from propagating from section to section. Sealing plates placed between sections also improve protection from fault propagation.

Figure 47 - Side Cover Assembly (R) with Sealing Bracket Assembly



Doors and Hinges

Due to the arc extinguishing capabilities of the patented MasterPacT circuit breakers with ArcBlok technology, front mounted arc resistant switchgear doors require no additional fasteners, hinges, or increased thickness and ultimately utilize the same doors as standard Power-Zone 4 switchgear¹⁹. This allows for reductions in weight and cost. Rear mounted arc resistant doors are reinforced with thicker steel (22 inches wide are 12 gauge and 36 inches wide are 10 gauge), and are structurally reinforced for additional strength.

¹⁹. Doors of half height have had vents removed vs. non-Arc Resistant construction to mitigate venting out of the front of the structure.

Figure 48 - Typical Front Door Construction



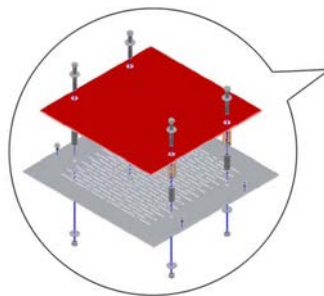
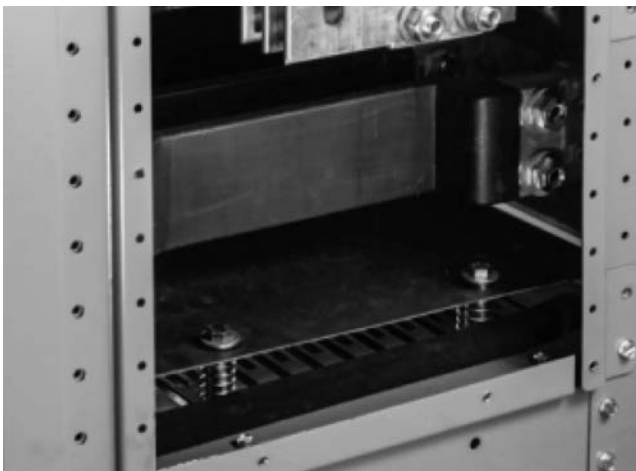
Figure 49 - Typical Rear Door Construction



Bus Compartment Spring Loaded Floor Damper

The bus compartment of each arc resistant section contains a spring-loaded floor. The floor is comprised of several compression springs, steel covered with fire retardant polypropylene insulator barrier, and a perforated base plate that allows for thermal ventilation during normal operating conditions and closes under the event of an internal arcing fault, preventing dangerous energies from escaping the bottom of the equipment. Ventilation in the floor damper assembly, allows for fully rated bus.

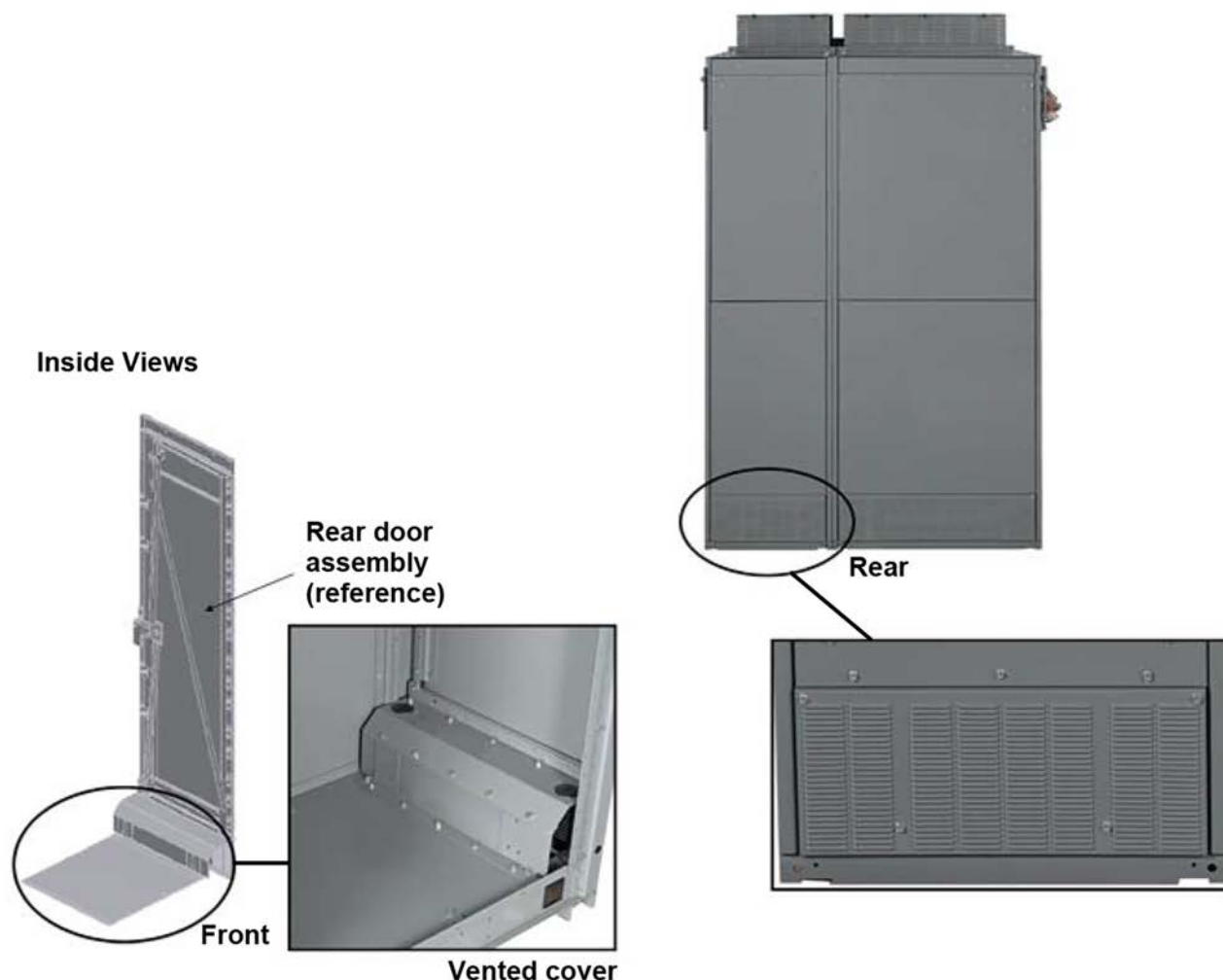
NOTE: Due to the floor mounted damper system, bottom incoming busway is not available.



Internal Baffle Assembly and Vents

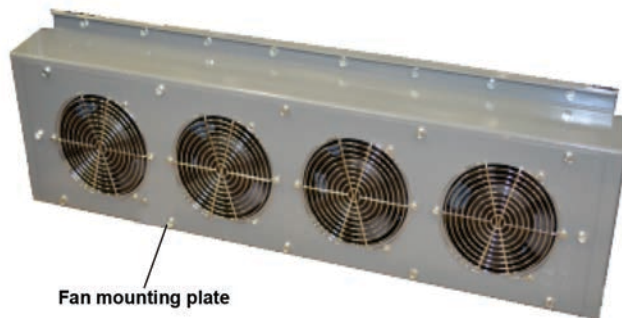
Arc resistant switchgear structures have been modified to include an internal baffle compartment and a repositioning of front and rear door vents to the base of the equipment for improved ventilation and convective cooling.

The internal baffle assembly employs a chamfered design which maximizes air velocity and optimizes the cooling capacity of incoming air. The baffle is designed with louvers that are covered with a chamfered bracket that also allows ground connections. All arc resistant switchgear sections contain louvered vents mounted near the base of the equipment on the rear.



Fans

Figure 50 - Fan Mounting Plate



For sections with vertical riser bus rated above 4000 A:

To meet thermal requirements, AR/PZ-4 technology requires a standard roof baffle or an optional open top into a plenum. Fans located at the bottom rear of the equipment are also required. Refer to Fan Mounting Plate, page 80 for fan location and construction.

Figure 51 - Fan Dashboard



The fans are thermostatically controlled and only operate when needed. Each fan assembly is provided with a dashboard located on a dedicated instrument compartment door to indicate the status of the fan system. The fan dashboard includes a light for each fan to indicate ON or OFF as well as a light to indicate if the temperature has passed the threshold to turn the fan system ON. There is also a selector switch called FAN MODE which has two settings, AUTO and TEST. AUTO mode means that the thermostat is used to automatically control when the fans run. Switching to TEST mode makes all of the fans run, regardless of the thermostat setting. Test mode should be used when performing fan system maintenance.

The fan system is designed with one redundant fan per system. The redundant fan will only run if one of the other fans is inoperable and the thermostat indicates the fans need to be running. If the fans become inoperable and the temperature exceeds an acceptable level, the main circuit breaker will be tripped.

MasterPacT MTZ2, 3 or NW Circuit Breakers with ArcBlok Technology

MasterPacT circuit breakers with ArcBlok technology helps quench an arc before it propagates inside the circuit breaker compartment. This patented technology provides improved protection from the consequences of internal arcing faults without increasing the footprint of the circuit breaker cell or structure. This simple, stand-alone circuit breaker solution features performance and space-savings unmatched in the industry, all while allowing for easy installation and reduced maintenance and inspection requirements. ArcBlok technology is the first to reduce the arc flash incident energy, pressure blast, and equipment damage at the cell.

The MasterPacT with ArcBlok technology interfaces with the ArcBlok cradle to prevent arcing events by enclosing the phases at the primary connection of the cradle. If for any reason an arcing event happens, with the separation between phase to phase and phase to ground, the arc is extinguished in less than 12 ms to reduce arc flash energy. The MasterPacT NW with ArcBlok technology is tested as part of Arc Resistant Equipment to ANSI C37.20.7.

Figure 52 - MasterPacT Circuit Breaker with ArcBlok (NW shown)



Cluster Shields

The ArcBlok system is comprised of 2 primary interworking components, cluster shields and cradle barriers. The cluster shields provide isolation and protection of circuit breaker stabs in the connected, test, and disconnected positions. These cluster shields are attached to the rear of the circuit breaker and work in concert with the cradle barriers to create a labyrinth effect. This purposely designed labyrinth system helps to prevent the opportunity for faults to occur at the stabs. In the event of an arc fault, the cluster shields and cradle barriers are engineered to extinguish the arc much faster than standard switchgear.

Figure 53 - Cluster Shields



NOTE: Circuit breaker ratings up to 200 kAIC with ArcBlok are available in Arc Resistant Power-Zone 4 Switchgear; however, the switchgear has a maximum short circuit rating of 100 kAIC and will be stated as such on the lineup rating nameplate even though the CB nameplate will indicate a 200 kAIC rating.

Cradle Barriers

The cradle barriers are attached to the rear of the cradle and each of the phase isolation barriers interlock with the cluster shields on the rear of the circuit breaker to complete the ArcBlok system. The cradle barrier assembly is comprised of a thermo set body and a Formex® cover located on the top and back surfaces which make no direct contact with any grounded metal components. The Formex cover contains perforated venting slots which both allow for additional ventilation of the stab connections and transfer the arc fault away from the breaker and out the top of the gear. ArcBlok cradle barriers are provided on all circuit breakers and prepared spaces in Power-Zone 4 Arc Resistant Switchgear.

Figure 54 - Cradle Barriers Front View

Figure 55 - Cradle Barrier Rear View

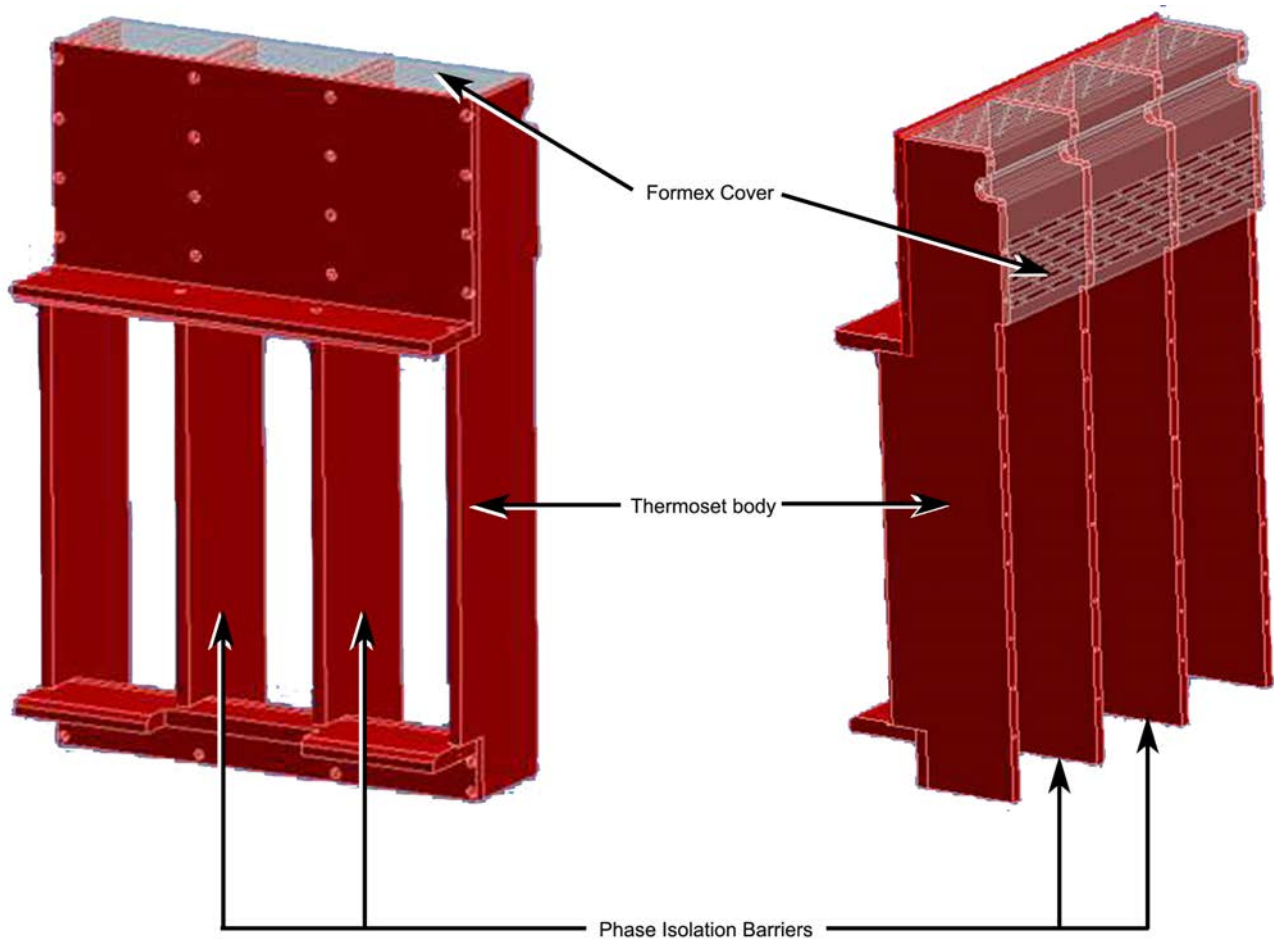


Figure 56 - MasterPacT Cradle with ArcBlok showing cradle barriers



NOTE: CTs must be located in bus/cable compartment for Arc Resistant Switchgear. Systems with Modified Differential Ground Fault Systems require CTs to be mounted in the bus compartment.

Spare Cassette for Prepared Space

Prepared spaces are available for future expansion in Power-Zone 4 arc resistant switchgear. Each prepared space requires a spare cassette. Spare cassettes are comprised of MasterPacT MTZ2, 3 or NW cradles and MasterPacT MTZ2, 3 or NW circuit breaker casings which do not contain any functional circuit breaker components (i.e. trip units, contacts, arc chutes, etc.). For future expansion, the MasterPacT MTZ2, 3 or NW circuit breaker cassette must be removed and replaced with a fully functional MasterPacT MTZ2, 3 or NW circuit breaker. Future expansion circuit breakers cannot be sized for loads greater than what the prepared space is designed and built to deliver from the factory. To maintain the arc resistant ratings of the gear, all cassettes must be racked in with the door closed. ArcBlok cradle barriers are provided on all circuit breakers and prepared spaces in Power-Zone 4 Arc Resistant Switchgear.

Room Clearance Requirements

10-ft. minimum ceiling height is required as measured from the base of the AR switchgear to the ceiling (i.e. 28.5-in. of clear space above the equipment) is required and includes arc blast, baffles or plenum needs. There is a minimum 3-in. space required around the equipment front, sides or rear according to the ANSI C37.20.7 test criteria, unless the equipment is direct coupled to other equipment. If the equipment is located against a Power-Zone house wall that opens up for rear access to the terminal cabinet, a clearance of 14-in. is required from the rear of the equipment for proper ventilation. Additional space may be required for insertion and withdrawal of circuit breakers and to transfer to other compartments with a hoist or crane. In addition, required minimum clearances around switchgear are given in Article 110.28 of the National Electric Code or Rule 2-308 of the Canadian Electrical Code.

Power-Zone 4 Arc Resistant Switchgear Ratings

For information regarding arc resistant switchgear ratings, please reference the Codes and Standards, page 71 and the Power-Zone 4 Switchgear Ratings, page 102.

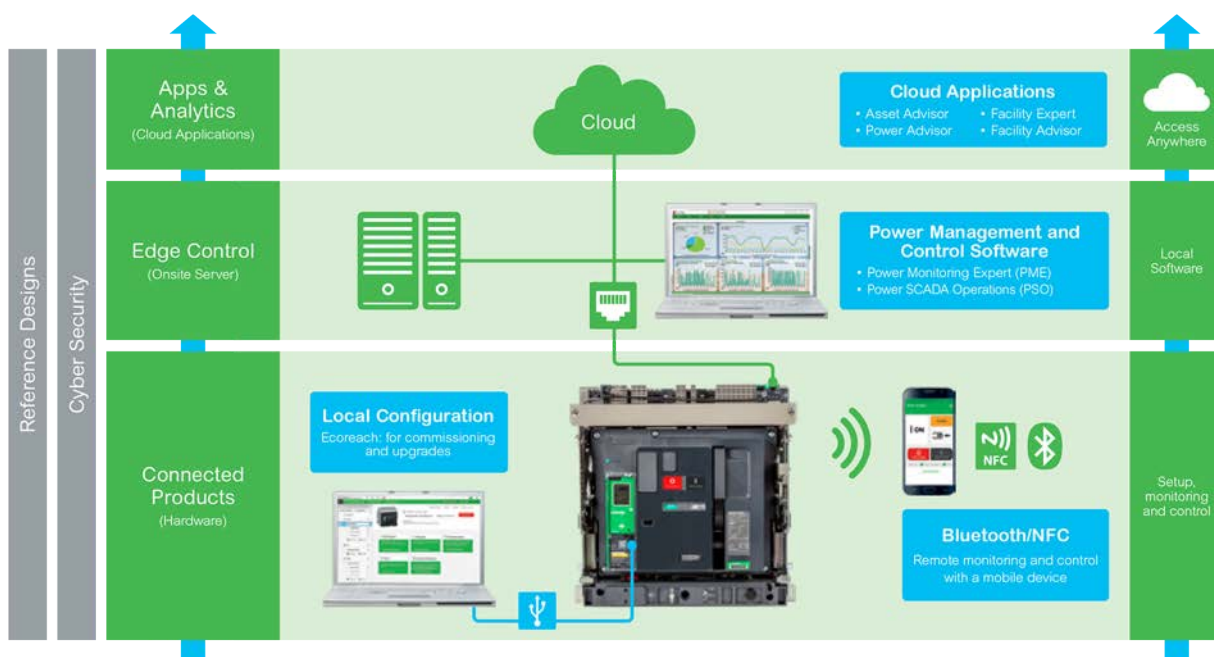
EcoStruxure Power and Power-Zone 4 Switchgear

Power-Zone 4 switchgear is available with the EcoStruxure power IOT-enabled architecture and platform from Schneider Electric. A key enabler is the MicroLogic trip unit for the MasterPacT MTZ or NW/NT circuit breakers. Power-Zone 4 switchgear may be fitted with several devices including: circuit monitors, advanced power quality meters, power meters, trip units, programmable logic controllers, digital relays, transformer temperature controllers, IO, lighting control, continuous thermal monitoring, arc flash relays, surge protective devices and more. As an available option, software packages for edge control and asset management are available to integrate the Power-Zone 4 switchgear and any installed intelligent components with your entire power distribution and communications networks. For more detailed information on software, please contact your local sales representative.

EcoStruxure Power Equipment Integration

MasterPacT MTZ integration with EcoStruxure Power architecture generates valuable data, enabling:

- Square D brand electrical distribution equipment to communicate and respond to asset management tools and software
- Connection to EcoStruxure Power software unlocks your electrical system's potential
- Remote monitoring and control with any supervision system to carry out predictive and preventive maintenance
- Remote notification and maintenance planning with Facility Expert digital maintenance logbook
- Proactive facility management with EcoStruxure Facility Advisor, Power Monitoring Expert, Power SCADA Operation, and Building Operation software
- Asset life-cycle management and condition-based maintenance via equipment monitoring
- Asset and alarm management
- Energy efficient and power quality management
- Compliance with regulations for energy-efficient buildings



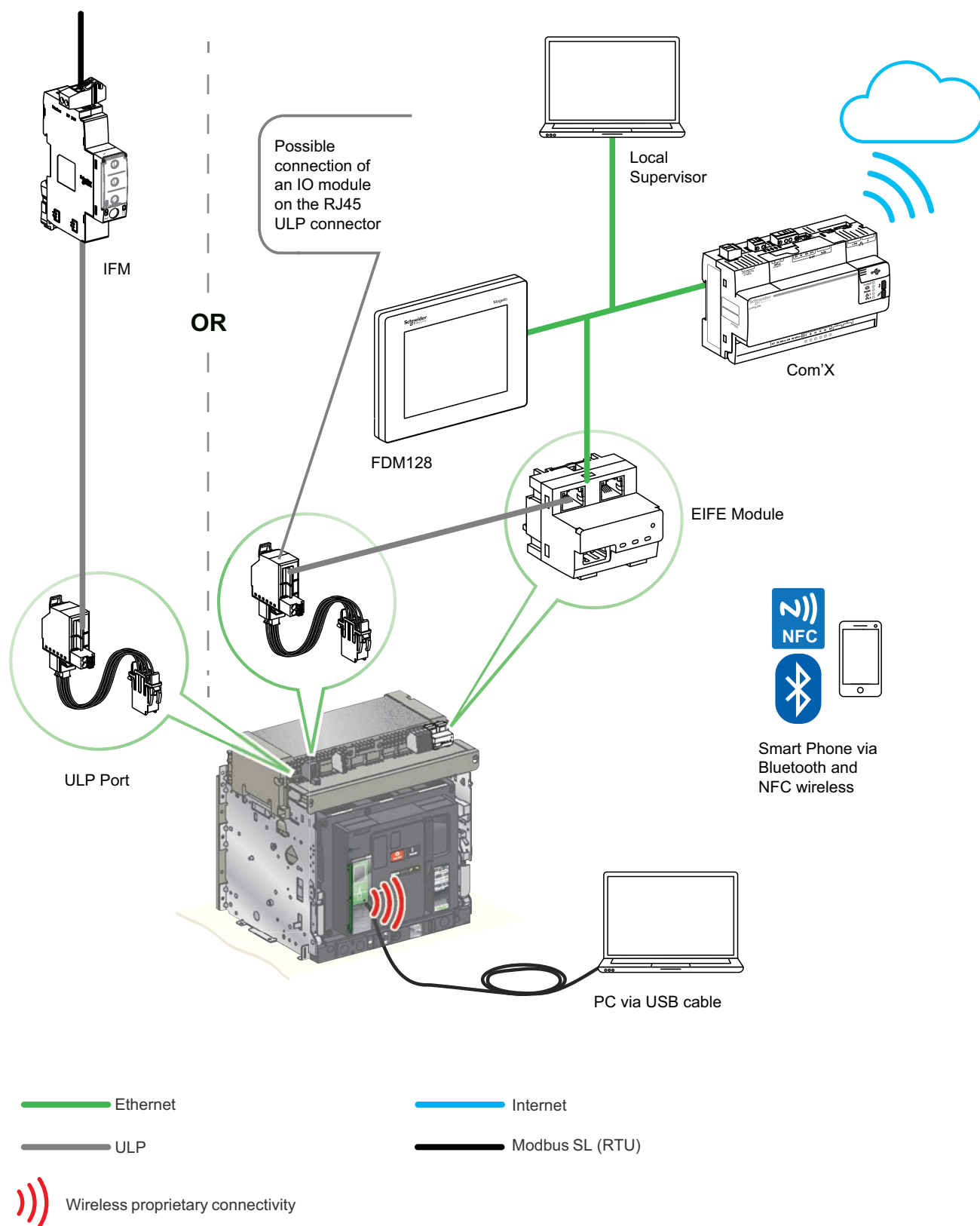
Communications Options in Power-Zone 4 Switchgear

General Architecture

Ethernet has become the universal link between electrical equipment, computers and communicating devices inside buildings. The large amount of information which can be transferred makes the connection of the Enerlin'X™ Breaker Digital System to cloud hosted and web-based services of Schneider Electric a reality.

MicroLogic X control units and interfaces offers multiple communication channels:

- Connection to an Ethernet network through either an EIFE or an IFE interface module. The EIFE and IFE modules are connected to the MicroLogic X control unit by means of a ULP port and a prefabricated ULP cord.
- Connection to a Modbus SL (RTU) RS 485 bus is through an IFM interface module. The IFM module is connected to the MicroLogic X control unit by means of a ULP port and a prefabricated ULP cord.
- Communication with a smartphone via Bluetooth channel or a self-powered NFC channel.
- Communication with a PC via a USB port.
- Connection to Internet-based servers or cloud platform. The connection to Internet can be performed through a Universal Panel Server module connected to internal Ethernet network.

Figure 57 - Connectivity Capabilities of Masterpact MTZ Breakers

To improve the capabilities of monitoring and control, one or two IO modules connected to the ULP bus can be associated to IFE, EIFE, and IFM modules. The EIFE is designed to monitor the three positions of the drawout circuit breaker when inserted in its cradle:

- Circuit breaker racked IN (CE contact).
- Circuit breaker racked OUT (CD contact).
- Circuit breaker in test position (CT contact).
- No additional IO module is required to monitor these three positions

The following control orders, information and data, are made available on Ethernet and Modbus SL (RTU):

- Control orders:
 - MX diag&com shunt trip opening order
 - XF diag&com shunt close closing order
- Events:
 - All the events logged in the MicroLogic X control unit event logbooks
- Status indications:
 - ON/OFF O/F
 - Spring charged CH
 - Ready to close
 - Overcurrent trip SDE
 - Connected / disconnected / test position CE/CD/CT
- Measurements
 - Instantaneous measurement information
 - Averaged measurement information
 - Max/Min values
 - Energy metering
 - Power quality...
- Operating assistance:
 - Protection settings and alarm
 - Histories
 - Maintenance indicators
- Accessibility:
 - Access control by password, to be initialized by the user

Using the capabilities of the MicroLogic X control unit and communication interfaces above, two networking architectures are available in Power-Zone 4 Switchgear as a two-tiered offer for optimized value and performance. The two architectures are:

- Direct Ethernet – Best Performance/Full Web Access: up to 250 kbps to circuit breakers. Ethernet allows multiple devices to communicate simultaneously
- Modbus RS485 to Ethernet – Moderate Performance/Web Access: Serial Modbus = 19.2 kbps - Number of devices significantly affects response time

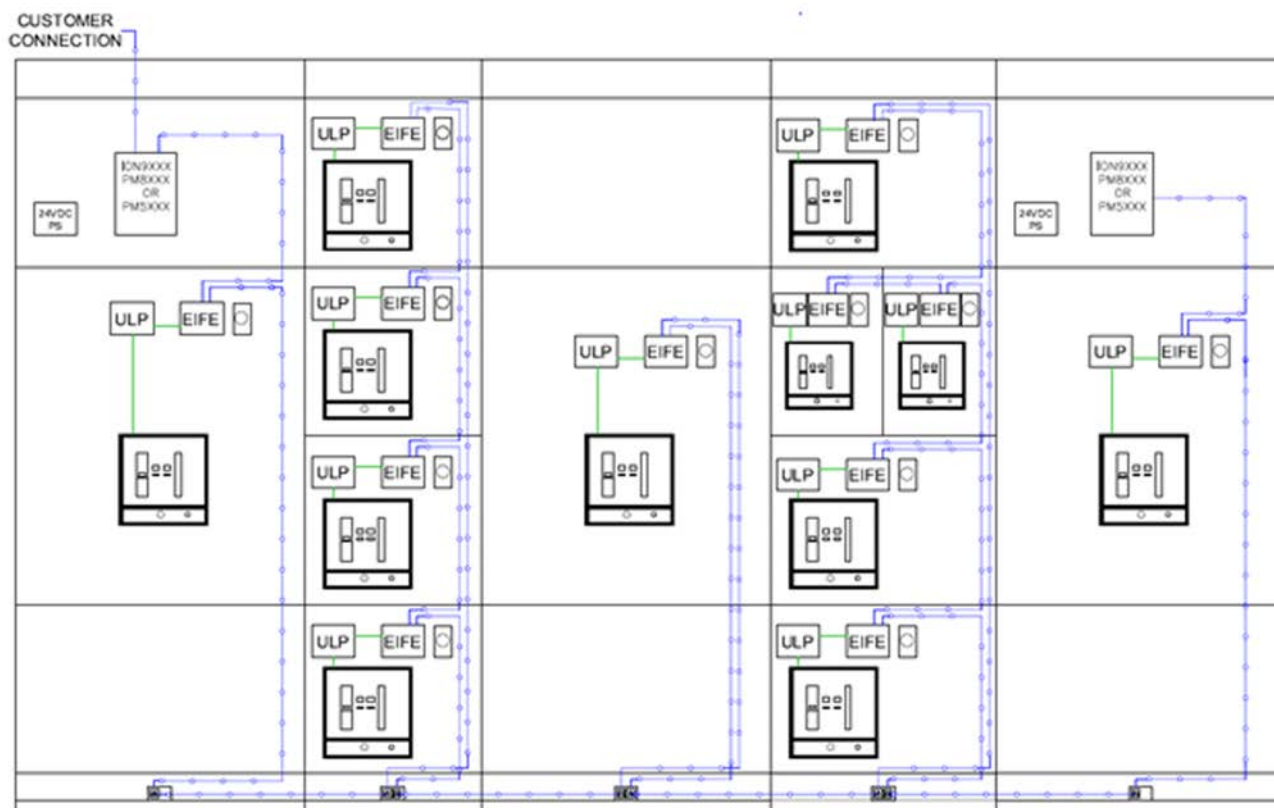
The above two architectures are available on all MasterPacT NT/NW and MTZ breakers.

Direct Ethernet Modbus TCP with MTZ MicroLogic X Breakers (Preferred Product Offer)

- Ethernet is used to connect all breakers on a daisy chain for connection to the customer.
- An EIFE on each breaker provides dedicated Ethernet connection /IP address for each breaker
- Communication to trip unit up to 250 kbps / Ethernet speed up to 1 Mbps
- Ethernet provides convenient compatibility with external software (EcoStruxure Power Monitoring Expert, EcoStruxure Power SCADA Operations, Building Management Systems, others)
- For localized access, each IFE/breaker and meter has its own IP address and Web pages
- Powerview Web pages embedded in each EIFE provide status, monitoring, trending, alarming, maintenance logging, etc.

- Meters are also on Ethernet - Available meters:
 - PowerLogic Power Meter 5000 Basic Power and Energy Meter
 - PowerLogic 8000 and ION 9000 Advanced Power Quality Meter
- Completely factory tested
- Daisy-chain architecture shown. An optional Star topology is available.

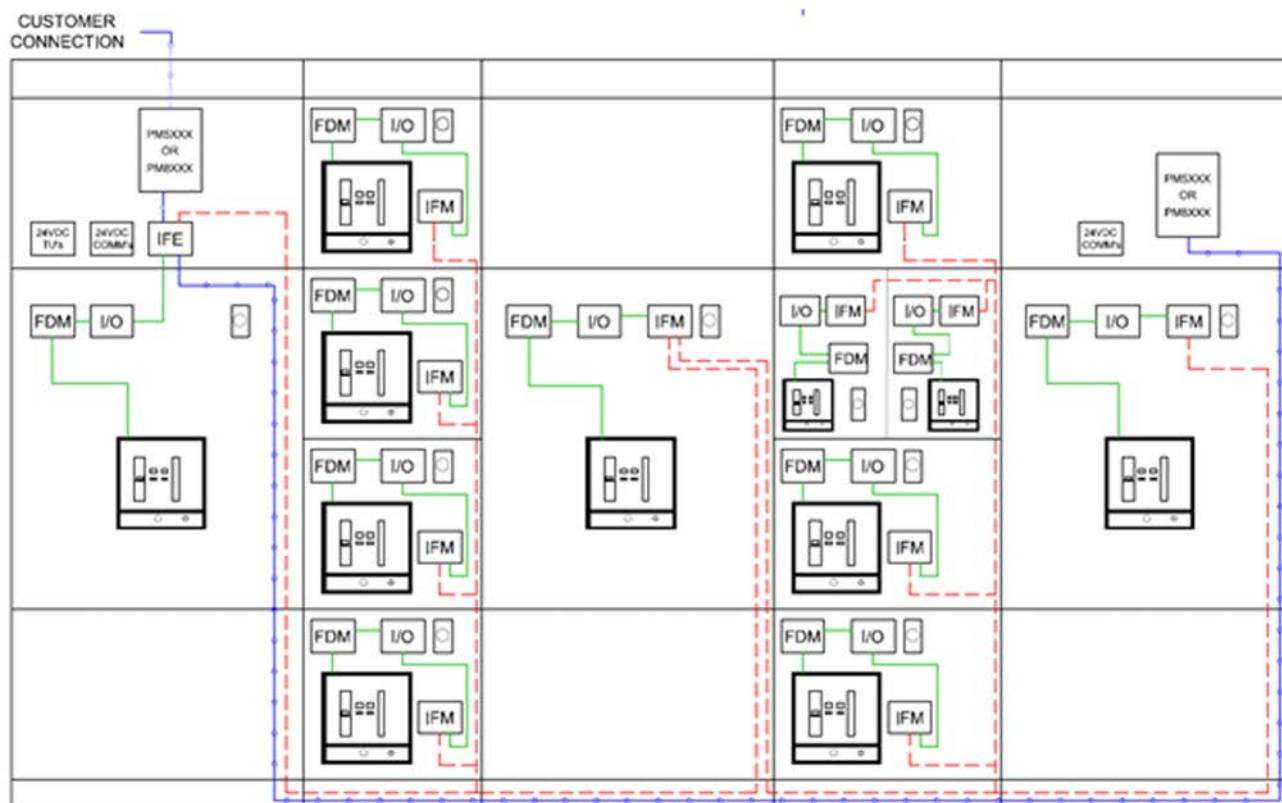
Figure 58 - Direct Ethernet network for MTZ in Power-Zone 4 Main-Tie-Main



Modbus RS485 to Ethernet Modbus TCP (NW/NT and MTZ MicroLogic X Breakers)

- Each breaker includes an IO module for cradle status and an IFE Switchboard Server on 1st breaker provides IP address/All other breakers communicate via Modbus RS485 using IFMs (Interface Modbus)
- Communication to trip unit 19.2 kBaud / Ethernet speed up to 1 Mbps
- Powerview Web pages embedded in IFE can provide status, monitoring, trending, maintenance logging, etc. for all breakers (up to 20)
- IFE Alarming for first breaker only in this configuration
- Meters are also on Ethernet - Available meters:
 - PowerLogic Power Meter 5000 Basic Power and Energy Meter
 - PowerLogic 8000 and ION 9000 Advanced Power Quality Meter
- Completely factory tested

Figure 59 - Modbus Serial to Ethernet TCP/IP for MTZ or NW/NT in Power-Zone 4 Main-Tie Main



Blue Wire = Ethernet (Modbus TCP/IP)

Red Wire = Modbus Serial (RS485, 2Wire)

Green Wire = ULP Cable

Continuous Thermal Monitoring Option

Power-Zone 4 Low Voltage Switchgear is available with an optional continuous thermal monitoring solution to provide 24/7 temperature values for critical connections in the entire lineup. Continuous thermal monitoring can be used to monitor trends over time for identifying faulty connections. This option is based on digital technology, providing new ways to monitor and alert facility management and maintenance people on a continuous basis and between inspections. The Continuous Thermal Monitoring seamlessly integrates innovative wireless temperature sensor data with EcoStruxure™ Power Monitoring Expert (PME) to provide facility operations and maintenance teams insights into equipment's thermal and humidity data. Live data, alarms, events, trends and notifications can be provided by the PME software. Digital services via EcoStruxure Asset Advisor can also be provided from secure Cloud-hosted analytics of the temperature data where advanced analytics can help expert service engineers identify patterns and abnormalities to predict when potential electrical fire risks may arise.

Sensor installation locations in PZ4 and QED-6 switchgear include the following (see diagram below):

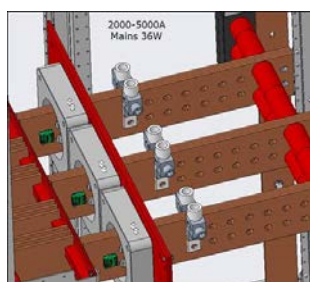
- Incoming phase connections of main breaker(s).
- Outgoing phase connections of feeder breakers.

Connect up to 100 sensors per EcoStruxure Panel Server wireless data concentrator to monitor field connections. Up to five concentrators can be connected to the substation monitoring device to calculate temperature thresholds and to integrate with an HMI mounted on the door of the switchgear. Option includes three door-mounted indicating lights for healthy, pre-alarm and alarm.

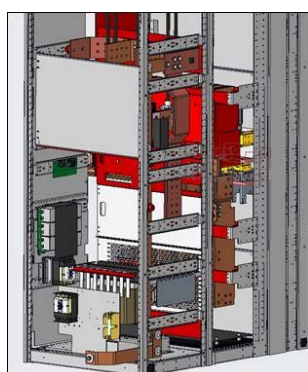
NOTE: Splice bars and joints are securely torqued with conical washers and are considered maintenance free. Since they are lower risk these points are not monitored in the standard monitoring solution.

Mains Section

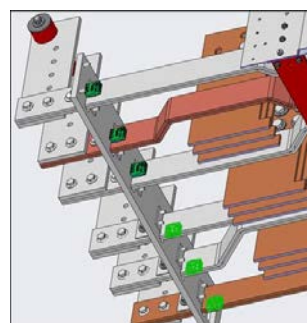
Feeder Section



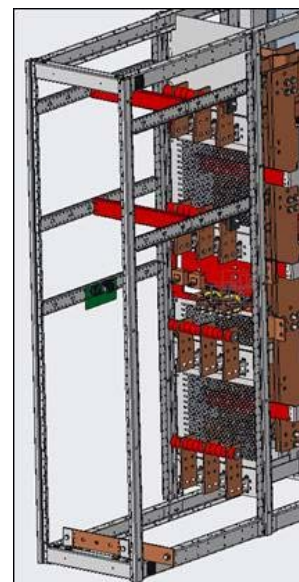
TH110



CL110



TH110



CL110

System Components

TH110 Sensors

- A** Utilizing a ferromagnetic ribbon placed around the bus bar at cable connections, the TH110 thermal sensors self-power and transmit via the Zigbee® Green Power protocol. This self-powered feature means there are no batteries to replace.

CL110

- B** Environmental sensors are placed one per structure and constantly monitor the interior temperature and for potential condensation.

Zigbee® Concentrator

- C** The EcoStruxure Panel Server is a wireless data concentrator and gateway that collects wireless temperature data and shares it over Modbus TCP.

HMI

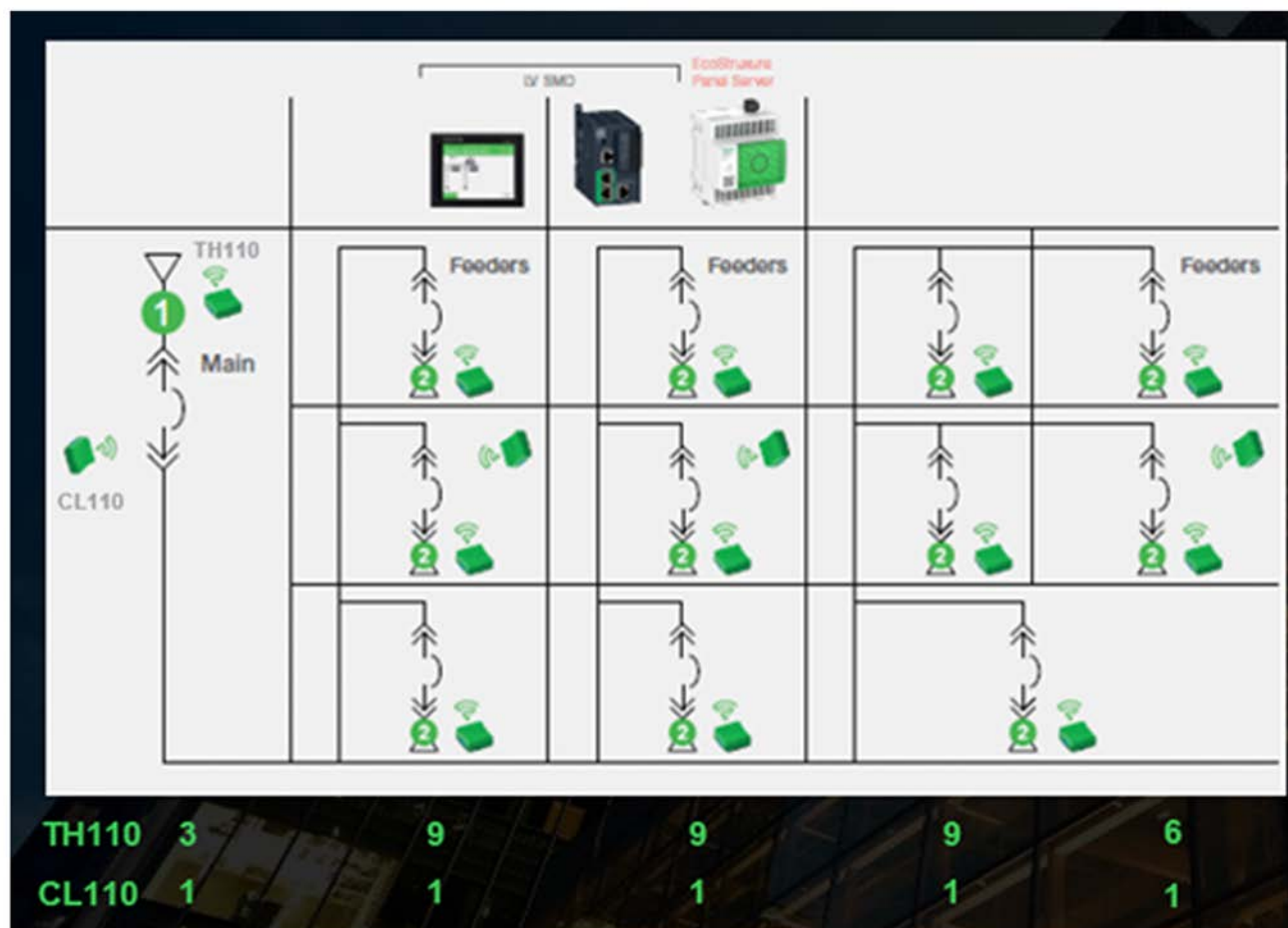
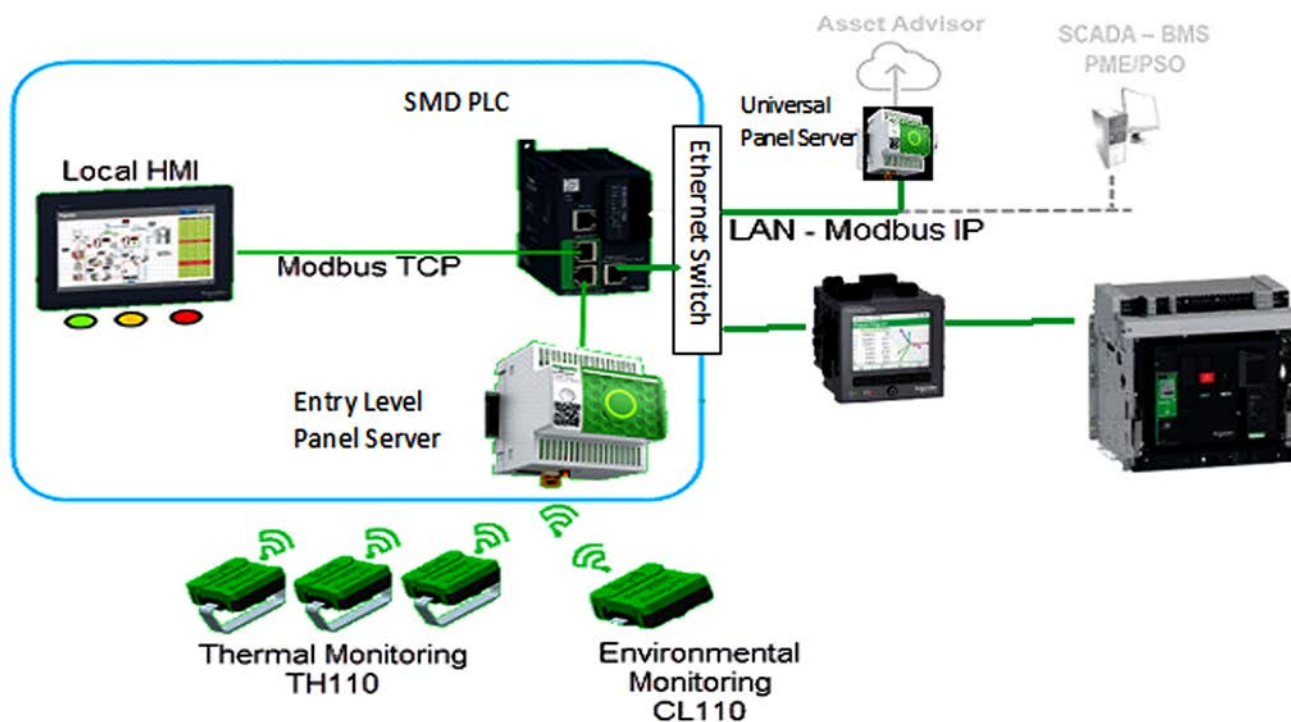
- D** The HMI allows the operator to interface with the system directly at the switchgear.

PLC

- E** The PLC gathers data from the Zigbee® concentrators and forwards that information to both the HMI and to the network using the Modbus TCP/IP Ethernet protocol.



Figure 60 - Typical Continuous Thermal Monitoring Solution with Breakers, Meters and HMI



NOTE: Zigbee concentrator/receiver signal range is 2 sections away; therefore, a concentrator is required every 5 sections.

Load Connection IR Windows

An option, windows can be provided for viewing field-connected load terminations at each feeder breaker in the lineup via Infrared (IR) camera. Main Breaker Line side connections are not included due to Service Entrance barriers blocking line of sight for scanning. Windows are provided on cable compartment doors/covers based on feeder breaker placement.

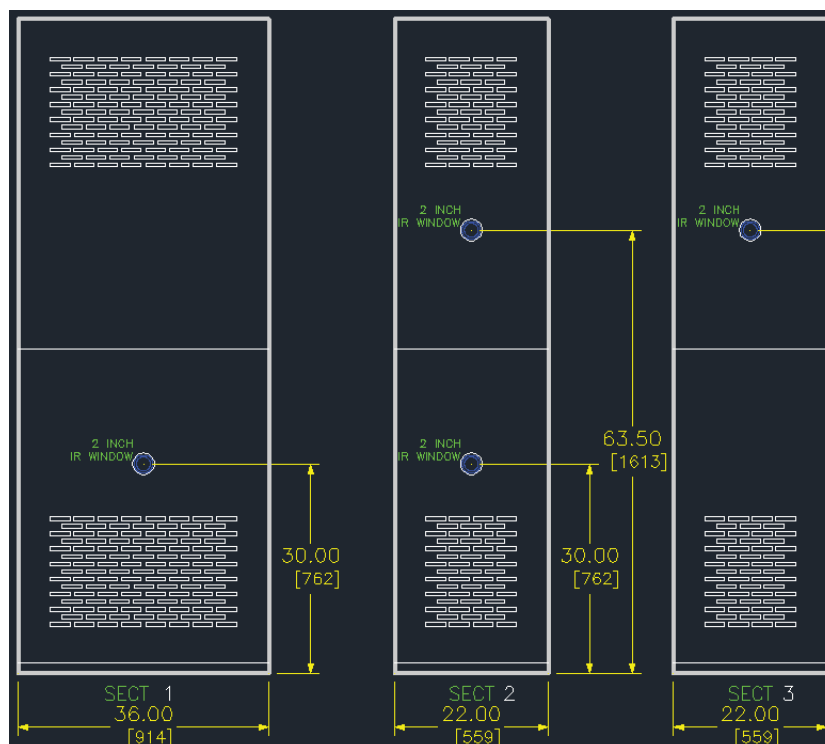
The infrared inspection window enables permanent access for inspection of electrical components without disturbing operations. Specially developed for infrared inspections, the window is made of a glass-like material that is transparent to infrared rays and allows hot spots to be registered by a thermographic camera.

IRISS Brand VPT is used for NEMA Type 1 enclosures. Square D Brand H.VIR is used for NEMA Type 3R and Arc Resistant enclosures.

In some cases 1 or 2 windows may be installed on each section:

1. The top window allows for viewing load connections for breakers in either or both of the top two (A & B) cell locations.
2. The bottom window allows for viewing load connections for breakers in either or both of the bottom two (C & D) cell locations.

See sample rear elevation drawings below.



All IR Window selectable applications are UL/CUL Listed for PZ4

Offer Restrictions

- Not available on 54" deep enclosures since windows are too close to the lug pads to get a good viewing angle on all connections with an IR camera.
- Not available for Sprinkler Resistant or Indoor Water Resistant due to large vents on rear doors preventing window placement
- Not available with Filtered Vent Openings.

Optional Components

ION9000/9000T Series Advanced Power Quality Meters



Web enabled PowerLogic ION9000 series meters are used to monitor electric distribution networks, service entrances and substations. It enables businesses to manage complex energy supply contracts that include power quality guarantees. Low-range current accuracy makes it ideal for independent power producers and cogeneration applications that require the accurate bi-directional measurement of energy. It is well suited to load curtailment, equipment monitoring and control and energy pulsing and totalization applications. Integrate it with Power Management Software applications. The ION9000T captures extremely fast voltage events that are missed by most other power meters, enabling advanced diagnostics and high-resolution event associations for fast, conclusive diagnosis and resolution to transient voltages.

Power-Zone 4 Switchgear offers a 96mm color display (std) and a 192 mm touchscreen display (opt) along with additional Input & Output Module options as shown below:

- 6 Digital Inputs, & 2 Digital Outputs
- 12 Digital Inputs & 4 Digital Outputs
- 6 Digital Inputs, 2 Digital Outputs, 4 Analog Inputs & 2 Analog Outputs

Applications

Ideal for applications in industrial facilities, data centers, infrastructure and other critical power environments.

Figure 61 - Power-Zone 4 with ION9000 Meter Standard 96 mm Color Display



Standard 96 mm Color Display
shown on Main breaker door. An
optional 192 mm touchscreen display
(shown) is available on instrument
compartment door

PowerLogic PM8000 Advance Power Quality Meters

Figure 62 - PM8244 Meter module (mounted in Instrument Compartment of PZ4)



Figure 63 - 3.5" Color Graphic Display (mounted on Main Breaker door n PZ4)



The PowerLogic PM8000 series meters are compact, cost-effective multifunction power meters that will help you ensure reliability and efficiency of your power system. These meters will help you:

- Reveal and understand complex power quality conditions
- Measure, understand and act on insightful data gathered from your entire power system

Designed for key metering points throughout your energy infrastructure, the PowerLogic PM8000 series meter has the versatility to perform nearly any job you need a meter to do.

Power-Zone 4 Switchgear offers a 96 mm color display (std) as shown on previous page along with additional Input & Output Module options as shown below:

- 6 Digital Inputs, & 2 Digital Outputs
- 12 Digital Inputs & 4 Digital Outputs
- 6 Digital Inputs, 2 Digital Outputs, 4 Analog Inputs & 2 Analog Outputs

Applications

Ideal for applications in industrial facilities, commercial buildings, utility networks, or critical power environments.

Advanced Power Quality Meters Comparison:

When deciding which Advanced Power Quality Meter to choose, the chart below shows a basic feature comparison.

	PM8000	ION9000	ION9000T
PQ measurements	THD, individual harmonics (127th ²⁰), sag / swell, DDD	THD, TDD, individual harmonics (511th ²⁰), sag / swell, DDD, flicker, transients	THD, TDD, individual harmonics (511th ²⁰), sag / swell, DDD, flicker, transients
PQ standards compliance: IEC 61000-4-30 / IEC62586-1 / OEC62586-2	Class S / No / Yes	Class A / Yes / Yes	Class A / Yes / Yes

20. Via EcoStruxure Power software.

	PM8000	ION9000	ION9000T
PQ on board reporting	IEEE519, EN50160, ITIC (CBEMA) and SEMI curves	IEEE519, EN50160, ITIC (CBEMA) and SEMI curves	IEEE519, EN50160 and ITIC (CBEMA) and SEMI curves
Waveform capture	210 cycles @ 256 samples / cycle (V & I)	60 cycles @ 1024 samples / cycle (V & I)	60 cycles @ 1024 samples per cycle (V / I) 1 cycle @ 200k samples / cycle (V)
High speed RMS capture	Yes (30 sec pre event + 60 sec post event)	Yes (30 sec pre event + 60 sec post event)	Yes (30 sec pre event + 60 sec post event)
Sampling rate	256	1024	1024 / 10 MHz V
kWh accuracy	0.2	0.1	0.1
Hardware lock	Yes	Yes	Yes
Internal memory	512 MB	2 GB	2 GB
Communication ports	Dual Ethernet + 1 x RS485	Dual Ethernet + 2 x RS485 + USB + Optical	Dual Ethernet + 2 x RS485 + USB + Optical
Communication protocols	Modbus RTU and TCP, ION, DNP3, IEC61850	Modbus RTU and TCP, ION, DNP3, IEC61850, DLMS	Modbus RTU and TCP, ION, DNP3, IEC61850, DLMS
On board I/O	3DI / 1DO	8DI / 4DO / 2RO	8DI / 4DO / 2RO
Cyber security	Advanced security, HTTPS, encrypted and digitally signed firmware	Advanced security, HTTPS, encrypted and digitally signed firmware, TPM	Advanced security, HTTPS, SFTP, SSH, encrypted and digitally signed firmware, TPM
Display	96 mm color graphical	96 mm color graphical or 192 mm color + touch	96 mm color graphical or 192 mm color + touch

PowerLogic PM5000 Basic Multi-Function Meter

**Figure 64 -
PowerLogic PM5563
remote display**



The PowerLogic PM5563 power meter offered in PZ-4 is the ideal fit for cost-management applications. Designed for use in both energy management systems and building management systems, it provides the measurement capabilities needed to allocate energy usage, perform tenant metering and sub-billing, pin-point energy savings, optimize equipment efficiency and utilization, and perform a high-level assessment of the power quality of the electrical network. In the 3.78 x 3.78 in door-mounted liquid crystal graphical display, all three phases, neutral, and ground can be monitored simultaneously. The bright, anti-glare display features large characters and powerful backlighting for easy reading even in extreme lighting conditions and viewing angles. Easy-to-understand menus, text in eight selectable languages, icons, and graphics create a friendly environment to learn about your electrical network. Ethernet gateway and enhanced cybersecurity are also benefits.

Characteristics

- Accuracy class 0.2S for active energy metering
- Compliance to regulations EN50470-1/3 (MID), IEC 61557-12, IEC 62053-21/22, IEC 62053-23
- Dual Ethernet ports as standard
- Ethernet-to-serial gateway functionality
- Onboard web pages for viewing real-time and logged information
- Cyber security enhancements to help ensure data integrity
- Data logging locally in non-volatile memory ensures that information is not lost during a power or communications outage

- Multiple tariffs give you flexibility in your billing structure
- Individual harmonics in addition to THD and TDD to help locate the source of disturbances
- Graphical display with intuitive menu-driven navigation means information is easy to locate and read
- Real-time clock with battery back up

Applications

Ideal for applications in Buildings, Industry, Healthcare, Data Center and Infrastructure

Surge Protective Devices

The Surge Protection Device (SPD) is an optional device which can be added to the Main Circuit Breaker(s). Square D SurgeLogic brand Surge Protection Devices (SPDs) are designed to provide transient voltage surge protection to devices on the load side of the main disconnect. The devices are physically mounted in the rear cable compartment area of the Low Voltage Drawout Switchgear/Switchboard (for applications requiring front mounting in an instrument compartment, contact the factory).

SPDs are available on 4-wire Solidly Grounded or High Resistance Grounded AND 3-wire Ungrounded or High Resistance Grounded systems. See below for details on offer restrictions

Figure 65 - Power-Zone 4 with SurgeLogic SPD



Standard Features

Surge Protection Devices are SPD Type 1 Rated. Each SPD comes with the following standard features:

- Circuit Breaker disconnect (fixed mounted in rear cable compartment)
- Display mounted on front instrument compartment door with phase diagnostic LED's, alarm LED, audible alarm with Test/Disable/Enable button, surge counter display with reset.
- EMI/RFI noise filter

- cULus Listed per UL 1449 Standard, 3rd Edition Type 2 SPD, UL 1283 5th Ed., and CAN/CSA C22.2 No. 8-M1986
- Individually fused suppression modes utilizing surge-rated fuses
- Each suppression MOV is thermally protected for low current faults
- Can be applied to equipment with up to 200kAIC Short Circuit Withstand rating
- 1 Form C alarm contact (rated for 24 VDC/AC, 2A)
- Surge counter

Surge Ratings available:

- 120 kA and 160 kA for Medium Exposure applications
- 240 kA, 320 kA and 480 kA for High Exposure applications

Restrictions

1. 480 kA rated SPD is not available for 600 VAC 3 phase 3 wire delta connected systems (either ungrounded or high resistance grounded).
2. 480kA surge rating is not supported for High Resistance Grounded applications.
3. SPD not available for High Resistance Grounded configurations at:
 - 208Y/120 V, 3 Ph, 4W, 60 HZ or
 - 220Y/127 V, 3 Ph, 4W, 60 Hz or
 - 240 V, 3 Ph, 3W, 60 Hz

Figure 66 - Surge Protection Device (SPD) in rear cable compartment sidewall of Rear Accessible PZ-4



Figure 67 - Surge Protection Device (SPD) in front cable compartment sidewall of Front Accessible PZ-4



Technical Overview

This section contains technical data pertaining to Power-Zone 4 standard switchgear, Power-Zone 4 Arc Resistant switchgear, MasterPacT circuit breakers, and MicroLogic trip units. Power-Zone 4 switchgear is industrial-duty equipment built to ANSI standards and uses 100% rated MasterPacT circuit breakers. Switchgear ratings are listed below.

Power-Zone 4 Switchgear Ratings

Table 12 - Switchgear Options

120/208 to 635 Vac, 1Ø3W, 3Ø3W, or 3Ø4W ²¹
1600 A–6000 A ^{22, 23, 24}
50/60 Hz

Table 13 - Equipment Ratings

Short Circuit Current Ratings (kA)			Short Time Withstand Ratings (kA)
254 V	508 V	635 V	
42	42	42	42
65	65	65	65
85	85	85	85
200 ²⁵	200 ²⁵	130 ²⁵	100

Bus Type	Continuous Amperes
Cross	1600, 2000, 3200, 4000, 5000, 6000 ^{26, 24}
Vertical	1600, 2000, 3200, 4000, 5000, 6000 ²⁶
Neutral ²¹	1600, 2000, 3200, 4000, 5000, 6000 ²⁶

Equipment Standards

All Power-Zone 4 switchgear are 100% rated and are assembled and tested in an ISO 9001 facility to applicable standards including:

Standard	Description
ANSI C37.20.1	Metal-enclosed low voltage circuit breaker switchgear
ANSI C.37.51	Testing of metal-enclosed low voltage ac circuit breaker switchgear
ANSI C.37.20.7	Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults
CSA C22.2 No. 31	Switchgear assemblies
UBC and CBC	Zone 4 seismic applications
UL 1558	Switchgear assemblies

21. Neutral bus ratings of 50% and 100% up to 6000 A, 150% up to 3200 A, 200% up to 2500 A.

22. Standard rated bus, density rated bus available to 5000 A.

23. Arc Resistant gear rated up to 5000 A. Front Accessible gear rated up to 3200 A.

24. For 10,000 A bus, contact TAG.

25. 100 kA for arc resistant switchgear and for front accessible switchgear.

26. Maximum bus rating of 5000 A for arc resistant sections and 3200 A for Front Accessible sections.

Special Applications

This section contains information regarding low voltage systems in seismic and high altitude applications.

Available options for Seismic Applications

Power-Zone 4 switchgear has been tested for applications according to the following codes and regulations:

- IBC (International Building Code)
- ASCE 7–10
- NBCC (National Building Code of Canada)
- CBC (California Building Code)
- OSHPD (Office of Statewide Health Planning and Development)

Equipment must be anchored properly to fully comply with zone 4 installations. Additional information can be found in Bulletin No. 80298-002-05, *Power-Zone 4 Low Voltage, Metal-Enclosed, Drawout Switchgear with MasterPacT Low Voltage Power Circuit Breakers*. Structures are slightly modified with an additional bracket on the base of the structure which are provided for the purpose of seismic anchoring.

High Altitude Applications

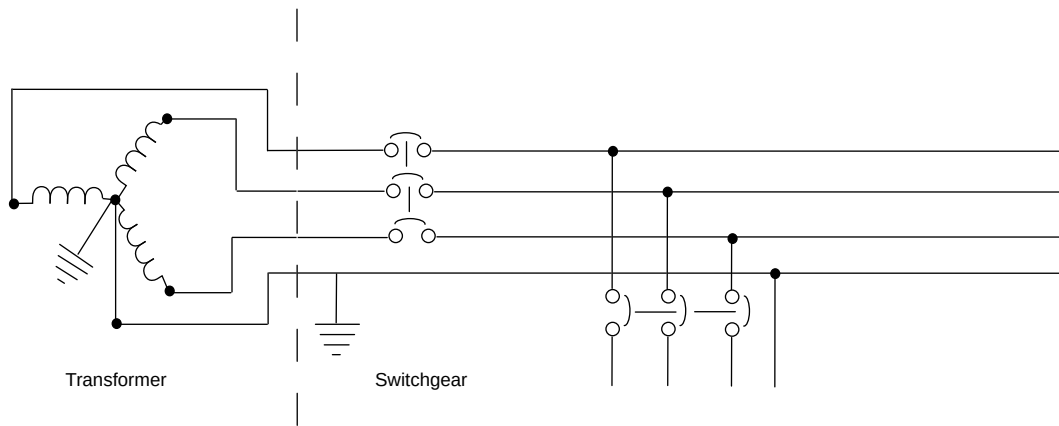
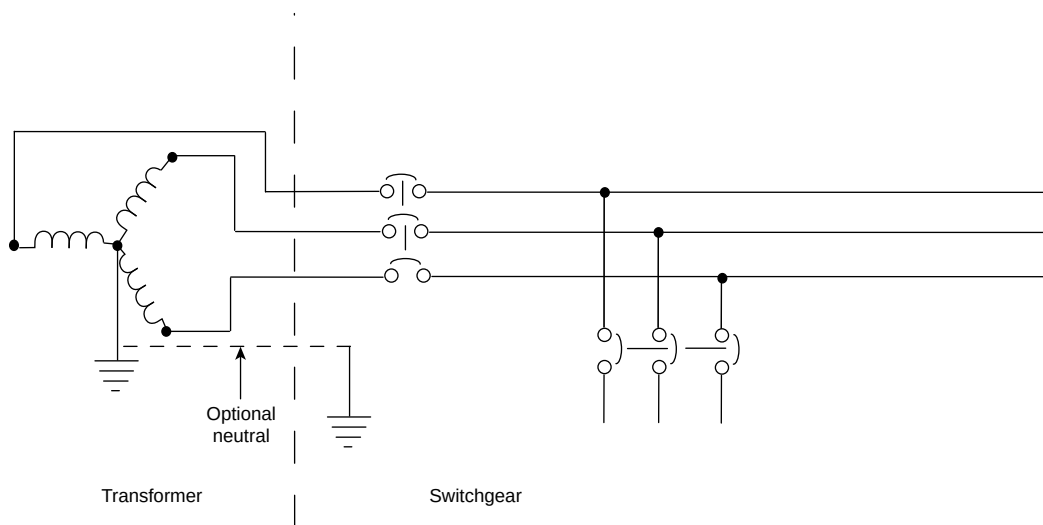
When Power-Zone 4 switchgear with MasterPacT circuit breakers is installed at a location greater than 6600 feet above sea level, the equipment ratings must be de-rated (see Altitude Correction Factors per ANSI C37.20.1 par. 8.1.3, page 38).

Distribution Systems

This section contains a brief overview of Wye and Delta distribution systems.

Wye Solidly Grounded Systems

A Wye system is the most common type of three-phase distribution system for low voltage switchgear. Wye systems are either three- or four-wire distribution systems that are grounded, either in the equipment (see Four-Wire Wye Distribution (i.e. with Neutral Bus)—Solidly Grounded System - 3 phase, 4 wire, page 104), or at the transformer source (see Three-Wire Wye Distribution (i.e. without Neutral bus)—Solidly Grounded System - 3 phase, 3 wire, page 104).

Figure 68 - Four-Wire Wye Distribution (i.e. with Neutral Bus)—Solidly Grounded System - 3 phase, 4 wire**Figure 69 - Three-Wire Wye Distribution (i.e. without Neutral bus)—Solidly Grounded System - 3 phase, 3 wire**

When the system is grounded in the equipment and the neutral phase is carried through the equipment, the system is described as a four-wire solidly grounded system with neutral connections available to supply single phase-to-neutral loads, such as lighting loads. Neutral bus is available for distributing the neutral conductor to the loads and can be rated at 50%, 100%, 150% or 200% of the phase bus ampacity depending on bus size.

When the system is grounded at the transformer source and no neutral phase is carried through the equipment, the system is described as a three-wire solidly grounded system (3W Equipment, Neutral Terminated at Source). No neutral connections are available; all loads must be three-phase (or single “phase-to-phase”) loads.

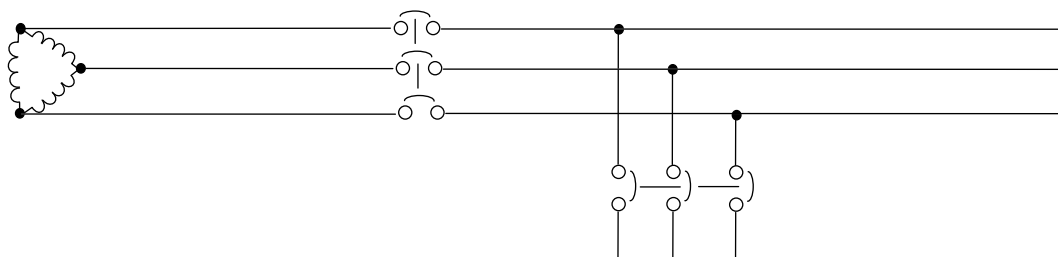
In some cases, the neutral is delivered to the service entrance where it is bonded to ground similar to the four-wire solidly grounded system but the neutral bus is not provided for neutral loads (3W Equipment, Neutral in Incoming Section only).

Delta Grounded and Ungrounded Systems

Delta three-wire systems are rarely used in low voltage distribution systems. Delta three-wire distribution systems can be grounded or ungrounded services. Generally, Delta systems are ungrounded. In some cases, they are grounded on the “corner” of the delta or some other point. Ungrounded Delta systems do not have a reference point or ground. Corner or Grounded B Phase Delta distribution systems do provide a reference point but require one phase to be connected to the ground.

Low voltage drawout switchgear with MasterPacT circuit breakers is designed and built to ANSI C37.20.1 and is tested for single phase-to-phase faults. They can be applied on “corner” grounded Delta distribution systems. Power-Zone 4 switchgear with MasterPacT circuit breakers is suited for corner grounded or ungrounded systems.

Figure 70 - Three-Wire Delta Distribution—Ungrounded - 3 phase, 3 wire



Although ungrounded systems have been used for many years, they are not recommended in newly designed low voltage distribution systems. Ungrounded power systems may be unstable. [High Resistance Ground Option, page 110](#) are recommended for use in newly designed low voltage distribution systems.

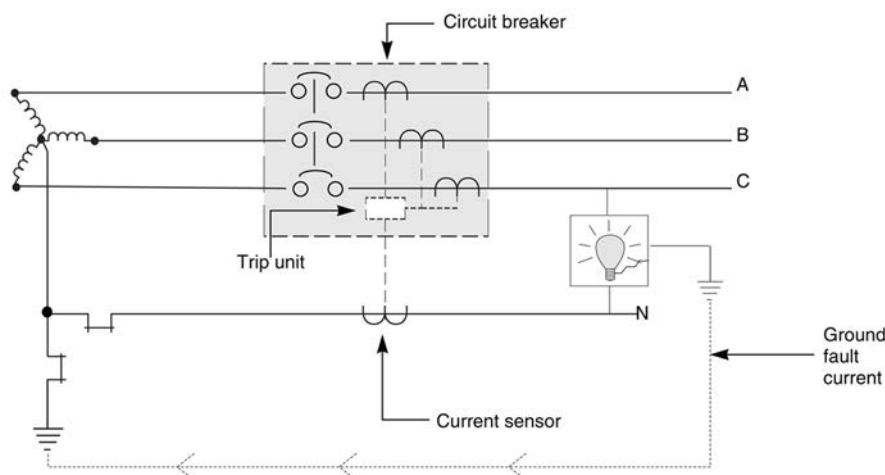
Ground Fault Protection for Wye Systems

The need for ground fault protection in three-phase solidly grounded Wye systems is due to the possibility of low magnitude ground fault currents. Phase-to-phase faults are of a magnitude that overcurrent protection devices (trip units) can operate rapidly and positively to signal the circuit breaker to open. Ground faults can be of a much lower magnitude and require specialized elements in the trip unit for detection.

Power-Zone 4 switchgear with MasterPacT circuit breakers equipped with MicroLogic trip units has the capability of providing ground fault sensing (alarm with no tripping) and ground fault protection (tripping) on three-phase, three-wire and three-phase, four-wire solidly-grounded systems. MasterPacT circuit breakers can be used for overcurrent protection on ungrounded or resistance grounded systems, but are not suitable for ground fault protection on these systems.

Ground faults are an inadvertent flow of current between the normal current-carrying conductors and ground. These ground faults usually start at a low level and, if left undetected, escalate causing significant heat and mechanical damage to the electrical system. Ground faults can escalate to a phase-to-phase fault causing major system damage. The ground fault system in the MasterPacT circuit breakers monitors the flow of current in the system and detects ground fault currents. The circuit breaker will trip to protect the circuit, or send an alarm through the appropriate interface equipment, depending on the option installed.

Figure 71 - MasterPacT Circuit Breaker Ground Fault System Sensing Capabilities



The National Electrical Code (NEC) requires ground fault protection on solidly grounded Wye electrical services of more than 150 V to ground, but not exceeding 635 V phase-to-phase for each service disconnect rated 1000 A or more. This includes service entrance, feeders and building disconnects. The NEC also requires ground fault alarm (no tripping) on emergency systems and allows ground fault alarm on continuous processes, fire pumps, and other circuits that would be more hazardous if stopped without an orderly shutdown.

Ground Fault Protection with Tripping

Ground fault protection is available as an option on MasterPacT circuit breakers with MicroLogic 6.0X, 6.0Xi, 6.0A, 6.0P or 6.0H trip units. MasterPacT circuit breakers offer three different ground fault sensing options: residual, ground-source return and modified differential. The sensing options make it possible to match the number and location of current sensors to the application. The pickup and delay settings for ground fault are adjustable locally with the dial settings or through the key pad. The pickup and delay settings for ground fault are also adjustable remotely over a computer network on MicroLogic 6.0 and higher trip units. A neutral current sensor (NCT) must be installed in the neutral if ground fault trip is used on a three-phase, four-wire system.

Ground Fault Protection without Tripping

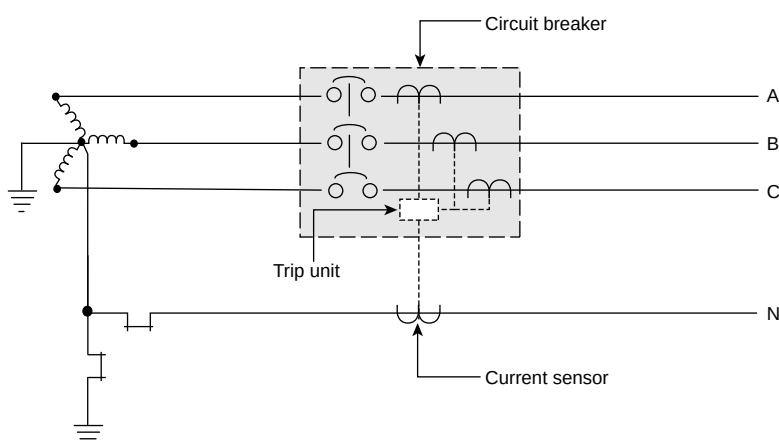
All MasterPacT circuit breakers with MicroLogic 3.0X/Xi, 5.0X/Xi or 6.0X/Xi with optional Ground Fault Alarm Digital Module, 5.0P or 5.0H trip units have the ability to sense and report a ground fault alarm through the optional programmable contact module (M2C or I/O Module) or communication network. A neutral current sensor (NCT) must be installed in the neutral if ground fault alarm is used on a three-phase, four-wire system.

The pickup and delay settings for the ground fault alarm are adjustable locally through the key pad on the trip unit or remotely over a computer network.

Residual Ground Fault Sensing

Residual ground fault sensing systems use one current sensor for each current-carrying conductor. The trip unit vectorially sums the secondary outputs from each sensor to determine if there is a ground fault and the magnitude of the ground fault. The following diagram shows the current sensors for a three-phase, four-wire system. There is a current sensor on each phase and the neutral.

Figure 72 - Typical Residual Ground Fault Sensing System with Phase Conductors



The sensors for the phase conductors A, B and C are inside the circuit breaker. The neutral current transformer is installed in the neutral circuit.

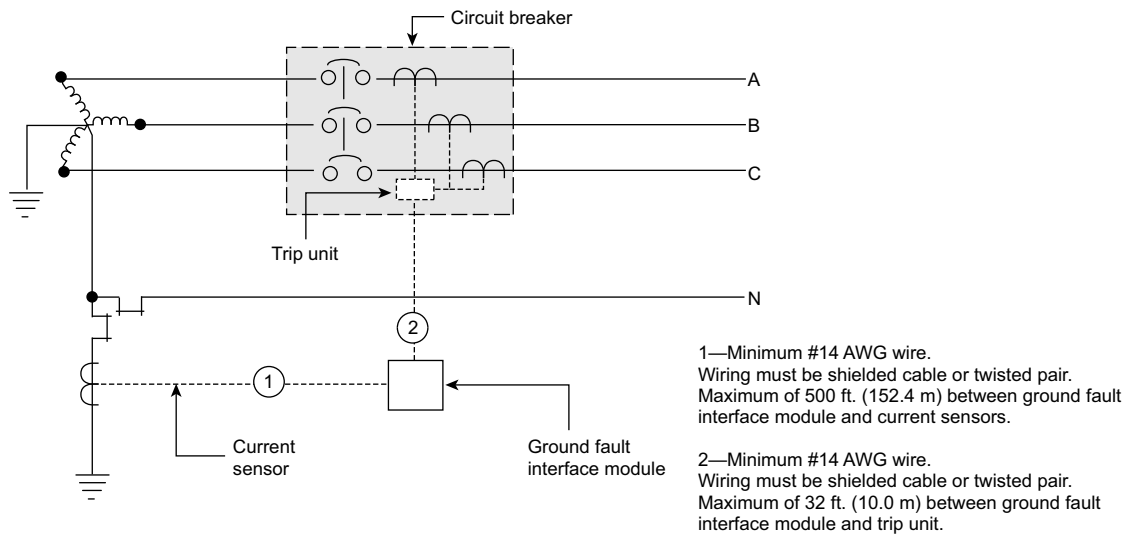
NOTE: In Power-Zone 4 Switchgear, Neutral Current Transformers (NCTs) are provided as standard with ground fault protection on feeder circuit breakers with 4-wire loads.

If the circuit breaker were used on a three-phase, three-wire system, the neutral current transformer would not be necessary.

Ground Source Return

Ground source return ground fault sensing systems use one current sensor on the ground conductor. The current sensor measures the ground current flow. The following diagram shows the current sensor for a three-phase, four-wire system. Ground source return can also be used on three-phase, three-wire systems.

Figure 73 - Typical Ground Source Return Sensing System with Ground Fault Interface Module and Current Sensor



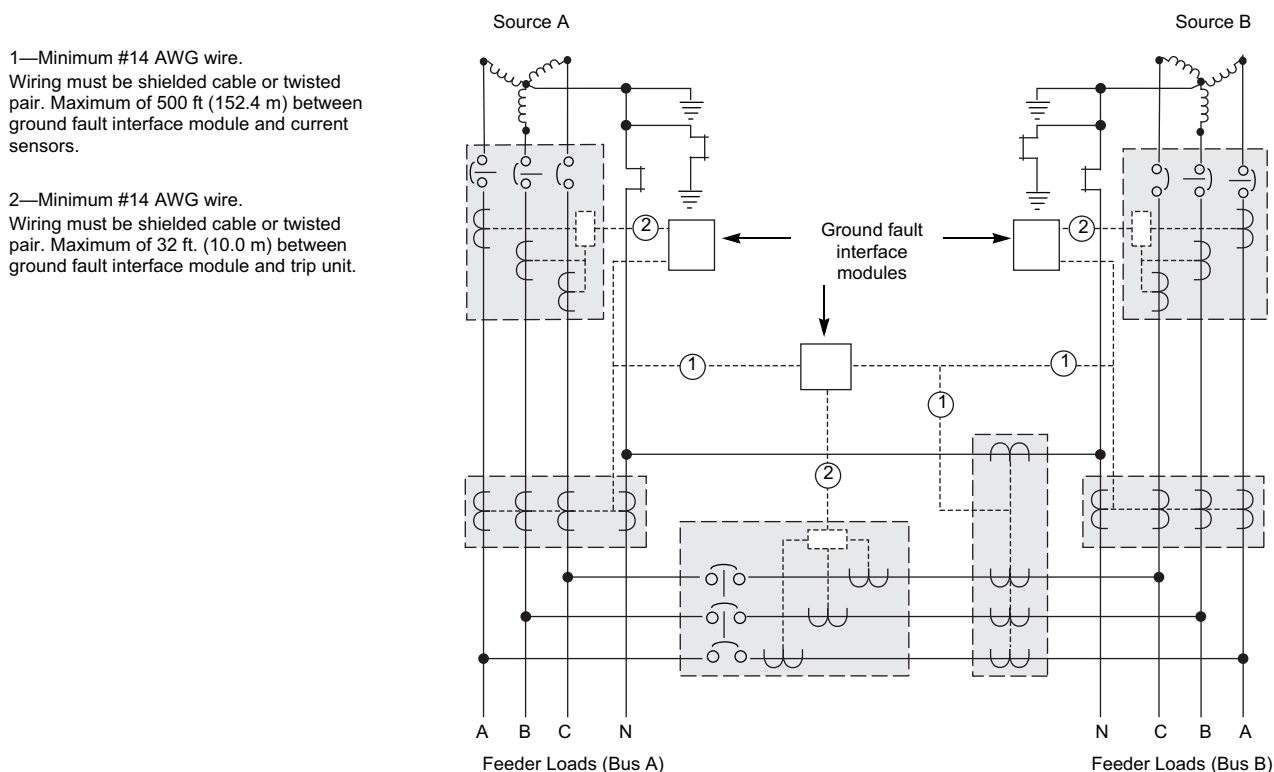
Ground-source return sensing systems require the use of the optional ground fault interface module and a sensor installed in the ground circuit.

The current sensor and ground fault interface module must be wired per the installation and wiring instructions included with the ground fault interface module.

Modified Differential Ground Fault System

A modified differential ground fault system (MDGF) is used for multiple sourced systems. Normal residual and ground-source return systems will not correctly sum all of the circulating currents caused by the multiple neutral paths and multiple grounds. The following diagram shows a typical main-tie-main system. Each source transformer is grounded, and the service entrance neutral is bonded to ground. Multiple neutral paths allow neutral current to circulate and return to the supplying transformer by several different paths. The ground fault system must be capable of correctly summing these circulating currents.

Figure 74 - Typical Modified Differential Ground Fault System with Ground Fault Interface Modules



The modified differential ground fault sensing system requires the use of ground fault interface modules and current sensors installed in all normal current-carrying conductors.

The current sensors and ground fault interface modules must be wired in parallel and the polarity of the current sensors must be maintained per the installation and wiring instructions included with the ground fault interface module.

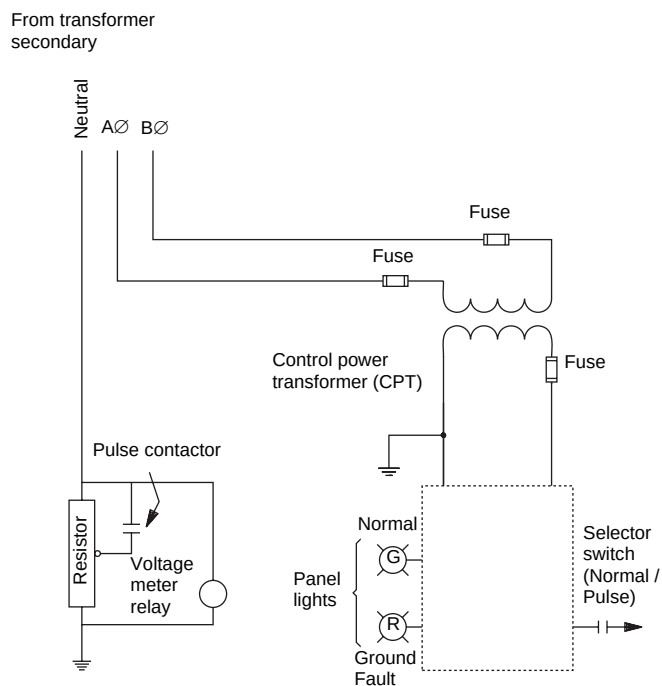
High Resistance Ground Option

When continuity of service for a distribution system is a high priority, high-resistance grounding adds the features of a grounded system on an ungrounded system, while minimizing the risk of service interruptions resulting from ground faults. High resistance grounding simultaneously provides a system reference point (or ground) to overcome the negative effects of low level ground faults and limits the magnitude of current that can flow during a ground fault. A resistance value is selected to limit the overvoltage during arcing faults. Industry practice has established that the resistance value should be selected relative to the system capacitive charging current.

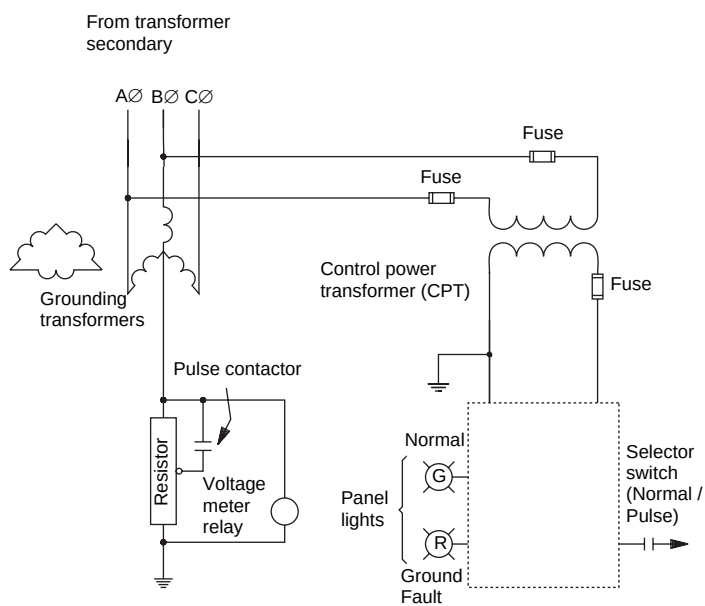
High resistance grounding equipment provides a high resistance grounding circuit for ungrounded power systems. Depending upon the options selected, high resistance grounding equipment offers the following functions:

- Provides system stability and prevents overvoltages by damping high frequency system oscillations due to ground faults and other system disturbances.
- Provides a way to detect and warn of the first ground fault that occurs within the system.
- Provides a means of monitoring the condition of the system voltage in relation to ground potential by means of voltage measurements.
- In the event of a line-to-ground fault event, provides a way to pulse the ground fault current so the path of ground fault current can be traced by a portable detector.
- Enables the system to continue to operate with a single line-to-ground fault present.

These functions are accomplished with system neutral grounding adjusted so that ground fault currents are only slightly higher than the natural capacitive charging currents of the ungrounded systems. By selecting the appropriate options, high resistance grounding equipment is available for Wye or Delta ungrounded configured systems rated for 480 and 600 volts nominal. See [Diagrams of Wye and Delta Systems](#), page 111.

Figure 75 - Diagrams of Wye and Delta Systems

Circuit Diagram Showing Wye Systems



Circuit Diagram Showing Delta Systems

High Resistance Grounding is only available for the following System Voltages:

- 480V 3Ph 3W 60 Hz.
- 600V 3Ph 3W 60 Hz.
- 480Y/277V 3Ph 4W 60 Hz.
- 600Y/347V 3Ph 4W 60 Hz.

Resistor Unit

The resistor unit consists of a group of industrial resistors arranged to provide the proper resistance and capacity to dissipate heat under all operating conditions. The resistor unit may be mounted in an internal compartment in the low voltage equipment. When mounted in the low voltage equipment, the compartment is adequately ventilated to dissipate the heat developed during ground fault conditions. If the desired compartment cannot be sufficiently ventilated, or if one is not available, the equipment resistor unit is mounted on top of the equipment or in some remote location. An example of a ventilated resistor enclosure is shown below in *Typical Resistor Assembly*

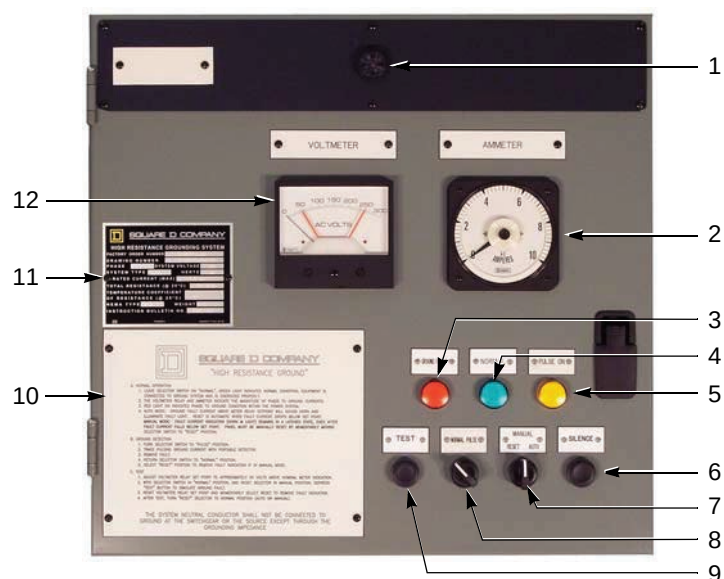
Figure 76 - Typical Resistor Assembly



Door Components

Door Component Locations below illustrates the door-mounted components of a typical high resistance ground unit.

Figure 77 - Door Component Locations



1	Alarm horn
2	Ammeter
3	Red light: Ground Fault
4	Green light: Normal
5	Amber light: Pulse On
6	Silence button

7	Reset/Manual/Auto switch
8	Normal/Pulse switch
9	Test button
10	Operation nameplate
11	Rating nameplate
12	Voltmeter

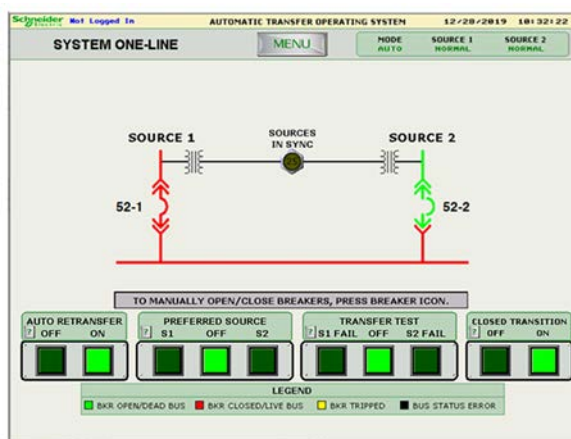
Automatic Transfer Option

Automatic transfer systems minimize power interruption by transferring the load from the normal source to an alternate source when the normal source is temporarily unavailable. The system uses multiple connections to power sources, usually utility sources, and a programmable logic controller (PLC) to achieve this transfer. These systems also feature redundant supplies of control power. Examples of automatic transfer systems with main-main or generator circuit breakers and main-tie-main or generator circuit breakers are shown in Main-Main (or Generator) Circuit Breaker Configuration, page 115 and Main-Tie-Main (or Generator) Circuit Breaker Configuration, page 116. The system also includes a door mounted Human Machine Interface for password protected control and monitoring of the system via one line based graphics.

Figure 78 - HMI Touchscreen Shown on Switchboard/Switchgear door



Figure 79 - One-Line Screen view for HMI with Automatic Transfer System



Main-Main or Main-Generator Option

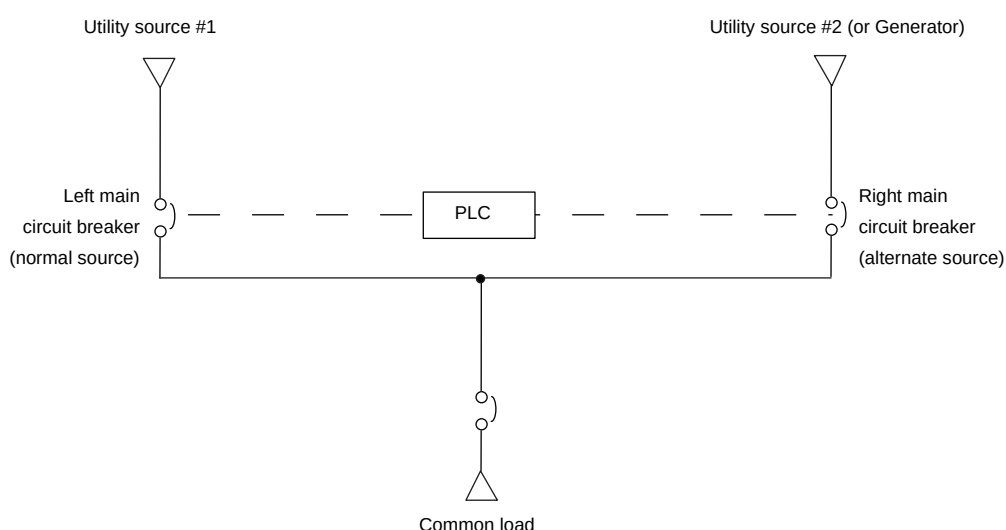
Each main circuit breaker connects to a utility source or one main circuit breaker connects to a utility source and the other main circuit breaker connects to a generator source. When the normal source becomes unavailable, the system transfers to the alternate. If the system comes equipped with a preferred source selector option, the system reverts to the preferred source automatically once it is available. Without the selector, automatic retransfer does not occur.

Optional listing to UL 1008 for both **closed** and **open** transition transfer schemes is available. When an **open** transition UL 1008 listed transfer scheme is specified, a mechanical interlocking cable is provided between the two main circuit breakers

(main-main or main-generator) to assure that at least one circuit breaker is always open. This way, one circuit breaker is open prior to closing the other main.

NOTE: The generator source breaker can be either the left or right located main circuit breaker.

Figure 80 - Main-Main (or Generator) Circuit Breaker Configuration



The PLC based, breaker-based automatic transfer design from Schneider Electric are designed to meet Underwriters Laboratories (UL) 1008 and to be applied on National Electrical Code® (NEC®) 700, *Emergency Systems*. They are also applicable to NEC 701, Legally-Required Standby Systems and NEC 702, *Optional Standby Systems*.

NOTE: In Canada, the ANSI Switchgear automatic transfer system is designed and listed to meet CSA C22.2 No.178.1. This transfer switch is suitable for control of motors, electric discharge lamps, tungsten filament lamps, and electric heating equipment where the sum of motor full-load ampere ratings and the ampere ratings of other loads do not exceed the ampere rating of the switch, and the tungsten load does not exceed 30 percent of the switch rating.

Main-Tie-Main or Main-Tie-Generator Option

Both main circuit breakers, connected to a utility source, are connected together by means of a normally open tie circuit breaker.

NOTE: One main circuit breaker can be connected to a generator source instead of a utility source.

Each main circuit breaker feeds independent load buses. Various settings of the preferred source selector switch and the retransfer on/off options determine which circuit breakers are closed during various operating conditions.

NOTE: The generator source breaker can be either the left or right located main circuit breaker.

Figure 81 - Main-Tie-Main (or Generator) Circuit Breaker Configuration

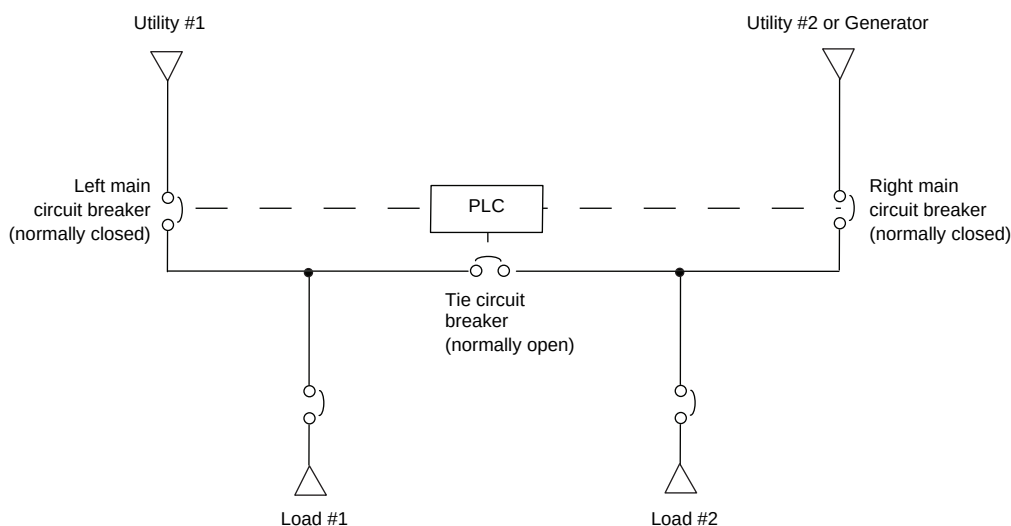
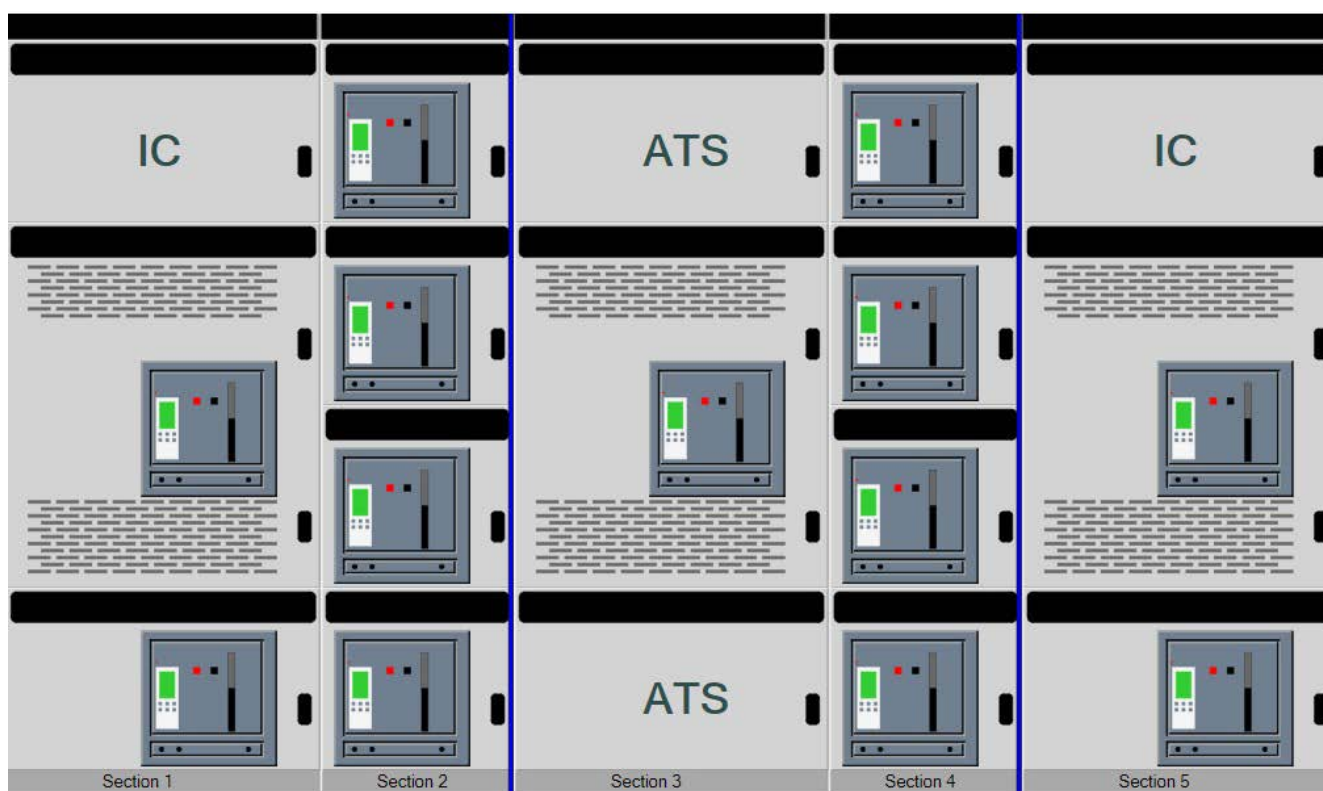


Figure 82 - Layout Arrangement for Main-Tie-Main Power-Zone 4 Lineup Automatic Transfer PLC Solution



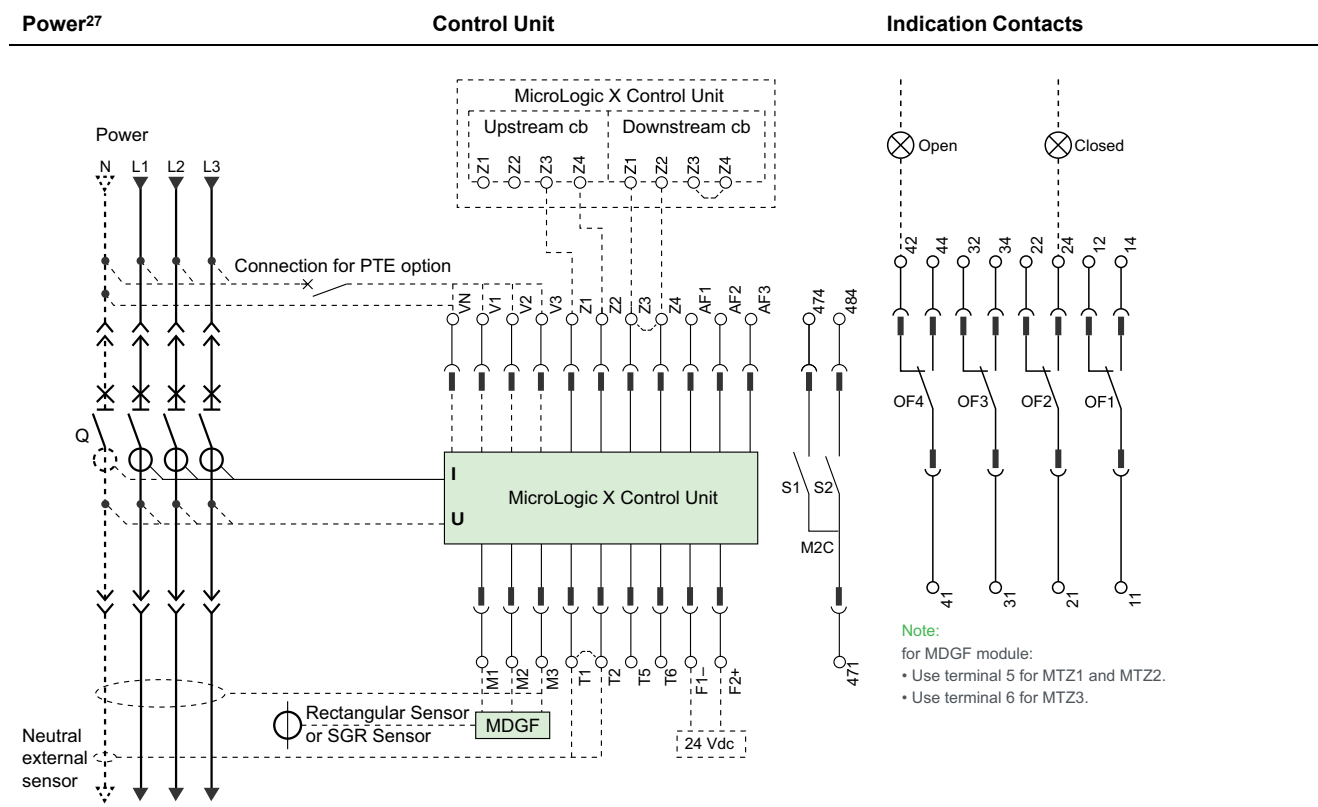
Full Sequences of Operation for these pre-engineered PLC Automatic transfer Systems can be obtained by contacting Schneider Electric.

Basic Electrically Operated Circuit Breaker Diagrams

This section contains MasterPacT circuit breaker diagrams. Refer to catalog *MasterPacT MTZ Circuit Breakers and Switches 0614CT1701* for additional information.

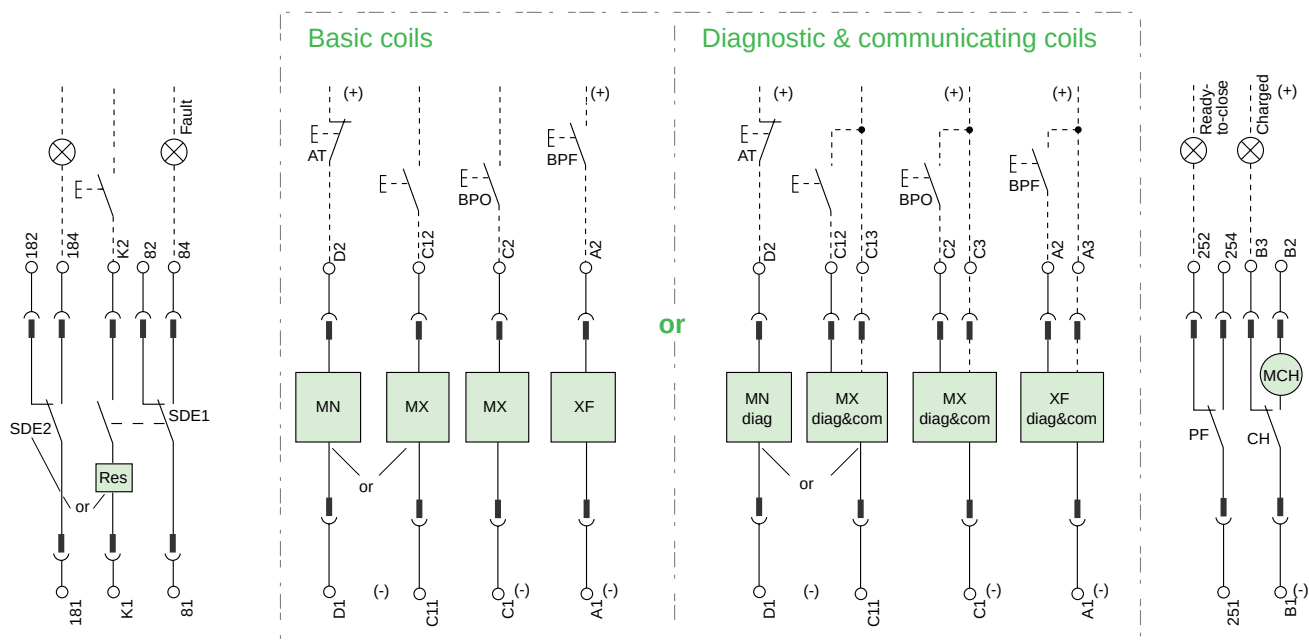
MasterPacT MTZ1 Drawout Devices

The diagram is shown with circuits de-energized, all devices open, connected and charged and relays in normal position.



NOTE: It is possible to add a second MX/MX diag&com or a MN/MN diag voltage release. The second MX diag&com voltage release can only be installed after the delivery of the circuit breaker. This is an after-sales adaptation.

27. For a three-pole MasterPacT MTZ circuit breaker in a power system with neutral distributed, the neutral must be connected to the Vn terminal of the MicroLogic X control unit and the ENVT configured to "Yes" to maintain the quality of power measurement.

Remote Operation²⁸

NOTE: Maximum length of the two wires between A2–A3/C20C3/C12/C13: 5 m (16 ft.).

For the maximum length of the wiring between the AC/DC power supply and the voltage release terminals A1–A3/C1–C3/C11–C13/D1–D2: see .

28. Possible to add a second MX/MX diag&com or a MN/MN diag coil.

Table 14 - Terminal Block Marking

CE3	CE2	Com	UC1	UC2	SDE2	UC4	UC3	SDE1	MN	MX	XF	PF	MCH		
334	324	F2* 1 or F1* F2* F1* ULP	T6 M1	M2 M3/T1/T5	184 182 181	V3 V2 V1	VN	84 82 81	D2 D1	C2 C3 C1	A2 A3 A1	254 252 251	B2 B3 B1		
or															
or															
or															
OF4	OF3	OF2	OF1	CD2	CD1	CE1	CT1	Res	M2C / ESM	2 nd MX					
44	34	24	14	824	814	314	914	K2	484 474	C12 C13 C11					
42	32	22	12	822	812	312	912	K1	471						
41	31	21	11	821	811	311	911								
or															
EIFE															

Drawout device only.

SDE1, OF1, OF2, OF3, OF4 supplied as standard.

Drawout device only.

SDE1, OF1, OF2, OF3, OF4 supplied as standard.

Interconnected connections (only one wire per connection point).

[1] The connection of the +/- of the power supply either on terminals F2/F1 or on the +/- terminals of the ULP port must be strictly respected. Crossing the polarities may damage the device.

Indication Contacts Terminal Block

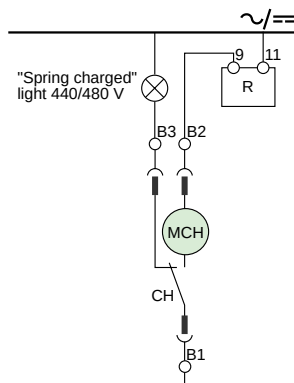
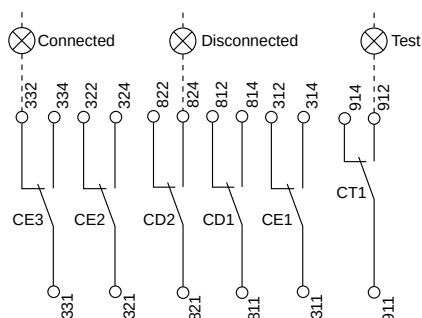
OF4 / OF3 / OF2 / OF1 : Open/closed indication contacts OF

Cradle Contacts Terminal Block

CD2 / CD1: Disconnected position contacts

CE3 / CE2 / CE1: Connected position contacts

CT1: Test position contacts

**Control Unit Terminal Block**

Com : ULP Communication

UC1 : Z1-Z4 Zone Selective Interlocking
M1 = MDGF module input

UC2 : T1, T2 = Neutral External Sensors
M2, M3 = MDGF Module Input

UC3 : Voltage Connector (must be connected to the neutral with a 3P circuit breaker)

UC4 : External Voltage Connector (PTE option)

M2C : 2 Programmable Contacts (external relay) ext. 24 Vdc power supply required is not installed.

Remote Operation Terminal Block

SDE2: Overcurrent Trip Indication Contact

or
Res: remote reset

SDE1: Overcurrent Trip Indication Contact (supplied as standard)

MN /MN diag: Undervoltage Release Standard or Diagnostic

MX/MX diag&com: Shunt Trip Standard or Diagnostic & Communicating

2nd MX/MX diag&com: Shunt Trip Standard or Diagnostic

XF/XF diag&com: Shunt Close Standard or Diagnostic & Communicating

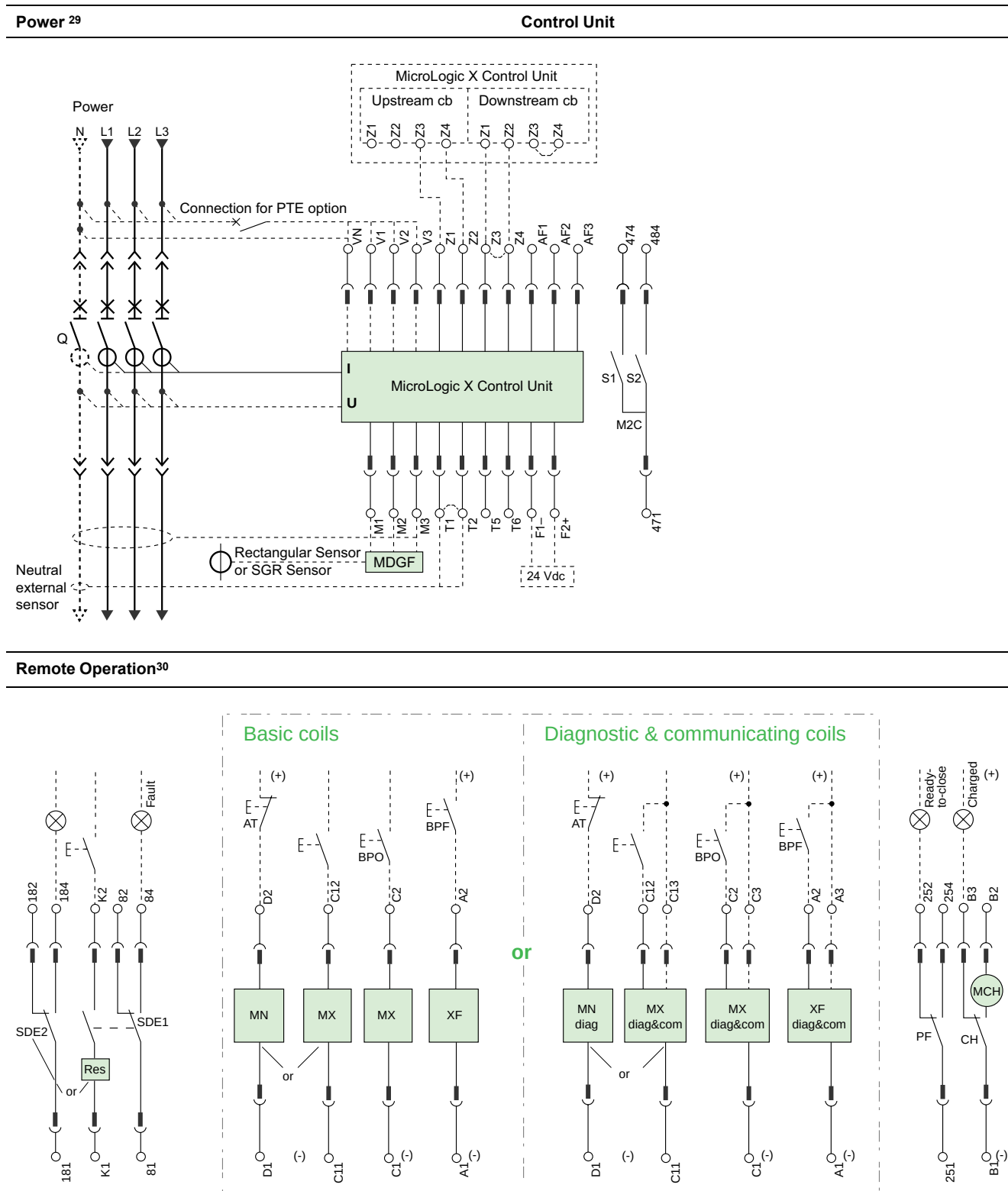
PF: Ready-to-Close Contact

MCH: Spring Charging Motor

NOTE: When communicating MX diag&com or XF diag&com accessories are used, the third wire (C3,A3, C13) must be connected even if the communication module is not installed.

MasterPacT MTZ2/MTZ3 Drawout Devices

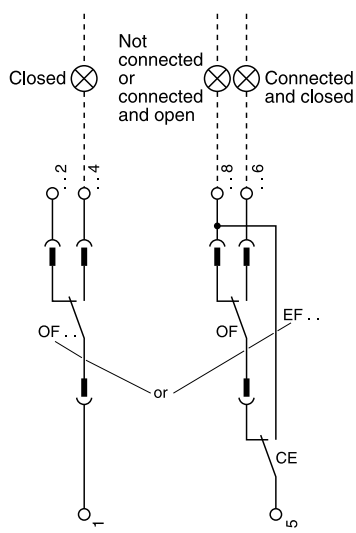
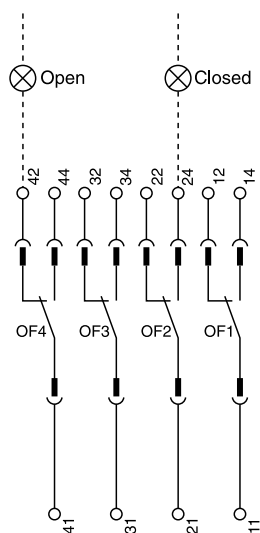
The diagram is shown with circuits de-energized, all devices open, connected and charged and relays in normal position.



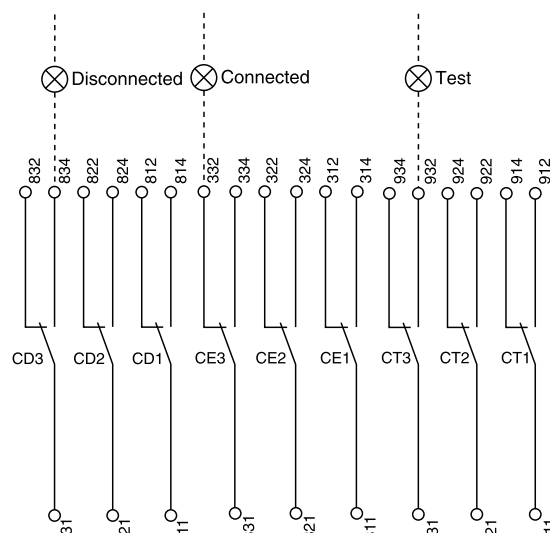
29. For a three-pole MasterPacT MTZ circuit breaker in a power system with neutral distributed, the neutral must be connected to the Vn terminal of the MicroLogic X control unit and the ENVT configured to "Yes" to maintain the quality of power measurement.

30. It is possible to add a second MX/MX diag&com or an MN/MN diag coil.

Indication Contacts



Cradle Contacts



Control Unit Terminal Block

- Com :** ULP communication
- UC1 :** Z1-Z4 Zone Selective Interlocking
M1 = MDGF module input
- UC2 :** T1, T2 = Neutral External Sensors
M2, M3 = MDGF module input ext. 24 Vdc power supply required
- UC3 :** Voltage Connector (must be connected to the neutral with a 3P circuit breaker)
- UC4 :** External Voltage Connector (PTE option)
- or**
- M2C :** 2 Programmable Contacts (external relay)

Remote Operation Terminal Block

- SDE2:** Overcurrent trip indication contact
- or**
- Res:** Remote Reset
- SDE1:** Overcurrent Trip Indication Contact (Supplied as Standard)
- MN /MN diag:** Undervoltage Release Standard or Diagnostic
- MX/MX diag&com:** Shunt Trip Standard or Diagnostic & Communicating
- 2nd MX/MX diag&com:** Shunt Trip Standard or Diagnostic
- XF/XF diag&com:** Shunt Close Standard or Diagnostic & Communicating
- PF:** Ready-to-Close Contact
- MCH:** Spring Charging Motor

NOTE: When communicating MX com or XF com accessories are used, the third wire (C3,A3, C13) must be connected even if the communication module is not installed.

Table 15 - Terminal Block Marking

CD3	CD2	CD1	Com	UC1	UC2	SDE2	UC4	UC3	M2C/ESM	SDE1	CE3	CE2	CE1	MN	MX	XF	PF	MCH
834	824	814		T6	M1	184	V3		484	84	334	324	314	D2	C2	A2	254	B2
832	822	812		Z3	Z4	182	V2	VN	474	82	332	322	312		C3	A3	252	B3
831	821	811		Z1	Z2	181	V1		471	81	331	321	311	D1	C1	A1	251	B1

CE6	CE5	CE4
364	354	344
362	352	342
361	351	341

Res
K2
K1

CT6	CT5	CT4	2 nd MX
964	954	944	C12
962	952	942	C13
961	951	941	C11

OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11	OF4	OF3	OF2	OF1	CT3	CT2	CT1
244	234	224	214	144	134	124	114	44	34	24	14	934	924	914
242	232	222	212	142	132	122	112	42	32	22	12	932	922	912
241	231	221	211	141	131	121	111	41	31	21	11	931	921	911

EF24	EF23	EF22	EF21	EF14	EF13	EF12	EF11
248	238	228	218	148	138	128	118
246	236	226	216	146	136	126	116
245	235	225	215	145	135	125	115

CE9	CE8	CE7
394	384	374
392	382	372
391	381	371

CD6	CD5	CE4
864	854	844
862	852	842
861	851	841

EIFE

OF22	OF21	OF14	OF13	OF12	OF11	OF4	OF3	OF2	OF1
 224	 214	 124	 134	 124	 114	 44	 34	 24	 14
 222	 212	 122	 132	 122	 112	 42	 32	 22	 12
 221	 211	 121	 131	 121	 111	 41	 31	 21	 11
or	or	or	or	or	or				
EF22	EF21	EF14	EF13	EF12	EF11				
 228	 218	 148	 138	 128	 118				
 226	 216	 146	 136	 126	 116				
 225	 215	 145	 135	 125	 115				

Dr

SD

Int

[1] The connection between the $\pm$ terminals

Drawout device only.

SDE1, OF1, OF2, OF3, OF4 supplied as standard.

Interconnected connections (only one wire per connection point).

[1] The connection of the +/- of the power supply either on terminals F2/F1 or on the +/- terminals of the ULP port must be strictly respected. Crossing the polarities may damage the device.

Conduit Area Dimensions

Figure 83 - 60 in. Deep Feeder Sections (36W/30W/22W), Rear Accessible, Top and Bottom Conduit Entrance Dimensions – Not for Construction (consult factory drawings)

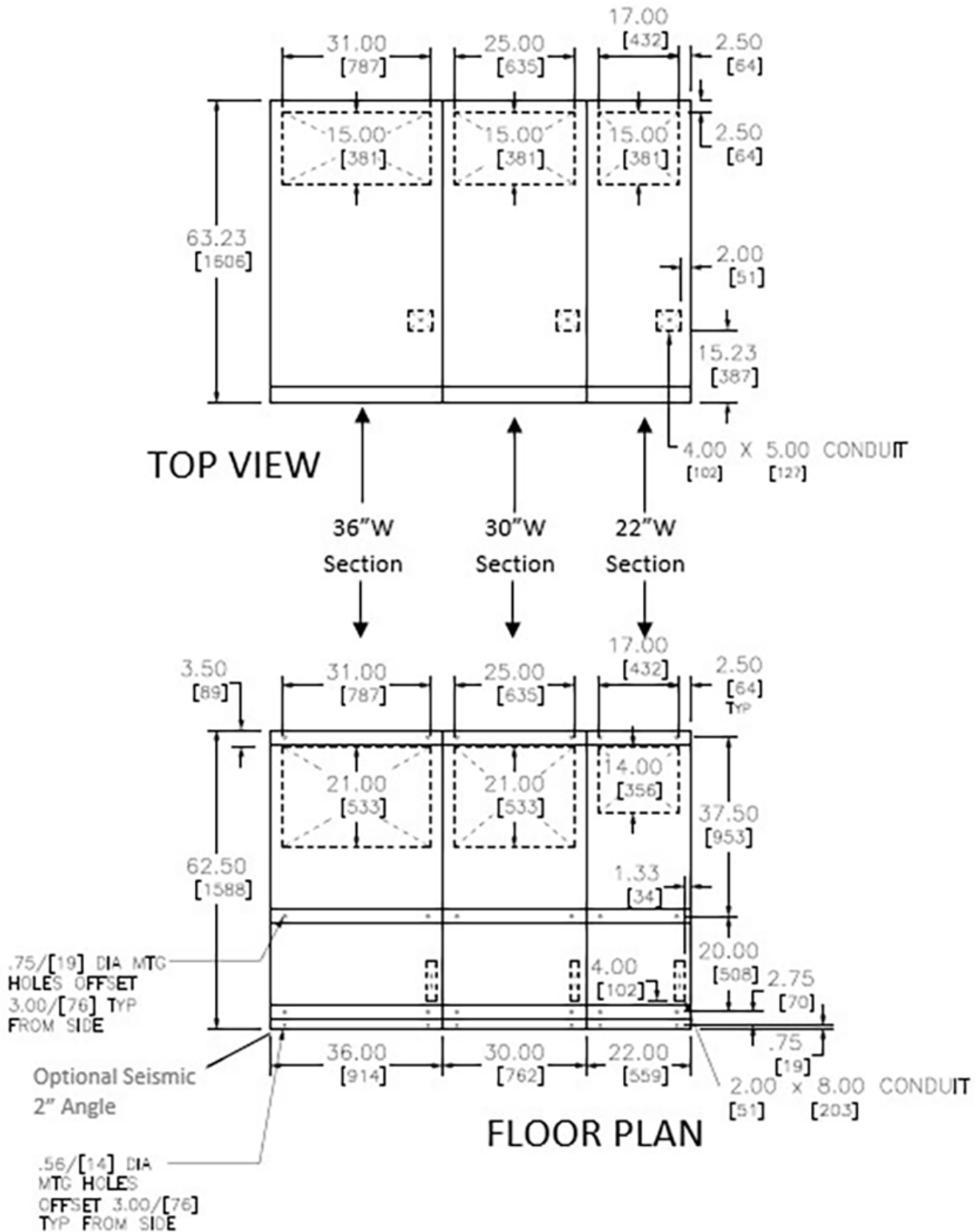


Figure 84 - 72 in. Deep Feeder Sections (36W/30W/22W), Rear Accessible, Top and Bottom Conduit Entrance Dimensions – Not for Construction (consult factory drawings)

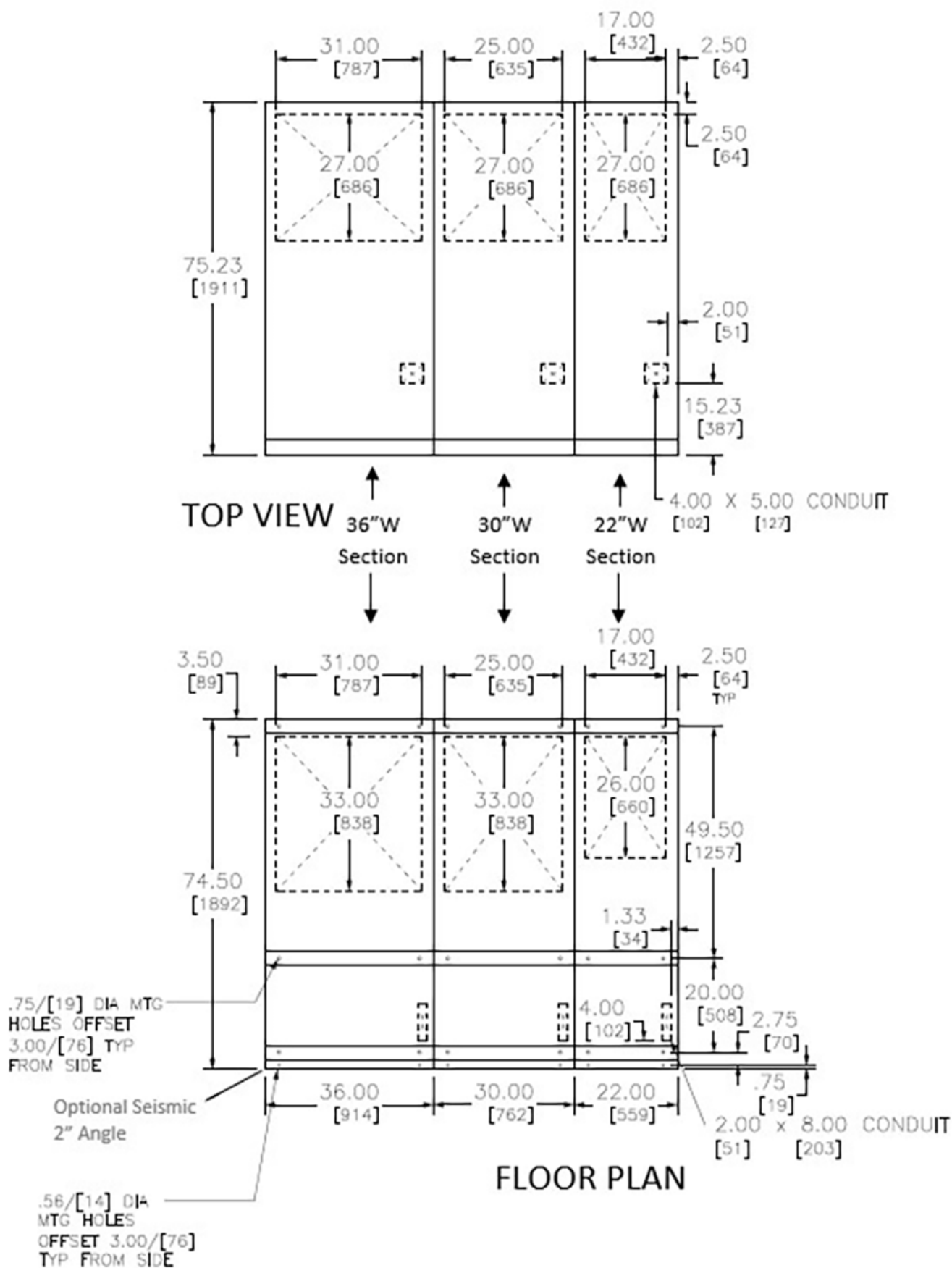


Figure 85 - 80 in. Deep Feeder Sections (36W/30W/22W), Rear Accessible, Top and Bottom Conduit Entrance Dimensions – Not for Construction (consult factory drawings)

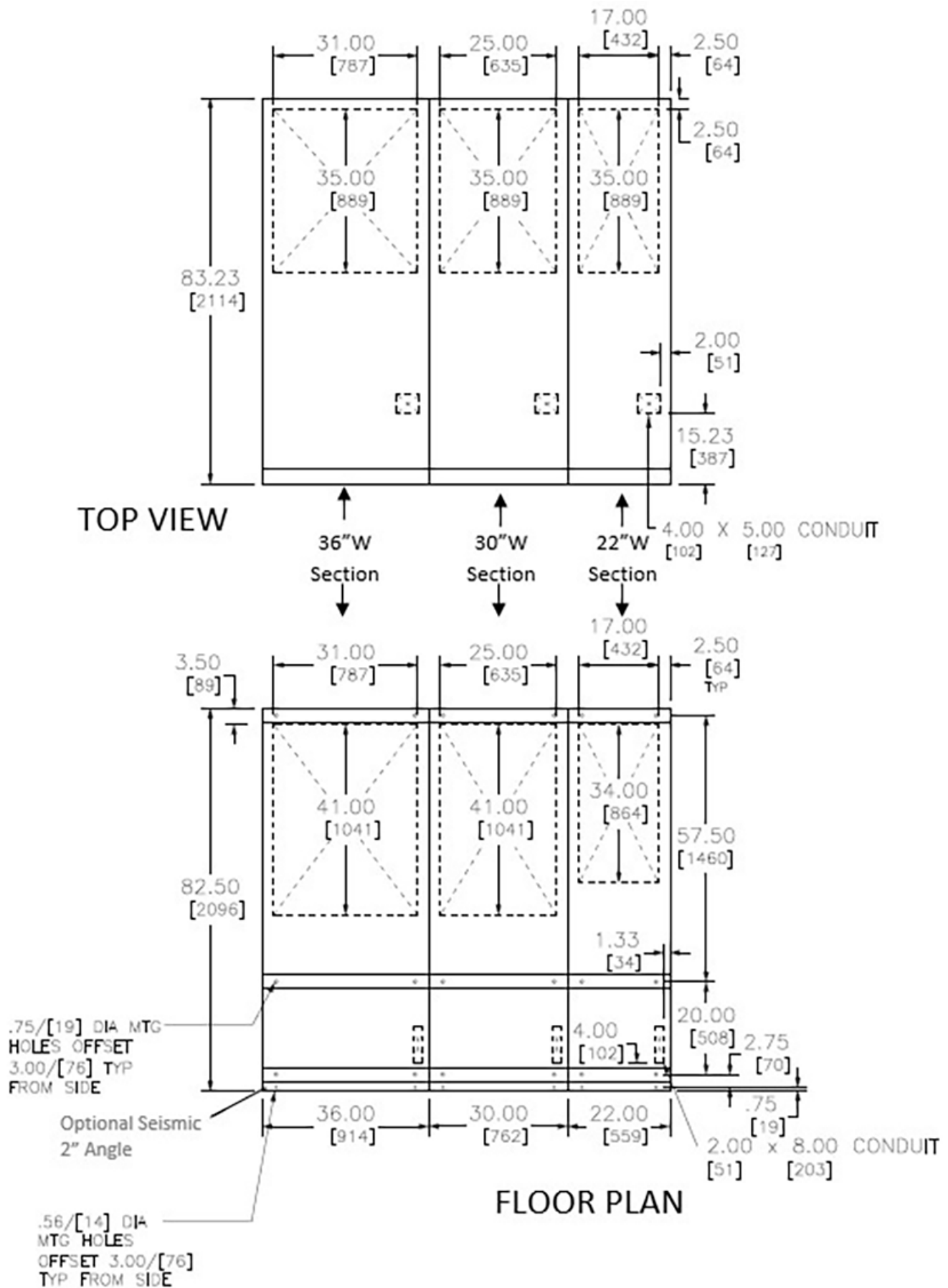
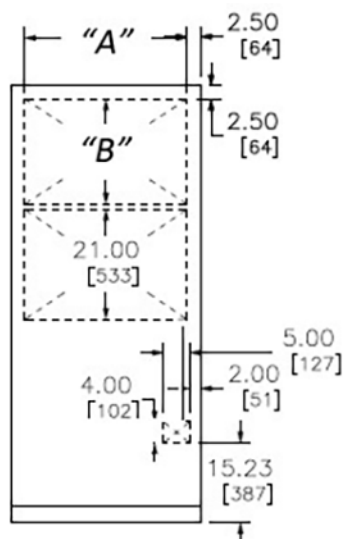
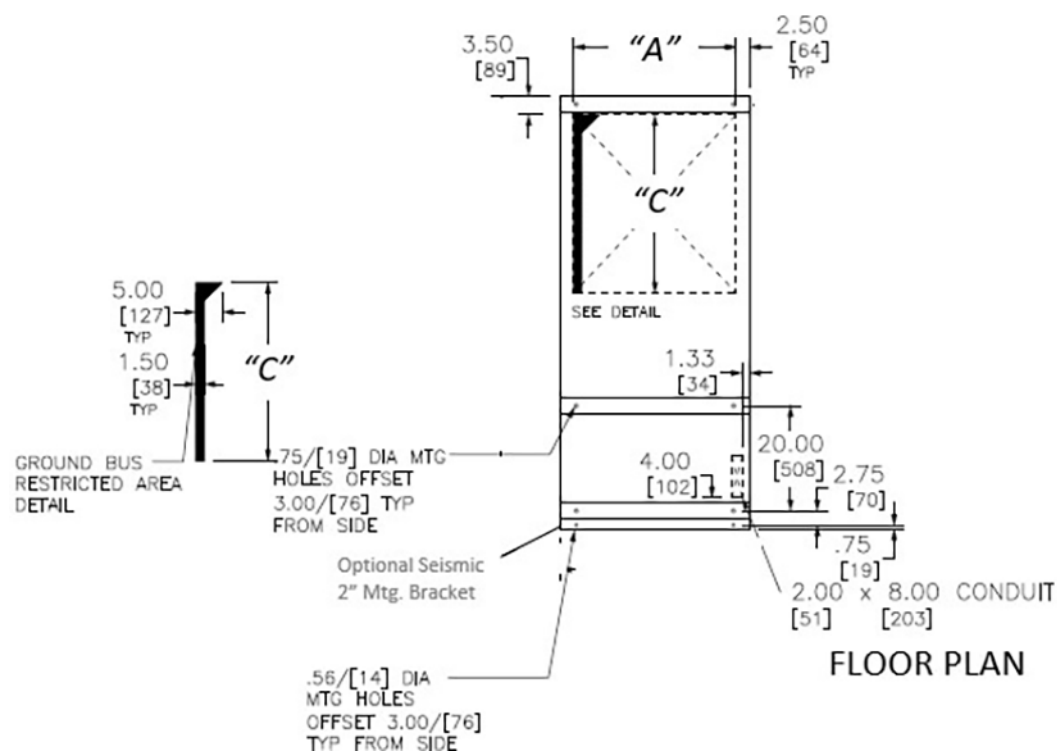


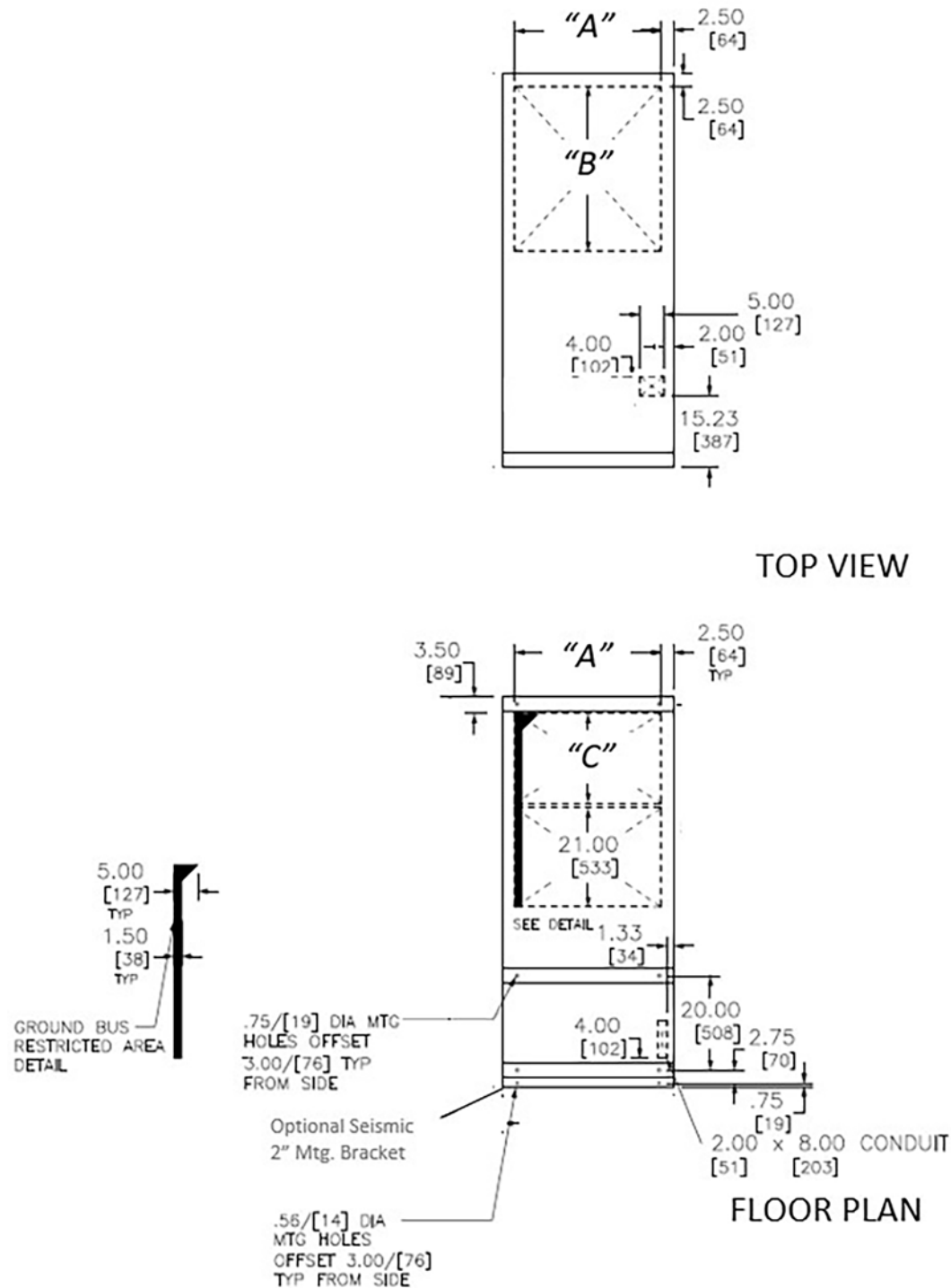
**Figure 86 - Incoming Main Section with Top Incoming Cable, Rear Accessible, Conduit Entrance
Dimensions – Not for Construction (consult factory drawings)****TOP VIEW****FLOOR PLAN**

Dimension	22 in. W	36 in. W
A	17 in.	31 in.

Dimension	60 in. D ³¹	72 in. D	80 in. D
B	0 in.	12 in.	20 in.
C	14 in.	26 in.	34 in.

31. Cable incoming not available in 60 in. D above 3200 A due to number of conduits required.

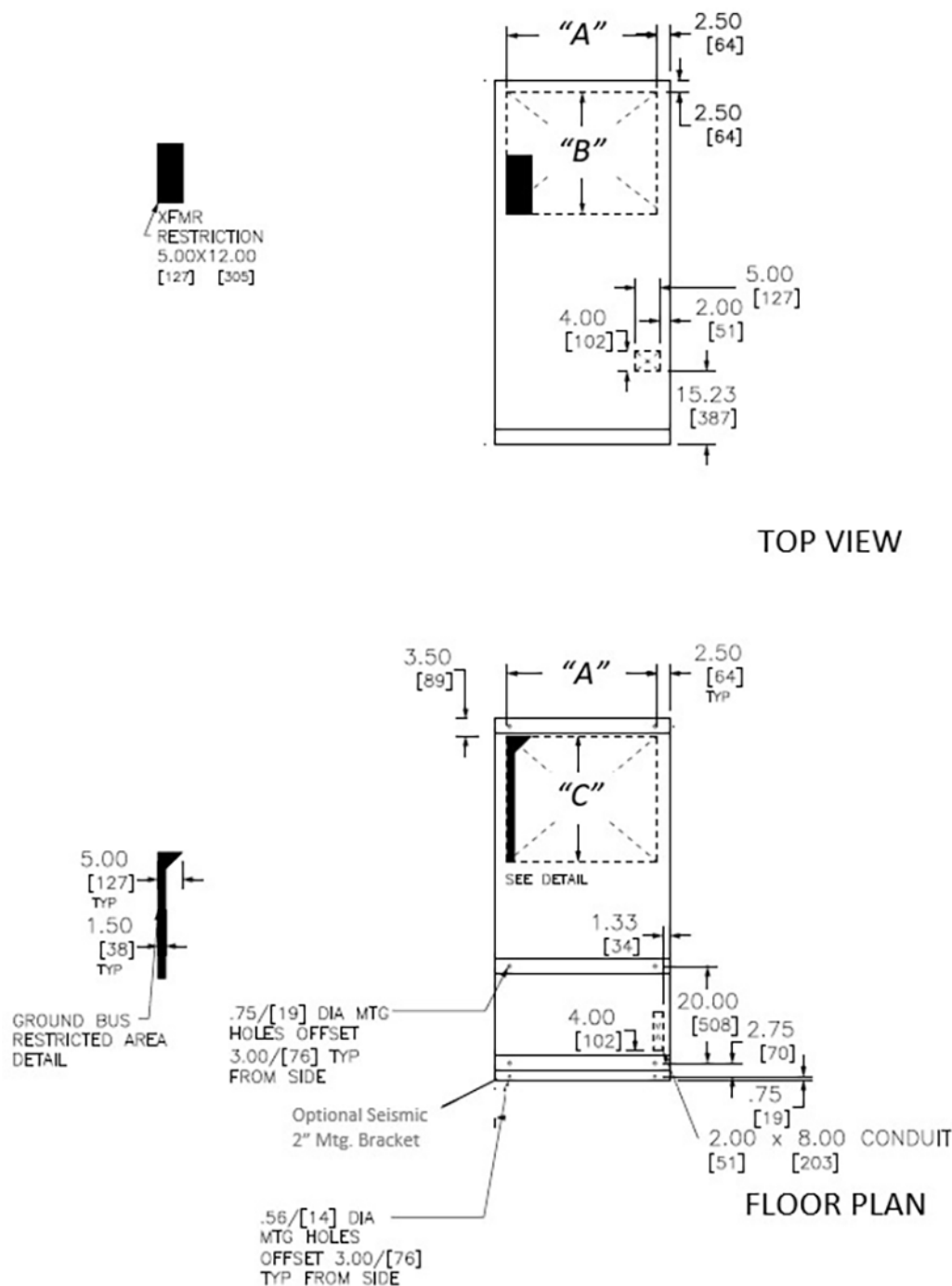
**Figure 87 - Incoming Main Section with Bottom Incoming Cable, Rear Accessible, Conduit Entrance
Dimensions – Not for Construction (consult factory drawings)**



Dimension	22 in. W	36 in. W
A	17 in.	31 in.

Dimension	60 in. D ³²	72 in. D	80 in. D
B	15 in.	27 in.	35 in.
C	0 in.	11 in.	19 in.

32. Cable incoming not available in 60 in. D above 3200 A due to number of conduits required.

Figure 88 - Incoming Main Section, Close-Coupled to Square D Transformer, Rear Accessible, Conduit Entrance Dimensions – Not for Construction (consult factory drawings)

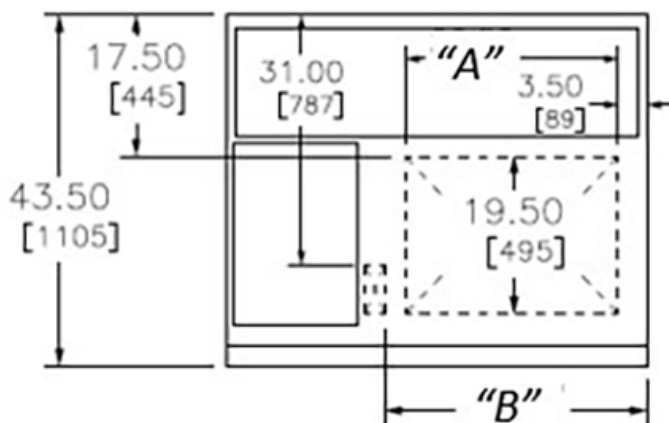
Dimension	22 in. W	36 in. W
A	17 in.	31 in.

Dimension	60 in. D	72 in. D	80 in. D
B	12 in.	25 in.	33 in.
C	14 in.	26 in.	34 in.

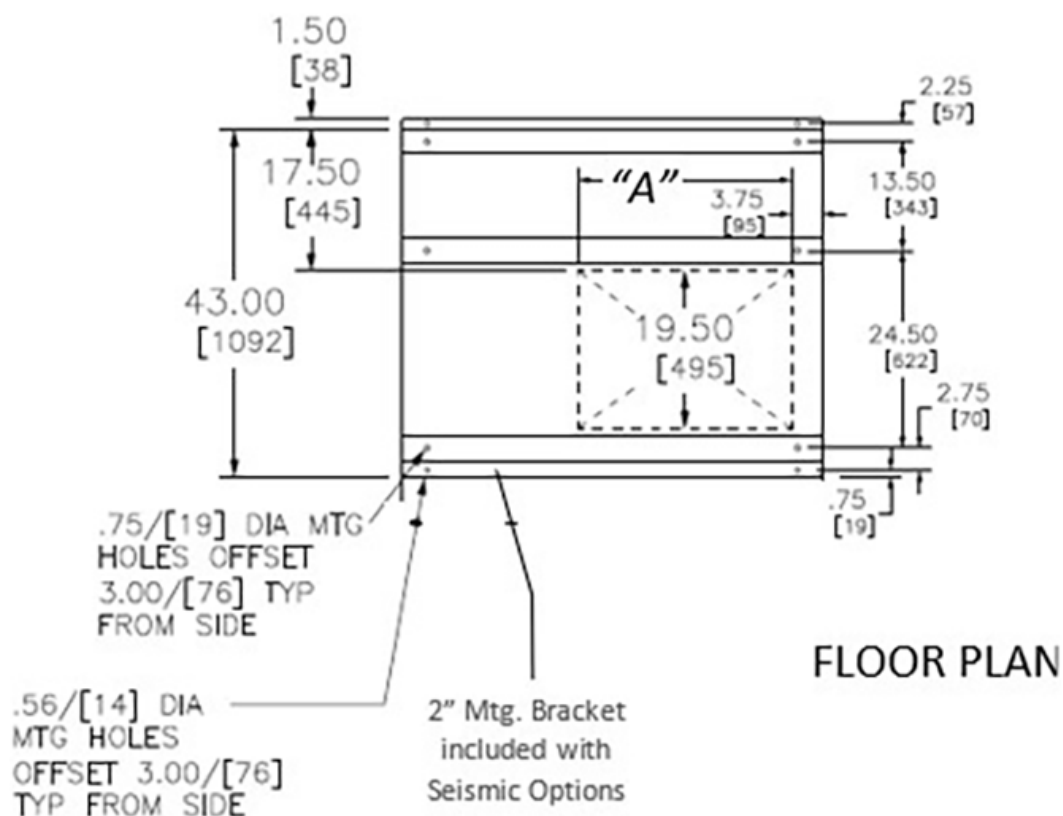
NOTE: XFMR & Ground Bus restricted areas move to right side for Close-Coupled Transformer connected on right end of lineup.

Figure 89 - Main with Feeders OR Feeders Only Section, Top or Bottom Incoming Cable, Front Accessible, Conduit Entrance Dimensions – Not for Construction (consult factory drawings)

DETAIL:
2.50 X 6 CONTROL
WIRE CONDUIT OPENING



TOP VIEW

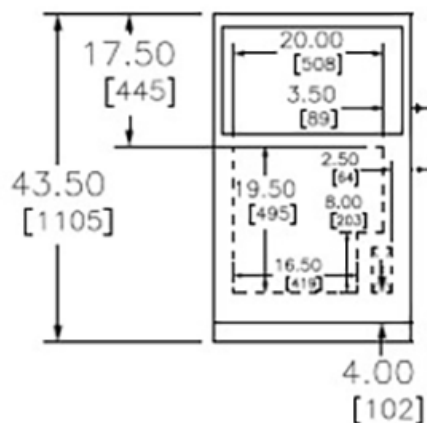


FLOOR PLAN

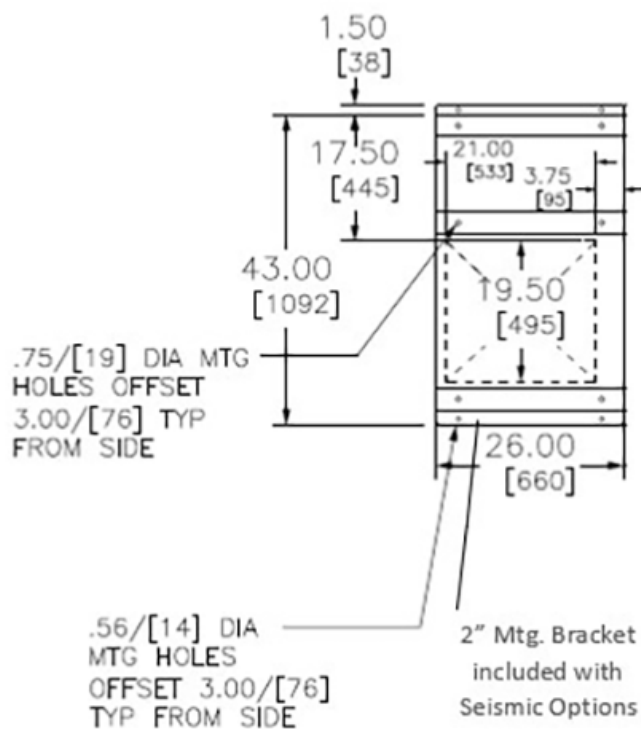
Dimension	44 in. W	52 in. W	58 in. W
A	18.5 in.	26.5 in.	32.5 in.
B	24.5 in.	32.5 in.	38.5 in.

Figure 90 - 26W Main without Feeders Section, Top or Bottom Incoming Cable, Front Accessible, Conduit Entrance Dimensions – Not for Construction (consult factory drawings)

DETAIL:
2.50 X 6 CONTROL
WIRE CONDUIT OPENING
AVAILABLE WITH TOP OR
BOTTOM INCOMING

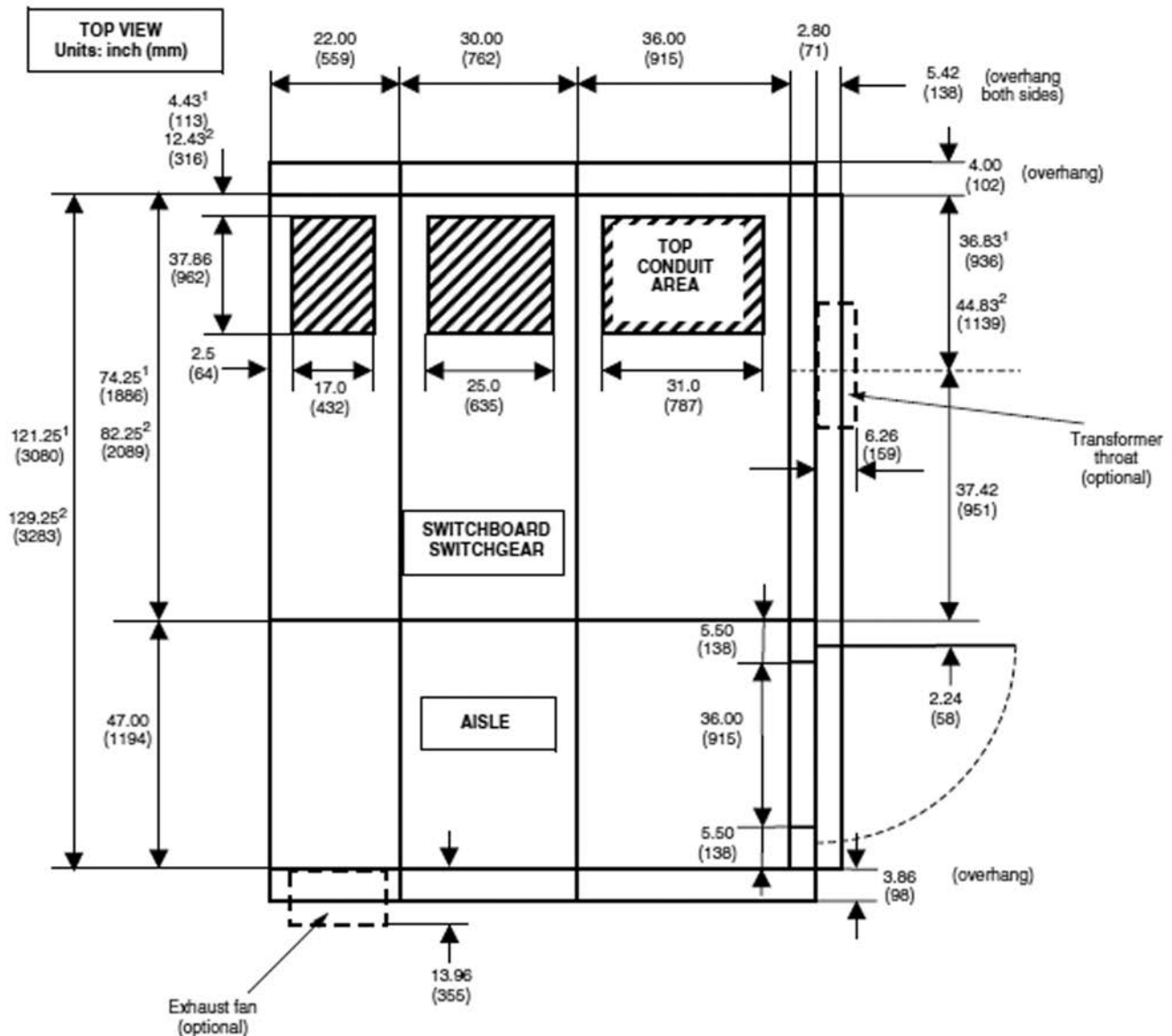


TOP INCOMING



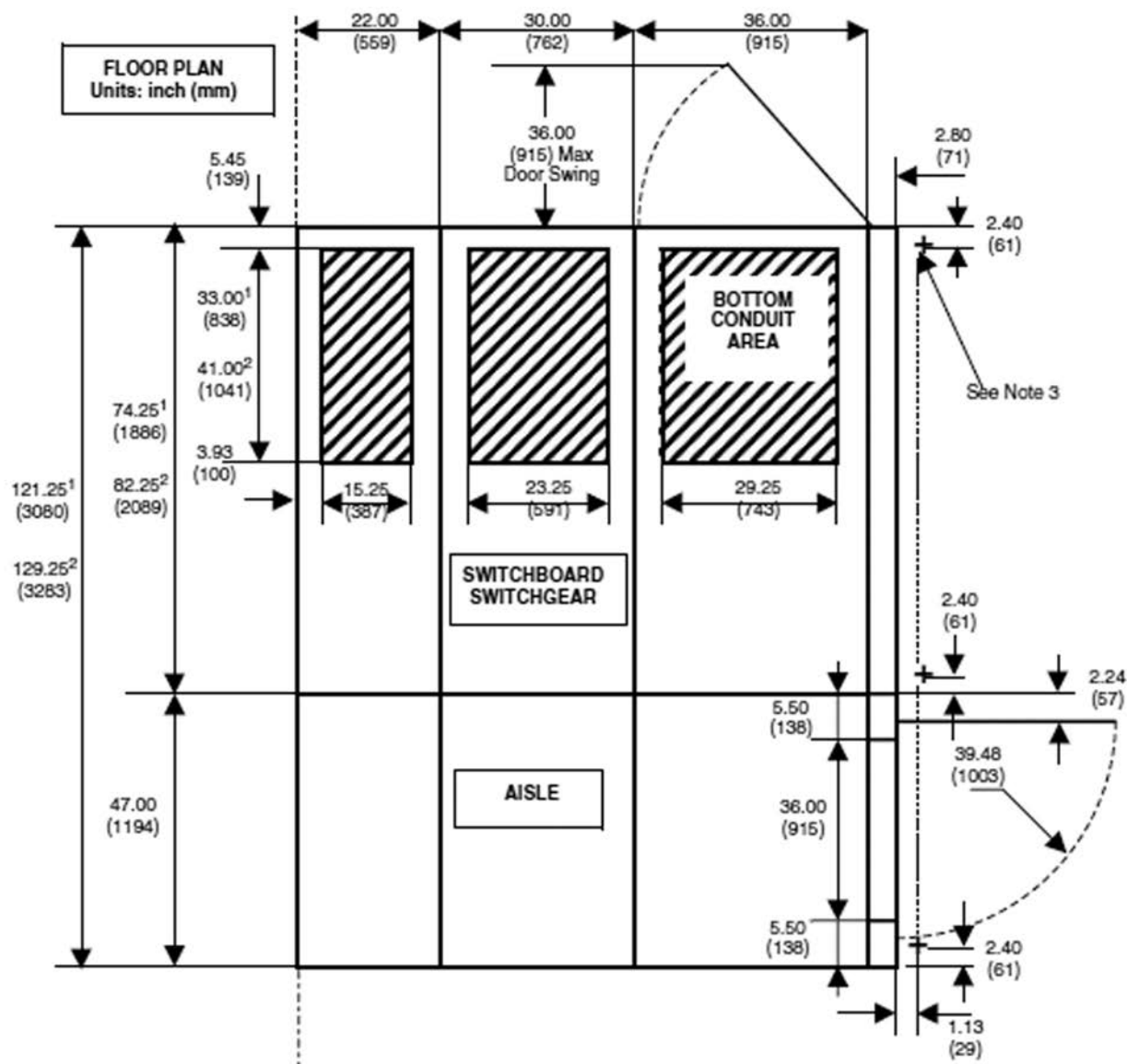
BOTTOM INCOMING

**Figure 91 - NEMA 3R Walk-in Low Voltage Switchboard/Switchgear Top Conduit Entrance Dimensions—
Not for Construction (consult factory drawings)**



NOTE:

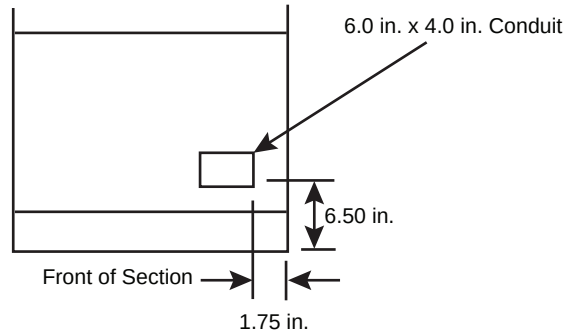
1. This dimension corresponds to 72-inch PZ-4/QED-6 equipment.
2. This dimension corresponds to 80-inch PZ-4/QED-6 equipment.

**Figure 92 - NEMA 3R Walk-in Low Voltage Switchboard/Switchgear Bottom Conduit Entrance
Dimensions–Not for Construction (consult factory drawings)****NOTE:**

1. This dimension corresponds to 72-inch PZ-4/QED-6 equipment.
2. This dimension corresponds to 80-inch PZ-4/QED-6 equipment.
3. Location of Anchor Bolts (3) at both ends by user; min. 0.5 in. (12.5 mm).

Arc Resistant Construction Notes:

- Use Rear Accessible NEMA Type 1 figures above for Conduit Entry dimensions but add 6.5" to depth of Top View openings and reduce depth of Floor Plan openings by 6.5" due to ventilation duct.
- Section depth will grow (+4.00-in./102 mm) where fans (5000 A riser bus) are required (see Fan Mounting Plate, page 80).
- Arc Resistant Construction is not available in NEMA Type 3R Walk-In or Front Accessible Enclosures.
- 30 in. (762 mm) wide structures are not available.
- Control conduit openings are available on top of section as shown below.



Layout Arrangements and Section Widths

Figure 93 - Available Breaker Positions — 3-Pole, Rear Accessible Feeder Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including secondary wiring trough compartment is 93.7 in. (2380 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Section Depth (60, 72 or 80 in.) will determine final arrangement based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75°C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Cell A	800– 2000 A ³³ Feeder	800– 1600 A Feeder	800– 1600 A Feeder	800– 1600 A Feeder
	800– 2000 A ³³ Feeder	800– 1600 A Feeder	800– 1600 A Feeder	3200 A Feeder (100 kAIC Max.)
	800– 2000 A ³³ Feeder	800– 1600 A Feeder	3200 A Feeder (100 kAIC Max.)	800– 1600 A Feeder
	800– 2000 A ³³ Feeder	3200 A Feeder (100 kAIC Max.)	800– 1600 A Feeder	800– 1600 A Feeder
	22 in. W	22 in. W	22 in. W	22 in. W

Cell A	800–2000 A ³³ Feeder	800–2000 A ³³ Feeder	800 MTZ1 Feeder	800 MTZ1 Feeder	800–2000 A ³³ Feeder
	3200 A Feeder (100 kAIC Max.)	800–2000 A ³³	800 MTZ1 Feeder	800 MTZ1 Feeder	800–2000 A ³³ Feeder
	4000 A Feeder	3200 A Feeder (above 100 kAIC)	800 MTZ1 Feeder	800 MTZ1 Feeder	800–2000 A ³³ Feeder
	800–2000 A ³³ Feeder	4000 A Feeder	800 MTZ1 Feeder	800 MTZ1 Feeder	800–2000 A ³³ Feeder
	36 in. W	36 in. W	30 in. W		30 in. W

33. 2000/3200 A Feeders rated above 100 kAIC require 2 cells and cannot be in same section with other 3200–4000 A Feeders. In addition, arc resistant 2000 A main/tie/feeder rated 100 kAIC @ 635 V (L1/L1F) requires 2 cells in a 36 in. wide section.

Figure 94 - Available Breaker Positions — 3-Pole, Rear Accessible Main Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including secondary wiring trough compartment is 93.7 in. (2380 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Section Depth (60, 72 or 80 in.) will determine final arrangement based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75°C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Cell A	Factory Use Instrument Compartment	800– 2000 A ³⁴ Feeder	Factory Use Instrument Compartment	800– 2000 A ³⁴ Feeder
Cell B	1600– 2000 A Top Entry Main (100 kAIC or less)	1600– 2000 A Top Entry Main (100 kAIC or less)	3200 A Top Entry Main (100 kAIC or less)	800– 2000 A ³⁴ Feeder
Cell C	800– 2000 A ³⁴ Feeder	Blank or IC	800– 2000 A ³⁴ Feeder	3200 A Bottom Entry Main (100 kAIC or less)
Cell D	800–2000 A ³⁴ Feeder	Factory Use Instrument Compartment	800–2000 A ³⁴ Feeder	Factory Use Instrument Compartment
	22 in. W³⁵	22 in. W³⁵	22 in. W	22 in. W

Cell A	Factory Use Instrument Compartment	800–2000 A ³⁴ Feeder
Cell B	Top Entry 1600–3200 A Main (above 100 kAIC)	Bottom Entry 1600–3200 A Main (above 100 kAIC)
Cell C	4000–5000 A Main	4000–5000 A Main
Cell D	800–2000 A ³⁴ Feeder	Factory Use Instrument Compartment
	36 in. W	36 in. W

34. 2000/3200 A Feeders rated above 100 kAIC require 2 cells and cannot be in same section with other 3200–4000 A Feeders. In addition, arc resistant 2000 A main/tie/feeder rated 100 kAIC @ 635 V (L1/L1F) requires 2 cells in a 36 in. wide section.

35. 30 in. Wide main sections are available by contacting Schneider Electric.

Figure 95 - Available Breaker Positions — 3-Pole, Rear Accessible Tie Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including secondary wiring trough compartment is 93.7 in. (2380 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Section Depth (60, 72 or 80 in.) will determine final arrangement based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75°C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Cell A	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder
Cell B	1600–3200 A Tie ³⁷ (100 kAIC or less)	1600–3200 A Tie ³⁷ (above 100 kAIC)
Cell C	800–2000 A ³⁶ Feeder	4000–5000 A Main
Cell D	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder
	22 in. W	36 in. W

Cell A	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder
Cell B	Tie with Transition ³⁷ 1600–3200 A Tie (100 kAIC or less)	800–2000 A ³⁶ Feeder	Tie with Bus Transition Section ³⁷ 1600–3200 A Tie (above 100 kAIC)	800–2000 A ³⁶ Feeder
Cell C	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder	4000–5000 A Main	800–2000 A ³⁶ Feeder
Cell D	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder	800–2000 A ³⁶ Feeder
	22 in. W	22 in. W	36 in. W	22 in. W

36. 2000/3200 A Feeders rated above 100 kAIC require 2 cells and cannot be in same section with other 3200–4000 A Feeders. In addition, arc resistant 2000 A main/tie/feeder rated 100 kAIC @ 635 V (L1/L1F) requires 2 cells in a 36 in. wide section.

37. Bus Transition Section is required when Main Entry direction is the same for both mains. Transition section can include feeders as shown and may be extended to 30 in. or 36 in. W. Lineups with 2 Utility Mains and opposite entry (i.e. one main top incoming and one main bottom incoming) do not need a bus transition section.

Figure 96 - Available Breaker Positions — 4-Pole, Rear Accessible Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including secondary wiring trough compartment is 93.7 in. (2380 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Section Depth (60, 72 or 80 in.) will determine final arrangement based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75°C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Cell A	Blank or IC	1600–2000 A Feeder	Factory Use Instrument Compartment	1600–2000 A Feeder	Blank or IC	Blank or IC
Cell B	4000–5000 A Main/Tie Or 4000 A Feeder	1600–2000 A Feeder	Top Entry 3200 A Main	Bottom Entry 3200 A Main	3200 A Feeder	1600–2000 A Feeder
Cell C		1600–2000 A Feeder				3200 A Feeder
Cell D	Blank or IC	1600–2000 A Feeder	1600–2000 A Feeder	Factory Use Instrument Compartment	1600–2000 A Feeder	
	48 in. W	30 in. W	30 in. W	30 in. W	30 in. W	30 in. W

Figure 97 - Available Breaker Positions — Front Accessible Feeder Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including roof ventilation boxes is 94.75 in. (2407 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Final arrangement will be based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75°C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Front Accessible Switchgear may require longer and heavier shipping splits than traditional Rear Accessible Switchgear. In some Front Accessible cases 92 in. wide (2235.2 mm) and 8000 lb. (3629 kg) shipping splits will be provided. Customer should review Front Accessible factory supplied approval or record drawings to determine provisions for equipment handling and moving around obstructions at site. For questions on Front Accessible Switchgear, contact your local Schneider Electric Representative.

800–2000 A Feeder	Cable Compartment	800–2000 A Feeder	Cable Compartment	800–2000 A Feeder	Cable Compartment
800–2000 A Feeder		800–2000 A Feeder		800–2000 A Feeder	
800–2000 A Feeder		800–2000 A Feeder		800–2000 A Feeder	
800–2000 A Feeder		800–2000 A Feeder		800–2000 A Feeder	
	44 in. W		52 in. W		58 in. W

Figure 98 - Available Breaker Positions — Front Accessible Incoming Main without Feeder Sections

NOTE: Not convertible for future circuit breaker use. Height including roof ventilation boxes is 94.75 in. (2407 mm). 26 in. wide Incoming Main section is not available for SPD, Relay Class CT or HRGU applications. Main with Feeders section shown below will accommodate more options.

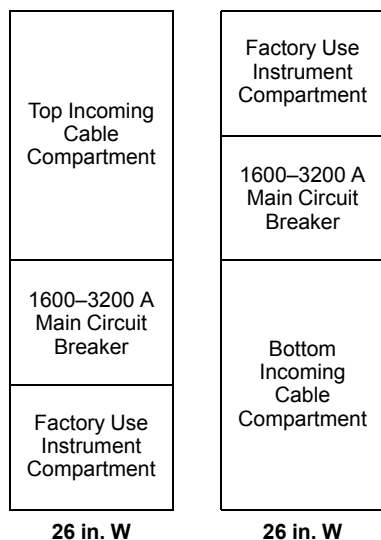


Figure 99 - Available Breaker Positions — Front Accessible Main with Feeder Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including roof ventilation boxes is 94.75 in. (2407 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Final arrangement will be based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75° C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Front Accessible Switchgear may require longer and heavier shipping splits than traditional Rear Accessible Switchgear. In some Front Accessible cases 92 in. wide (2235.2 mm) and 8000 lb. (3629 kg) shipping splits will be provided. Customer should review Front Accessible factory supplied approval or record drawings to determine provisions for equipment handling and moving around obstructions at site. For questions on Front Accessible Switchgear, contact your local Schneider Electric Representative.

Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Top Main Entry	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Bottom Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit Only)	Feeders Cable Compartment
1600–3200 A Bottom Entry Main	Incoming Mains Cable Compartment	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
Factory Use Instrument Compartment	Incoming Mains Cable Compartment	1600–3200 A Top Main Entry	800–2000 A Feeder (Bottom Exit Only)	800–2000 A Feeder (Bottom Exit Only)	Feeders Cable Compartment
800–2000 A Feeder (Top Exit Only)	Incoming Mains Cable Compartment	1600–3200 A Bottom Entry Main	800–2000 A Feeder (Top Exit Only)	800–2000 A Feeder (Top Exit	

58 in. W required for 4-Wire neutral or Surge Protective Device options.

Figure 100 - Available Breaker Positions — Front Accessible Tie Sections

NOTE: Any main, tie, or feeder compartment positions may be used as a blank, or instrument compartment. Not convertible for future circuit breaker use. Height including roof ventilation boxes is 94.75 in. (2407 mm).

It is required to use the Schneider Electric Low Voltage Drawout product selector tool for proper layout. Some arrangements may not be possible due to factors such as conduit space, cable sizing, system bus ampacity, etc. Final arrangement will be based on conduit entry space available. All conduit entry space is calculated based on 500 kcmil copper cables in 3.5 in. conduits. Cables are assumed to have 90°C insulation rating and sized per 75°C tables in NEC Table 310.16. Operating load current of sections cannot exceed main(s) ampacity.

Front Accessible Switchgear may require longer and heavier shipping splits than traditional Rear Accessible Switchgear. In some Front Accessible cases 92 in. wide (2235.2 mm) and 8000 lb. (3629 kg) shipping splits will be provided. Customer should review Front Accessible factory supplied approval or record drawings to determine provisions for equipment handling and moving around obstructions at site. For questions on Front Accessible Switchgear, contact your local Schneider Electric Representative.

Factory Use Instrument Compartment	Factory Use Instrument Compartment	Feeders Cable Compartment
1600–3200 A Tie	1600–3200 A Tie	
Blank/ Instrument Compartment	800–2000 A Feeder	
Blank/ Instrument Compartment	800–2000 A Feeder	
22 in. W Tie without Feeders³⁸		44 in. or 52 in. W Tie with Feeders option³⁸

Factory Use Instrument Compartment	800–2000 A Feeder	Feeders Cable Compartment
1600–3200 A Tie	800–2000 A Feeder	
Blank/ Instrument Compartment	800–2000 A Feeder	
Blank/ Instrument Compartment	800–2000 A Feeder	

66, 74, or 80 in. W Tie with Bus Transition³⁸

38. Bus Transition Section is required when Main Entry direction is the same for both mains. Transition section can include feeders as shown and may be extended to 74 in. or 80 in. W. Lineups with 2 Utility Mains and opposite entry (i.e. one main top incoming and one main bottom incoming) do not need a bus transition section.

Figure 101 - Front View, NEMA 1, Rear Accessible, Non-Arc Resistant Low Voltage Switchgear

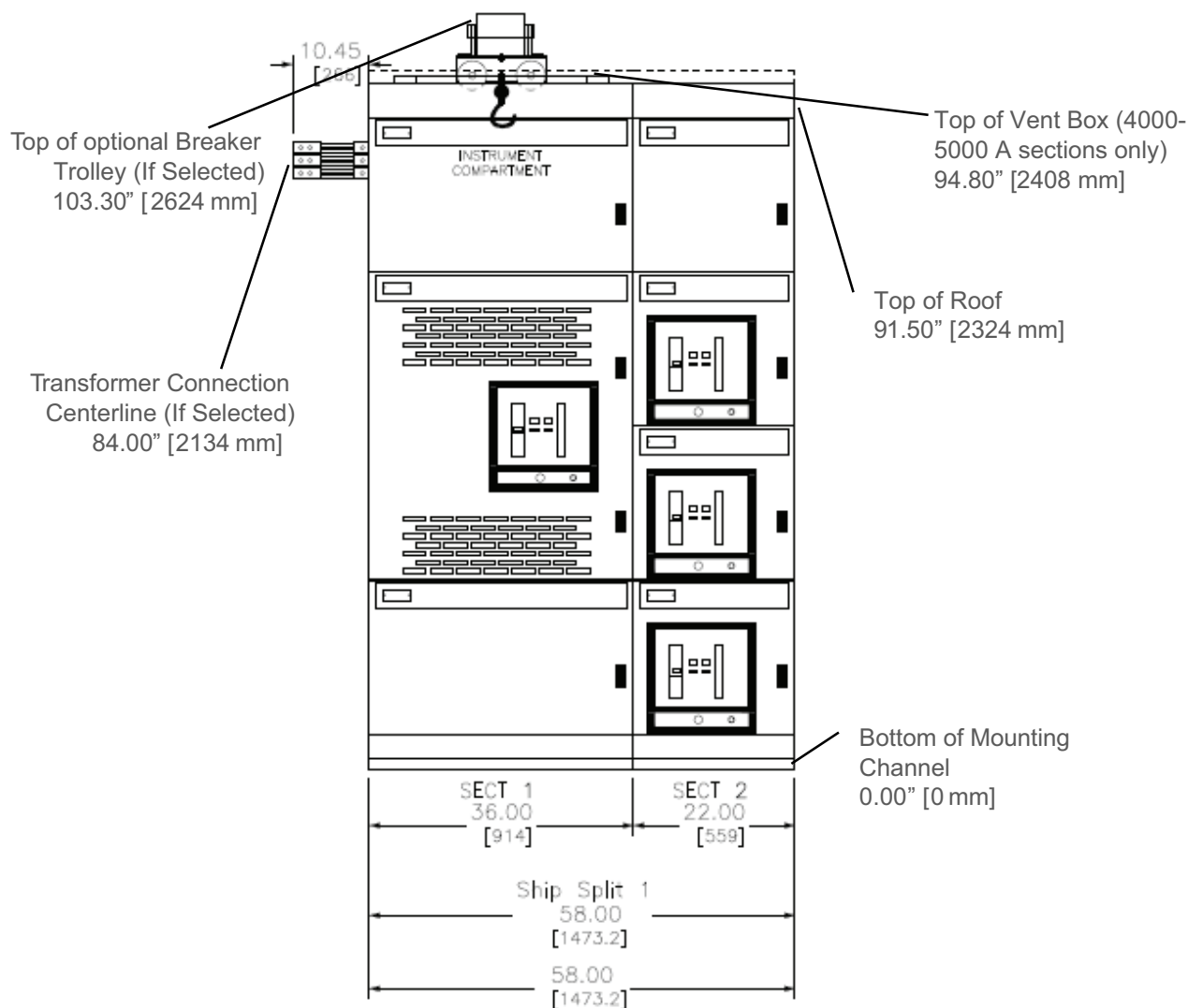


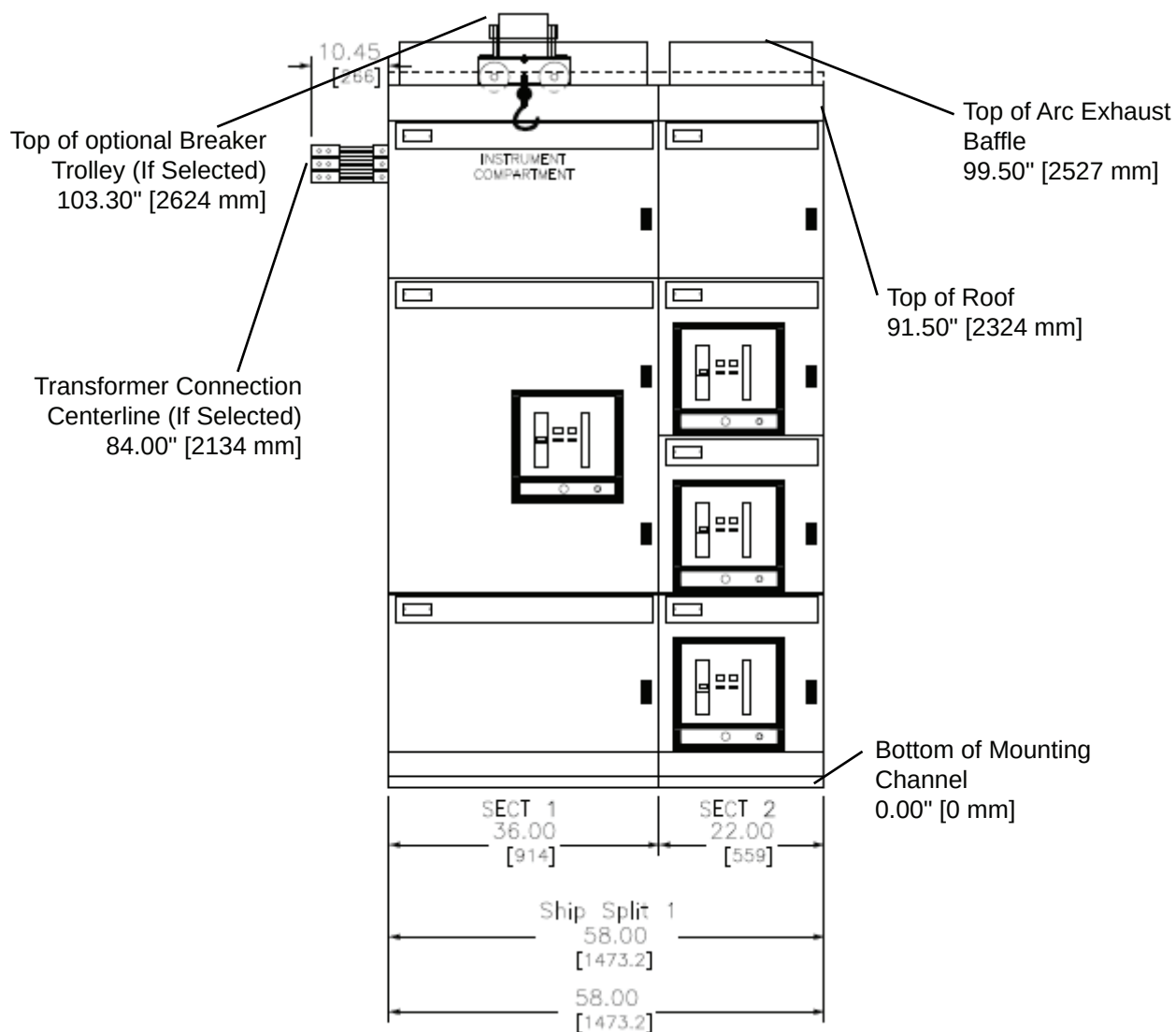
Figure 102 - Front View, NEMA 1, Rear Accessible, Arc Resistant Low Voltage Switchgear (with Baffle Option)

Figure 103 - Front View, NEMA 1, Rear Accessible, Arc Resistant Low Voltage Switchgear (with Plenum Option)

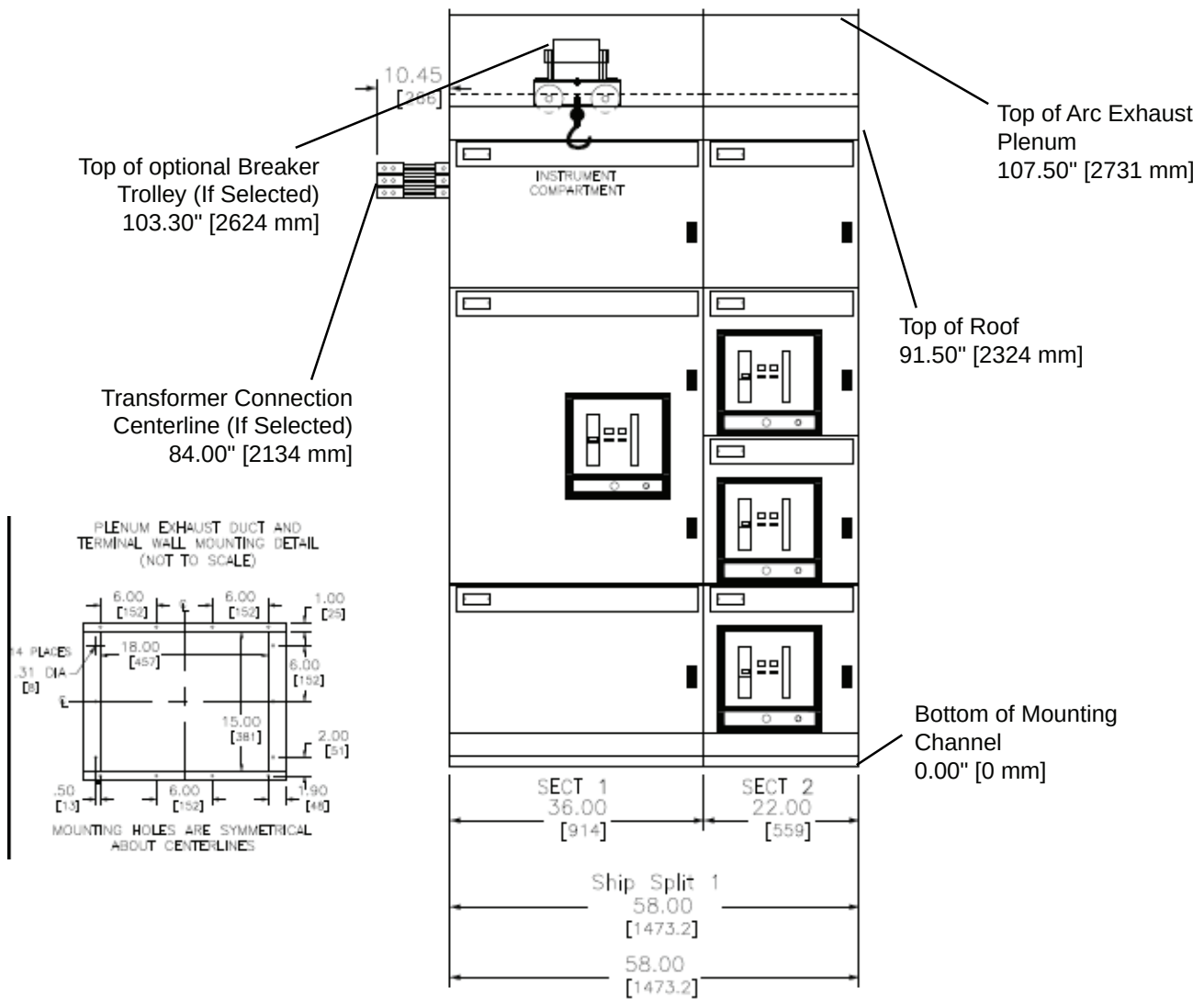


Figure 104 - Front View, NEMA 1, Front Accessible, Low Voltage Switchgear

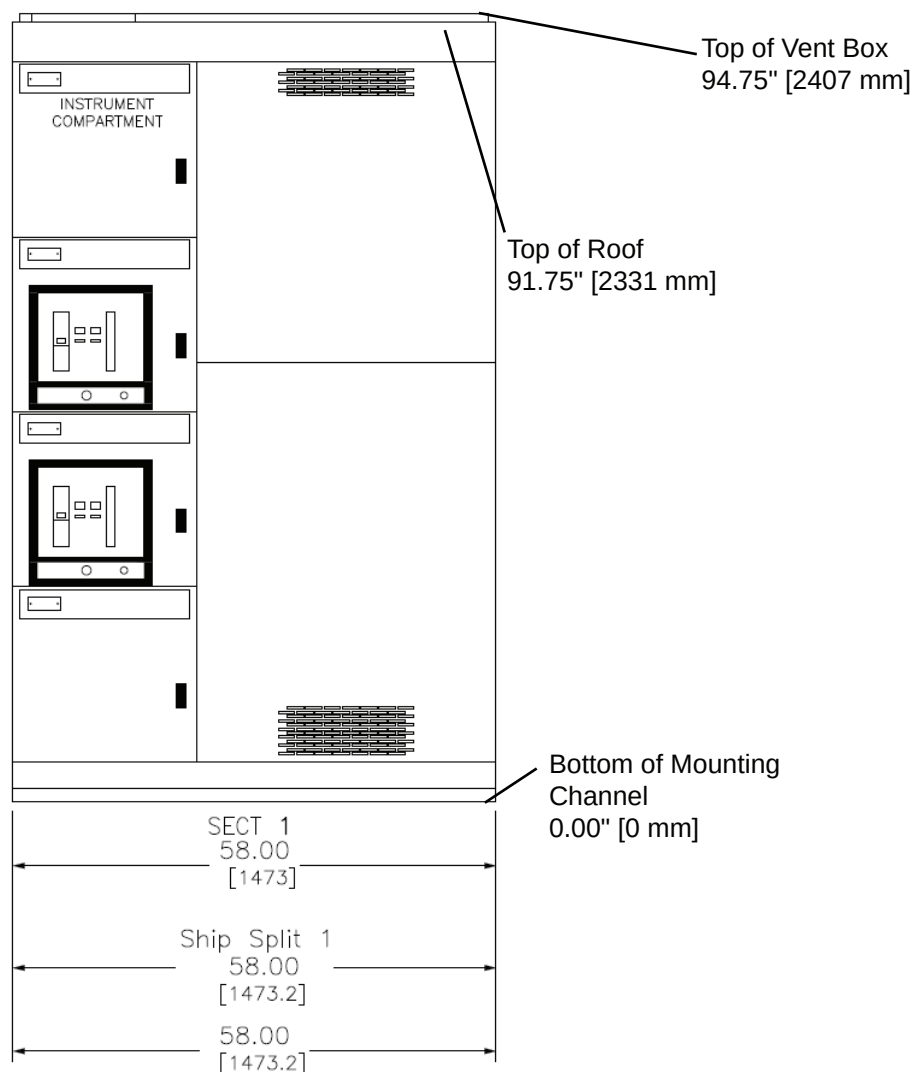


Figure 105 - Front View, NEMA 3R Walk-in Low Voltage Switchboard/Switchgear

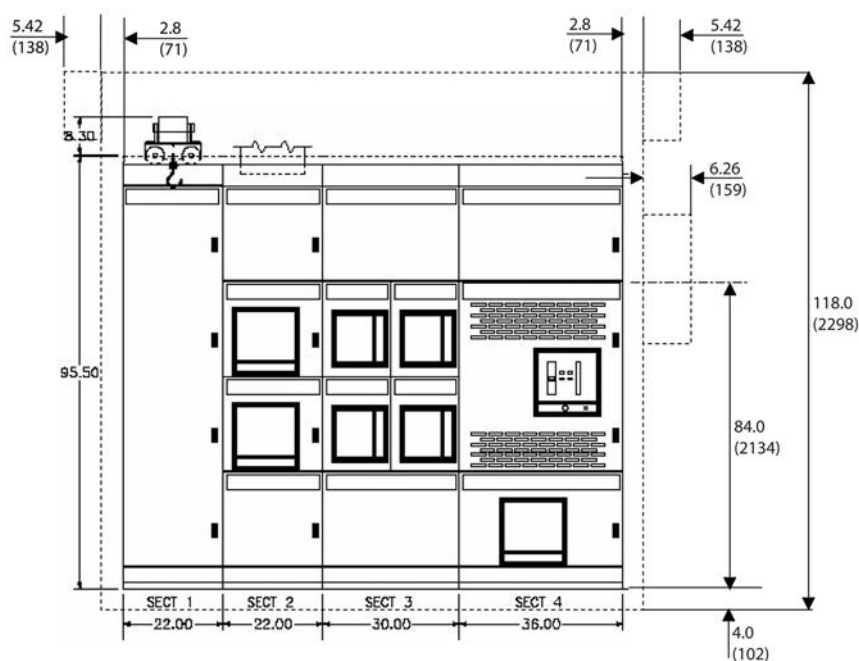
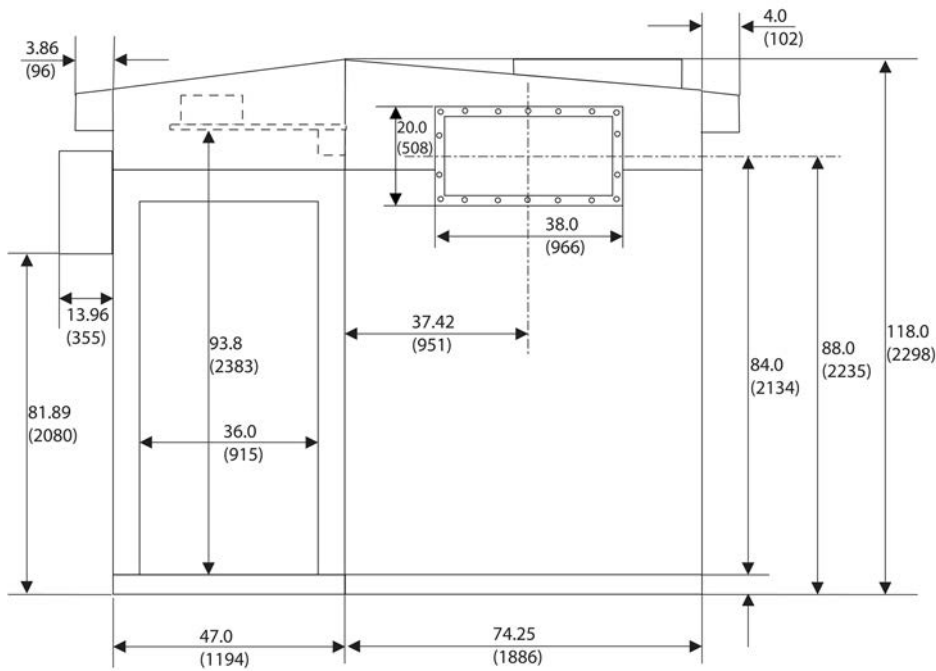
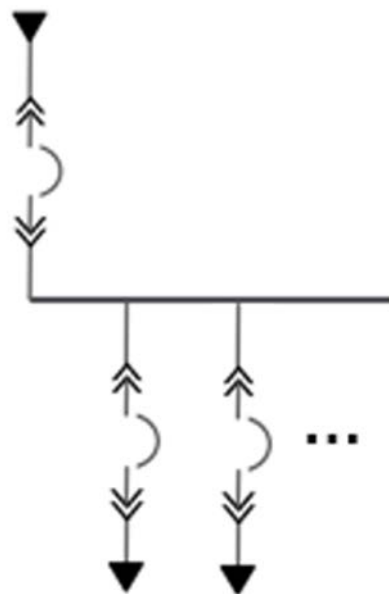


Figure 106 - Right Side View, NEMA 3R Walk-in Low Voltage Switchboard/Switchgear



System Source Applications and Selection

Single Main

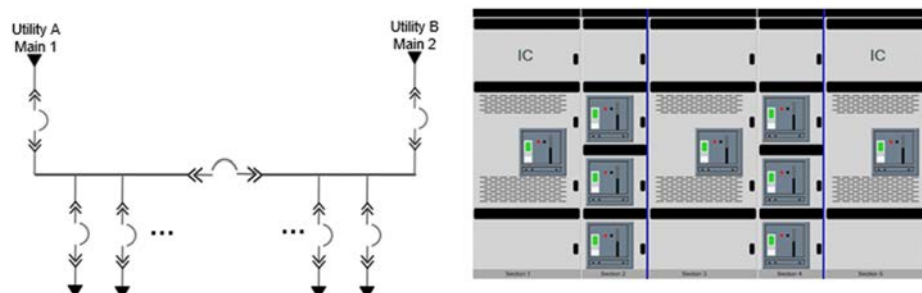


Lineup contains only one(1) incoming main from utility, transformer, or generator. The purpose of the single main is to disconnect all incoming conductors from the source.

- Source may be connected to the lineup via Cable, Close Coupled to Transformer or Busway.
- No tie breakers are required in Single Main configuration.

Main can be top or bottom incoming. The Main can be on the left or right side of the lineup. All feeders on left located main can only be located to the right of the main. All feeders on right located main can only be located to the left of the main.

End Fed Main-Tie-Main

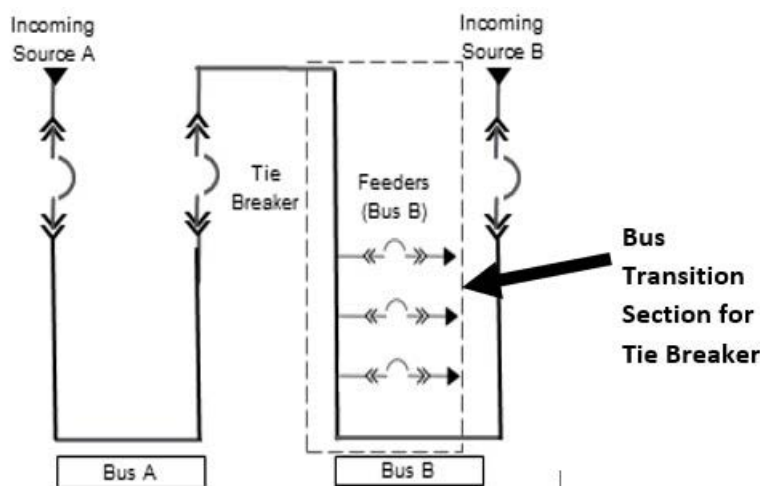


Lineup contains two (2) incoming mains from utility or upstream transformer. The purpose of the Main-Tie-Main configuration is to allow the feeders to be supplied power from 2 sources with a tie breaker disconnect between Bus "A" and Bus "B". The normally open tie isolates the 2 buses both electrically (when open) and physically with barriers. In case one utility main is unavailable the feeders can all be fed from the remaining available source by closing the tie. The opening and closing of the mains/tie for various operating conditions are controlled by automatic source controllers or key interlocking.

- Sources may be connected to the lineup via Cable, Close Coupled to Transformer or Busway

Mains can be the same incoming direction (both top, both bottom) or be top incoming on one and bottom incoming on the other. End Fed Main-Tie-Main will have the main disconnects physically and electrically located at the left and right ends of the lineup. All feeders will be in between the mains and separated by the tie as shown in the figure above.

When both mains have incoming direction the same the tie breaker must have an additional bus transition section on its right side to properly locate the horizontal cross bus to the top or bottom.

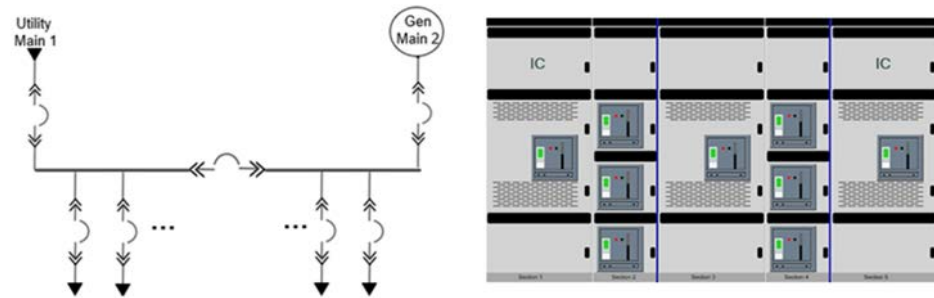


In the case of the 2 mains having different incoming directions the addition of a bus transition is not necessary.

NOTE: There are options in how the tie physically connects Bus A to Bus B as follows: Bus (default), Cable (optional) and Busway (Optional).

Multiple Tie Breakers are available by contacting the Schneider Electric factory.

End Fed Main-Tie-Generator

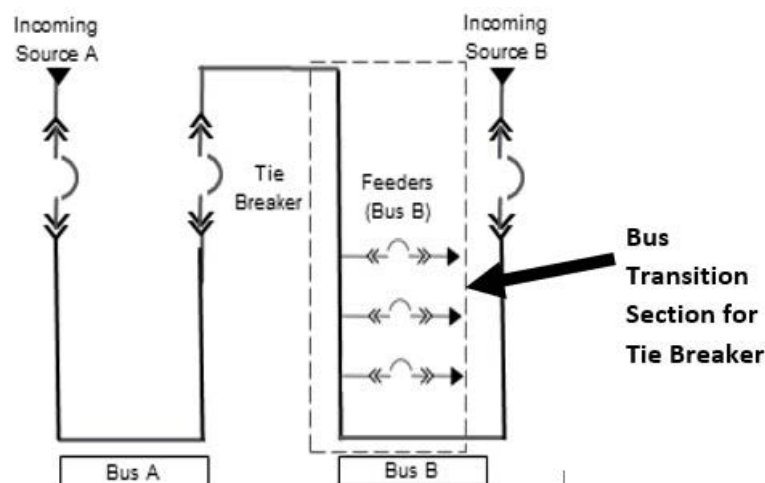


Lineup contains one (1) incoming main from utility or upstream transformer AND one (1) incoming main disconnect for backup generator source. The purpose of the Main-Tie-Generator configuration is to allow all feeders in the lineup to be supplied power from Main 1 (normally closed) and the Tie breaker (normally closed). The Generator and its Main 2 (normally open) are available as a backup source in case the Main 1 source is unavailable. The Tie breaker opens during a transfer to the generator. The opening and closing of the mains/tie for various operating conditions are controlled by automatic source controllers or key interlocking.

- Sources may be connected to the lineup via Cable, Close Coupled to Transformer or Busway (

Mains can be the same incoming direction (both top, both bottom) or be top incoming on one and bottom incoming on the other. End Fed Main-Tie-Generator will have the main disconnects physically and electrically located at the left and right ends of the lineup and cannot be moved. The Generator Main can be selected to be on the right or left end of the lineup. All feeders will be in between the mains and separated by the tie as shown in the figure above.

When both mains have incoming direction the same the tie breaker must have an additional bus transition section on its right side to properly locate the horizontal cross bus to the top or bottom.



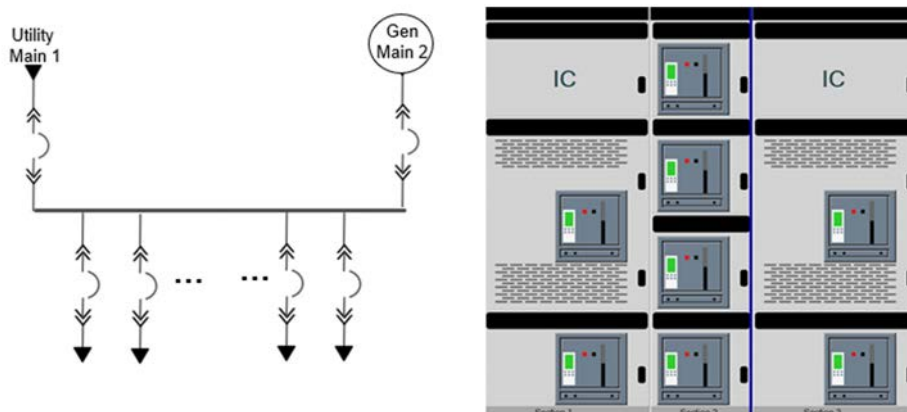
In the case of the 2 mains having different incoming directions the addition of a bus transition is not necessary.

NOTE: There are options in how the tie physically connects Bus A to Bus B as follows: Bus (default), Cable (optional) and Busway (Optional).

End Fed Main-Tie-Generator allows for a maximum two (2) Main Breakers. When more than 2 incoming mains with options are required contact Schneider Electric factory.

Multiple Tie Breakers are available by contacting the Schneider Electric factory.

End Fed Main-Generator

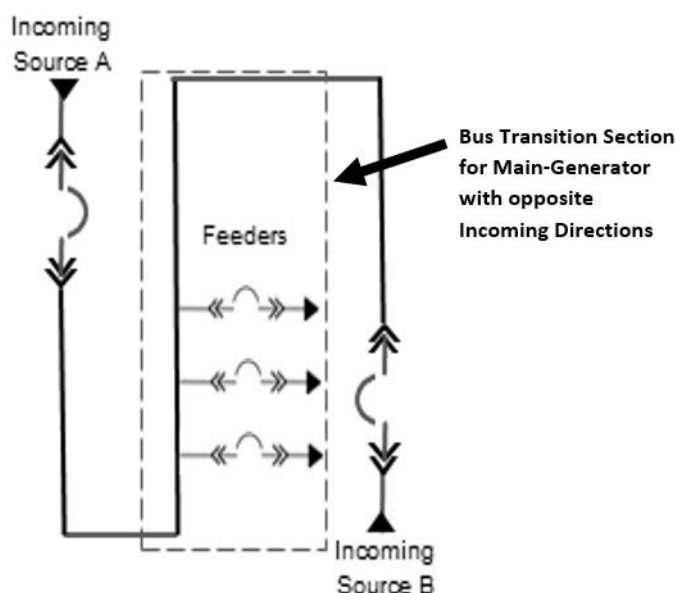


Lineup contains one (1) incoming main from utility or upstream transformer AND one (1) incoming main disconnect for backup generator source. The purpose of the Main-Generator configuration is to allow all feeders in the lineup to be supplied power from Main 1 (normally closed). The Generator and its Main 2 (normally open) are available as a backup source in case the Main 1 source is unavailable or there is a source 1 power failure. The opening and closing of the mains for various operating conditions are controlled by automatic source controllers or key interlocking.

- Sources may be connected to the lineup via Cable, Close Coupled to Transformer or Busway.

Mains can be the same incoming direction (both top, both bottom) or be top incoming on one and bottom incoming on the other. End Fed Main-Generator will have the main disconnects physically and electrically located at the left and right ends of the lineup and cannot be moved. The Generator Main can be selected to be on the right or left end of the lineup. All feeders will be in between the mains as shown in the figure above.

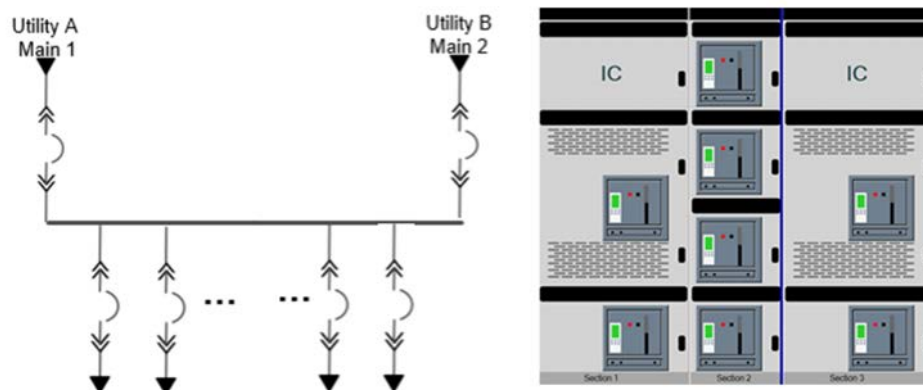
NOTE: When the incoming directions of the mains are different, a minimum lineup of 3 sections is needed to account for an additional section needed to transition the horizontal cross bus location.



In the case of the 2 mains having same incoming directions the addition of a bus transition is not necessary.

End Fed Main-Generator allows for a maximum two (2) Main Breakers. When more than 2 incoming mains with options are required contact Schneider Electric factory.

End Fed Main-Main

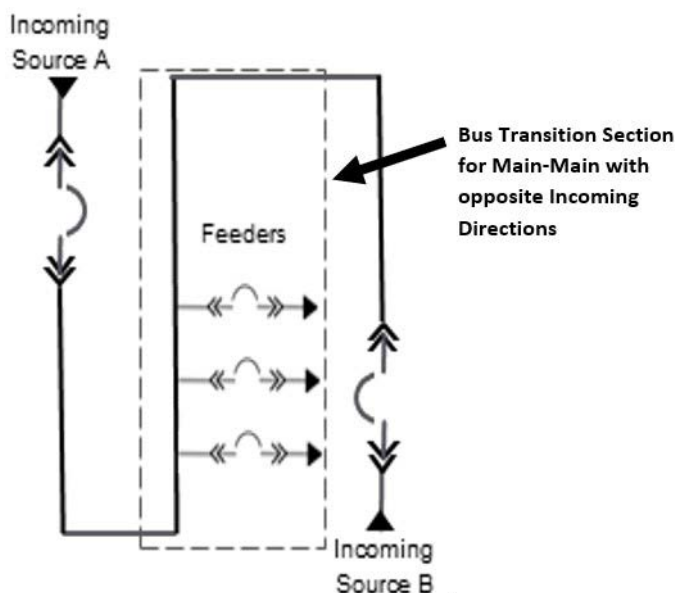


Lineup contains two (2) incoming mains from utility or upstream transformer. The purpose of the Main-Main configuration is to allow all feeders in the lineup to be supplied power from Main 1 (normally closed). Main 2 (normally open) is available as a backup source in case the Main 1 source is unavailable or there is a source 1 power failure. The opening and closing of the mains for various operating conditions are controlled by automatic source controllers or key interlocking.

- Sources may be connected to the lineup via Cable, Close Coupled to Transformer or Busway.

Mains can be the same incoming direction (both top, both bottom) or be top incoming on one and bottom incoming on the other. End Fed Main-Main will have the main disconnects physically and electrically located at the left and right ends of the lineup and cannot be moved. All feeders will be in between the mains as shown in the figure above.

NOTE: When the incoming directions of the mains are different, a minimum lineup of 3 sections is needed to account for an additional section needed to transition the horizontal cross bus location.



In the case of the 2 mains having same incoming directions the addition of a bus transition is not necessary.

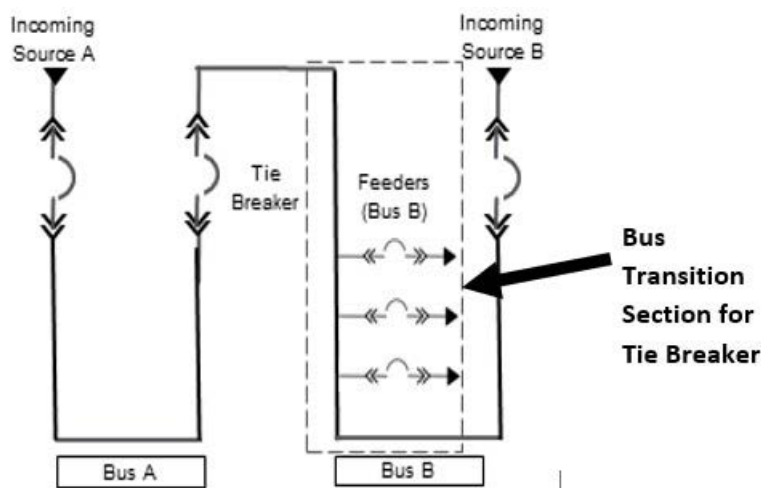
If more than 2 incoming mains are required contact Schneider Electric factory.

Center Fed Main-Tie-Main



Similar in features to the End Fed Main-Tie-Main except Center Fed Main-Tie-Main will have the main disconnects physically and electrically located in between **all** feeders. All feeders will be located to the right or left of the mains and separated by the tie as shown in the figure above. Feeders cannot be placed in between the mains as this would not be a Center Fed topology.

When both mains have incoming direction the same the tie breaker must have an additional bus transition section on its right side to properly locate the horizontal cross bus to the top or bottom. In the case of Center Fed Main-Tie-Main.



NOTE: Feeders allowed in this section if the lineup is End Fed configuration. Feeders are NOT allowed in this section if the lineup is Center Fed configuration.

In the case of the 2 mains having different incoming directions the addition of a bus transition is not necessary.

NOTE: In Center Fed Main-Tie-Main configurations the Tie breaker is not allowed to be split from the lineup and therefore only the bussed tie connection is available.

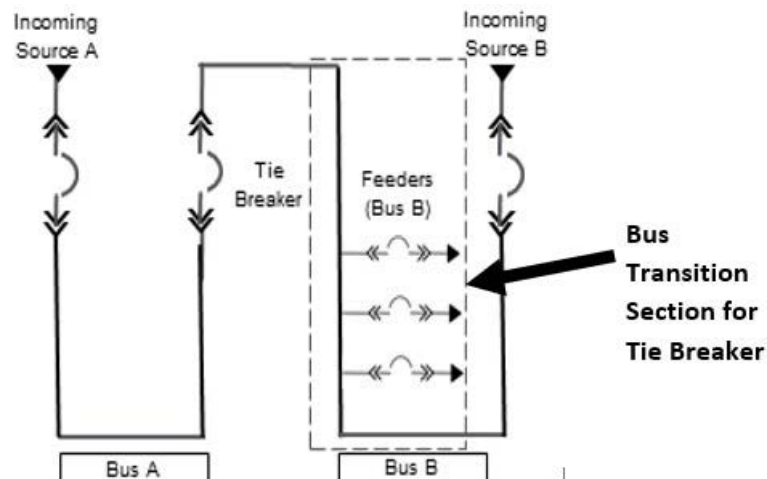
Multiple Tie Breakers are available by contacting the Schneider Electric factory.

Center Fed Main-Tie-Generator



Similar in features to the End Fed Main-Tie-Generator except Center Fed Main-Tie-Generator will have the main disconnects physically and electrically located in between **all** feeders. The Generator Main can be selected to be on the right or left side of the tie in the lineup. All feeders will be located to the right or left of the mains and separated by the tie as shown in the figure above. Feeders cannot be placed in between the mains as this would not be a Center Fed topology.

When both mains have incoming direction the same the tie breaker must have an additional bus transition section on its right side to properly locate the horizontal cross bus to the top or bottom. Feeders **cannot** be placed in this additional bus transition section in the case of Center Fed Main-Tie-Main.



NOTE: Feeders allowed in this section if the lineup is End Fed configuration. Feeders are NOT allowed in this section if the lineup is Center Fed configuration.

In the case of the 2 mains having different incoming directions the addition of a bus transition is not necessary.

NOTE: In Center Fed Main-Tie-Generator configurations the Tie breaker is not allowed to be split from the lineup and therefore only the bussed tie connection is available.

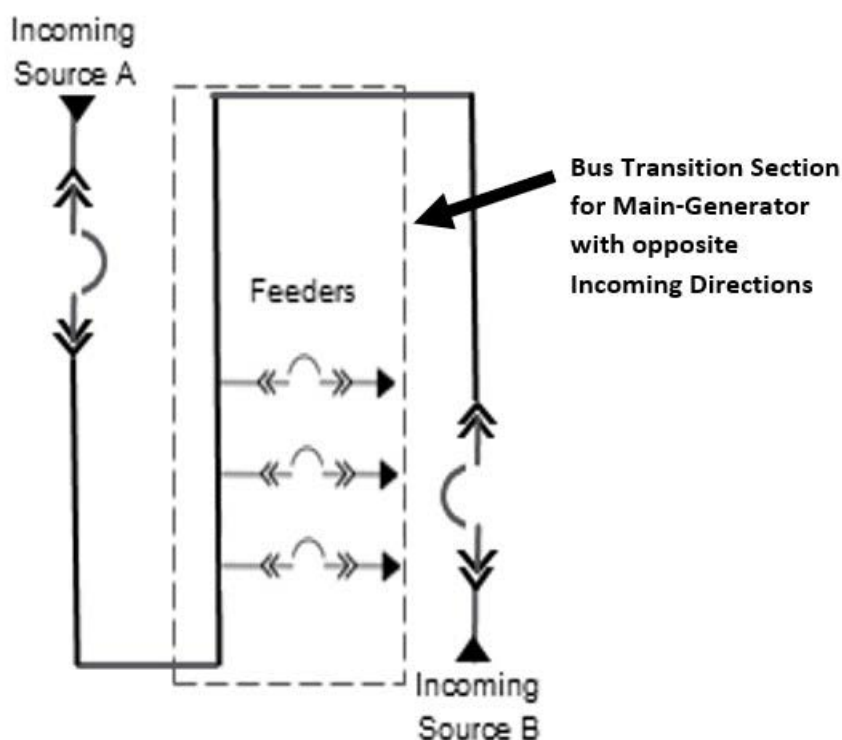
If more than one Tie Breaker or multiple Generator Breakers are required contact the Schneider Electric factory.

Center Fed Main-Generator



Similar in features to the End Fed Main-Generator except Center Fed Main-Generator will have the main disconnects physically and electrically located in between **all** feeders. The Generator Main can be selected to be on the right or left side of the utility main. All feeders will be located to the right or left of the mains as shown in the figure above. Feeders cannot be placed in between the mains as this would not be a Center Fed topology.

NOTE: When the incoming directions of the mains are different, a minimum lineup of 3 sections is needed to account for an additional section needed to transition the horizontal cross bus location. Feeders **cannot** be placed in this additional bus transition section in the case of Center Fed Main-Generator.

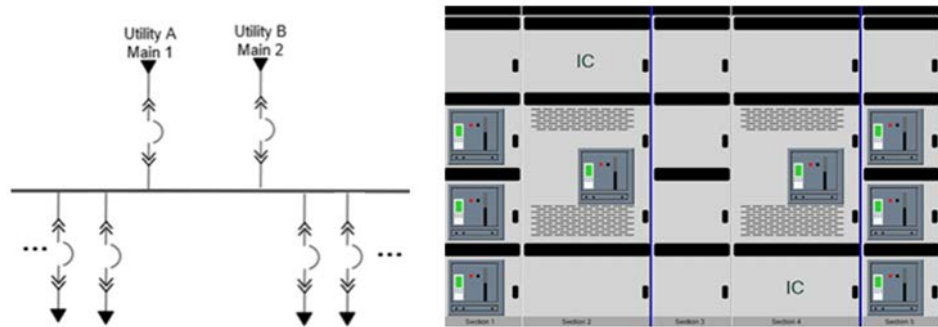


NOTE: Feeders allowed in this section if the lineup is End Fed configuration. Feeders are NOT allowed in this section if the lineup is Center Fed configuration.

In the case of the 2 mains having same incoming directions the addition of a bus transition is not necessary.

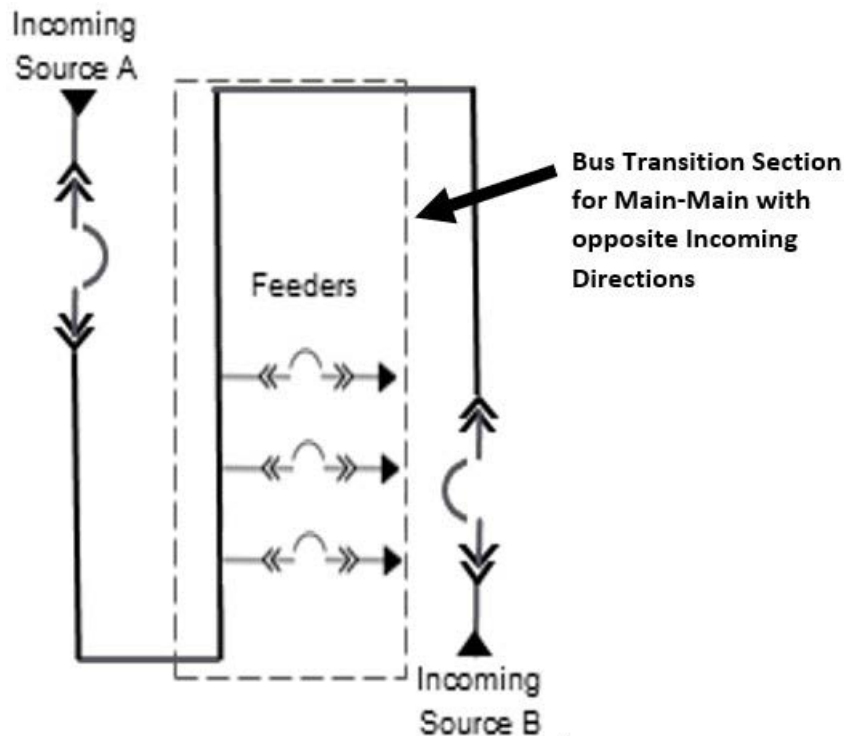
If more multiple Generator Breakers are required contact the Schneider Electric factory.

Center Fed Main-Main



Similar in features to the End Fed Main-Main except Center Fed Main-Main will have the main disconnects physically and electrically located in between **all** feeders. All feeders will be located to the right or left of the mains as shown in the figure above. Feeders cannot be placed in between the mains as this would not be a Center Fed topology.

NOTE: When the incoming directions of the mains are different, a minimum lineup of 3 sections is needed to account for an additional section needed to transition the horizontal cross bus location. Feeders **cannot** be placed in this additional bus transition section in the case of Center Fed Main-Main.

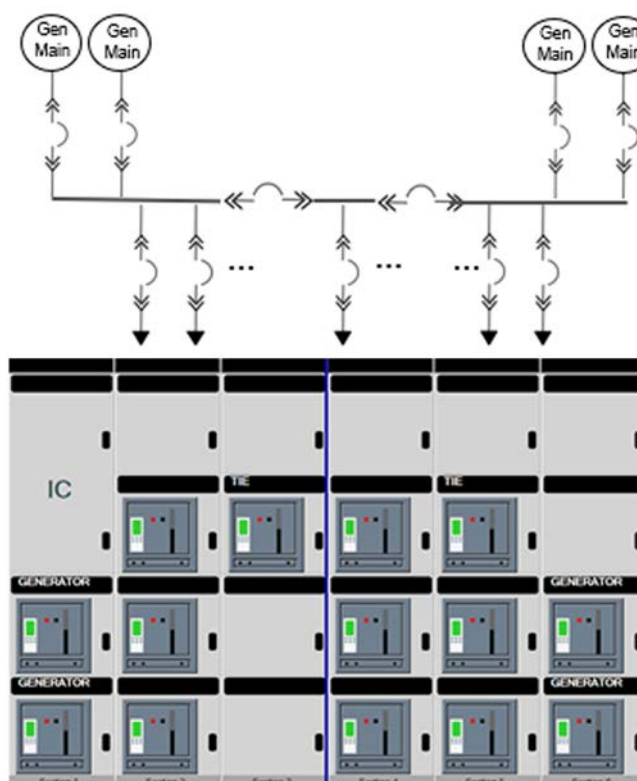


NOTE: Feeders allowed in this section if the lineup is End Fed configuration. Feeders are NOT allowed in this section if the lineup is Center Fed configuration.

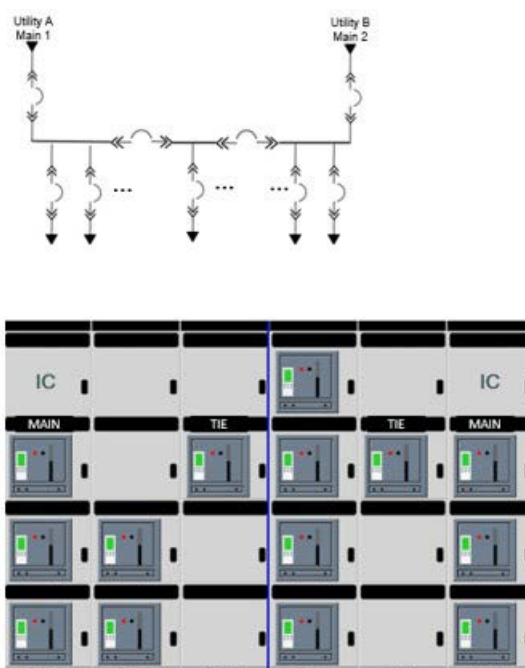
In the case of the 2 mains having same incoming directions the addition of a bus transition is not necessary.

If more than 2 incoming mains are required contact Schneider Electric factory.

Parallel Generators



End Fed Main-Tie-Tie-Main



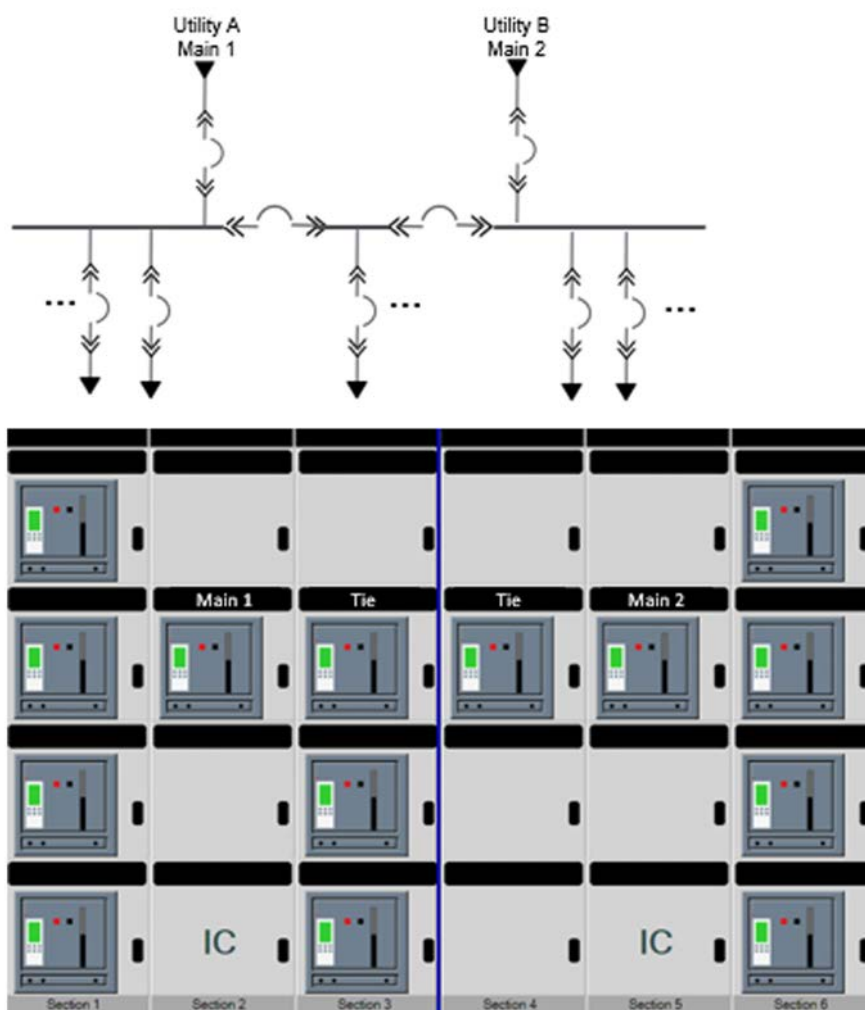
Lineup contains two (2) incoming mains from utility or upstream transformer AND two (2) tie breakers. The purpose of the Main-Tie-Tie-Main configuration is to allow the feeders to be supplied power from 2 sources with two (2) tie breaker disconnects between Bus "A" and Bus "B". In the normal state one tie is closed and one is open. The two (2) ties configuration provides additional maintenance advantages vs. one (1) tie configuration. For example, maintenance can be performed on one of the ties creating a state where it is fully de-energized on both sides by opening the other tie (assuming the ties are in separate sections and the

main feeding the corresponding tie is open). Additionally, for load flexibility feeders can be added between the two (2) tie breakers to allow either bus to feed loads between the ties in case one source is unavailable. Both ties can be opened to de-energize the loads between them.

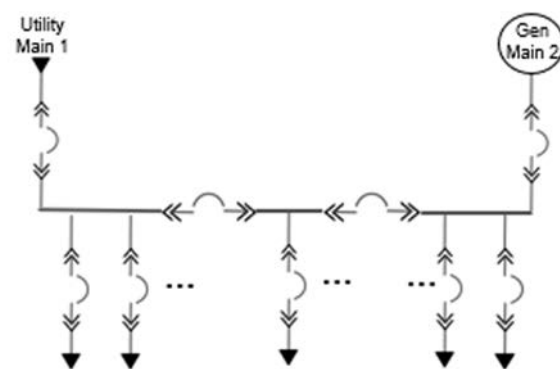
Much like the single tie configuration, in case one utility main is unavailable the feeders can all be fed from the remaining available source by closing both ties. The opening and closing of the mains/ties for various operating conditions are controlled by automatic source controllers or key interlocking.

Sources may be connected to the lineup via Cable, Close Coupled to Transformer or Busway.

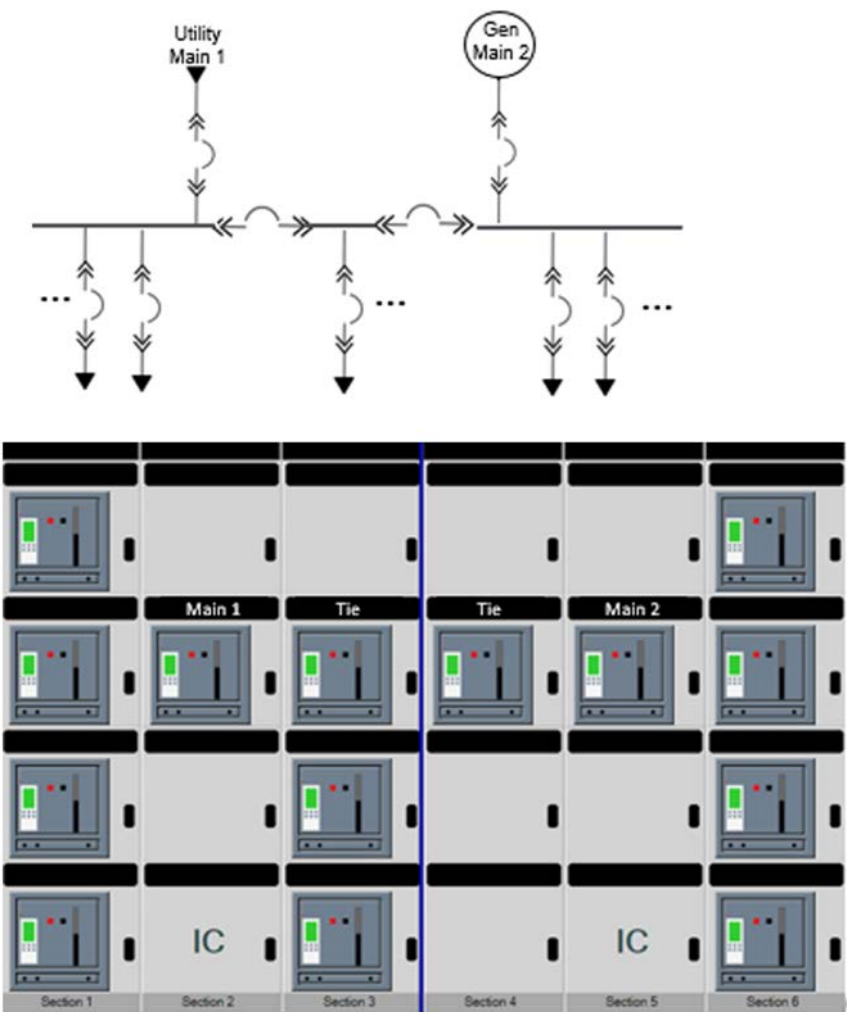
Center Fed Main-Tie-Tie-Main



End Fed Main-Tie-Tie-Generator



Center Fed Main-Tie-Tie-Generator



Weights

Refer to the shipping documents for the actual weights and dimensions. The weights given here are approximate values. Must add breaker weights for each breaker from **Circuit Breaker Cell Weights (lbs/kg)**, page 159 to the section weights in **Section Weights (lbs/kg)**, page 159.

Table 16 - Circuit Breaker Cell Weights (lbs/kg)

Breaker Frame Amps	No. of Poles	Filled Breaker Space	Prepared Space only
800 Amp (MTZ1/NT)	3 Pole (single wide)	91/42	51/24
800 Amp (MTZ2/NW)	3 Pole (single wide)	290/132	181/83
1600 Amp			
2000 Amp			
3200 Amp	3 Pole (single wide)	351/160	224/102
3200 Amp	6 Pole (double wide)	673/305	446/203
4000 Amp			
5000 Amp			
1600 Amp	4 Pole (single wide)	367/167	225/103
2000 Amp			
3200 Amp	4 Pole (single wide)	444/202	279/127
3200 Amp	8 Pole (double wide)	847/385	552/251
4000 Amp			
5000 Amp			

Table 17 - Section Weights (lbs/kg)

Section Contains only 3/6 Pole Circuit Breaker on No Circuit Breakers ³⁹			
Bus Rating	22-in. Wide ⁴⁰	30-in. Wide	36-in. Wide ⁴¹
1600-2000 Amp	1200/545	1250/567	1300/590
3200 Amp	1400/635	1450/658	1500/681
4000-5000 Amp	1700/772	1750/794	1800/817
Section Contains at least one 4/8 Pole Circuit Breaker			
Bus Rating	30-in. Wide	48-in. Wide	
1600-2000 Amp	1750/794	3575/1622	
3200 Amp	2025/918	3575/1622	
4000-5000 Amp	2025/918	3575/1622	

Consult factory or quotation drawings for other section types.

39. Weights listed are for NEMA Type 1, 72-in. D. For NEMA Type 3R Walk-In, add 645 lbs for each 22-in. wide section, add 782 lbs for each 30-in. wide section and add 926 lbs for each 36-in. wide section.

40. Add 110 lbs for Arc Resistant 22-in. wide section. Add 28 lbs for baffles or 233 lbs for plenums per every 2 sections.

41. Add 140 lbs for Arc Resistant 36-in. wide section. Add 40 lbs for baffles or 250 lbs for plenums per every 2 sections.

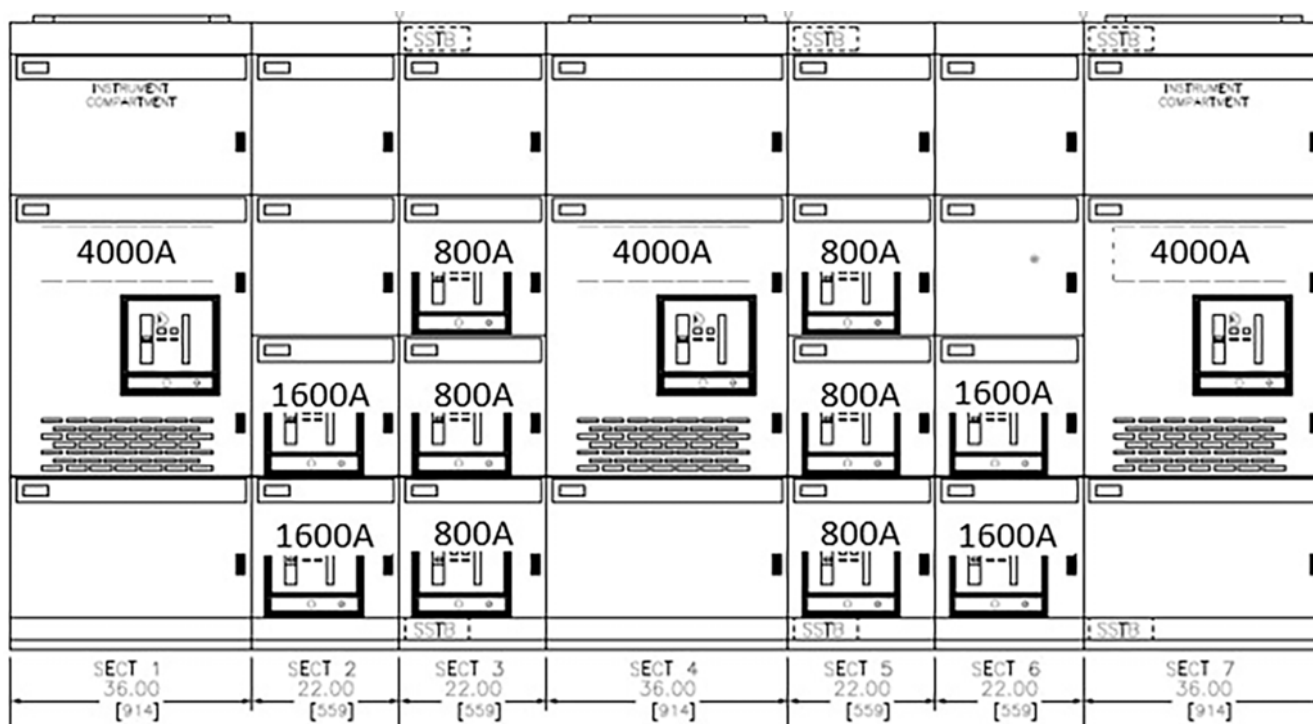
Heat Loss Estimates

Table 18 - Heat Loss Estimates for Sizing of Environmental Provisions

Breaker Frame Amps	Watts Loss @ Load = 100% of Rating ⁴²	Notes	7 Section MTM Example (shown below)	Prepared Space only
800 Feeder (MTZ2/NW)	200	Includes losses for Breaker +Vertical Riser Bus+Cable+Lugs	6 @ 80% load	768
1600 Feeder	450		4 @ 75% load	1013
2000 Feeder	550			
3200 Main/Tie	1562			
4000 Main/Tie	1738		3 @ 100% load	5214
5000 Main/Tie	3022			
Section Cross Bus Amps		Includes losses for Thru Bus only		
1600	171	22 in. W (for 30 in. W add 33%)		
2000	267			
3200	325			
4000	831	22 in. W/30 in. W/ 36 in. W	7	5817
5000	1163			
			Total	12812

Calculate total Losses by adding all Breaker Frame losses + all Section Cross Bus losses for each breaker/section in the lineup.

For more accurate data, contact Schneider Electric for pricing of either Level 1 Lineup Specific Calculations or Level 2 Full Thermal Analytics Study.



42. For Watts Loss values at actual load amps less than 100% of values above, derate by the square of the actual load % (i.e. new Watts_{actual} = (I_{actual}/I_{100% load})² x Watts_{100% load})

Power-Zone 4 Switchgear Specification

Please refer to the following specifications:

26 23 00 Low Voltage Switchgear, Power-Zone 4 CSI Specification.

Schneider Electric
800 Federal Street
Andover, MA 01810
USA

888-778-2733

www.se.com

As standards, specifications, and design change from time to time,
please ask for confirmation of the information given in this publication.

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