Low-voltage power distribution and control systems > Switchboards >

Pow-R-Line *i*X switchboard

Contents

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Application Considerations and Definitions

Eaton's Pow-R-Line® family of distribution switchboards incorporates new design concepts that fit the ever-increasing need for applications on high short-circuit systems, while retaining maximum flexibility, safety and convenience throughout the line.

Front-Access

Front-access switchboards align at the rear, enabling them to be placed against a wall (Type Pow-R-Line Xpert™ front accessible). If the main section is deeper than others, due to physical size of the main device, the necessary offset in lineup will occur in front, and the main section will be accessible from the side as well as from the front. Eaton also offers front-accessible switchboards that align at the front and rear.

Front- and Rear-Access

Front- and rear-access switchboards align at the front and the rear. Bus maintenance and cable entry and exit require rear access. There are two types of rear-accessible switchboards. Both types use the same incoming utility and/or main structures. The first type uses group-mounted feeder devices with panel construction (Type Pow-R-Line Xpert front and rear accessible). The second type uses individually compartmentalized feeder devices with load side insulated bus bar extensions (Type Pow-R-Line *i*X).

Individually Mounted

Larger overcurrent protective devices (OCPD) may be individually mounted. In most cases, this means that the OCPD is mounted vertically in the switchboard and is connected via bus bar. All insulated case circuit breakers, power air circuit breakers and bolted pressure contact switches are individually mounted. Molded case circuit breakers 600 A and above may be individually mounted when used as a main or as a feeder device feeding other OCPD within a section or adjacent sections.

Compartmentalized Feeder and Branch Devices

Compartmentalized molded case circuit breakers and fusible switches provide additional isolation. Individually mounted molded case circuit breakers and fusible switches through 1200 A are available in a compartmentalized, rear-access, rear-connected switchboard. See Pow-R-Line *i*X switchboards in this section for details.

Standard Switchboard Height

Standard Pow-R-Line switchboard height is 90.00 inches (2286.0 mm). Contact Eaton for special heights.

Group Mounting

Group-mounted circuit protective devices are an assembly of units mounted on a panelboard type chassis. Units may be molded case breakers, fusible switches, customer metering and surge protective devices.

A main molded case breaker or main fusible switch, within the sizes listed for panelboard design, can be included in the panel-mounted assembly in lieu of a separate, individually mounted unit.

Space Only for Future Devices Group-Mounted Construction

Where space only for future circuit protective devices is required, the proper space and a blank filler plate will be supplied. Connections and mounting hardware are not included.

Provision for Future Devices

Where provisions for future circuit protective devices are required, space for the device, corresponding vertical bus, device connectors and the necessary mounting hardware will be supplied.

Bus Bar System

Standard bus in the switchboards is tin-plated aluminum. Copper, silver-plated copper or tin-plated copper are also available.

Main bus and sub-main buses meet UL® and NEMA® standards for temperature rise on all Pow-R-Line switchboards. Special density rated bus is available.

Overcurrent Devices

To properly select and size overcurrent devices for use in a switchboard, the allowable temperature rise must be taken into account as to its effect on the tripping characteristics of the devices in question per UL 891.

Accordingly, the NEC® requires overcurrent devices to be rated not less than 125% of the continuous load they are protecting. To comply with this, an 80% derating factor must be used with all overcurrent devices such as molded case breakers and FDPW fusible switches unless they are tested and listed for application at 100% of the rating. All Magnum™ type breakers and bolted pressure switches are 100% rated.

Short-Circuit Rating

Standard bus and connectors on all switchboards are rated for use on systems capable of producing up to 65,000 A rms symmetrical short-circuit current at the incoming terminals.

Increased bus short-circuit ratings equal to that of connected switchboard devices, up to 200,000 A rms symmetrical, are available in most Pow-R-Line Xpert switchboards when approved main devices are installed. UL labeled switchboard sections are marked with their applicable short-circuit rating.

When air power circuit breakers are used as feeder devices in a switchboard, these devices may experience up to a 30-cycle (1/2 second) delay if the instantaneous setting is turned off. Eaton has qualified our low-voltage switchboards when air power circuit breakers are used as feeders (and mains) to 30 cycles. This rating is not recognized under the UL 891 standard. However, Eaton has witness tested the structure bussing with a qualified National RecognizedTesting Laboratory (NRTL) at 30 cycles (1/2 second) up to 100 kAIC symmetrical.

Provision for Busway Entrance and Exit

Busway connections to switchboard sections include cutout and drilling in the top of the switchboard with riser connections from the switchboard device or bus, up to the point where the bus duct enters the switchboard. No connections are furnished external to the switchboard.

In all transactions involving busway attached to switchboards, it is essential that information regarding orientation of the busway with respect to the front of the switchboard be supplied to the coordinating assembly plant.

On Pow-R-Line Xpert switchboards, a solid bus bar is used to connect the bus duct to the individually mounted main device, main or sub-main switchboard bus, or vertical main bus of panel-mounted circuit protective device panels. **Busway fed by group-mounted branch devices are cable connected.**

Aluminum riser connections are standard. Copper- or silver-plated copper is available as an option.

Transitions

Transition structures are required for connecting switchboards to the secondary of power center transformer (fluid filled), motor control centers, and for other special switchboard configurations such as "L" or "U" shaped lineups. In some applications, an extra structure complete with connections is required; in others, where switchboard depth and space permit, only the connection conductors are required. Refer to Eaton for these applications.

Auxiliary Structures

These are normally mounted adjacent to service structures or distribution structures, and used where incoming service or feeder conductors require additional space or facilities not included in the standard switchboard, such as:

1. Mounted adjacent to a top connected service structure and used as a cable pull structure where service conductors are brought in underground. Auxiliary structures are the same depth and height as the service structure, and are wide enough to accommodate the incoming cables.
2. Mounted adjacent to a service structure and used as a bus transition compartment for running riser bus from the load-side of the service structure up to top outgoing bus duct connection when distribution structures are not required. Auxiliary structures are the same depth and height as service structures.

In addition to the above applications, auxiliary structures may be mounted adjacent to a distribution structure and used as a structure for lighting panel or other device that may be cable-connected to a branch circuit device in the distribution structure. Dimensions are compatible with the arrangements required.

Switchboards Used as Service Equipment

Service equipment is the electrical equipment that constitutes the main control and means of power cutoff the electric service (normally Power Company supply) brought into the building.

Where switchboards are to be used as service equipment, certain NEC and UL requirements apply that necessitate modifications not normally supplied in switchboards.

The following is a summary of the requirements that are pertinent to the application of a switchboard for service equipment:

A. A switchboard with main lugs only (no main disconnect) must be designed so that all circuits in the switchboard can be disconnected from the supply source by the operation of no more than six operating handles (breaker or switch).

   Switchboards equipped with main disconnect devices are not subject to the above six disconnect limitation, as the entire board can be de-energized with the main disconnect device.

   Ground fault protection of equipment must be provided for solidly grounded wye electrical services of more than 150 V to ground, but not exceeding 600 V phase-to-phase for each service disconnecting means rated 1000 A or more.

B. For testing purposes, means are also required to disconnect the switchboard neutral bus from the grounded service neutral conductor (single-phase, three-wire; and three-phase, four-wire systems). To comply with this requirement, a removable link (solid bar) is provided in the switchboard neutral bus. This link is generally located near the point where the main feeders enter the switchboard or in the area of the main disconnect device where one is provided.

To further comply with NEC and UL requirements, a separate bonding strap is connected from the neutral bus to the switchboard frame. This bonding connection is located on the line side of the removable neutral link, maintaining a service ground to the switchboard frame when the test link is removed. See **Figure 21.4-1**.

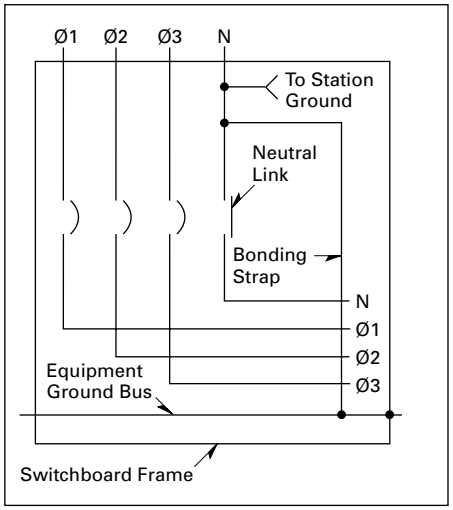


Figure 21.4-1. Neutral Link

UL labeling will clearly indicate service equipment listed switchboards.

Underwriters Laboratories Requirements and Labeling

The basic requirement for obtaining a UL label on a switchboard is that all the component devices (breakers, switches and so on) in the switchboard assembly are UL listed. In addition, the switchboard must comply with all applicable provisions of UL 891.

Today's modern electrical systems require that switchboards offer a wide selection of electrical devices, many of which do not fall within the scope of UL listed devices. Therefore, the conditions under which a switchboard may be labeled are limited.

Listed below are several important guidelines for consideration when a UL label is specified:

1. UL nameplates, where applicable, are supplied for each vertical structure rather than one common nameplate for the complete switchboard lineup. Where all of the component devices in the switchboard are UL listed and all applicable provisions of UL 891 are met, each of the switchboard sections may be labeled.
2. Individual vertical structures of a switchboard may be labeled where they comply with UL requirements, although other vertical structures in the same switchboard lineup may not meet the UL standards, and will not be labeled.
3. All Pow-R-Line Xpert switchboards are UL labeled when all mounted devices are UL listed.

Alternate Power Source Capabilities

Multiple solutions are available to accommodate alternate power sources. Due to the large number of customer and system requirements, details are not provided in this guide. Eaton offers solutions that include main-main and main-tie-main configurations. Automatic transfer equipment, including UL 1008 listed transfer switches and other automatic transfer schemes, are available.

Automatic Transfer Equipment

For continuity of service, automatic transfer equipment between two incoming sources may be required. This equipment transfers the load upon failure of the normal (or preferred) source to the standby (or alternate) source. Upon restoration of the normal source, the load is automatically transferred back to it. To accomplish this, electrically operated main protective devices (and bus tie devices, if required) must be employed. Additional relays also are required to detect source voltage failure and to transfer control power, when required. A manual selector switch is usually provided to select the mode of operation—automatic or manual transfer.

Seismic Qualification

Refer to Power Distribution Systems Design Guides for information on seismic qualification for this and other Eaton products.

Product Overview

Pow-R-Line *i*X switchboards meet NEMA Standard PB-2 and UL 891.

Construction Details

- 4000 A main bus maximum
- Front and rear accessible—main and distribution sections
- Feeder devices individually compartmentalized
- Sections front and rear aligned
- Designed for mounting with code clearance to a wall

Main Devices, Individually Mounted

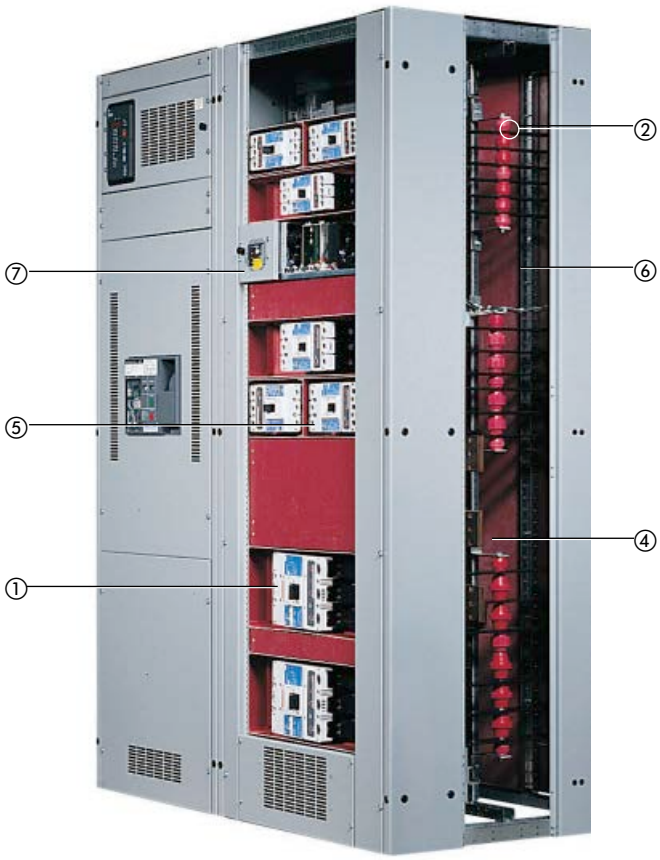
- Power Defense™ molded case circuit breakers, 400–2500 A, fixed or drawout
- Insulated case circuit breakers, Series NRX™ NF, 800–1200 A, fixed and drawout
- Insulated case circuit breakers, Series NRX RF, 800–3000 A, fixed and drawout
- Insulated case circuit breakers, Magnum SB, 800–4000 A
- Air power circuit breakers, Magnum DS, 800–4000 A, fixed or drawout
- Air power circuit breakers with current limiting fuses, Magnum DSL, 800–4000 A
- Bolted pressure switches, 800–4000 A, fixed
- Fusible switches, 400–1200 A, fixed

Pow-R-Line iX Switchboard

Feeder Devices

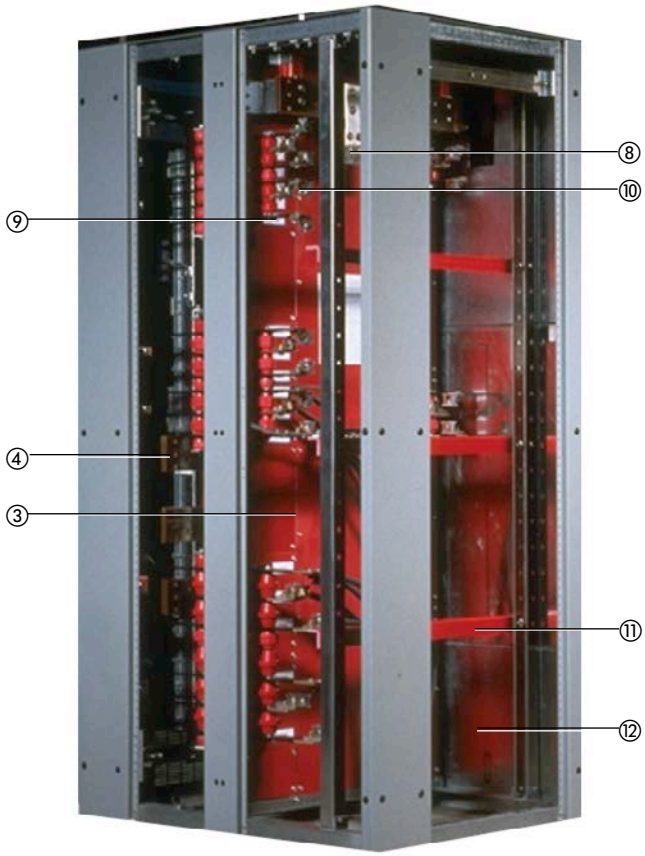
- Molded case circuit breakers, 15–1200 A are compartmentalized
- Molded case circuit breakers above 1200 A are not compartmentalized
- Fusible switches, 100–1200 A
- Insulated case circuit breakers, Magnum SB, 800–4000 A
- Air power circuit breakers, Magnum DS, 800–2000 A
- Bolted pressure switches, 800–2500 A
- Insulated case circuit breakers, Series NRX NF, 800–1200 A, fixed and drawout
- Insulated case circuit breakers, Series NRX RF, 800–3000 A, fixed and drawout
- Trip units that integrate Eaton's Arcflash Reduction Maintenance System™ to reduce potential arc flash
- Integral ground fault protection available in electronic trip units from 15 to 5000 A
- Electronic trip units that integrate zone selective interlocking capabilities available in molded case, insulated case and air power circuit breakers

Pow-R-Line *i*X Construction Features



Distribution Section—Front View

① Glass polyester circuit breaker compartment.
② Insulated copper load side runbacks.
③ Full length barrier isolating the cable compartment.
④ Horizontal cross bus.
⑤ Tandem mounted circuit breakers through 400 A.
⑥ Isolating bus compartment.



Distribution Section—Rear View

⑦ Available zero sequence ground fault.
⑧ Angled neutral connections.
⑨ A, B, C phase connections.
⑩ Anti-turn lugs.
⑪ Movable cable support.
⑫ Generous conduit space.

Pow-R-Line *i*X Switchboards... Greater Flexibility and Increased Safety Features

Eaton's Pow-R-Line *i*X switchboards are engineered in a new compartmentalized design for applications where a greater degree of safety is required. A wide variety of configurations is possible, including utility metering, customer metering, main devices, branch devices, accessories and enclosures.

Significant safety features include:

- Individual compartments for branch devices—glass polyester for circuit breakers and steel for fusible switches. These compartments help eliminate possible contact with the main bus and reduce fault propagation
- Three-section construction with each section barriered from the other
  - Device section: each device is mounted in its own compartment
  - Bus bar section: contains both horizontal and vertical buses
  - Rear cable compartment: completely isolated from the bus bars
- Insulated copper runback. Power is taken from the protective device by the insulated copper runback through a standard full height glass polyester barrier to the rear cable compartment. This design virtually eliminates the possibility of accidental contact with the main buses during installation or maintenance

A Wide Selection of Main and Branch Devices

Main devices are available from 400–4000 A and can include Power Defense molded case circuit breakers, Magnum SB and DS breakers, and fusible switches or bolted pressure switches. Main buses are rated up to 4000 A.

Ground fault test panels can be mounted in compartments with the circuit breakers for convenience and space savings.

Branch circuit breakers range from 150 to 1200 A frames. Branch fusible switches are available from 100 to 1200 A frames.

Short-circuit ratings up to 200,000 A are UL listed.

Pow-R-Line *i*X switchboards are UL listed and meet all applicable requirements of NEMA and NEC. They are rear-accessible and front- and rear-aligned.

Pow-R-Line iX switchboards can help to provide for future distribution system requirements by including empty compartments for branch circuit breakers and fusible switches. (Circuit breaker provisions shown.)

Space-Saving Ground Fault Test Panels

Pow-R-Line *i*X switchboards can accommodate either integral or zero sequence types of ground fault protection. Depending on the specific application, a test panel can be mounted in the circuit breaker compartment, which may eliminate the need for an auxiliary structure.

Provisions for Future Devices

Future expansion provisions include line side connectors, load side runbacks, terminals, and glass polyester compartments and covers (for circuit breakers).

Customer Metering

Eaton microprocessor-based metering devices are standard when customer metering is specified. Conventional metering is available. IQ and Power Xpert devices can provide communications capabilities. See Advanced and Electronic Metering & Local Subnetworks Design Guides.

Circuit Breakers and Fusible Switches

Table 21.4-1. Molded Case Circuit Breakers

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	Number of Poles	Voltage		Trip Type ①	UL Listed Interrupting Ratings rms Symmetrical Amperes									
			AC	DC		AC Ratings Volts						DC Ratings Volts ②			
						120	120/240	240	277	480	600	125	250	125/250	600
PDD2xF	100–225	2, 3	240	125	N.I.T.	—	—	22	—	—	—	10	—	—	—
PDD2xG	100–225	2, 3	240	125	N.I.T.	—	—	65	—	—	—	10	—	—	—
PDD2xM	100–225	2, 3	240	125	N.I.T.	—	—	100	—	—	—	10	—	—	—
PDD2xP	100–225	2, 3	240	125	N.I.T.	—	—	200	—	—	—	10	—	—	—
PDG2xF	15–100	1	277	125	N.I.T.	—	—	—	14	—	—	10	—	—	—
PDG2xF	15–100	2, 3	480	250	N.I.T.	—	—	18	—	14	—	—	10	—	—
HFDDC ③	15–150	2, 3	—	600	N.I.T.	—	—	—	—	—	—	42	42	—	35
PDG2xG	15–225	1	277	125	N.I.T.	—	—	—	35	—	—	10	—	—	—
PDG2xG	15–225	2, 3	600	250	N.I.T.	—	—	65	—	35	18	—	10	—	—
PDG2xG	15–225	4	600	250	N.I.T.	—	—	65	—	35	18	—	10	—	—
PDG2xM	15–225	1	277	125	N.I.T.	—	—	—	65	—	—	10	—	—	—
PDG2xM	15–225	2, 3	600	250	N.I.T.	—	—	100	—	65	25	—	22	—	—
PDG2xM	15–225	4	600	250	N.I.T.	—	—	100	—	65	25	—	22	—	—
PDG2xP	15–225	2, 3	600	250	N.I.T.	—	—	200	—	100	35	—	22	—	—
PDG2xP	15–225	4	600	250	N.I.T.	—	—	200	—	100	35	—	22	—	—
HJDDC ③	70–250	2, 3	—	600	I.T.	—	—	—	—	—	—	42	42	—	35
JGE ④	70–250	2, 3	600	250	I.T.	—	—	65	—	25	18	—	—	10	—
JGS ④	70–250	2, 3	600	250	I.T.	—	—	65	—	35	25	—	—	—	—
JGH ④	70–250	2, 3	600	250	I.T.	—	—	100	—	65	35	—	—	—	—
JGC ④	70–250	2, 3	600	250	I.T.	—	—	200	—	100	50	—	—	—	—
PDG3xGy	250–400	2, 3	240	250	N.I.T.	—	—	65	—	—	—	—	10	—	—
PDG3xG*	70–400	2, 3	600	250	I.T.	—	—	65	—	35	25	—	10	—	—
PDF3xG* ⑤	70–400	3	600	250	I.T.	—	—	65	—	35	25	—	10	—	—
PDG3xM*	70–400	2, 3	600	250	I.T.	—	—	100	—	65	35	—	22	—	—
PDF3xM ⑤	70–400	3	600	250	I.T.	—	—	100	—	65	35	—	22	—	—
PDD3xP*	70–400	2, 3	600	250	I.T.	—	—	200	—	100	50	—	22	—	—
HKDDC ③	100–400	2, 3	—	600	I.T.	—	—	—	—	—	—	42	42	—	35
LHH ⑥	125–400	2, 3	600	250	I.T.	—	—	100	—	65	35	—	42	—	—
NHH	150–350	3	600	—	—	—	—	100	—	65	35	—	—	—	—
LGE ④⑥	300–600	2, 3	600	250	I.T.	—	—	65	—	35	25	10	22	—	—
LGH ④⑥	300–600	2, 3	600	250	I.T.	—	—	100	—	65	35	10	22	—	—
LGC ④⑥	250–600	2, 3	600	250	I.T.	—	—	200	—	100	50	—	42	—	—
PDG3xG* ⑦	300–600	2, 3	600	250	I.T.	—	—	65	—	35	25	10	22	—	—
PDG3xM* ⑦	300–600	2, 3	600	250	I.T.	—	—	100	—	65	35	10	22	—	—
PDG3xP* ⑥⑦	250–600	2, 3	600	250	I.T.	—	—	200	—	100	50	—	42	—	—
PDG4xG ⑥	400–800	2, 3	600	250	N.I.T.	—	—	65	—	50	25	—	22	—	—
PDF4xG ⑤⑥	400–800	3	600	—	N.I.T.	—	—	65	—	50	25	—	22	—	—
PDG4xM ⑥	400–800	2, 3	600	—	N.I.T.	—	—	100	—	65	35	—	25	—	—
PDF4xM ⑤⑥	400–800	3	600	—	N.I.T.	—	—	100	—	65	35	—	25	—	—
HMDLDC ③	300–800	2, 3	—	600	I.T.	—	—	—	—	—	—	42	42	—	—
PDG5xM	600–1200	2, 3	600	—	N.I.T.	—	—	100	—	65	35	—	—	—	—
PDG5xP	600–1200	2, 3	600	—	N.I.T.	—	—	200	—	100	50	—	—	—	—
NGH ④	600–1200	2, 3	600	—	N.I.T.	—	—	100	—	65	35	—	—	—	—
NGC ④	600–1200	2, 3	600	—	N.I.T.	—	—	200	—	100	50	—	—	—	—
CNGC ⑤	600–1200	3	600	—	N.I.T.	—	—	200	—	100	50	—	—	—	—
NBDC ③	700–1200	2, 3	—	600	I.T.	—	—	—	—	—	—	42	42	—	50
RG 1600	800–1600	3	600	—	N.I.T.	—	—	125	—	65	50	—	—	—	—
CRG 1600	800–1600	3	600	—	N.I.T.	—	—	125	—	65	50	—	—	—	—
RG 2000	1000–2000	3	600	—	N.I.T.	—	—	125	—	65	50	—	—	—	—
PDG6xP* 1600	700–1600	3	600	—	N.I.T.	—	—	200	—	100	65	—	—	—	—
PDG6xP* 2000	1000–2000	3	600	—	N.I.T.	—	—	200	—	100	65	—	—	—	—
PDG6xP* 2500	1000–2500	3	600	—	N.I.T.	—	—	200	—	100	65	—	—	—	—
PDG6xP* ③⑧	1600–2000	2, 3	—	600	I.T.	—	—	—	—	—	—	42	65	—	65

① N.I.T. is non-interchangeable trip unit. I.T. is interchangeable trip unit.
② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.
③ For use on DC systems only.
④ For use with drawout feeder device only.
⑤ 100% rated.
⑥ Not available in Pow-R-Line *i*X switchboards.
⑦ Available in bolt-on fixed mount or drawout feeder device.
⑧ Individually, vertically mounted.

Table 21.4-2. Magnum SB Insulated Case Circuit Breaker Interrupting Ratings ①

Circuit Breaker Type	Frame Amperes	Trip Unit Current Sensor and Rating Plug Ranges	Ratings rms Symmetrical Amperes (kAIC)		
			Interrupting Ratings		
			208/240 Vac	480 Vac	600 Vac
SBS-608	800	200–800	65	65	65
SBS-C08	800	200–800	100	100	85
SBS-612	1200	200–1200	65	65	65
SBS-C12	1200	200–1200	100	100	85
SBS-616	1600	200–1600	65	65	65
SBS-C16	1600	200–1600	100	100	85
SBS-620	2000	200–2000	65	65	65
SBS-C20	2000	200–2000	100	100	85
SBS-625	2500	200–2500	65	65	65
SBS-C25	2500	200–2500	100	100	85
SBS-630	3000	200–3000	65	65	65
SBS-C30	3000	200–3000	100	100	85
SBS-840	4000	2000–4000	65	65	65
SBS-C40	4000	2000–4000	100	100	85
SBS-850	5000	2500–5000	65	65	65
SBS-C50	5000	2500–5000	100	100	85

① Fixed internal instantaneous trip set at approximately 18 x In symmetrical.

Table 21.4-3. Series NRX RF Insulated Case Circuit Breaker Interrupting Ratings

Circuit Breaker Type	Frame Amperes	Trip Unit Current Sensor Ranges	Ratings rms Symmetrical Amperes (kAIC)	
			Interrupting Ratings	
			208/240 Vac	480 Vac
NRX-RF PXR 20/25	800	800	100	65
NRX-RF PXR 20/25	1200	800–1200	100	65
NRX-RF PXR 20/25	1600	800–1600	100	65
NRX-RF PXR 20/25	2000	800–2000	100	65
NRX-RF PXR 20/25	2500	800–2500	100	65
NRX-RF PXR 20/25	3000	800–3000	100	65
NRX-NF PXR 20/25	800	200–800	85	65
NRX-NF PXR 20/25	1200	200–1200	85	65

Table 21.4-4. Magnum DS Power Breaker Interrupting Ratings

Circuit Breaker Type	Frame Amperes	Ratings rms Symmetrical Amperes (kAIC)					
		Interrupting Ratings			Short-Time Rating ②		
		208/240 V	480 V	600 V	208/240 V	480 V	600 V
MDS-408	800	42	42	42	42	42	42
MDS-608	800	65	65	65	65	65	65
MDS-808	800	85	85	85	85	85	85
MDS-C08	800	100	100	100	85	85	85
MDS-616	1600	65	65	65	65	65	65
MDS-816	1600	85	85	85	85	85	85
MDS-C16	1600	100	100	100	85	85	85
MDS-620	2000	65	65	65	65	65	65
MDS-820	2000	85	85	85	85	85	85
MDS-C20	2000	100	100	100	85	85	85
MDS-632	3000	65	65	65	65	65	65
MDS-832	3000	85	85	85	85	85	85
MDS-C32	3000	100	100	100	85	85	85
MDS-840	4000	130	85	85	85	85	85
MDS-C40	4000	130	100	100	100	100	100
MDS-850	4000	130	85	85	85	85	85
MDS-C50	5000	130	100	100	100	100	100

② Also ratings without instantaneous trip.

Table 21.4-5. Current Limit-R Current Limiting Circuit Breakers—Non-Fused Type

Circuit Breaker Type	Cont. Ampere Rating at 40 °C	No. of Poles	Voltage		Trip Type ①	Federal Spec. W-C-375b	UL Listed Interrupting Ratings rms Symmetrical Amperes								
			AC	DC			AC Ratings Volts						DC Ratings Volts ②		
							120	120/240	240	277	480	600	125	250	125/250
FCL	15–100	2, 3	480	—	N.I.T.	③	—	—	200,000	—	150,000	—	—	—	—
LCL	125–400	2, 3	600	—	N.I.T.	③	—	—	200,000	—	200,000	100,000	—	—	—

① N.I.T. is non-interchangeable trip unit and I.T. is interchangeable trip unit.
② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.
③ Not defined in W-C-375b.

Table 21.4-6. TRI-PAC Current Limiting Circuit Breakers—Fused Type

Circuit Breaker Type	Cont. Ampere Rating at 40 °C	No. of Poles	Voltage		Trip Type ④	Federal Spec. W-C-375b	UL Listed Interrupting Ratings rms Symmetrical Amperes								
			AC	DC			AC Ratings Volts						DC Ratings Volts ⑤		
							120	120/240	240	277	480	600	125	250	125/250
FB	15–100	2, 3	600	250	N.I.T.	16a, 16b, 17a, 26a	—	—	200,000	—	200,000	200,000	—	—	100,000
LA	70–400	2, 3	600	250	I.T.	16a, 16b, 17a, 26a	—	—	200,000	—	200,000	200,000	—	—	100,000
NB	300–800	2, 3	600	250	I.T.	16b, 17a, 26a	—	—	200,000	—	200,000	200,000	—	—	100,000
PB	600–1600	2, 3	600	250	I.T.	17a, 26a	—	—	200,000	—	200,000	200,000	—	—	100,000

④ N.I.T. is non-interchangeable trip unit and I.T. is interchangeable trip unit.
⑤ Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.

Table 21.4-7. Electrical Characteristics of Fusible Switches

Device Type	System Voltage	Ampere Rating	Interrupting Capacities kA Symmetrical Amperes
Fusible switch	240 or 600	30–600 300–1200 30–600 800, 1200	200 kAIC with Class R Fuses 200 kAIC with ClassT Fuses 200 kAIC with Class R and J Fuses 200 kAIC with Class L Fuses
Bolted pressure switch	240 or 480	800, 1200, 1600 2000, 2500, 3000, 4000, 5000 ⑥	200 kAIC with Class L Fuses 200 kAIC with Class L Fuses 200 kAIC with Class L Fuses

⑥ 5000 A bolted pressure contact switch is not UL listed.

Table 21.4-8. Standard Switchboard Terminals Standard Main Breaker, Branch Breaker, Main Switch or Branch Switch Terminals

Breaker Type	Ampere Rating	Wire Size Ranges
PDD2xF, PDD2xG, PDD2xM, PDD2xP	100–225	# 4–#4/0 or # 6–300 kcmil
PDG2xF, PDG2xG, PDG2xM PDG2xP	15–100 125–225	#14–#1/0 # 4–#4/0 or #6–300 kcmil
FCL	15–100	#14–#1/0
JGS, JGH, JGC	70–250	# 4–350 kcmil
PDD3xGy	250–350 400	(1) 25–500 kcmil (2) 3/0–250 kcmil or (1) 3/0–500 kcmil
PDG3xG*, PDG3xM*, PDG3xP*, PDF3xG* ⑦, PDF3xM* ⑦	100–225 250–350 400	(1) #3–350 kcmil (1) 250–500 kcmil (2) 3/0–250 kcmil (1) 3/0–500 kcmil
PDG3xG*, PDG3xM*, LD ⑦, LHH, PDG3xP*, NHH	300–500 600 150–350	(2) 250–350 kcmil (2) 400–500 kcmil (1) #2–600 kcmil
PDG4xG, PDF4xG ⑦, PDG4xM, PDF4xM	400–600 700–800	(2) #1–500 kcmil (3) 3/0–400 kcmil (2) 500–750 kcmil
PDG5xM, PDG5xP, PDG6xM ⑦, PDG5xP ⑦	600–1000 1200	(3) 3/0–400 kcmil (4) 4/0–500 kcmil
LCL	125–225 250–400	(1) #6–350 kcmil (1) #4–250 kcmil and (1) 3/0–600 kcmil
FB-P	15–100	#14–1/0
LA-P	70–225 250–400	(1) #6–350 kcmil (1) #4–250 kcmil and (1) 3/0–600 kcmil
NB-P	350–700 800	(2) #1–500 kcmil (3) 3/0–400 kcmil

⑦ 100% rated breaker.

Note: All terminal sizes are based on wire ampacities corresponding to those shown in NEC Table 310.16 under the 75 °C insulation columns (75 °C wire). The use of smaller size (in circular mills), regardless of insulation temperature rating is not permitted without voiding UL labels on devices and equipment. For other terminals available on some ratings of molded case circuit breakers and fusible switches, refer to Molded Case Circuit Breakers & Enclosures Design Guides.

Cable Ranges for Standard Secondary Device Terminals

Wire and cable terminals supplied on switchboard mounted devices for making up incoming or outgoing cable connections are of the mechanical screw clamp pressure type. All standard terminals are suitable for use with either aluminum or copper cable except as noted in the table. Panel mounted devices use the standard terminal provided with that device.

Table 21.4-9. Fusible Switches

Ampere Rating	Wire Size Ranges
30, 60, 100 200	#14–1/0 #4–300 kcmil
400	250–750 kcmil or (2) 3/0–250 kcmil
600	(2) #4–600 kcmil or (4) 3/0–250 kcmil
800	(3) 250–750 kcmil or (6) 3/0–250 kcmil
1200	(4) 250–750 kcmil or (8) 3/0–250 kcmil

Table 21.4-10. Standard Mechanical Incoming Terminal Ranges for Main Lugs Only and Main Devices Including Circuit Breakers and Fusible Devices

Ampere Rating	Cable Range
400 600 800	(2) #2–500 kcmil (2) #2–500 kcmil (3) #2–500 kcmil
1000 1200 1600	(4) #2–500 kcmil (4) #2–500 kcmil (5) #2–500 kcmil
2000 2500 3000	(6) #2–500 kcmil (7) #2–500 kcmil (10) #2–500 kcmil

Table 21.4-11. Range Taking Compression Main Terminals ①

Main Ampere Rating	Number of Conductors and Wire Range Per Phase	
	Aluminum Conductors	Copper Conductors
1200 1600 2000 2500	(4) 500–750 kcmil (5) 500–750 kcmil (6) 500–750 kcmil (7) 500–750 kcmil	(3) 500–750 kcmil (4) 500–750 kcmil (4) 500–750 kcmil (6) 500–750 kcmil
3000 4000 5000	(8) 500–750 kcmil (11) 500–750 kcmil (13) 500–750 kcmil	(7) 500–750 kcmil (9) 500–750 kcmil (11) 500–750 kcmil

① Compression terminations will take a range of conductors and include 500, 600, 700 and 750 kcmil.

Power Xpert Release Trip Unit for Insulated Case Circuit Breakers

Power Xpert Release Trip Unit

Description

Eaton's Power Xpert Release (PXR) trip units are programmable communicating microprocessor-based low-voltage electronic trip unit systems for Eaton insulated case circuit breakers. PXR trip units are available in two models: PXR 20 and PXR 25.

The PXR electronic trip units provide an enhanced and easy-to-use interface that enables end users and maintenance engineers to more easily change set points, test and configure circuit breakers, and review energy and power information. Also, the Power Xpert Protection Manager software provides the capability of secondary injection tests and reports on-demand without the need of expensive test kits.

Standards and Certifications

The PXR trip units are listed by Underwriters Laboratories (UL) and Canadian Standards Association (CSA) for use in Series NRX NF and Series NRX RF circuit breakers. All PXR units have also passed the IEC 60947-2 test program that includes EMC testing. All trip units meet the low-voltage and EMC directives and carry the CE mark.

Features

Table 21.4-12. Power Xpert Features

Trip Unit	PXR 20	PXR 25
Diagnostics and Indication Features		
Trip Log	10 trip events 200 summary Additional storage available via CAM module	
Alarm log	10 alarm events—through COM	
Waveform capture	One waveform event captured in ETU	
Display	LCD dot matrix	
LEDs	ETU status Long trip Short trip	Instantaneous trip Ground trip ARMS status
Power for cause of trip LEDs	Control power or battery	
Battery Indication	Display (no PTT)	
Maintenance/wellness health and diagnostics	ETU temp. and max. Trip count Ops count / last date	Operating (run) time Health bar (algorithm)
PXR Metering, Communications and Other Features		
Metering—current	Yes Phase, Neutral, Ground, min., max., demand, peak	
Metering—voltage	No	Yes L-L, L-N, avg. min., max., Frequency, min., max.
Metering—power	No	Yes kW, kVA, kvar Demand-kW, kVA, kvar Peak Demands
Metering—energy	No	Yes kWh-fwd, rev, net, tot kvarh-lead, lag, net, tot
Metering—PF apparent	No	Yes min., max.
Communications	Modbus RTU optional CAM modules optional	Modbus RTU native CAM modules optional
Testing method	PC via USB port Internal Secondary injection test circuit	
Relay outputs—alarms or trips	3	
QR code—support information	Yes	
Password—setting menu and test	Yes	
RoHS	Yes	
Protection Features		
Ordering options	LSI, LSIG/A	
Number of sensors	1 sensor—NF 1 sensor—RF	
Sensor (rating) plug (I_n)	No plug Programmable I_n (21)	
Slopes	It, I^2t, I^2t IEEE—MI, VI, EI	
System frequency	50 / 60 Hz	
Long delay pickup (I_r)	0.4 –1.0 x (I_n)(10)	
Long delay time I^2t at 6x (I_r)	0.5–24 s (10)	
Long delay thermal memory	Yes—Program disable	
Short delay pickup	1.5–10 x (I_n)(10)	
Short delay time I^2t at 8x (I_r)	0.1, 0.3, 0.4, 0.5 s	
Short delay time flat	0.0, 0.1, 0.2, 0.3, 0.4, 0.5 s	
Instantaneous pickup	2–15 x (I_n)(10)	
Ground (earth) fault pickup	Trip: 0.2–1.0 x (I_n)(5) Alarm: 0.2–1.0 x (I_n)(4) Off	
Ground (earth) fault time I^2t at 0.625 x (I_n)	0.1, 0.2, 0.3, 0.4, 0.5 s	
Ground (earth) fault time flat	0.1, 0.2, 0.3, 0.4, 0.5 s	
ZSI, short delay and ground	Programmable Display indication	
Neutral protection	Yes Off, 60, 100%	
ARMS—arc flash—mode/settings	Optional—on or off/remote 5 settings (x I_n)	

Power Xpert Release Trip Unit for Molded Case Circuit Breakers

Description

Eaton's Power Xpert Release (PXR) trip units are programmable communicating microprocessor-based low-voltage electronic trip unit systems for Eaton molded case circuit breakers. PXR trip units are available in four models: PXR 10, PXR 20, PXR 20D and PXR 25.

Standards and Certifications

The PXR trip units are listed by Underwriters Laboratories (UL) and Canadian Standards Association (CSA) for use in Frame PD-2, PD-3, PD-4, PD-5 and PD-6 molded case circuit breakers. All PXR units have also passed the IEC 60947-2 test program that includes EMC testing. All trip units meet the low-voltage and EMC directives and carry the CE mark.

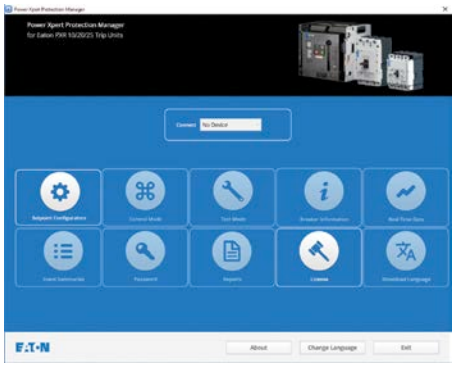
Features

The PXR electronic trip units provide an enhanced and easy-to-use interface that enables end users and maintenance engineers to more easily change set points, test and configure circuit breakers, and review energy and power information. Also, the Power Xpert Protection Manager software provides the capability of secondary injection tests and reports on-demand without the need of expensive test kits.

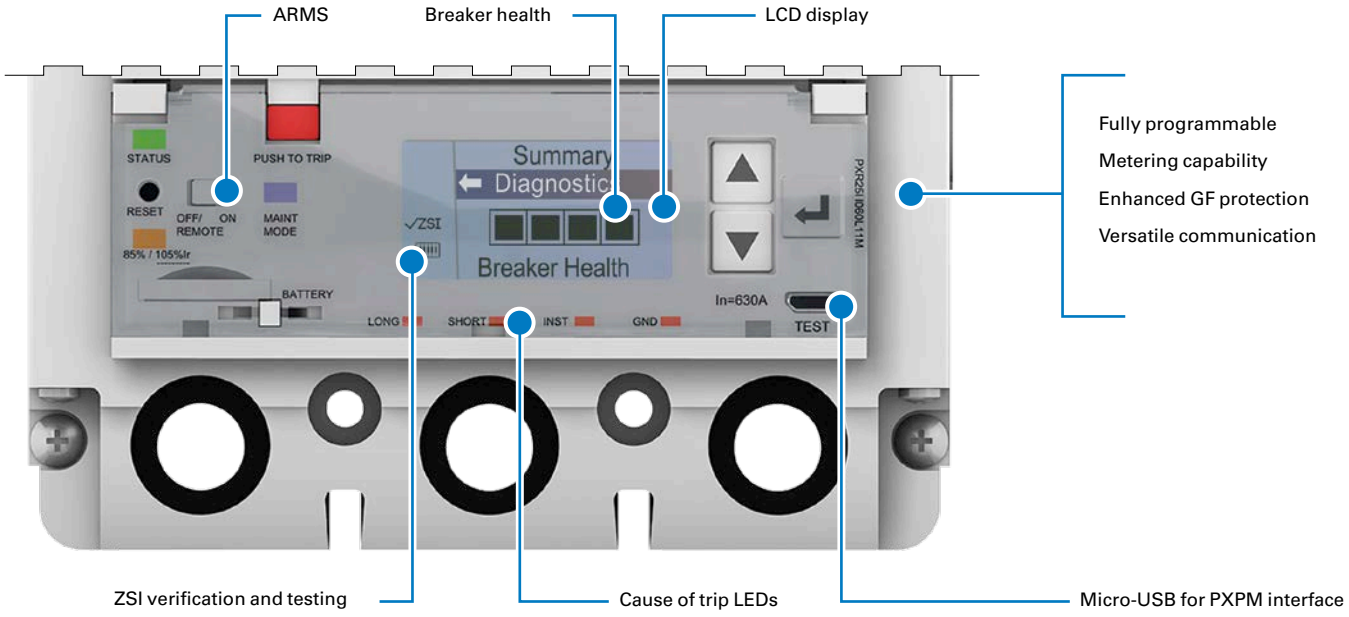
Advanced features include:

- Industry-first breaker health algorithms that provide real-time monitoring and communication of breaker condition
- Cause of trip LED indication and trip event data storage
- Zone selective interlocking (ZSI) verification and testing indication
- Adjustable Arcflash Reduction Maintenance System (ARMS) settings
- LCD display with programmable settings

Arcflash Reduction Maintenance System (ARMS)



Power Xpert Protection Manager (PXPM) Software



PXR 25 Trip Unit Features

Table 21.4-13. Power Xpert Release (PXR) Features

Features	PXR 10	PXR 20	PXR 20D	PXR 25
Protection types	LSI	LSI/LSIG	LSI/LSIG	LSI/LSIG
Status indication	Standard	Standard	Standard	Standard
USB secondary injection testing	Standard	Standard	Standard	Standard
Programmable by USB port (PXPM)	Standard	Standard	Standard	Standard
Independent instantaneous adjustment	Standard	Standard	Standard	Standard
Adjustable L, S, I, G pickup and time		Standard	Standard	Standard
Cause of trip indication	Available through USB port (PXPM)	Standard	Standard	Standard
Load alarm indication with 2 levels		Standard	Standard	Standard
Programmable load alarm levels			Standard	Standard
Ground fault protection and alarm		Optional	Optional	Optional
Arcflash Reduction Maintenance System (ARMS) Available PD3, PD4, PD5, PD6		Optional	Optional	Optional
Zone selective interlocking (ZSI) with indication		Optional	Optional	Optional
Programmable relays		Optional	Standard	Optional
Modbus RTU communication		Optional	Standard	Optional
CAM module communication		Optional	Optional	Optional
Rotatable LCD display			Standard	Standard
Breaker health and diagnostic monitoring		Available through USB port (PXPM)	Standard	Standard
Voltage metering accurate to 0.5%				Standard
Power and energy metering accurate to 1%				Standard

Metering Devices

Power Xpert Meters 1000

Power Xpert Meters 2000

Power Xpert Meter 3000

The Power Xpert 1000 Meters

The Power Xpert Meter 1000 series power and energy meters monitor the most critical aspects of an electrical distribution system. This premier metering instrument uses the latest in advanced technology to make it simple to use, powerful, scalable and highly flexible.

The Power Xpert Meter 1000 (PXM1000), 1100 (PXM1100), 1200 (PXM1200) and 1300 (PXM1300) deliver a cost-effective solution for energy and sub-metering applications. These three-phase meters provide high accuracy and advanced features in the standard 4-inch form factor and can be expanded with multiple modular I/O options.

Meter series benefits include:

- Utility billing accuracy that will help meet stringent customer specifications
- Ease of use in multiple applications
- Rogowski coils allow for ease of use in retrofit applications
- Multiple protocols including Modbus TCP and BACnet/IP and with available HTTP push, allowing data to be sent to the cloud to help meet energy code data storage requirements

The Power Xpert 2250 Meter

This meter provides all the core functions for monitoring power consumption and power quality, Ethernet connectivity and onboard gateway card limits. This unit uses D/A technology to sample circuits at 400 samples per cycle for extremely accurate measurement of power factor and energy consumption. In addition, the meter has 256 MB for logging meter data.

The Power Xpert 2260 Meter

This meter adds the ability to monitor total harmonic distortion and the ability to set onboard meter limits. The meter also will illuminate LEDs on the faceplate, indicating that a limit has been exceeded and provides 512 MB for data logging.

The Power Xpert 2270 Meter

This meter adds the ability to monitor individual harmonics and visualize waveforms on your desktop using the embedded web server and raises the storage to 768 MB for data logging.

Meter series benefits include:

- Fully understand your facility's power quality
- Detailed event information; pinpoint the root causes of problems—or prevent them from occurring
- Measure, trend and analyze power via information through onboard web and comma separated values (CSV) exporting capabilities
- Up to 768 MB of storage; typically 15 years of storage capability depending on the meter model and frequency of events
- Local or remote configuration

The Power Xpert 3000 Meter

The Power Xpert Meter 3000 (PXM3000) provides an extensive array of data, including power quality, energy and demand readings so you can manage energy utilization to help reduce peak demand charges and power factor penalties, and to identify excessive energy consumption.

Utilizing both a premier web interface with cloud storage and onboard data storage up to 4 GB, the PXM3000 allows you to keep your data at your fingertips to help reduce your overall energy usage and better manage your energy costs.

Key features include:

- Rich web interface
- Multiple protocols including Modbus RTU/TCP and BACnet/IP
- Onboard historical data charts
- Onboard waveform display
- Optional digital/analog inputs and outputs
- Storage of up to three custom data logs

IQ 100/200

Power Xpert Meter 4000/6000/8000

Power Xpert Gateway

IQ 130/140/150

Providing the first line of defense against costly power problems, Eaton's IQ 100 electronic power meters can perform the work of an entire wall of legacy metering equipment using today's technology.

- 24-bit AD converters that sample at more than 400 samples per cycle
- Meet ANSI C12.20 standards for accuracy of 0.5 percent
- Confidently used for primary revenue metering and submetering applications
- Direct-reading metered values such as watts, watt demand, watthours, voltage amperes (VA), VA-hours, vars, varhours and power factor
- Also available in Eaton's enclosed meter product

IQ 250/260

The IQ 250 and IQ 260 electronic meters provide capabilities you wouldn't normally expect in an affordable, ultra-compact meter—such as fast sampling rate and accurate metering for a full range of power attributes. Built-in slots allow for future upgrades.

- Comprehensive metering
- High-end accuracy
- Self-test capability to validate accuracy
- Large, easy-to-read display
- Local or remote configuration
- Industry-standard communication protocols
- Mix-and-match input/output options
- Integration with Eaton's Power Xpert Architecture
- Field-upgradeable

Power Xpert Meter 4000/6000/8000

The Power Xpert Meter 4000/6000/8000 series is an internet-enabled (including a built-in web server) power quality and energy meter with comprehensive power and energy measurement, and integrated quality analysis.

These meters allow you to use a standard web browser to surf the meter and visualize a waveform and analyze trends.

Meter series benefits include:

- Accurate detection of fast transients
- Early warning of impending problems
- At-a-glance view of power quality
- Reduces power monitoring cost
- Supports continuous, non-disruptive monitoring
- Accessible via the ethernet
- Uses industry-standard communication protocols

Power Xpert Gateway

Eaton's Power Xpert Gateway (PXG) bridges the IT and facilities management worlds by bringing disparate panel-boards, switchboards and other power equipment onto the network. The PXG takes the complexity out of connecting power equipment to the network. The web-enabled PXG is an out-of-the-box device that can support up to 96 devices, translate most industrial communication protocols, and offer user-selectable events and real-time trending. It also features e-mail notification of events, waveform capture and data/event logging—all with no special software. Adding basic meters or the utility's meter, the PXG assists in tracking energy usage. The PXG recognizes the interdependence of IT systems and power systems, and delivers what organizations need to bring these worlds together for seamless, end-to-end system reliability.

The PXG consolidates data available breakers, meters, motor controllers and protective relays, and presents the information in a variety of ways (a web browser being the most widely used method). The PXG is a stand-alone solution. As needs change and grow, the PXG can be integrated through Power Xpert Software into a broader solution that encompasses other intelligent hardware and can integrate with third-party network management systems (NMS) or building management systems (BMS) for system-wide monitoring and reporting of power and IT.

For detailed information, please refer to Power Management Connectivity & Monitoring Design Guide.

For information on other available power meters, visit
Eaton.com/meters

Surge Protective Devices

Integrated Surge Protective Devices

Integrated SPDs

Eaton integrates our industry-leading SPD Series surge protective devices into panelboard and switchboard assemblies. Lead length is kept to a minimum to maximize SPD performance. Integrated SPD units are UL listed and labeled to UL 1449 3rd Edition.

Key features include:

- Thermally protected metal oxide varistor (MOV) technology
- 20 kA nominal discharge current (I_n) rating (maximum rating assigned by UL)
- 50 through 400 kA surge current capacity ratings
- Three feature package options (basic, standard, and standard with surge counter)
- 200 kA short-circuit current rating (SCCR)
- 10-year warranty

The breadth of the SPD Series' features, options and configurations ensures that the correct unit is available for all electrical applications, including service entrances, distribution switchboards, panelboards and point-of-use applications.

For complete SPD product description, application and ratings, visit www.eaton.com/spd.

Table 21.4-14. Side-By-Side Comparison of the SPD Series' Available Feature Packages

Feature Package Comparison	Basic	Standard	Standard with Surge Counter
Surge protection using thermally protected MOV technology	■	■	
Dual-colored protection status indicators for each phase	■	■	
Dual-colored protection status indicators for the N-G protection mode	■	■	
Audible alarm with silence button		■	■
Form C relay contact		■	■
EMI/RFI filtering, providing up to 50 dB of noise attenuation from 10 kHz to 100 MHz		■	■
Surge counter with reset button			■

Pow-R-Line *i*X Layout Guide

Drawings

Drawings and data on the following pages reflect dimensions for worst case switchboard designs. Smaller switchboard dimensions may be available. Both preliminary and as-built approval drawings are available from Eaton.These drawings reflect the actual switchboard configured, and include height, width and depth dimensions.

Building Information Model

In addition, a building information model (BIM) 3D compatible drawing is available for all configured to order switchboards.

A BIM is a three-dimensional digital representation of a facility's physical and functional characteristics. It serves as a shared knowledge resource for information about a facility and forms a reliable basis for decisions throughout its life-cycle.

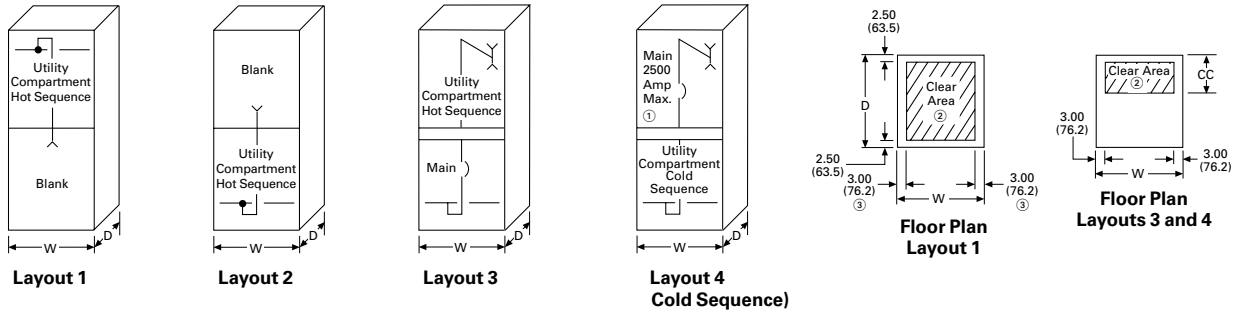
Eaton offers 3D BIM compatible models to support a variety of MEP software, including Autodesk AutoCAD MEP, Revit MEP and NavisWorks, Bentley Building Electrical Systems, Graphisoft ArchiCAD MEP Modeler, Nemetschek N.A. VectorWorks and others.

Table 21.4-15. Front- and Rear-Access Compartmentalized Feeders Pow-R-Line *i*X

Steps	Description		Page
Step 1 ①	Layout incoming main section (with or without main device) as follows: Special Utility Metering Compartment West Coast Utility Metering Compartment Standard NEMA® Utility Metering Compartment		 **21.4-21** **21.4-23** **21.4-25**
Step 2	Layout Feeder Devices in Distribution Sections Pow-R-Line *i*X	Outdoor Enclosures	**21.4-28**
Step 3	Technical data, e.g., interrupting ratings, terminal size.		**21.4-8**
Step 4	Specification Data	For a complete product specification in CSI format, see Eaton's Product Specification Guide, Section 16429.	

① Because utility compartment dimensions are the minimum required by utility, check "no metering" main device widths and use the larger width of either the main device or utility metering compartment.

Incoming Utility Compartments and/or Main Devices



Note: Switchboards designed using these main structures require rear access for cable terminations. Refer to NEC Article 110-26 for requirements.

Figure 21.4-2. Utility Compartment Layouts—Dimensions in Inches (mm)

① Cold Sequence: 3000 or 4000 A main device must be mounted in separate structure. The utility compartment will then be housed in the second structure. Branch devices or customer metering can then be mounted in remaining half of utility compartment structure.

② Clear area assumes no floor channels used under bottom frame.

③ If floor channels are present, this dimension is 6.00 (152.4).

Table 21.4-16. Dimensions for Figure 21.4-2 Layouts—Dimensions in Inches (mm)

Power Company Compartments Ampere Ratings	Metering Sequence	Width (W)	Rear-Access					
			Layout 1	Layout 2	Layout 3		Layout 4	
			Depth (D)	Depth (D)	Depth (D)	CC	Depth (D)	CC
Atlantic City Electric	Hot							
800		36 (914.4)	36 (914.4)	36 (914.4)	36 (914.4)	6 (152.4)	N/A	—
1200		36 (914.4)	48 (1219.2)	48 (1219.2)	48 (1219.2)	6 (152.4)	N/A	—
1600–2000		45 (1143.0)	48 (1219.2)	48 (1219.2)	48 (1219.2)	12 (304.8)	N/A	—
2500–4000		45 (1143.0)	48 (1219.2)	48 (1219.2)	48 (1219.2)	12 (304.8)	N/A	—
BGE (Baltimore Gas and Electric) ④	Hot							
800		36 (914.4)	36 (914.4)	36 (914.4)	⑤	⑤	N/A	—
1200–2500		36 (914.4)	36 (914.4)	36 (914.4)	⑤	⑤	N/A	—
3000–4000		45 (1143.0) ⑥	36 (914.4) ⑥	36 (914.4) ⑥	⑤	⑤	N/A	—
Eversource—NSTAR (Boston Edison, Cambridge Electric, Commonwealth Electric)	Cold							
800–1600		36 (914.4)	N/A	N/A	N/A	—	48 (1219.2)	18 (457.2)
2000–2500		36 (914.4)	N/A	N/A	N/A	—	48 (1219.2)	12 (304.8)
3000–4000		45 (1143.0) ⑦	N/A	N/A	N/A	—	48 (1219.2)	12 (304.8) ⑦
CH Energy Group (Central Hudson Gas and Electric)	Hot ④/Cold	⑧	⑧	⑧	⑧	⑧	N/A	—
Central Vermont Public Service	Hot	⑧	⑧	⑧	⑧	⑧	N/A	N/A
Cinergy/CG&E (Cincinnati Gas and Electric)	Hot							
800		36 (914.4)	36 (914.4)	36 (914.4)	36 (914.4)	6 (152.4)	N/A	—
1200–4000		45 (1143.0)	48 (1219.2)	48 (1219.2)	48 (1219.2)	12 (304.8)	N/A	—
Exelon/ComEd (Commonwealth Edison)	Hot							
400–1000		36 (914.4)	36 (914.4)	36 (914.4)	36 (914.4)	6 (152.4)	N/A	—
1200–2000		36 (914.4)	48 (1219.2)	48 (1219.2)	48 (1219.2)	12 (304.8)	N/A	—
2500–4000		36 (914.4)	48 (1219.2)	48 (1219.2)	48 (1219.2)	12 (304.8)	N/A	—

④ For special applications approved by the utility.

⑤ Refer to Eaton.

⑥ For BG&E, the utility compartment is mounted in the bottom for Layout 1 and top for Layout 2. For bottom feed (Layout 1); up to 2500 A, the main is mounted in top. For 3000 and 4000 A bottom feed, the main is in a separate structure. For top feed (Layout 2), maximum amperes is 4000 A and the main is mounted in the bottom.

⑦ Cold Sequence: 3000 or 4000 A main device must be mounted in separate structure. The utility compartment will then be housed in the second structure. Branch devices or customer metering can then be mounted in remaining half of utility compartment structure.

⑧ Dimensions are the same as standard NEMA utility compartments, refer to **Page 21.4-25**.

Note: "W" or "D" of structure is determined by the dimensions of the utility compartment or main device—whichever is greater. N/A = Not Applicable.

Note: Dimensions for estimating purposes only.

Table 21.4-16. Dimensions for Figure 21.4-2 Layouts—Dimensions in Inches (mm) (Continued)

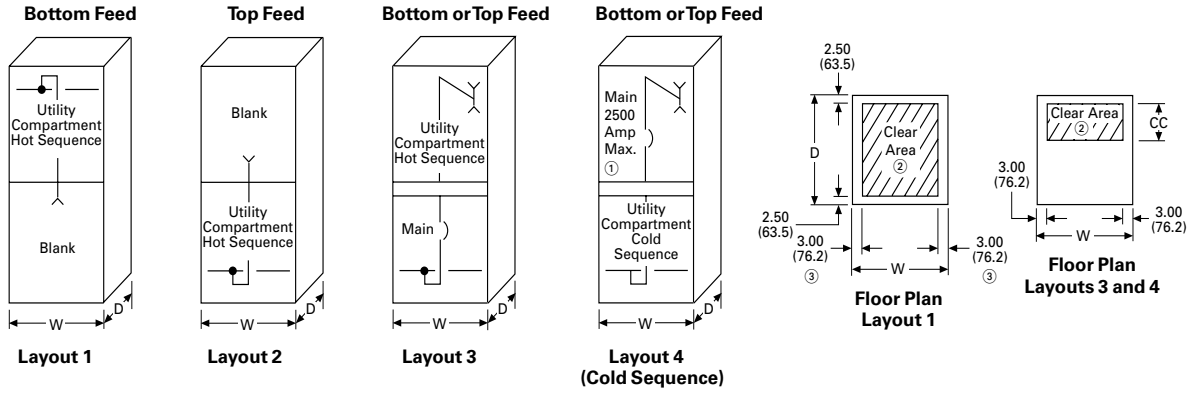
Power Company Compartments Ampere Ratings	Metering Sequence	Width (W)	Rear-Access					
			Layout 1	Layout 2	Layout 3		Layout 4	
			Depth (D)	Depth (D)	Depth (D)	CC	Depth (D)	CC
ConEdison (Consolidated Edison)	Hot							
800–1200 (Spec. 298) 1200–4000 (Spec. 377)		38 (965.2) 45 (1143.0)	36 (914.4) 48 (1219.2)	36 (914.4) 48 (1219.2)	36 (914.4) 48 (1219.2)	6 (152.4) 12 (304.8)	N/A N/A	— —
DTE Energy (Detroit Edison)	Hot							
800 1200–2500 3000–4000		36 (914.4) 36 (914.4) 45 (1143.0)	36 (914.4) 36 (914.4) 48 (1219.2)	36 (914.4) 36 (914.4) 48 (1219.2)	36 (914.4) 36 (914.4) 48 (1219.2)	6 (152.4) 6 (152.4) 12 (304.8)	N/A N/A N/A	— — —
Florida Power and Light	Hot	②	②	②	②	②	N/A	—
Georgia Power Co.	Hot	②	②	②	②	②	N/A	—
IPL (Indianapolis Power Co.)	Hot/Cold ①							
800 1200–2000 2500–4000		36 (914.4) 36 (914.4) 36 (914.4)	48 (1219.2) 48 (1219.2) 48 (1219.2)	48 (1219.2) 48 (1219.2) 48 (1219.2)	48 (1219.2) 48 (1219.2) 48 (1219.2)	12 (304.8) 12 (304.8) 12 (304.8)	48 (1219.2) 48 (1219.2) 48 (1219.2) ③	12 (304.8) 12 (304.8) 12 (304.8) ③
Jersey Central Power & Light (First Energy)	Hot ①/Cold							
800 1200–2000 2500–4000		② 45 (1143.0) 45 (1143.0)	② 48 (1219.2) 48 (1219.2)	② 48 (1219.2) 48 (1219.2)	② 48 (1219.2) 48 (1219.2)	② 12 (304.8) 12 (304.8)	② 48 (1219.2) 48 (1219.2) ③	② 12 (304.8) 12 (304.8) ③
Evergy/Kansas City Power and Light	Hot	②	②	②	②	②	N/A	—
PSEGLI (Public Service Electric-Long Island)	Hot							
800–1200 1600–2000 2500–4000		38 (965.2) 45 (1143.0) 45 (1143.0)	36 (914.4) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2)	6 (152.4) 12 (304.8) 12 (304.8)	N/A N/A N/A	— — —
LG&E Energy (Louisville Gas and Electric)	Hot							
800 1200–2000 2500–3000		36 (914.4) 45 (1143.0) 45 (1143.0)	48 (1219.2) 48 (1219.2) 48 (1219.2)	48 (1219.2) 48 (1219.2) 48 (1219.2)	48 (1219.2) 48 (1219.2) 48 (1219.2)	6 (152.4) 12 (304.8) 12 (304.8)	N/A N/A N/A	— — —
Madison Gas and Electric	Cold							
800–1200 1600–2000 2500–3000		36 (914.4) 36 (914.4) 45 (1143.0)	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	— — —	36 (914.4) 36 (914.4) 48 (1219.2) ③	6 (152.4) 6 (152.4) 12 (304.8) ③
Massachusetts Electric (National Grid)	Hot							
800 1200–2000 2500–4000		② 36 (914.4) 36 (914.4)/	② 36 (914.4) 36 (914.4)	② 36 (914.4) 36 (914.4)	② 36 (914.4) 48 (1219.2)	② 6 (152.4) 12 (304.8)	N/A N/A N/A	— — —
Metropolitan Edison (First Energy)	Hot	②	②	②	②	②	N/A	—
Monongahela Power	Hot	45 (1143.0)	48 (1219.2)	48 (1219.2)	48 (1219.2)	②	N/A	—
Naperville	Hot	②	②	②	②	②	N/A	—
Narragansett (National Grid)	Hot							
800 1200–2000 2500–4000		② 36 (914.4) 36 (914.4)/	② 36 (914.4) 36 (914.4)	② 36 (914.4) 36 (914.4)	② 36 (914.4) 48 (1219.2)	② 6 (152.4) 12 (304.8)	N/A N/A N/A	— — —

① For special applications approved by the utility.

② Dimensions are the same as standard NEMA utility compartments, refer to **Page 21.4-25**.

③ Cold Sequence: 3000 or 4000 A main device must be mounted in separate structure. The utility compartment will then be housed in the second structure. Branch devices or customer metering can then be mounted in remaining half of utility compartment structure.

Note: "W" or "D" of structure is determined by the dimensions of the utility compartment or main device—whichever is greater. N/A = Not Applicable.



Note: Switchboards designed using these main structures require rear access for cable terminations. Refer to NEC Article 110-26 for requirements.

Figure 21.4-3. Utility Compartment Layouts—Dimensions in Inches (mm)

① Dimensions are the same as standard NEMA utility compartments, refer to **Page 21.4-25**.
② Clear area assumes no floor channels used under bottom frame.
③ If floor channels are present, this dimension is 6.00 (152.4).

Table 21.4-16. Dimensions for Figure 21.4-3 Layouts—Dimensions in Inches (mm) (Continued)

Power Company Compartments Ampere Ratings	Metering Sequence	Width (W)	Rear-Access					
			Layout 1	Layout 2	Layout 3		Layout 4	
			Depth (D)	Depth (D)	Depth (D)	CC	Depth (D)	CC
New York State Electric and Gas	Cold							
800–1200 1600–2000 2500–4000		36 (914.4) 36 (914.4) 36 (914.4)	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	— — —	36 (914.4) 48 (1219.2) 48 (1219.2) ④	6 (152.4) 6 (152.4) 6 (152.4) ④
Niagara Mohawk (National Grid)	Cold							
800–1200 1600–2000 2500–4000		⑤ 36 (914.4) 36 (914.4)	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	— — —	⑤ 36 (914.4) 36 (914.4) ④	⑤ 6 (152.4) 6 (152.4) ④
Eversource—Northeast (Northeast Utilities, Connecticut Light & Power)	Hot ⑥/Cold							
800–1200 1600–2000 2500–4000		36 (914.4) 36 (914.4) 36 (914.4)	36 (914.4) 36 (914.4) 48 (1219.2)	36 (914.4) 36 (914.4) 48 (1219.2)	⑤ 48 (1219.2) 48 (1219.2)	⑤ 12 (304.8) 12 (304.8)	⑤ 48 (1219.2) 48 (1219.2) ④	⑤ 12 (304.8) 12 (304.8) ④
XCEL (Northern States Power)	Hot							
800–1200 1600–2500 3000–4000		36 (914.4) 36 (914.4) 45 (1143.0)	36 (914.4) 36 (914.4) 48 (1219.2)	— — 36 (914.4)	36 (914.4) 36 (914.4) 48 (1219.2)	6 (152.4) 6 (152.4) 12 (304.8)	N/A N/A N/A	— — —
Orange and Rockland	Hot	⑤	⑤	⑤	⑤	⑤	N/A	—
PPL (Pennsylvania Power and Light)	Hot							
800–4000 ⑦		45 (1143.0)	48 (1219.2) ⑧	48 (1219.2) ⑨	54 (1371.6)	6 (152.4)	N/A	—
Exelon/PECO (Philadelphia Electric Company)	Hot	⑤	⑤	⑤	⑤	⑤	N/A	—

④ Cold Sequence: 3000 or 4000 A main device must be mounted in separate structure. The utility compartment will then be housed in the second structure. Branch devices or customer metering can then be mounted in remaining half of utility compartment structure.
⑤ Dimensions are the same as standard NEMA utility compartments, refer to **Page 21.4-25**.
⑥ For special applications approved by the utility.
⑦ Refer to Eaton.
⑧ For limiter lugs or more than six mechanical lugs per phase, a separate pull section is required.
⑨ For limiter lugs or more than six mechanical lugs per phase, a 12.00-inch (304.8 mm) pull box is required.
Note: "W" or "D" of structure is determined by the dimensions of the utility compartment or main device—whichever is greater. N/A = Not Applicable.

Table 21.4-16. Dimensions for Figure 21.4-3 Layouts—Dimensions in Inches (mm) (Continued)

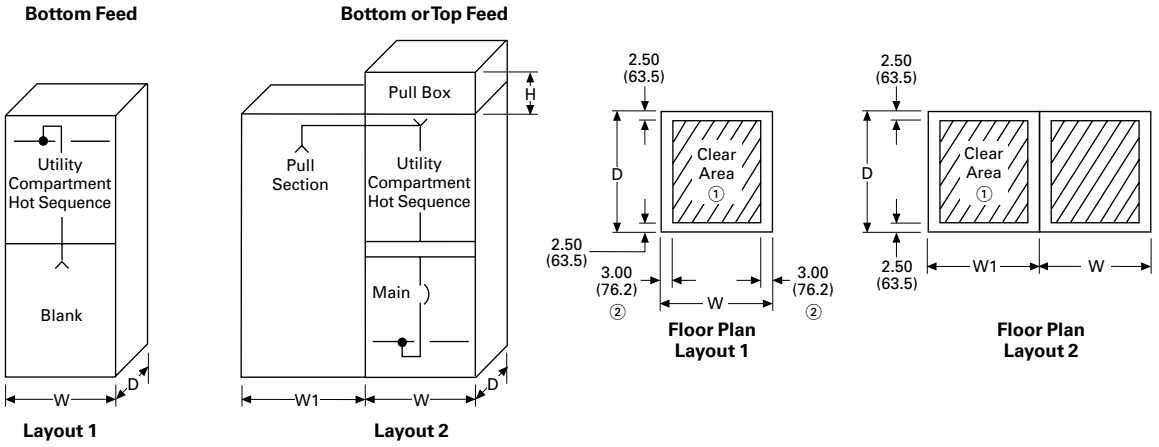
Power Company Compartments Ampere Ratings	Metering Sequence	Width (W)	Rear-Access					
			Layout 1	Layout 2	Layout 3		Layout 4	
			Depth (D)	Depth (D)	Depth (D)	CC	Depth (D)	CC
PEPCO (Potomac Electric Power Company)	Hot							
800–2000 2500–4000 800–3000 4000		36 (914.4) 36 (914.4) 36 (914.4) 36 (914.4)	30 (762.0) 36 (914.4) N/A N/A	N/A N/A 36 (914.4) 48 (1219.2)	N/A N/A N/A N/A	— — — —	N/A N/A N/A N/A	— — — —
XCEL (Public Service Company of Colorado)	Hot							
800 1200–2500 3000–4000		① 36 (914.4) 45 (1143.0)	① 36 (914.4) 48 (1219.2)	① 36 (914.4) 48 (1219.2)	① 36 (914.4) 48 (1219.2)	① 6 (152.4) 12 (304.8)	N/A N/A N/A	— — —
PSEG—New Jersey	Hot							
800 1200–2000 2500 3000–4000		36 (914.4) 45 (1143.0) 45 (1143.0) 45 (1143.0)	36 (914.4) 48 (1219.2) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2) 48 (1219.2)	6 (152.4) 12 (304.8) 12 (304.8) 12 (304.8)	N/A N/A N/A N/A	— — — —
Public Service of New Hampshire	Hot/Cold ②	①	①	①	①	①	N/A	—
First Energy Toledo Edison	Cold	①	①	①	①	①	N/A	—
Ameren (Union Electric)	Hot							
800–4000		①	①	①	①	①	N/A	N/A
Dominion (Virginia Power Company)	Hot							
800–1200 1600–2000 2500–4000		36 (914.4) 45 (1143.0) 45 (1143.0)	36 (914.4) 36 (914.4) 48 (1219.2)	36 (914.4) 36 (914.4) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2)	6 (152.4) 12 (304.8) 12 (304.8)	N/A N/A N/A	— — —
We Energies (Wisconsin Electric Power Co.)	Hot							
800–1200 1600–3000 4000		36 (914.4) 36 (914.4) 45 (1143.0)	36 (914.4) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2)	6 (152.4) 12 (304.8) 12 (304.8)	N/A N/A N/A	— — —
Alliant Energy (Wisconsin Power and Light)	Hot							
800–1200 1600–2000 2500–3000		36 (914.4) 36 (914.4) 45 (1143.0)	36 (914.4) 48 (1219.2) 48 (1219.2)	36 (914.4) 48 (1219.2) 48 (1219.2)	48 (1219.2) 48 (1219.2) 48 (1219.2)	12 (304.8) 12 (304.8) 12 (304.8)	N/A N/A N/A	— — —
Wisconsin Public Service Corp.	Hot							
1000–4000		45 (1143.0)	36 (914.4)	36 (914.4)	N/A	—	N/A	—
Centergy	Hot				Bottom	Top		
1200–2000 2500–4000		36 (914.4) 45 (1143.0)	30 (762.0) 36 (914.4)	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A
CPS Energy	Hot							
800–4000		45 (1143.0)	36 (914.4)	36 (914.4)	36 (914.4)	36 (914.4)	N/A	N/A
NES (Nashville Electric Service)	Hot							
800–2500 3000–4000		36 (914.4) 45 (1143.0)	30 (762.0) 36 (914.4)	N/A N/A	30 (762.0) 36 (914.4)	30 (762.0) ③ 36 (914.4) ③	N/A N/A	N/A N/A

① Dimensions are the same as standard NEMA utility compartments, refer to **Page 21.4-25**.
② For special applications approved by the utility.
③ Per NES requirements, power flow through utility compartment must be bottom to top. If top incoming, a separate pull section is required.

Note: "W" or "D" of structure is determined by the dimensions of the utility compartment or main device—whichever is greater. N/A = Not Applicable.

Note: The following utilities have standardized on the National Electrical Manufacturers Association (NEMA) utility metering compartment standard. American Electric Power, Central Hudson Gas and Electric, Central Vermont, Consumers Power Company, Delmarva Power and Light, Georgia Power Company, Kansas City Power And Light, Orange and Rockland, Philadelphia Electric Company, Allegheny Power, Toledo Edison, Union Electric, Columbus Southern Power, Pennsylvania Electric Co. and Southern Maryland Electric Coop.

Incoming West Coast Utility CT Compartments and/or Main Devices



Note: Switchboards designed using these main structures require rear access for cable terminations. Refer to NEC Article 110-26 for requirements.

Figure 21.4-4. West Coast Utility Layouts—Dimensions in Inches (mm)

① Clear area assumes no floor channels used under bottom frame.
② If floor channels are present, this dimension is 6.00 (152.4).

Table 21.4-17. Dimensions for Figure 21.4-4 Layouts—Dimensions in Inches (mm)

Power Company Compartments Ampere Ratings	Front- and Rear-Access					
	Layout 1		Layout 2		(Top Feed) Top-Mounted Pull Box	(Bottom Feed) Pull Section
	Width (W)	Depth (D)	Width (W)	Depth (D)	Height (H)	Width (W1)
West Coast Utilities E.U.S.E.R.C.						
400–800	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	N/R	30 (762.0)
1000	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	30 (762.0)	36 (914.4)
1200	38 (965.2)	30 (762.0)	38 (965.2)	30 (762.0)	36 (914.4)	36 (914.4)
1600	45 (1143.0)	30 (762.0)	38 (965.2)	30 (762.0)	36 (914.4)	45 (1143.0)
2000	45 (1143.0)	30 (762.0)	38 (965.2)	30 (762.0)	36 (914.4)	45 (1143.0)
2500	51 (1295.4)	36 (914.4)	38 (965.2)	30 (762.0)	36 (914.4)	51 (1295.4)
3000	51 (1295.4)	36 (914.4)	38 (965.2)	30 (762.0)	36 (914.4)	51 (1295.4)
4000	51 (1295.4)	36 (914.4)	51 (1295.4)	36 (914.4)	36 (914.4)	51 (1295.4)
Southern California Edison (S.C.E.)						
400	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	N/R	30 (762.0)
600–800	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	N/R	30 (762.0)
1000	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	30 (762.0)	36 (914.4)
1200	38 (965.2)	30 (762.0)	38 (965.2)	30 (762.0)	36 (914.4)	36 (914.4)
1600	45 (1143.0)	30 (762.0)	38 (965.2)	30 (762.0)	36 (914.4)	45 (1143.0)
2000	45 (1143.0)	30 (762.0)	38 (965.2)	30 (762.0)	36 (914.4)	45 (1143.0)
2500	—	—	38 (965.2)	30 (762.0)	36 (914.4)	51 (1295.4)
3000	—	—	38 (965.2)	30 (762.0)	36 (914.4)	51 (1295.4)
4000	—	—	51 (1295.4)	36 (914.4)	36 (914.4)	51 (1295.4)
Los Angeles Department of Water and Power (L.A.D.W.P.)						
400	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	③	30 (762.0)
600–800	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	③	30 (762.0)
1000	36 (914.4)	24 (609.6)	36 (914.4)	24 (609.6)	③	36 (914.4)
1200	38 (965.2)	30 (762.0)	38 (965.2)	30 (762.0)	③	36 (914.4)
1600	45 (1143.0)	30 (762.0)	38 (965.2)	30 (762.0)	③	45 (1143.0)
2000	45 (1143.0)	30 (762.0)	38 (965.2)	30 (762.0)	③	45 (1143.0)
2500	—	—	38 (965.2)	30 (762.0)	③	51 (1295.4)
3000	—	—	38 (965.2)	30 (762.0)	③	51 (1295.4)
4000	—	—	51 (1295.4)	36 (914.4)	③	51 (1295.4)

③ Refer to Eaton.

Note: "W" or "D" of structure is determined by the dimensions of the utility compartment or main device—whichever is greater. N/R = Not Required.

Note: Dimensions for estimating purposes only.

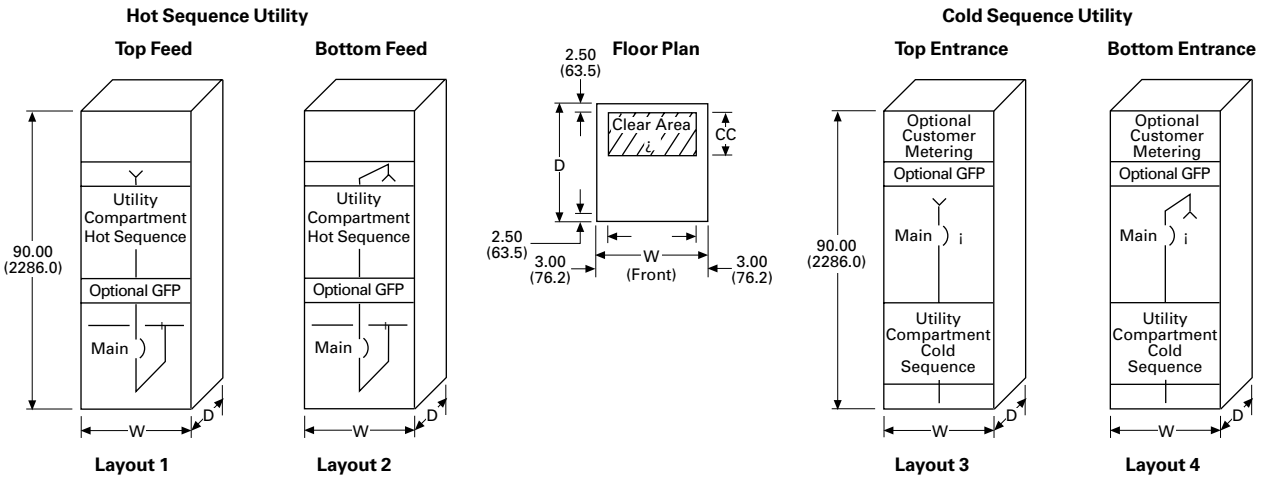
Table 21.4-17. Dimensions for Figure 21.2-3 Layouts—Dimensions in Inches (mm) (Continued)

Power Company Compartments Ampere Ratings	Front- and Rear-Access					
	Layout 1		Layout 2		(Top Feed) Top-Mounted Pull Box	(Bottom Feed) Pull Section
	Width (W)	Depth (D)	Width (W)	Depth (D)	Height (H)	Width (W1)
West Coast Utilities						
Pacific Gas and Electric (P.G. and E.)						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600 2000 2500	45 (1143.0) 45 (1143.0) —	30 (762.0) 30 (762.0) —	38 (965.2) 38 (965.2) 38 (965.2)	30 (762.0) 30 (762.0) 36 (914.4)	36 (914.4) 36 (914.4) 36 (914.4)	45 (1143.0) 45 (1143.0) 51 (1295.4)
3000 4000	— —	— —	38 (965.2) 51 (1295.4)	36 (914.4) 36 (914.4)	36 (914.4) 36 (914.4)	51 (1295.4) 51 (1295.4)
San Diego Gas and Electric (S.D.G. and E.)						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600 2000 2500	45 (1143.0) 45 (1143.0) —	30 (762.0) 30 (762.0) —	38 (965.2) 38 (965.2) 38 (965.2)	30 (762.0) 30 (762.0) 30 (762.0)	36 (914.4) 36 (914.4) 36 (914.4)	45 (1143.0) 45 (1143.0) 51 (1295.4)
3000 4000	— —	— —	38 (965.2) 51 (1295.4)	30 (762.0) 36 (914.4)	36 (914.4) 36 (914.4)	51 (1295.4) 51 (1295.4)
Seattle City Light (City of Seattle)						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600–2000 2500–3000 4000	38 (965.2) 38 (965.2) 51 (1295.4)	30 (762.0) 30 (762.0) 36 (914.4)	45 (1143.0) ② ②	30 (762.0) ② ②	36 (914.4) 36 (914.4) 36 (914.4)	36 (914.4) 45 (1143.0) ① 51 (1295.4) 51 (1295.4)
UniSource Energy Services						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600–2000 2500–3000	38 (965.2) 38 (965.2)	30 (762.0) 30 (762.0)	45 (1143.0) ②	30 (762.0) ②	36 (914.4) 36 (914.4)	36 (914.4) 45 (1143.0) ① 51 (1295.4)
Idaho Power						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600–2000 2500–3000 4000	38 (965.2) 38 (965.2) 51 (1295.4)	30 (762.0) 30 (762.0) 36 (914.4)	45 (1143.0) ② ②	30 (762.0) ② ②	36 (914.4) 36 (914.4) 36 (914.4)	36 (914.4) 45 (1143.0) ① 51 (1295.4) 51 (1295.4)
Alameda Municipal Power						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600–2000 2500–3000 4000	38 (965.2) 38 (965.2) 51 (1295.4)	30 (762.0) 30 (762.0) 36 (914.4)	45 (1143.0) ② ②	30 (762.0) ② ②	36 (914.4) 36 (914.4) 36 (914.4)	36 (914.4) 45 (1143.0) ① 51 (1295.4) 51 (1295.4)
City of Glendale						
400–800 1000 1200	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	36 (914.4) 36 (914.4) 38 (965.2)	24 (609.6) 24 (609.6) 30 (762.0)	N/R 30 (762.0) 36 (914.4)	30 (762.0) 36 (914.4) 36 (914.4)
1600–2000 2500–3000 4000	38 (965.2) 38 (965.2) 51 (1295.4)	30 (762.0) 30 (762.0) 36 (914.4)	45 (1143.0) ② ②	30 (762.0) ② ②	36 (914.4) 36 (914.4) 36 (914.4)	36 (914.4) 45 (1143.0) ① 51 (1295.4) 51 (1295.4)

① Minimum required section width is 36 inches; however, Eaton standard design is 45 inches.
② See utility company for appropriate dimensions.

Note: "W" or "D" of structure is determined by the dimensions of the utility compartment or main device—whichever is greater. N/R = Not Required.

Incoming Standard (NEMA) Utility CT Compartment and/or Main Device



Note: Switchboards designed using these main structures require rear access for cable terminations. Refer to NEC Article 110-26 for requirements.

Figure 21.4-5. NEMA Utility Compartment Layouts—Dimensions in Inches (mm)

① Clear area assumes no floor channels used under front or rear frame members.

② IQ meter can be mounted to disconnect door as an alternate location for molded case circuit breakers and fixed-mounted power circuit breakers.

Table 21.4-18. Main Device Structure Size for Figure 21.4-5 Layouts

Note: Dimensions for estimating purposes only. For metric conversion: inches x 25.4 = mm.

Main Device	Max. Amp. Rating	Width (W)	Depth (D)	Min. Cable Space CC
Fixed-Mounted Devices				
Molded Case Breakers Available With Optional Integral GFP				
PDG3xG* PDG3xM* PDG3xP*	400 400 400	36 36 36	48 48 48	12 12 12
PDG3xM* PDG3xP*	600 600	36 36	48 48	12 12
PDG4xG PDG4xM	800 800	36 36	48 48	12 12
PDG5xM PDG6xP	1200 2000	36 36	48 48	12 12
PDG6xP*	2500	36	48	12
100% Rated Molded Case Breakers Available with Optional Integral GFP				
PDF3xG* PDF3xM	400 400	36 36	48 48	12 12
PDF4xG PDF4xM	800 800	36 36	48 48	12 12
PDG5xM PDG5xP	1200 1200	36 36	48 48	12 12
PDG6xP* PDG6xP*	1600 2000	36 36	48 48	12 12
TRI-PAC Fuse Type Current Limiting Breakers				
LA-P NB-P PB-P	400 800 1600	36 36 36	48 48 48	12 12 12

Note: See **Page 21.4-27** for layout of distribution sections. See **Page 21.4-28** for outdoor rainproof enclosures.

Main Device	Max. Amp. Rating	Width (W)	Depth (D)	Min. Cable Space CC
Fixed-Mounted Devices				
100% Rated Insulated Case Circuit Breakers Available with Optional Integral GFP				
Magnum SB, DS ③	800 1600 2000 3000 ④ 4000 ④	36 36 36 45 45	48 48 48 48 48	12 12 12 12 12
100% Rated Power Circuit Breakers Available with Optional Integral GFP				
Magnum DSX	800 1600 2000 3000 ④ 4000 ④	36 36 36 45 45	48 48 48 48 48	12 12 12 12 12
Fusible Switches				
400 600 800 1200	400 600 800 1200	36 36 36 36	48 48 48 48	12 12 12 12
100% Rated Electric Trip Bolted Pressure Switches Available with Optional GFP				
CBC-800 CBC-1200 CBC-1600 CBC-2000 CBC-2500 CBC-3000 CBC-4000	800 1200 1600 2000 2500 3000 ④ 4000 ④	36 36 36 36 45 45 45	48 48 48 48 48 48 48	12 12 12 12 12 12 12

Note: Top-mounted pull boxes are available with heights of 12.00, 18.00, 24.00 and 30.00 inches (304.8, 457.2, 609.6 and 762.0 mm).

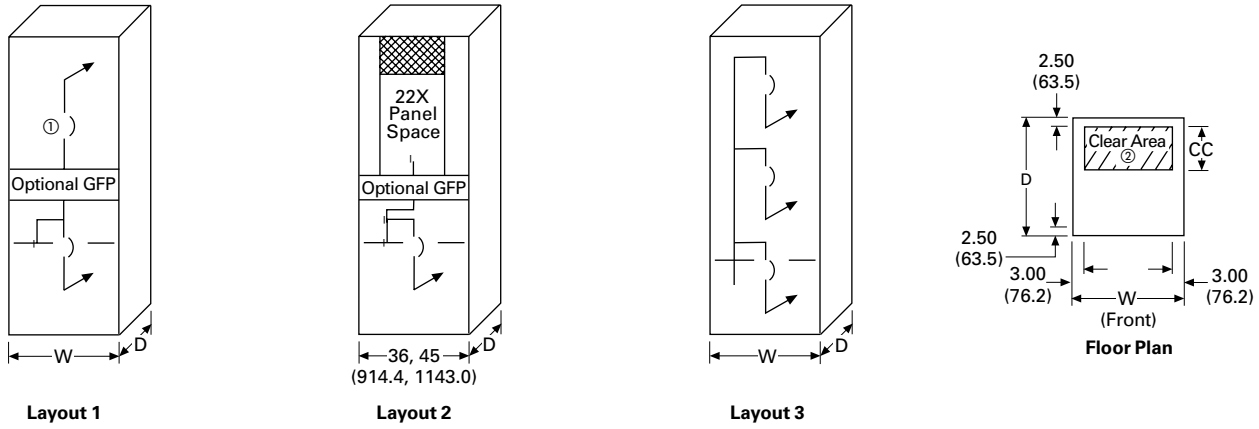
Main Device	Max. Amp. Rating	Width (W)	Depth (D)	Min. Cable Space CC
Fixed-Mounted Devices				
100% Rated Manual Bolted Pressure Switches Not Available with Ground Fault Protection				
QA-800 QA-1200 QA-1600 QA-2000 QA-2500 QA-3000 QA-4000	800 1200 1600 2000 2500 3000 ④ 4000 ④	36 36 36 36 45 45 45	48 48 48 48 48 48 48	12 12 12 12 12 12 12
Drawout-Mounted Devices				
100% Rated Insulated Case Circuit Breakers Available with Optional Integral GFP				
Magnum SB, DS ③	800 1600 2000 3000 ④ 4000 ④	36 36 36 45 45	54 54 54 66 66	6 6 6 18 18
100% Rated Power Circuit Breakers Available with Optional Integral GFP				
Magnum DSX	800 1600 2000 3000 ④ 4000 ④	36 36 36 45 45	54 54 54 66 66	6 6 6 18 18

③ Magnum DS power circuit breakers used as feeder devices have been qualified by Eaton and third-party witness tested for 30-cycle withstand. 30-cycle withstand is not recognized by UL 891.

④ Layout 1.

Note: Dimensions for estimating purposes only. For metric conversion: inches x 25.4 = mm.

Individually Mounted Feeder Devices



Layout 1 **Layout 2** **Layout 3** **Floor Plan**

Note: Switchboards designed using these distribution structures require rear access for cable terminations. Refer to NEC Article 110-26 for requirements.

Figure 21.4-6. Individually Mounted Feeder Layouts—Dimensions in Inches (mm)

① When using top-mounted (bottom feed) inverted bolted switches, verify acceptance with code authorities.

② For **Layout 2,** width will be 36.00 or 45.00 inches (914.4 or 1143.0 mm) depending on size of panel mounting devices. Refer to **Page 21.2-12**.

Table 21.4-19. Stacked Distribution Structure Sizes for Figure 21.4-6 Layouts 1 and 2—Dimensions in Inches (mm) ③

Feeder Device	Max. Amp. Rating	Zero Sequence GFP		No GFP or with Integral GFP		Minimum Cable Space CC
		Minimum		Minimum		
		Width (W)	Depth (D)	Width (W)	Depth (D)	
Fixed-Mounted Devices						
Molded Case Breakers						
PDG6xP*	1600	30 (762.0)	48 (1219.2)	26 (660.4)	48 (1219.2)	12 (304.8)
PDG6xP*	2000	30 (762.0)	48 (1219.2)	26 (660.4)	48 (1219.2)	12 (304.8)
PDG6xP*	2500	30 (762.0)	54 (1371.6)	26 (660.4)	48 (1219.2)	12 (304.8)
100% Rated Insulated Case Circuit Breakers Available with Optional Integral GFP						
Magnum SB, DS ⑤	800	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	18 (457.2)
	1600	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	18 (457.2)
	2000	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	18 (457.2)
100% Rated Insulated Case Circuit Breakers Available with Optional Integral GFP						
Magnum DSX	800	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	18 (457.2)
	1600	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	18 (457.2)
	2000	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	18 (457.2)
100% Rated Electric Trip Bolted Pressure Switches						
CBC-800	800	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	12 (304.8)
CBC-1200	1200	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	12 (304.8)
CBC-1600	1600	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	12 (304.8)
CBC-2000	2000	36 (914.4)	48 (1219.2)	36 (914.4)	48 (1219.2)	12 (304.8)
CBC-2500	2500	45 (1143.0)	48 (1219.2)	36 (914.4)	48 (1219.2)	12 (304.8)
100% Rated Manual Bolted Pressure Switches Not Available with Ground Fault Protection						
QA-800	800	—	—	30 (762.0)	48 (1219.2)	12 (304.8)
QA-1200	1200	—	—	30 (762.0)	48 (1219.2)	12 (304.8)
QA-1600	1600	—	—	30 (762.0)	48 (1219.2)	12 (304.8)
QA-2000	2000	—	—	30 (762.0)	48 (1219.2)	12 (304.8)
QA-2500	2500	—	—	36 (914.4)	48 (1219.2)	12 (304.8)

③ Structure size determined by device requiring largest width and depth.

④ Magnum DS power circuit breakers used as feeder devices have been qualified by Eaton and third-party witness tested for 30-cycle withstand. 30-cycle withstand is not recognized by UL 891.

Table 21.4-20. Stacked Distribution Structure Sizes for Figure 21.4-6 Layout 3 Only—Dimensions in Inches (mm)

Feeder Device	Maximum Ampere Rating	No GFP or with Integral GFP		Minimum Cable Space CC
		Minimum		
		Width (W)	Depth (D)	
Fixed-Mounted Devices				
100% Rated Insulated Case Circuit Breakers Available with Optional Integral GFP				
Magnum SB, DS ⑤	800	36 (914.4)	36 (914.4)	6 (152.4)
100% Rated Insulated Case Circuit Breakers Available with Optional Integral GFP				
Magnum DSX	800	36 (914.4)	36 (914.4)	6 (152.4)
100% Rated Manual Bolted Pressure Switches Not Available with Ground Fault Protection				
QA-800	800	30 (762.0)	48 (1219.2)	12 (304.8)

⑤ Magnum DS power circuit breakers used as feeder devices have been qualified by Eaton and third-party witness tested for 30-cycle withstand. 30-cycle withstand is not recognized by UL 891.

Note: See **Page 21.4-27** for layout of distribution sections.
See **Page 21.4-29** for outdoor rainproof enclosures.

Note: Top-mounted pull boxes are available with heights of 12, 18, 24 and 30 inches (304.8, 457.2, 609.6 and 762.0 mm).

Distribution Sections—Group-Mounted Devices

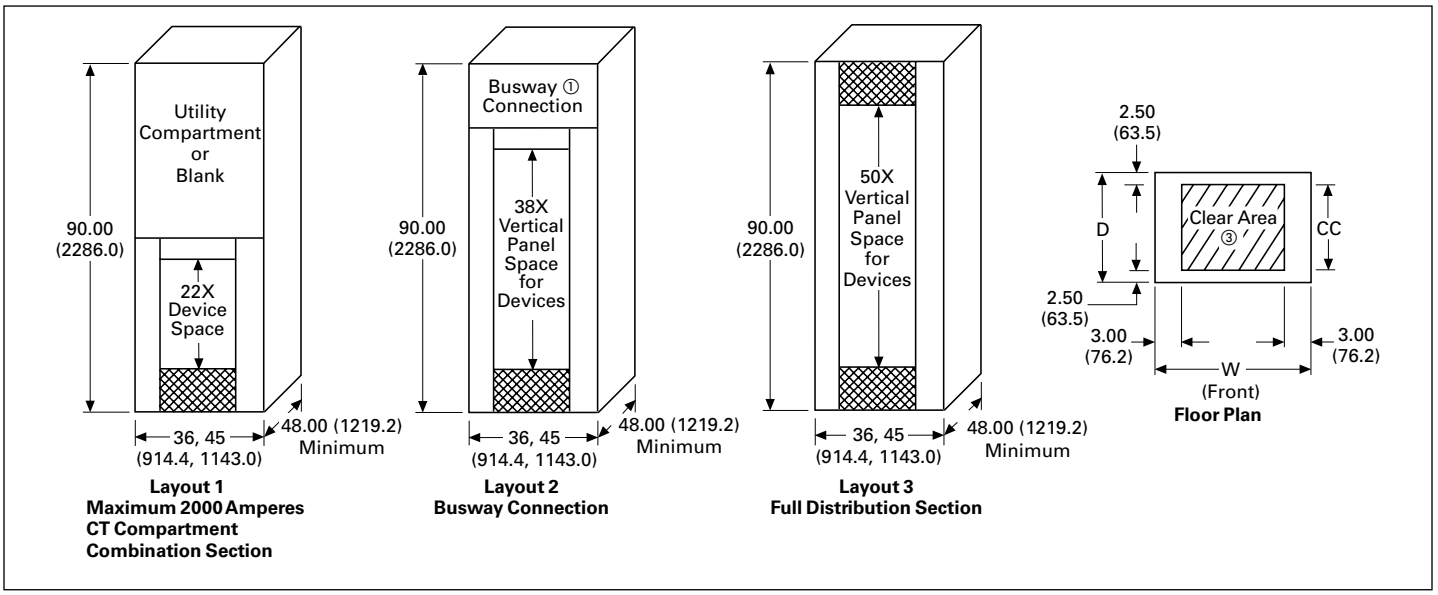


Figure 21.4-7. Distribution Section Layout—Dimensions in Inches (mm)

① Busway connection can be either incoming service to structure or exiting load from a feeder breaker. Increased depth will be required.
② For panels rated above 2000 A, minimum depth is 24.00 inches (609.6 mm).
③ Clear area assumes no floor channels used under bottom frame.

Table 21.4-21. Pow-R-Line *i*X

Minimum Depth (D)	4000 A Maximum
	Minimum Cable Space CC
48 (1219.2)	18 (457.2)
54 (1371.6)	54 (1371.6)
66 (1676.4)	66 (1676.4)

Outdoor Enclosures

Non-Walk-in with Flat Roof

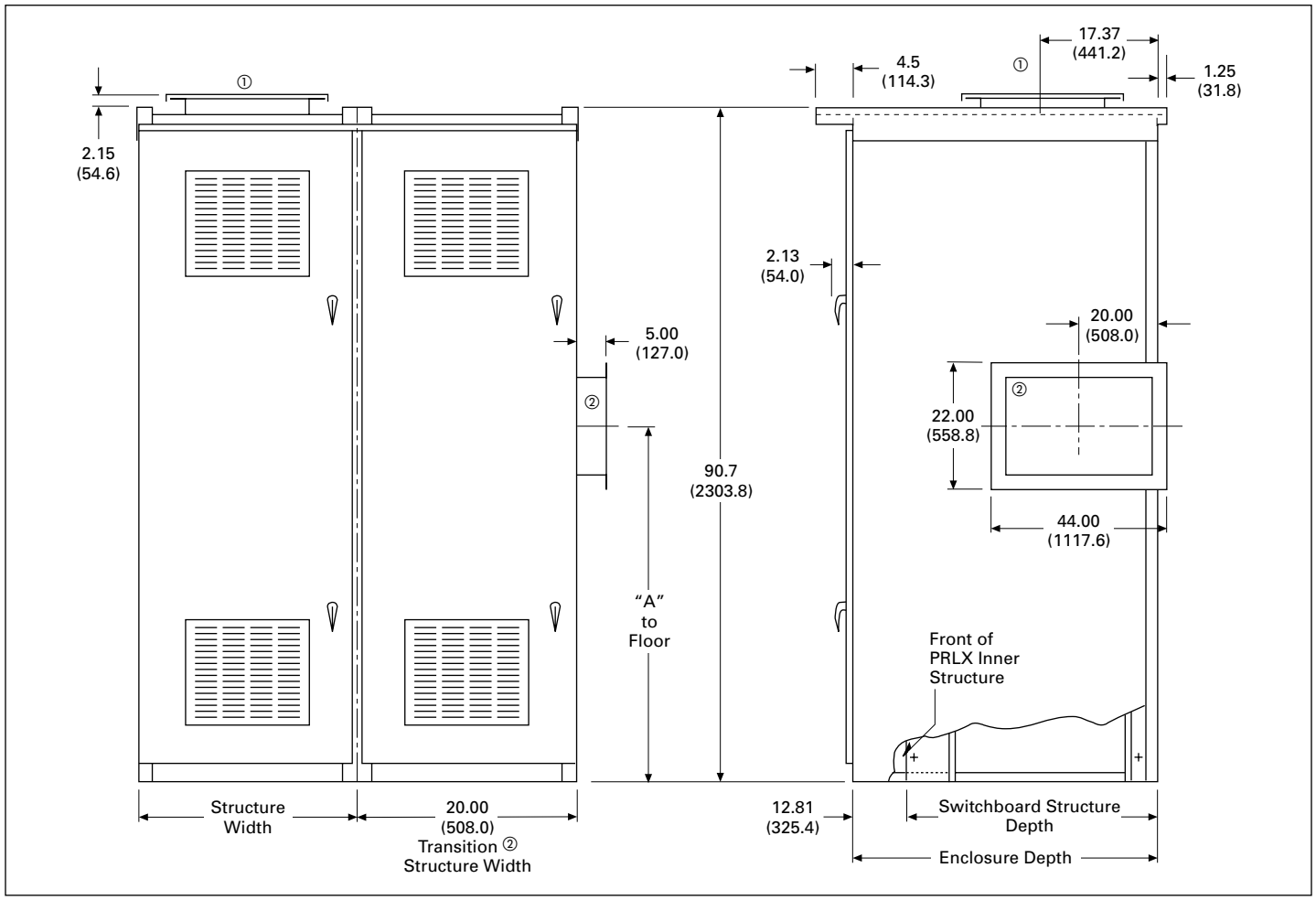


Figure 21.4-8. Front-Access—Non-Walk-In with Flat Roof—Dimensions in Inches (mm)

① Standard busway entry/exit location, 36.00-inch (914.4 mm) deep minimum.

② 20.00-inch (508.0 mm) wide structure always required when throat connecting to other equipment. Standard transformer throat connection, 48.00-inch (1219.2 mm) deep structure only.

Table 21.4-22. Switchboard Depths—Dimensions in Inches (mm)

Switchboard Indoor Structure Depth	Non-Walk-in Enclosure Depth
24 (609.6)—not available for transformer connection	37 (939.8)
30 (762.0)—not available for transformer connection	43 (1092.2)
36 (914.4)—not available for transformer connection	49 (1244.6)
48 (1219.2)—minimum for transformer connection	61 (1549.4)

Table 21.4-23. Transformer Throat Location—Dimensions in Inches (mm)

Transformer	Dimension "A"
0–2500 kVA	55 (1397.0)
2501–5000 kVA	61 (1549.4)

Non-Walk-in with Sloped Roof

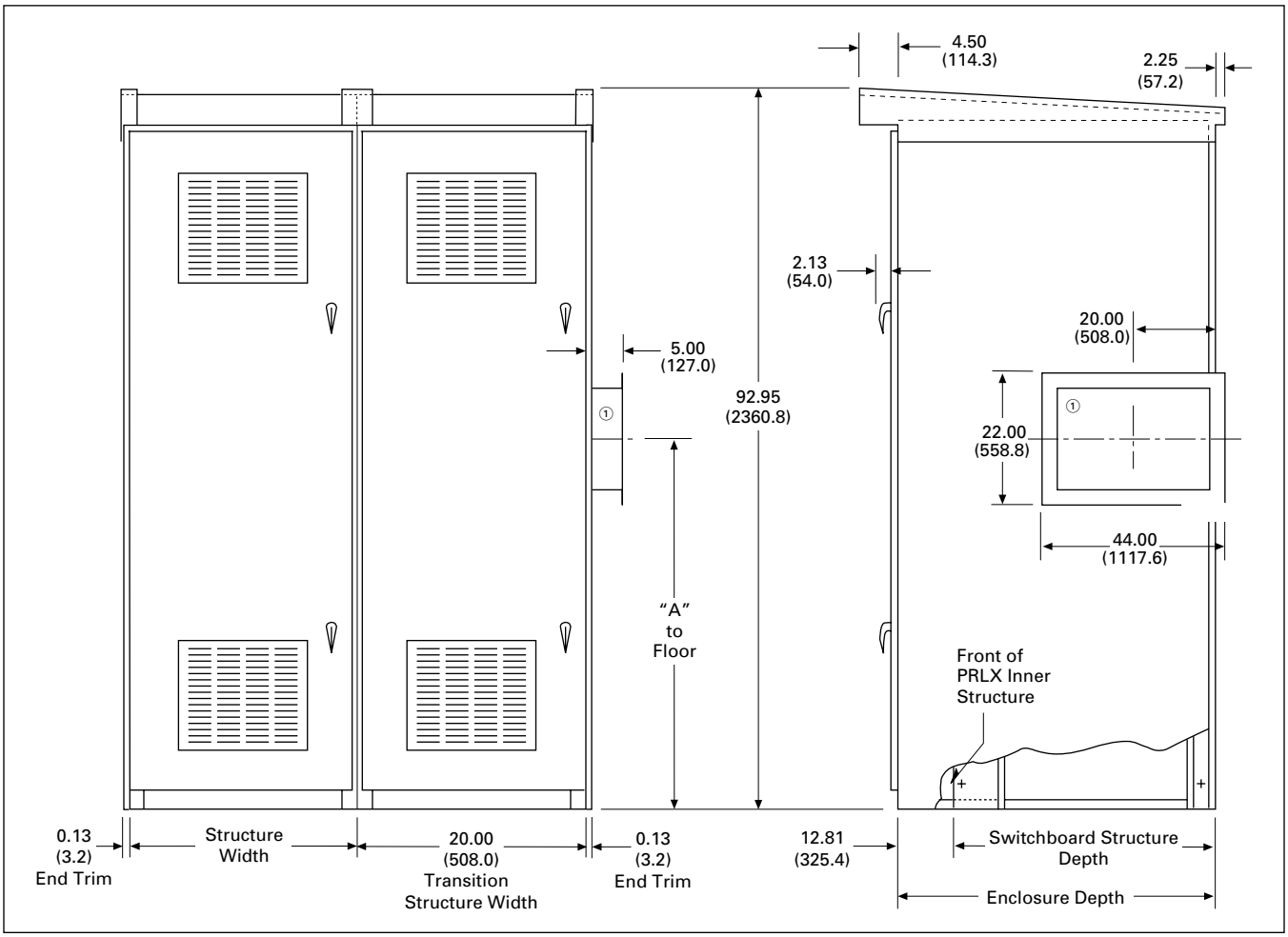


Figure 21.4-9. Front-Access—Non-Walk-In with Sloped Roof—Dimensions in Inches (mm)

① 20.00-inch (508.0 mm) wide structure always required when throat connecting to other equipment. Standard transformer throat connection, 48.00-inch (1219.2 mm) deep structure minimum.

Table 21.4-24. Switchboard Depths—Dimensions in Inches (mm)

Switchboard Indoor Structure Depth	Non-Walk-in Enclosure Depth
24 (609.6)—not available for transformer connection	37 (939.8)
30 (762.0)—not available for transformer connection	43 (1092.2)
36 (914.4)—not available for transformer connection	49 (1244.6)
48 (1219.2)—minimum for transformer connection	61 (1549.4)
54 (1371.6)	67 (1701.8)
66 (1676.4)	79 (2006.6)

Table 21.4-25. Transformer Throat Location—Dimensions in Inches (mm)

Transformer	Dimension "A"
0–2500 kVA	55 (1397.0)
2501–5000 kVA	61 (1549.4)

Note: Dimensions for estimating purposes only.

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