QED-2 Low Voltage Switchboard

General and Application Information

Catalog

Class 2742
Release date 11/2025

www.se.com

Legal Information

The information provided in this document contains general descriptions, technical characteristics and/or recommendations related to products/solutions.

This document is not intended as a substitute for a detailed study or operational and site-specific development or schematic plan. It is not to be used for determining suitability or reliability of the products/solutions for specific user applications. It is the duty of any such user to perform or have any professional expert of its choice (integrator, specifier or the like) perform the appropriate and comprehensive risk analysis, evaluation and testing of the products/solutions with respect to the relevant specific application or use thereof.

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QED-2 Switchboards

Product Description

QED-2 switchboards provide a convenient and economical means of distributing electric power. These enclosed, free-standing structures contain circuit breaker or fusible overcurrent protection for services rated up to 5000 A with a maximum voltage of 600 Vac. QED-2 switchboards are custom–made for use as service entrance equipment or as distribution centers in commercial, institutional, and industrial applications.

An auxiliary section is also available for cable or bus transition or to provide additional space for connecting the service conductors to the line side of the main. The auxiliary section is a full-height section with a depth to match that of the adjacent section. It can contain customer metering or through bus and incoming lug pads.

The QED-2 frame allows various special components to be mounted in the switchboard. These components include automatic throwover systems, transfer switches, and special metering systems. This flexibility means the QED-2 switchboard can meet customer requirements on the most complicated applications.

Features

Figure 1 - MasterPacT™ MTZ Breaker on Left with I–Line™

Distribution Section on Right

- Sections rated to 6000 A horizontal bus, 3000 A vertical bus
- Single mains to 5000 A
- Six subdivision mains to 4000 A
- Individually mounted feeders to 4000 A
- Suitable for service entrance or distribution
- NEMA Type 1 or Type 3R enclosures
- Front or front and rear accessible
- 91.5 in. (2324 mm) high with base channels
- Section widths available: 12 in. (305 mm), 24 in. (610 mm), 30 in. (762 mm), 36 in. (914 mm), 42 in. (1067 mm), 48 in. (1219 mm), or 54 in. (1372 mm) wide
- Frame depths available: 24 in. (610 mm), 36 in. (914 mm), 48 in. (1219 mm), 54 in. (1372 mm), or 60 in. (1524 mm)
- Voltage to 600 Vac or 250 Vdc
- Factory assembled
- SIS Type Wire for control wiring
- Hot or cold sequence utility metering
- Customer metering
- Surge Protective Devices (SPD)

Structures

Figure 2 - NEMA Type 3R Enclosure over Two Sections

The QED-2 switchboard frame has been designed to provide a sturdy platform on which to build Schneider Electric switchboard products. Individual switchboard sections are built from formed steel channels and angles, then secured together with thread-rolling screws. These thread-rolling screws, when compared with regular self-tapping screws, provide superior torque and strip-out resistant qualities.

Section dimensions are determined by the type, size, quantity, and arrangement of the components and devices being installed.

Figure 3 - QED-2 I-Line Section with Bus

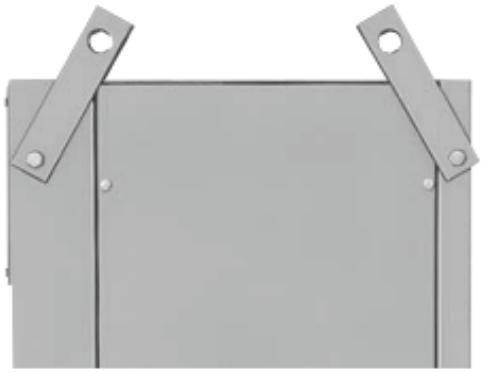
Each section features a removable one-piece top plate, which makes locating the top conduit entry simple. When extra height is required, Schneider Electric can supply a 12 in. (305 mm) or 24 in. (610 mm) high pullbox. (The pullbox is not available with NEMA Type 3R enclosures.)

All covers, doors, and frames are made of formed steel for extra rigidity. A deep front corner channel and side plate covers the sides. The back is covered with removable plates that have formed edges. All covers are secured with slot/hex head thread rolling screws which greatly minimize the chances of thread strip-out.

The standard paint finish on all Power-Style QED-2 switchboards is an ANSI #49 medium light gray baked enamel over an iron phosphate pretreatment. Non-standard finishes are an available option when specified.

QED-2 switchboards are available in either NEMA Type 1 indoor or Type 3R outdoor enclosures.

Figure 4 - Lifting Bars can be used on QED–2 NEMA Type 1 Sections up to –3000 A



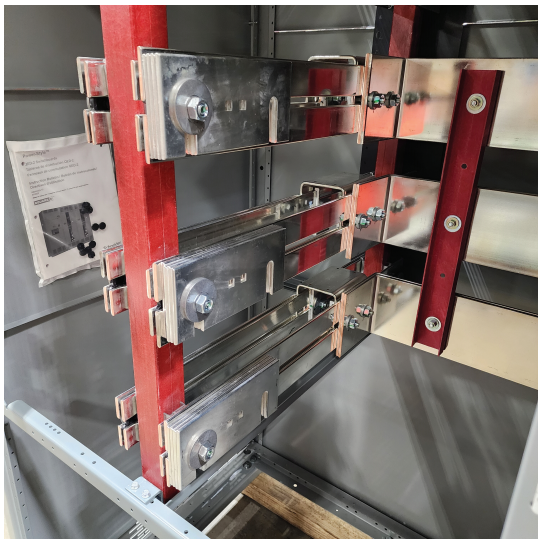
Each QED-2 section 3000 A or less has removable lifting bars and is clearly labeled with handling procedures. The sections are shipped separately to allow the installer extra flexibility when moving the sections to the desired location. Once in place, the sections are secured together, linking the strength of each frame. Optional multiple-section shipments do not have lifting bars.

Bus Design

Through Bus

The heart of a switchboard is the horizontal through bus which connects the individual section bussing. The through bus is available in ratings from 1200 – 6000 A. QED-2 through bus uses aluminum or copper rectangular bus bars. Connections are made by using an “E” connector assembly.

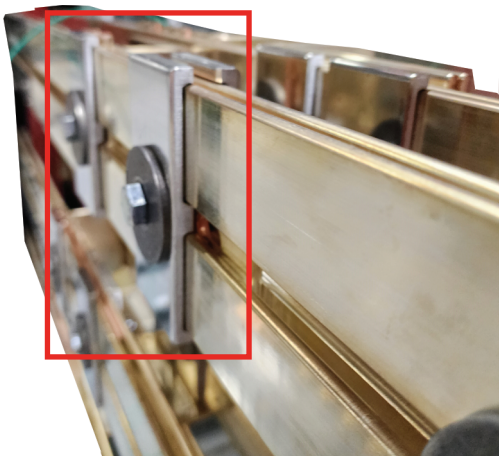
Figure 5 - 4000 A Through Bus Assembly



Bus ampacity (A) ratings have been determined from UL 891 heat rise testing. This method is the most accurate, since actual tests are used for determining optimal bus sizes. Density rated options (1000 A / square in., 700 A / square in., 750 A / square in.) are available.

A 100% neutral bus is provided on 3-phase, 4-wire (3Ø4W) and 1-phase, 3-wire (1Ø3W) systems. Ground bus is standard and matches the type of through bus. Optional, increased-size ground bus is available.

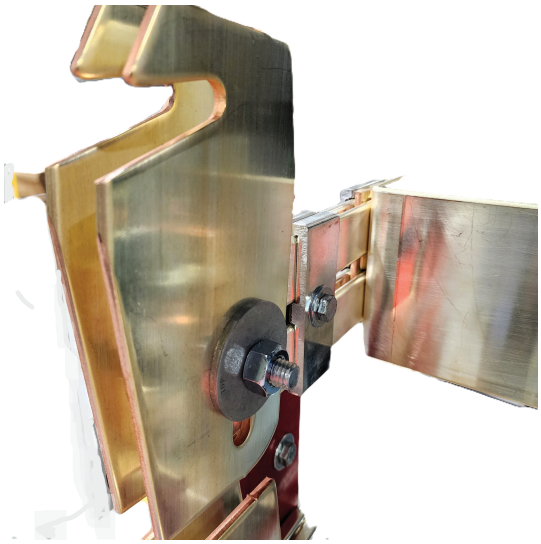
Figure 6 - “E” Connector on Through Bus



“E” Connector Assembly

The “E” connector assembly eliminates the alignment problems associated with conventional bus bar connections. The “E” connector assembly, consisting of an “E” connector, carriage bolt, conical washer, and hex nut, requires only one wrench to tighten. This assembly is used on splice connections and connections to through bus from the panel bus. By providing more uniform pressure over the contact surface, a highly efficient and cooler connection is obtained.

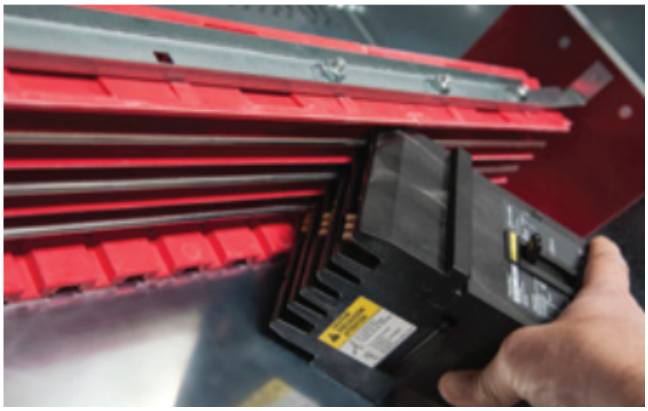
Figure 7 - Captive Splice Bus, Distribution to Distribution



Captive Splice Bars

Captive splice bars are provided on through bus connections through 2500 A. They provide easy installation and reduce the chances of losing parts during installation. Splice connections are made up of splice bars and the “E” connector assembly. For splicing convenience, customers can access the through bus bars in QED-2 main and distribution sections from the front of the switchboard. Slots are provided in the splice bus for ease of assembly. For addition of future sections, through bus is extended to the sides as standard in all sections.

Figure 8 - Efficient Distribution



The I-Line distribution section is enhanced for ease of installation.

The I-Line offers jaw-type connections which provide a firmer, more secure grip on the bus bar under high-level fault conditions for improved uptime. Distribution sections are available in single or double row construction allowing an increased power density in a compact footprint.

Main Sections

Figure 9 - 2000 A MasterPacT™ Main Circuit Breaker with PowerLogic Power Meter

The main devices for overcurrent / short circuit protection and disconnect purposes are available as circuit breakers or fusible switches in QED-2 switchboards. These individually mounted main disconnect sections can contain PowerPacT M-, P-, and R-Frame molded case circuit breakers to a maximum of 2500 A. The MasterPacT (stored energy) circuit breaker is available to a maximum of 5000 A and Boltswitch™ fused switches are available to a maximum of 4000 A. Ground fault protection is available through MicroLogic™ trip units on the PowerPacT P- and R-Frame and MasterPacT circuit breakers. Ground fault protection is available on Boltswitch fused switches with the BPGF100 ground fault system. Section width varies with mains and options. The MasterPacT circuit breaker is available in fixed or drawout construction.

Available Features

- 5000 A maximum disconnects
- 600 Vac maximum

- Individually mounted mains
  - PowerPacT MG, MJ (800 A max.)
  - PowerPacT PG, PJ, PK, PL (1200 A max.)
  - PowerPacT RG, RK, RJ, RL (2500 A max.)
  - MasterPacT NW & MTZ2/3 (5000 A max.)
  - Fused Power Devices (electric or manual trip, 4000 A only)
- Top or bottom feed
- Busway connection available
- Suitable for use as service entrance
- Energy Reducing Maintenance Switch ERMS or Maintenance Mode Setting Switch (MMS) options
- Ground fault protection (not available on PowerPacT M-frame)
  - MicroLogic trip unit (residual)
  - BPGF100 Ground Fault Relay/Sensor (zero sequence)
- Customer metering
  - PowerLogic power meter (communications available)
  - ION meter (communications available)
- Utility compartment (hot or cold sequence metering)
- Surge protective device in instrument compartment

Six subdivision mains are available as individually mounted devices up to a rating of 4000 A. The multiple mains are available as either PowerPacT M-, P-, or R-Frame circuit breakers, MasterPacT circuit breakers, or Boltswitch fused switches. All six subdivision mains are connected to the through bus, which is available in ratings up to 5000 A. Refer to national and local codes adopted in the equipment location to determine proper layout of mains for service entrance applications. For example, the 2020 edition of the US National Electrical Code (NEC) no longer allows two to six service disconnecting means to be in the same switchboard section.

Group-Mounted Distribution Sections

Figure 10 - I-Line Distribution Section

- 3000 A maximum copper vertical bus
- 1600 A maximum aluminum vertical bus
- 63 in. (1600 mm) panel height to 2000 A; 72 in. (1829 mm) for 3000 A
- 72 in. (1829 mm) maximum single row circuit breaker mounting space
- 117 in. (2972 mm) maximum double row circuit breaker mounting space
- 1200 A maximum circuit breaker rating

QED-2 switchboard distribution sections are available with an I-Line™ group-mounted distribution panel. Each of these interiors mounts to the frame front corner channels with horizontal mounting rails. Connectors secured to the through bus with the “E” connector assembly bring power into the center of each interior bus. The vertical bus feeds power to each branch disconnect. When a neutral is required, it is located at the side of the I-Line circuit breaker mounting pan. This convenient neutral location provides for front accessible neutral connections. Ample wireway space is provided for the load side cabling of branch disconnects.

Schneider Electric molded case circuit breakers are available in I-Line plug-on group construction. In this construction, the line end of the circuit breaker plugs directly onto the I-Line panel bus assembly. Branch circuit breakers can be quickly and efficiently installed and wired from the front of the switchboard. I-Line circuit breakers are keyed to mounting slots in the support pan to provide automatic alignment and reduced installation time. The circuit breakers are then secured to the pan with screws. I-Line switchboard sections are available in single row or double row construction. Single row permits mounting of circuit breakers only on one side of the I-Line bus, while double row construction provides for circuit breaker mounting on both sides of the I-Line bus assembly. Different circuit breakers on double row construction can be

mounted opposite each other. Refer to Group Mounted Main or Branch Circuit Breakers, page 59 for information on breaker types and placement available in I-Line distribution sections.

Individual Mounted Feeders

Individual Mounted Feeders

QED-2 switchboard distribution sections are also available in individually mounted construction. This type of construction allows for larger feeder ampacities up to 4000 A. The individually mounted feeder devices can contain PowerPacT M-, P-, and R-Frame and MasterPacT NW/MTZ circuit breakers, or Boltswitch fusible switches to a maximum of 4000 A. Ground fault protection is available through MicroLogic trip units on PowerPacT, P-, and R-Frame and MasterPacT NW/MTZ circuit breakers. Ground fault protection is available on Boltswitch switches with the BPGF100 ground fault system. ERMS and MSS options zone interlocking is available as an option between the feeders and main. Arc energy reduction switches (ERMS or MMS) to comply with NEC Article 240.87 can also be added to individually mounted feeder devices as options.

Figure 11 - Stacked NW

Incoming Connections / Structure Modifications

Incoming Connections

Line-side lug connections are available for single main devices, bussed auxiliary sections, utility compartments, I-Line distribution sections, and quick connect generator switchboards. Lugs or studs can be provided as required.

Transformer connections are available for Power-Dry II™, Power-Cast II™, Uni-Cast II™, and liquid-filled transformers. These connections require a switchboard depth of 60 in. (1524 mm). For more information on dimensions and equipment alignment, see catalog 6020CT9401, Power-Zone™ Load Center Unit Substations.

Busway connections are available with a flanged collar (Qwik Flange™) or flanged end. Qwik Flange is available for NEMA Type 1, top feed only. They are available for aluminum bus from 800–4000 A and for copper bus from 800–5000 A. For more details on busway, see catalog 5600CT9101, Busway Systems.

Connect to existing — To add a section to an existing switchboard, the following is required:

- Factory order number from the nameplate of the existing switchboard
- Type of existing equipment: QED-2/S, QED-2 Series 2, QED-3, QED-4, or special location of the through bus for the adjacent section: top, middle, or bottom
- Bus bar size if 2000 A or smaller: 1.5 or 2.0 in. (38 or 51 mm)
- Depth of through bus from the front of the switchboard: 19.5, 27.5, or 36.0 in. (495, 699, or 914 mm)

Special connections are available for Model 6 motor control centers. Contact your local Schneider Electric representative for more information.

Auxiliary Section Information

Ampacity	Width	Depth
800–2000	24 in. (6.0 mm)	24 in. (610 mm)
2500	30 in. (762 mm)	
3000	36 in. (914 mm)	36 in. (914 mm)
4000	42 in. (1067 mm)	48 in. (1219 mm)
5000	48 in. (1219 mm)	

Fire Pump Lugs

Options
#10–2/0 per phase and neutral
#6–350 kcmil per phase and neutral

NOTE: Requires an auxiliary section.

Structure Modifications

- Auxiliary section–bussed or unbussed
- Steel barriers between sections
- Bottom closure plate
- Corner sections (≤ 2500 A), loadside wireway section and rear wireway (for large tenant mains only)
- Corrosion resistant base channels (standard for NEMA Type 3R)
- Drip hood (NEMA Type 1; not available for NEMA Type 3R)
- Hinged rear doors (must have rear access)

- Increased depth and width (for increased wire bending space)
- Interior lights and GFI receptacle for NEMA Type 3R enclosure
- Mimic bus nameplate (anodized aluminum or plastic)
- Paint—ANSI 49 (standard), ANSI 61, or special (contact your local Schneider Electric representative)
- Pullbox (NEMA Type 1 enclosure only)
- Reduced height sections–76.5 in. (requires longer lead time)
- Rodent barrier (standard on NEMA Type 3R)
- Strip heater with thermostat and/or humidistat (standard on NEMA Type 3R)
- Surge arrester

For additional options, please contact your local Schneider Electric representative.

Customer Metering

ION9000 / 9000T Series Advanced Power Quality Meters

Figure 12 - 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.

QED-2 Switchboards offer a 3.7 inch (96 mm) color display (std) and a 7.5 inch (192 mm) touchscreen display (opt) along with additional Input and Output Module options as shown below:

- 6 digital inputs, and 2 digital outputs
- 12 digital inputs and 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 13 - QED-2 with ION9000 Meter with Optional 7 in. Color Touchscreen Display

PowerLogic PM8000 Advance Power Quality Meters

Figure 14 - PM8244 Meter Module (mounted in Instrument Compartment of QED-2)

Figure 15 - 3.5 in. Color Graphic Display (mounted on Main Circuit Breaker Door in QED-2)

The PowerLogic PM8000 series meters are compact, cost-effective multifunction power meters that will help you ensure reliability and efficiency of a power-critical facility, reveal and understand complex power quality conditions. Measure, understand, and act on insightful data gathered from the entire power system. Designed for key metering points throughout the energy infrastructure, the PowerLogic PM8000 series meter has the versatility to perform nearly any job a meter can do, wherever needed.

QED-2 Switchboards offer a 0.13 inch (3.5 mm) color display as shown above along with additional Input and Output Module options as shown below:

- Six digital inputs, and two digital outputs
- Twelve digital inputs and four digital outputs

Applications:

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

Table 1 - Advanced Power Quality Meters Comparison

	PM8000	ION9000	ION9000t
PQ Measurements	THD, individual harmonics ((1) 127th), sag / swell, DDD	THD,TDD, individual harmonics ((1) 511th), sag / swell, DDD, flicker, transients	THD,TDD, individual harmonics ((1) 511th), sag / swell, DDD, flicker, transients
PQ standards compliance: IEC 61000–4–30 / IEC62586–1 / IEC62586–2	Class S / No / Yes	Class A / Yes / Yes	Class A / Yes / Yes
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 / 10MHz V
kWh accuracy	0.2	0.1	0.1
Hardware lock	yes	yes	yes
Internal memory	512 MB	2 GB	2 GB
Communications ports	Dual Ethernet + 1 x RS485	Dual Ethernet + 2x RS485 + USB * + Optical (1)	Dual Ethernet + 2x RS485 + USB * + Optical (1)
Communications 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 16 - PowerLogic PM5563 Remote Display

The PowerLogic PM5563 power meter offered in QED-2 is the ideal fit for cost-management applications. Designed for use in both energy management systems

(1) via EcoStruxure Power software

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 inch (96.012 x 96.012 mm) 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 cyber security are also benefits. These are highly accurate devices with global billing certifications.

Characteristics

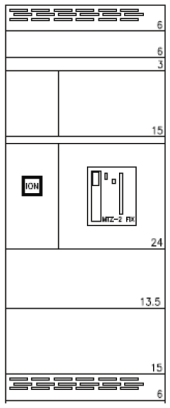
- Accuracy class 0.2S for active energy metering
- Compliance to regulations EN50470-1/3 (MID), IEC 61557-12, IEC 62053-21/22, IEC 62053-23
- Dual Ethernet ports as standard
- Ethernet-to-serial gateway functionality
- Onboard web pages for viewing real-time and logged information
- Cyber security enhancements 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 a 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

There are no option cards available for PM5563 meters.

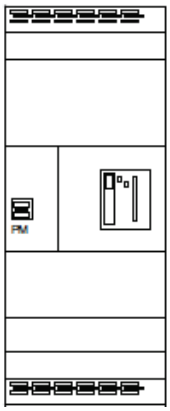
Applications:

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

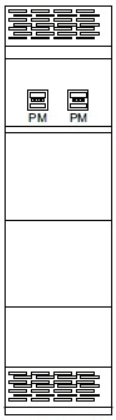
Metering Configurations (main shown are non-EUSERC)



MasterPacT NW with ION Meter



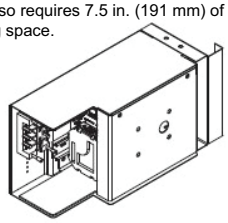
MasterPacT with Power Meter

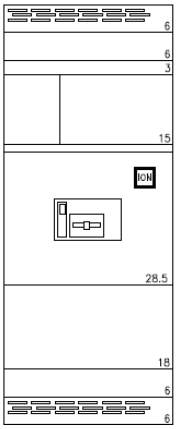


Power Meter for I-Line Circuit Breakers in 24 in. (610 mm) Wide Auxiliary Section

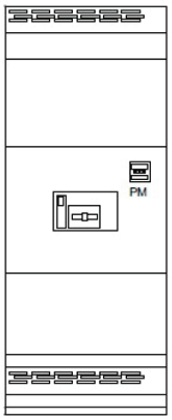
The I-Line mounting assembly for a PowerLogic power meter requires 7.5 in. (191 mm) of mounting space. (The mounting assembly does not connect to the bus stack.)

A CPT also requires 7.5 in. (191 mm) of mounting space.





PowerPacT R-Frame with ION Meter

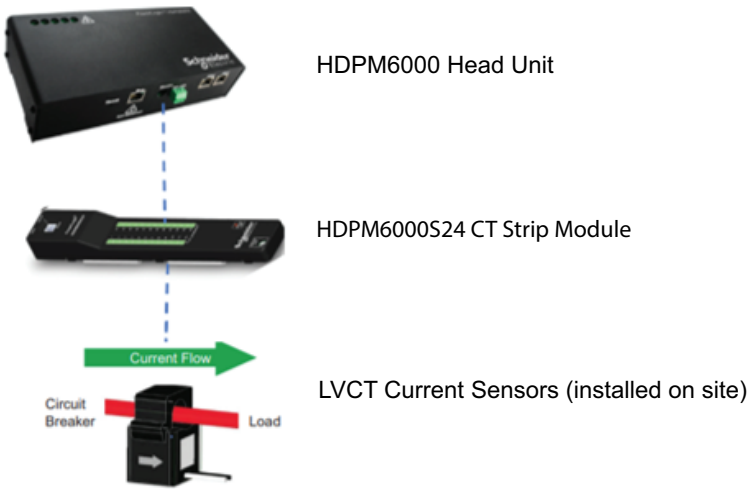


PowerPacT R-Frame with Power Meter

Circuit monitors and ION meters require an instrument compartment. Power meters can be mounted with the main.

PowerLogic HDPM6000 Power Quality Meter

Figure 17 - HDPM6000 Branch Metering Components



The HDPM6000 is a 3-phase power quality meter (PQM) option for QED–2 Switchboards that enables branch circuit monitoring in I-Line distribution sections. It can monitor loads up to 4000 A with utility grade system accuracy, delivers a complete range of power quality metrics (vTHD, iTHD), and provides waveform capture functionality without the need for additional proprietary software. The HDPM6000 can also maintain multiple, concurrent sessions with EPMS, DCIM or BMS applications via the Modbus, SNMP and BACnet IP protocols. Dual Ethernet ports allow multiple HDPM6000 head units to be daisy-chained in a single run. The HDPM6000 is easily integrated into any data center or building management information system on account of open protocol. Gateways or additional hardware are not required and the platform offers most standard forms of data connectivity. The on-board environmental communications port enables one-wire sensors to detect abnormal temperature and humidity conditions so adjustments can be made before problems occur.

The QED-2 Switchboard solution includes the HDPM6000 head unit, HDPM6000S24 strip unit and current ransducers for customer selected loads (up to 16 circuit breakers per I-Line section). Individual mount branch circuit breakers can also be added to the switchboard HDPM6000 system through additional I/O modules and current transducers.

Measurements

- Metering system parameters: V, I, PF, kW, kWh, kVAr, kVArh, kVA, kVAh, THDv, THDi
- Voltage and current waveform capture (optional)

Applications:

- Energy cost allocation
  - Accurately correlate and/or bill for circuit- and process-specific costs, keep users accountable for energy use
- Energy monitoring:
  - Gather and analyze consumption data to identify patterns, target energy efficiency measures and verify results, identify waste and opportunities to reduce energy
- Power quality monitoring per circuit (THD + waveform capture)
  - Analyze and interpret power quality data into useful information, improve system-wide performance, help determine causes of equipment malfunction

- Energy billing:
  - View current and historic circuit-focused energy bills, compare use across circuits, discover trends over time
- Compliance:
  - ASHRAE 90.1-2019, Seattle energy code, Title 24, etc.(2)

Asset management:

- Monitor up to 192 circuits
- Identify increased harmonics in the rack servers to detect a potential failure (THD/ circuit, waveform capture/circuit) Robust communications
- Support for MODBUS, SNMP, and BACnet TCP IP

Cyber security:

- Helps minimize vulnerabilities to critical power assets and systems and reinforce security strategy

Data Logging

- On-board memory for data logging
- Meet the needs of robust code compliance

Modular and scalable:

- Adapts to expanding electrical networks
- Scalable, future-proof capabilities
- Simplified installation for reduced wiring issues

Panelboard solution:

- Embedded web page for configuration and monitoring
- Touch screen HMI (optional) for data display
- EcoStruxure™ Power integration

Applications Ideal for large building applications such as data centers, industrial facilities, infrastructure and other similar environments.

(2) Contact your Schneider Electric sales representative for confirmation on compliance to other local standards not mentioned here.

Communications in QED-2 Switchboards

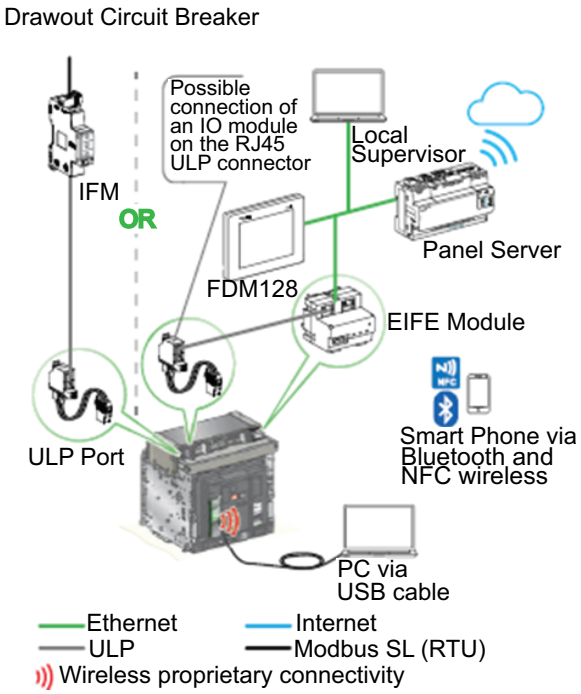
General Architecture

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 in MasterPacT MTZ breakers 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 a wireless powered Bluetooth channel or a self-powered NFC channel. An optional MicroLogic Xi control unit is available which removes all 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 Universal Panel Server connected to internal Ethernet network

Figure 18 - Communication Example of a Drawout Circuit Breaker



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 draw-out 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 and com shunt trip opening order
  - FX diag and 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 charge CH
  - Ready to close
  - Overcurrent trip SDE
  - Connected / disconnected / test position CE/CD/CT
- Measurements
  - Instantaneous measurement information
  - Average 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

Using the capabilities of the MicroLogic X control unit and communication interfaces above two networking architectures are available in QED-2 Switchboard as a two-tiered offer for optimized value and performance. 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

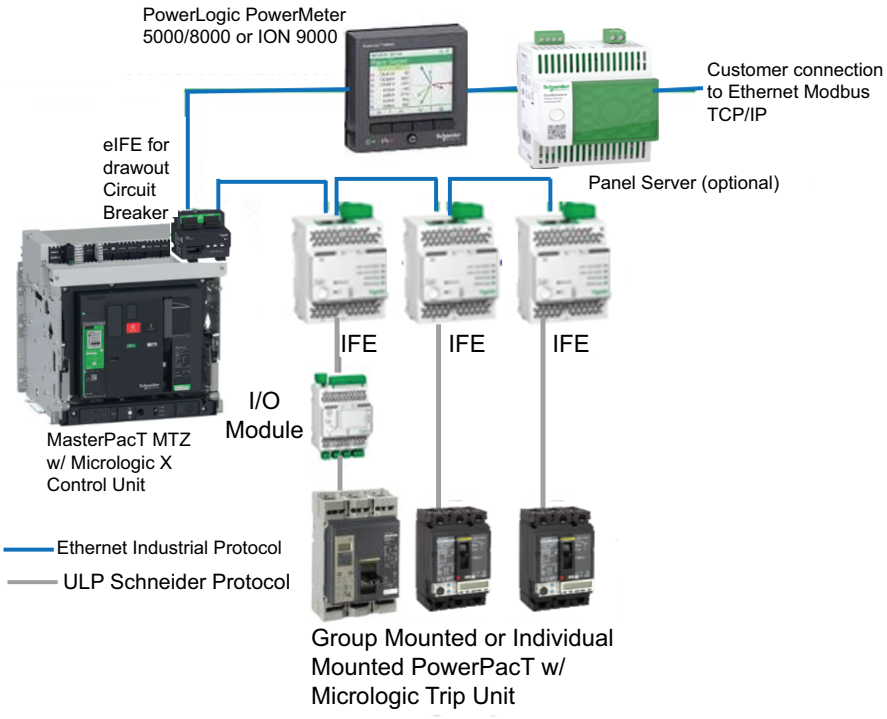
These two systems communications types are options on customer-selected or on all MasterPacT breakers in the lineup.

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

- Ethernet is used to connect all circuit breakers on a daisy chain for connection to the customer
- An eIFE or IFE provides dedicated Ethernet connection /IP address for each selected circuit breaker
- Communication to trip unit up to 250kbps / Ethernet speed up to 1Mbps

- Ethernet provides convenient compatibility with external software (PME, PSE, BMS, others)
- For localized access, each IFE/circuit 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 PowerMeter 5000 Basic Power and Energy Meter
  - PowerLogic 8000 and ION 9000 Advanced Power Quality Meter
  - HDPM6000 Power Quality Meter
- Factory tested

Figure 19 - Direct Ethernet Network for MTZ in QED-2

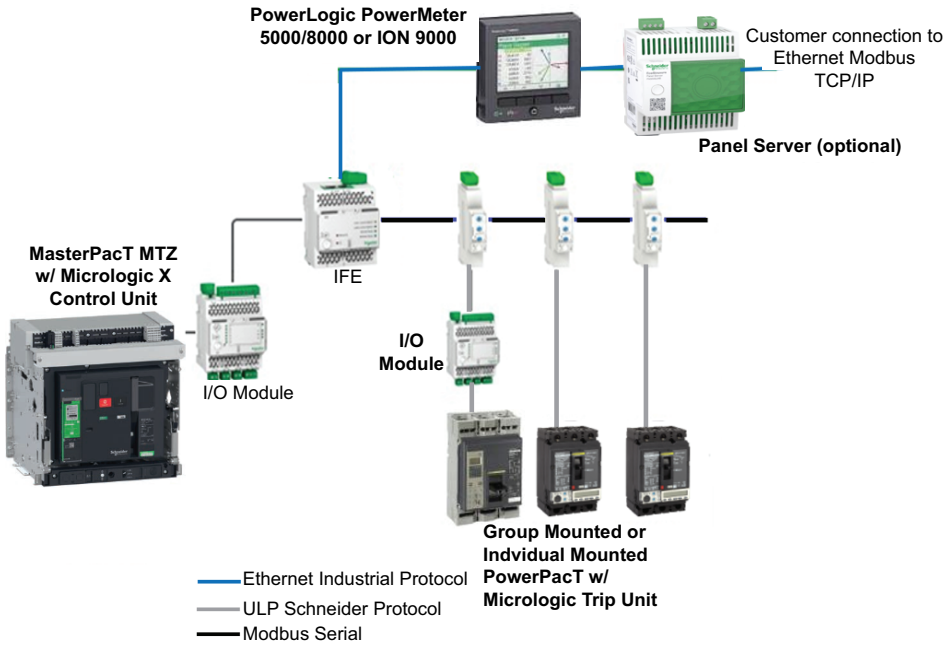


Modbus RS485 to Ethernet Modbus TCP (H / J / L / P / R / NW / NT and MTZ Breakers)

- Customer can select which circuit breakers have network connection individually
- Circuit breakers communicate Modbus RS485 via Modbus Interface Module (IFM) mounted in instrument compartments
- Each drawout breaker includes an I/O module for cradle status
- IFE Switchboard Server on 1st breaker provides an IP address. All other circuit breakers communicate via Modbus RS485 using Interface Modus (IFMs)
- Communication to trip unit 19.2 kBaud / Ethernet speed up to 1Mbps
- Powerview web pages embedded in IFE can provide status, monitoring, trending, maintenance logging, etc. for all circuit breakers (up to 20)
- IFE Alarming for first circuit breaker only in this configuration

- Meters are also on Ethernet - available meters:
  - PowerLogic PowerMeter 5000 Basic Power and Energy Meter
  - Powerlogic 8000 and ION 9000 Advanced Power Quality Meter
  - HDPM6000 Power Quality Meter
- Completely factory tested

Figure 20 - Modbus Serial to Ethernet TCP / IP for MTZ or NW / NT in QED-2



Continuous Thermal Monitoring

The Continuous Thermal Monitoring or (CTM) is a standard-design, factory-installed system that uses the PowerLogic TH110 to monitor the thermal status of individually-mounted circuit breakers and main lug terminations of QED-2 Low Voltage Switchboards to provide 24/7 temperature values for critical connections. Continuous thermal monitoring can be used to monitor trends over time for identifying inoperable 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 the thermal and humidity data of the equipment. Live data, alarms, events, trends, and notifications can be provided by the PME software. Asset monitoring via EcoCare services membership 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 fires may arise. Circuit breaker load terminals in group-mounted configurations are not monitored by the TH110 solutions. Monitoring solutions for group-mounted circuit breakers can be provided by contacting your Schneider Electric Sales representative.

Sensor installation locations in QED-2 switchboards include the following. (see diagram below):

- Incoming phase connections of unit mounted main circuit breaker / lug(s)
- Outgoing phase connections or unit mounted feeder circuit breaker(s)

- Each section with thermal sensors also includes an environmental sensor (CL110) to provide internal section ambient temperature and humidly data for monitoring and software analysis

Figure 21 - One-Line Diagram indicating Locations of Thermal Sensors (TH110) and Environmental Sensors (CL110)

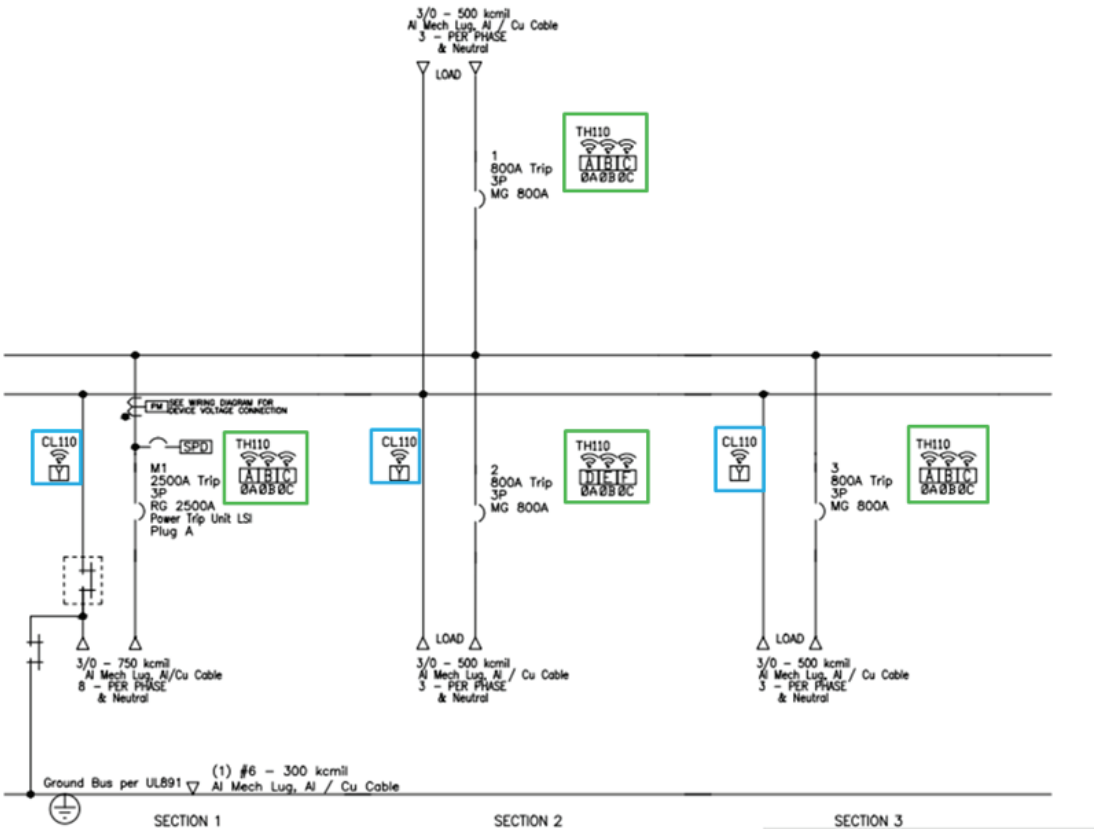
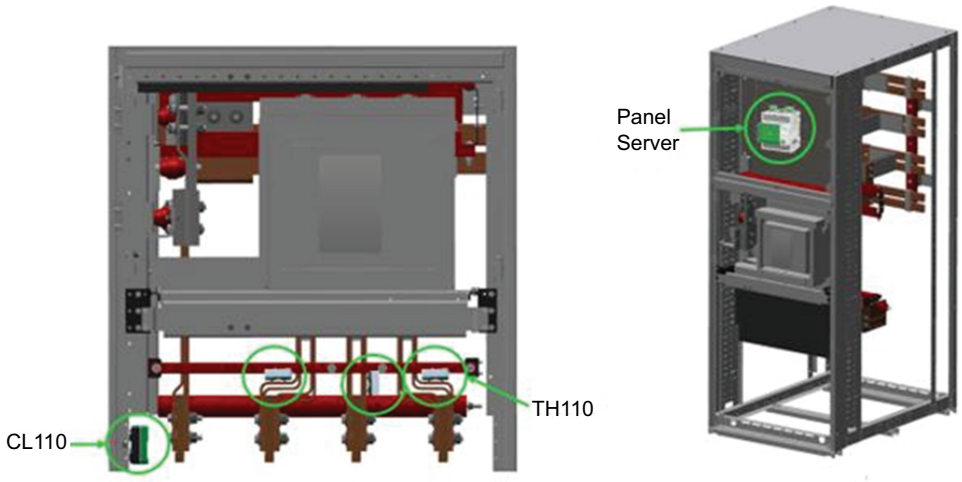


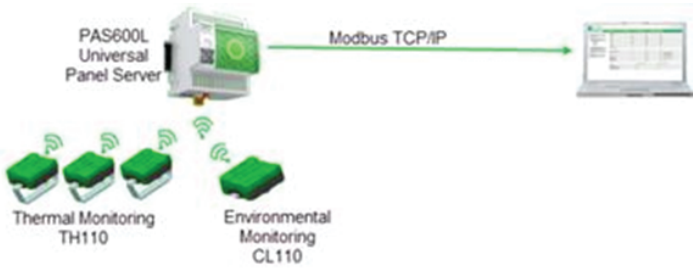
Figure 22 - Typical Physical Locations of Panel Server and Sensors in QED-2



Thermal monitoring sensors are connected wirelessly over Zigbee signal to the Universal Panel Server data concentrator to monitor field connections. The panel

server is connectable via Modbus TCP/IP to edge control software, SCADA, or cloud applications.

Figure 23 - PAS600L Universal Panel Server



NOTE: Field connections of cabled incoming / outgoing are available for this option. Splice bars and joints and busway / close coupled transformer connections are securely torqued with conical washers and are considered maintenance free. Neutral connections have typically lower loading and at ground potential. Since they are lower risk these points are not monitored in the standard monitoring solution. Distribution section feeders are also not monitored with this option. Utility compartments are not available for thermal monitoring devices which do not allow supplemental devices installed.

Why CTM

- Reduce the need for periodic thermography
- Supports condition-based maintenance and NFPA 70B procedures
- Detection of thermal runaway occurring between annual surveys
- Increased Mean Time Between failure of Switchboard vs. thermography via infrared windows
- Long-term trending to detect slow deterioration
- Can be integrated into Schneider Electric's EcoCare service membership for continuous monitoring and alarming

Table 2 - CTM vs. Thermography(IP) Scanning

	CTM	**IRScanning**
Measurement Frequency	Continuous (24/7)	Typically, once a year or less
Live Equipment Exposure	No	Yes, must be live to get in-use temperance readings
Live View of Temperance Readings	Yes	No, typically after report is compiled and analyzed
Temperance Trends	Yes, can be viewed live by anyone with granted access	Minimal data points make trending more difficult
Data Collection	Done via the sensors complied by software with alerts	Must be scheduled done by qualified personal with specialized equipment which can lead to high costs

Electronic Trip Systems: PowerPacT M/P / R-Frames and MasterPacT NW / NT

M-frame circuit breakers are available with the ET 1.0 electronic trip system. R-Frame and R-Frame circuit breakers are available with either the ET1.0I basic electronic trip system or the MicroLogic electronic trip system. The MasterPacT NW / NT (stored energy) circuit breakers are available with the MicroLogic electronic trip system. The sensing system responds to the flow of current through the circuit breaker.

Thermal Imaging

The thermal imaging function protects the cables or bus bars from overheating in case of low amplitude repetitive faults. Overheating can be due to repetitive motor starting, fluctuating load, intermittent ground faults, or subsequent closing after a fault. Traditional electronic protection does not protect against repetitive faults because the duration of each overload above the pickup setting is too short to achieve effective tripping. Nevertheless, each overload involves a temperature rise in the installation, the cumulative effect of which could lead to overheating of the system.

The thermal imaging function remembers and integrates the thermal heating caused by each pickup setting overrun. Before tripping, the integrated heating value reduces the associated time delay and, therefore, the reaction of the trip unit is closer to the real heating of the power network system. After tripping, the function will also reduce the time delay when closing the circuit breaker on an overload.

True RMS Current Sensing

The sensing system responds to the flow of current through the circuit breaker. The trip unit samples the current waveform to provide true RMS protection through the 15th harmonic. This true RMS sensing gives accurate values for the magnitude of a non-sinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated.

The MicroLogic H trip unit provides additional sampling of the waveforms to measure and provide waveform capture of harmonic distortion to the 31st harmonic.

ET Trip System

ET trip units are available with M-, P-, and R-Frame UL/IEC circuit breakers. The trip units are not field-interchangeable and do not accept any communications or other trip unit accessories. The trip system uses a set of current transformers (called CTs or sensors) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker.

ET1.0 (M-frame only)

The ET1.0 trip system is available on M-frame circuit breakers and is equipped with fixed long-time and adjustable instantaneous (LI) tripping functions only. The long-time pickup is 1.0 x sensor rating (In), while the instantaneous pickup is adjustable (dial settings from 2–10 In) with no intentional time delay.

ET1.0I (R-Frame and R-Frame only)

The ET1.0I trip system is available on both P-Frame and R-Frame circuit breakers and is equipped with fixed long-time and adjustable instantaneous (LI) tripping functions only. The long-time pickup is 1.0 x sensor rating (In.), while the instantaneous pickup is adjustable (dial settings from 1.5–12 x in.) with no intentional time delay.

MicroLogic™ Electronic Trip Systems

All MasterPacT NW circuit breakers are equipped with the MicroLogic trip system as standard. The P-Frame and R-Frame electronic trip circuit breakers can be equipped with the optional MicroLogic trip systems listed in the following table.

Table 3 - MicroLogic Trip Systems

Model	(LI) Long-time + Instantaneous Protection (UL Listed, IEC Rated)	(LSI) Long-time +Short-time + Instantaneous Protection (UL Listed, IEC Rated)	(LSIG) Long-time + Short-time + Instantaneous Protection + Equipment Ground-fault Protection (UL Listed, IEC Rated)
MicroLogic Basic Trip Unit	3.0	5.0	—
MicroLogic A Trip Unit	3.0A	5.0A	6.0A
MicroLogic P Trip Unit	—	5.0P	6.0P
MicroLogic H Trip Unit	—	5.0H	6.0H

Trip units are designed to protect power circuits and loads. MicroLogic trip systems use a set of current transformers (called CTs or sensors) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker. Adjustable rotary switches on the trip unit allow the user to set the proper overcurrent or equipment ground-fault current protection required in the electrical system. If current exceeds a set value for longer than its set time delay, the trip system opens the circuit breaker. Alarms can be programmed for remote indications. Measurements of current, voltage, frequency, power, and power quality optimize continuity of service and energy management.

Integration of protection functions in the Application Specific Integrated Circuit (ASIC) electronic component used in all MicroLogic trip units guarantees a high degree of reliability and immunity to conducted or radiated disturbances. On MicroLogic P and H trip units, an independent microprocessor manages the advanced functions.

Circuit breakers are shipped with the trip unit long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings. A qualified consultant or plant engineer must determine the actual settings required for a specific application. A coordination study is recommended to provide coordination between all circuit breakers in the distribution system.

Table 4 - Trip Unit Comparisons

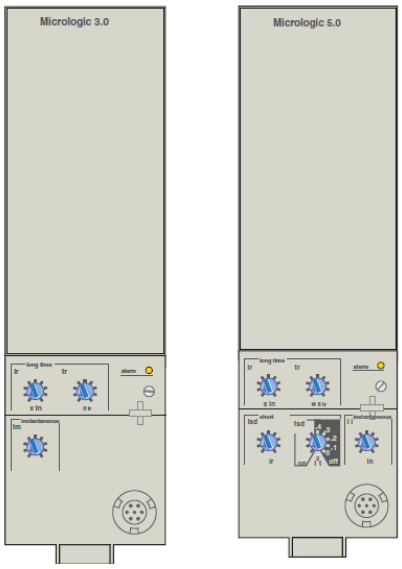
MicroLogic Trip Unit (X=Standard Feature; O = Available Option)

Feature	Standard		Ammeter			Power		Harmonics	
	3.0	5.0	3.0A	5.0A	6.0A	5.0P	6.0P	5.0H	6.0H
Field-installable (3)	X	X	X	X	X	X	X	X	X
LI	X	–	X	–	–	–	–	–	–
Isi	–	X	–	X	–	–	X	X	X
LSIG/Ground-Fault Trip (4)	–	–	–	X	X		X	X	–
Ground-Fault Alarm/No Trip (4)(5)	–	–	–	–	–	X	–	X	–
Ground-Fault Alarm and Trip (4)(5)	–	–	–	–	–	–	X	–	X
Adjustable Rating Plugs	X	X	X	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X	X	X	X
Phase-Loading Bar Graph			X	X	X	X	X	X	X
LED for Long-Time Pick-Up	X	X	X	X	X	X	X	X	X
LED for Trip Indication	–	–	X	X	X	X	X	X	X
Digital Ammeter	–	–	X	X	X	X	X	X	X
Zone-Selective Interlocking (6)	–	v	–	X	X	X	X	X	X
Communications	–	–	0	0	0	X	X	X	X
LCD Dot Matrix Display	–	–	–	–	–	X	X	X	X
Advanced User Interface	–	–	–	–	–	X	X	X	X
Protective Relay Functions	–	–	–	–	–	X	X	X	X
Neutral Protection (4)	–	–	–	–	–	X	X	X	X
Contact Wear Indication	–	–	–	–	–	X	X	X	X
Incremental Fine Tuning of Settings	–	–	–	–	–	X	X	X	X
Selectable Long-Time Delay Bands	–	–	–	–	–	X	X	X	X
Power Measurement	–	–	–	–	–	X	X	X	X
Power Quality Measurements	–	–	–	v	–	–	–	X	X
Waveform Capture	–	–	–	–	–	–	–	X	X

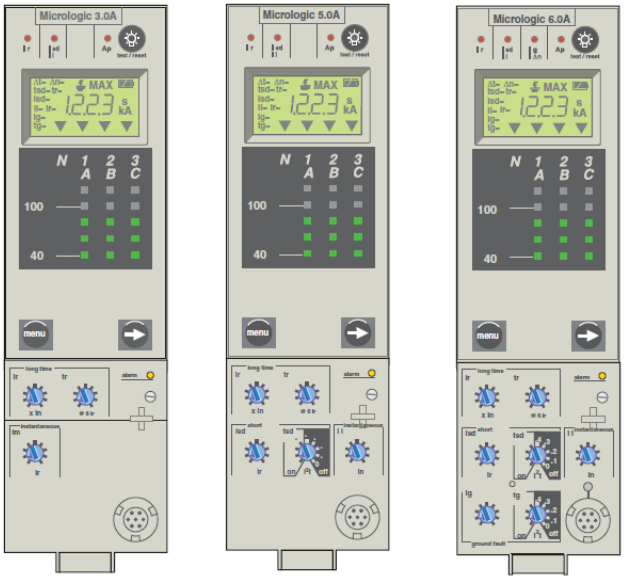
(3) I-Line circuit breaker are only available with non-interchangable trip units.
(4) Requires neutral current transformer on 3-phase, 4-wire circuits.
(5) I-Line circuit breakers are only available with non-interchangeable trip units.
(6) Not available for 2.0A trip unit as upstream devices.

Table 5 - Rating Plugs for MicroLogic 3.0, 5.0, 6.0 A / P / H Trip Units

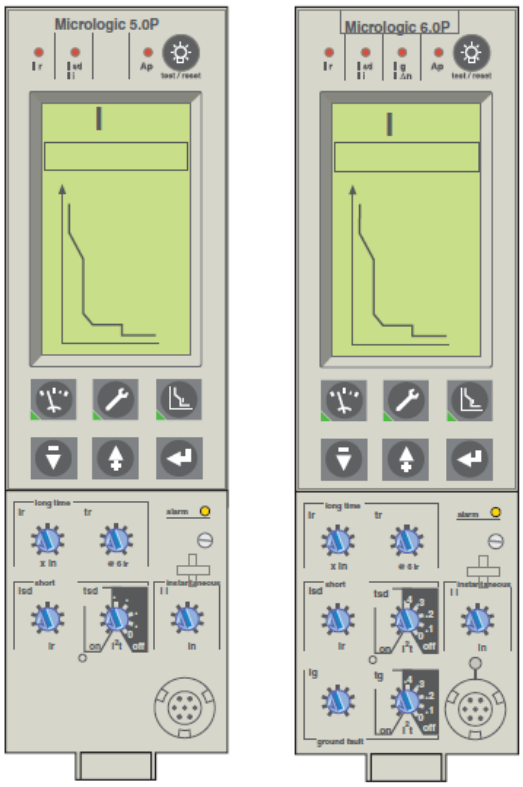
Standard	Option	Settings (Tolerance 1.05–1.2)
UL / ANSI	Plug A	0.40 – 0.45 – 0.50 – 0.60 – 0.63 – 0.70 – 0.80 – 0.90 – 1.0
	Plug B	0.40 – 0.44 – 0.50 – 0.56 – 0.63 – 0.75 – 0.80 – 0.95 – 1.0
	Plug C	0.42 – 0.50 – 0.53 – 0.58 – 0.67 – 0.75 – 0.83 – 0.95 – 1.0
	Plug D	0.40 – 0.48 – 0.64 – 0.70 – 0.80 – 0.90 – 0.93 – 0.95 – 1.0
	Plug E	0.60 – 0.70 – 0.75 – 0.80 – 0.85 – 0.90 – 0.93 – 0.95 – 1.0
	Plug F	0.84 – 0.86 – 0.88 – 0.90 – 0.92 – 0.94 – 0.96 – 0.98 – 1.0
	Plug G	0.66 – 0.68 – 0.70 – 0.72 – 0.74 – 0.76 – 0.78 – 0.80 – 0.82
	Plug H	0.48 – 0.50 – 0.52 – 0.54 – 0.56 – 0.58 – 0.60 – 0.62 – 0.64



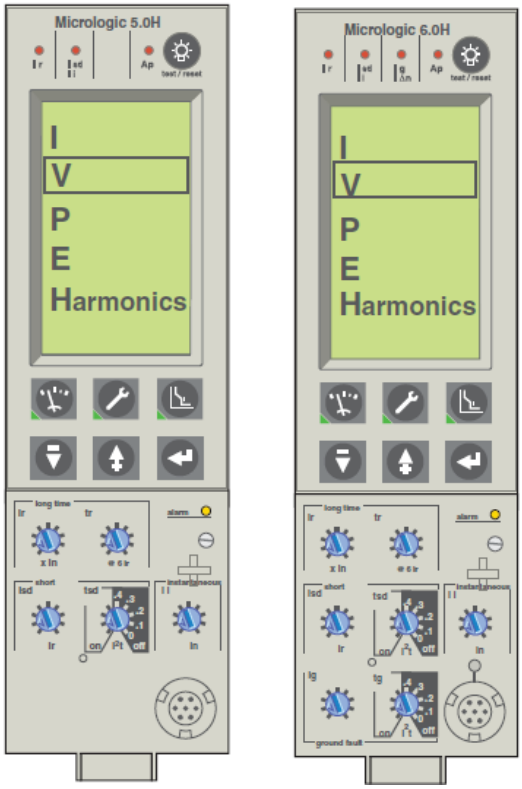
MicroLogic 3.0 and 5.0 Standard Trip Units



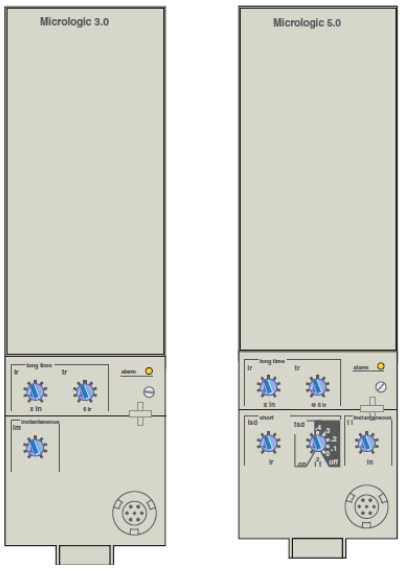
MicroLogic 3.0A, 5.0A and 6.0A Trip Units



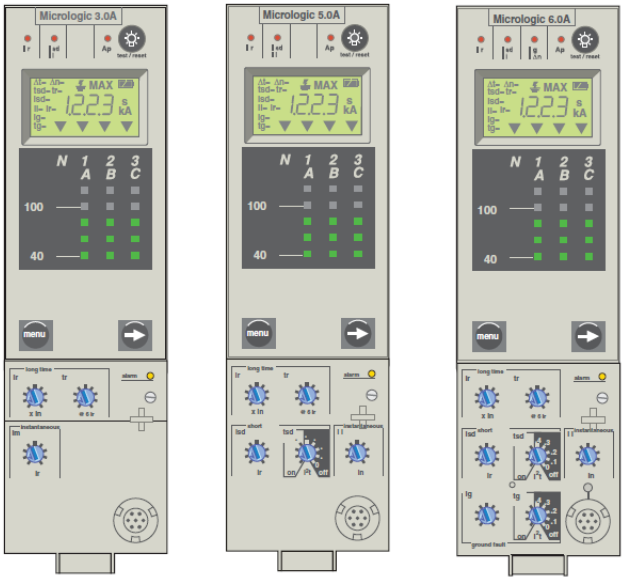
MicroLogic 5.0P and 6.0P Trip Units



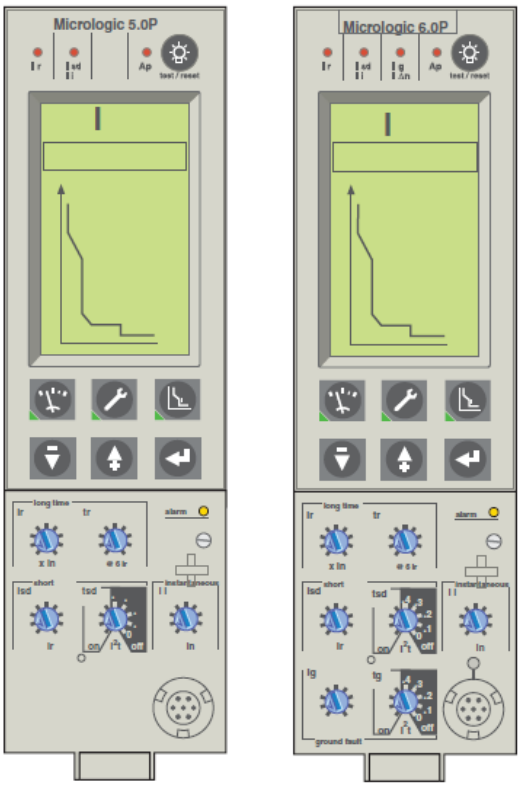
MicroLogic 5.0H and 6.0H Trip Units



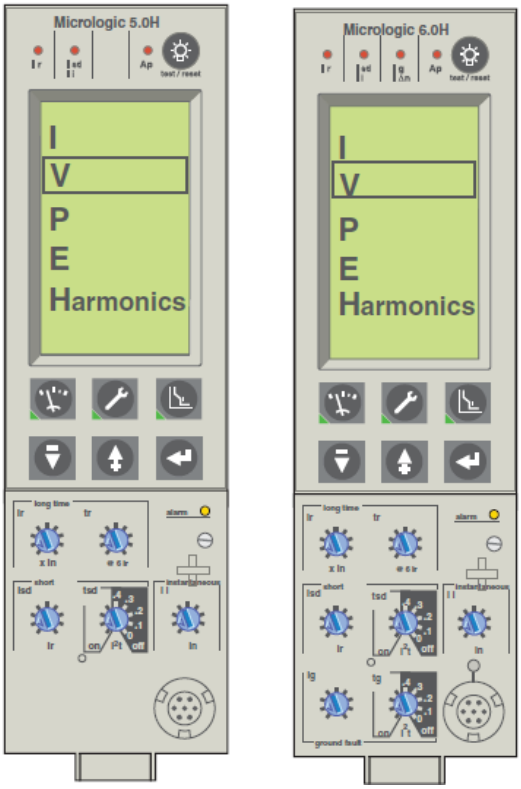
MicroLogic 3.0 and 5.0 Standard Trip Units



MicroLogic 3.0A, 5.0A and 6.0A Trip Units



MicroLogic 5.0P and 6.0P Trip Units



MicroLogic 5.0H and 6.0H Trip Units

Electronic Trip System: MasterPacT MTZ (MicroLogic X / Xi)

The MasterPacT™ MTZ circuit 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 EcoStructure Power architecture
- Mobile device connectivity for wireless alerts and maintenance

  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

MicroLogic X is available in three trip function types: L1 (3.0X), LSI (5.0X) and LSIG (6.0X) as shown below:

Table 6 - Protection Functions

	MicroLogic 3.0 X	**MicroLogic 5.0 X**	**MicroLogic 6.0 X**
Commercial Reference	LV848815	LV847609	LV847608
Long-time overcurrent protection (L)	✓	✓	✓
Short-time overcurrent protection (S)	—	✓	✓
Instantaneous overcurrent protection (I)	✓	✓	✓
Ground-fault protection (G)	—	—	✓
Earth-leakage protection (V)	—	—	—
Neutral protection	✓	✓	✓
Dual settings	✓	✓	✓
Overcurrent and trip cause indicators	✓	✓	✓
Zone selective interlocking	—	✓	✓
Trip history	✓	✓	✓
Setting change traceability	✓	✓	✓
Embedded power meter class 1	✓	✓	✓
Embedded diagnostics	✓	✓	✓

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

- 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.
- 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 coil circuit continuity
- MCH charging time
- “Time stamped” closing log
- MCH counter
- Alarm fail closing order
- MX coil circuit continuity
- MN 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:

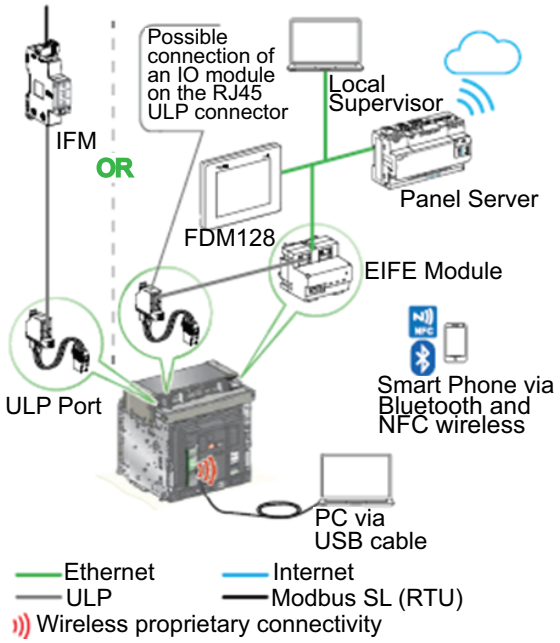
- Connection to an Ethernet network through either an EIFE or an IFE interface module. The EIFE and IFE modules are connected to the MicroLogic X control unit by means of a ULP port and a prefabricated ULP cord mounted on the cradle of the MTZ circuit breaker.
- Connection to a Modbus SL (RTU) RS 485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

  NOTE: 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.

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 in QED-2 Switchboards** section of this catalog for communication configurations available for MasterPacT within QED-2 Switchboards.

Figure 24 - Upgrade with Digital Modules

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

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.

An internal 24 Vdc power supply is provided in the QED-2 Switchboard. This is needed to enable the additional trip unit functions below:

- 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).

Trip Unit Comparison

The Trip Unit Comparison table lists the standard (X) and optional (O) trip unit features for Trip Unit types Standard, Ammeter, Power, Harmonic and MicroLogic X (Nx) for use in QED-2 Switchboards. 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.

Figure 25 - Trip Unit Comparison

	Standard			Ammeter				Power		Harmonics		X/Xi
Features	**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
LSO	X	–	–	X	–	–	–	–	–	–	–	X
LSI	–	–	X	–	–	X	–	X	–	X	–	X
LSIG/Ground Fault Trip	–	–	–	–	–	–	X	–	X	–	X	X
Ground Fault Alam/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	–
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	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
Communications	–	–	–	–	O	O	O	X	X	X	X	X
LCD	–	–	–	–	–	–	–	X	X	X	X	X
Advanced User Interface	–	–	–	–	–	–	–	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 Quantity Measurements Total	–	–	–	–	–	–	–	–	–	X	X	X
Power Quantity Measurements per phase	–	–	–	–	–	–	–	–	–	X	X	DM
Waveform capture	–	–	–	–	–	–	–	–	–	X	X	DM

Trip Units for Branch Feeders, Group Mounted I-line

PowerPacT B-frame

Figure 26 - B-frame 3P I-Line Circuit Breaker

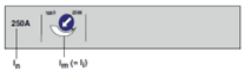
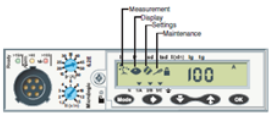
PowerPacT B-frame circuit breakers offer a fixed, factory-sealed thermal-magnetic trip unit designed to open automatically under overload or short circuit conditions. B-frame thermal-magnetic circuit breakers contain individual thermal (overload) and instantaneous (short circuit) sensing elements in each pole. QED-2 B-frame branch breakers are available from 15–125 A, 80% rated and have LI protection only. Refer to 0611CT1603 , PowerPacT B-frame 15 to 125 A Circuit Breaker Catalog for additional information.

Figure 27 - PowerPacT H-, J- and L-frame

- PowerPacT H-, J-, and L-frame circuit breakers offer a range of thermal-magnetic and MicroLogic electronic trip units in interchangeable cases. Thermal-magnetic trip units are designed to open automatically under overload or short circuit. H-frame and J-frame thermal magnetic circuit breakers contain individual thermal (overload) and instantaneous (short circuit) sensing elements in each pole.
- MicroLogic electronic trip units provide intelligent operation, with wide setting ranges make installation upgrades easier. Designed with processing capabilities, MicroLogic trip units can provide measurement information and device operating assistance to supply all of the information required to manage the electrical installation and optimize energy use.

- MicroLogic electronic trip units (Ammeter/Energy) can provide communications connectivity to Modbus Serial and Ethernet (Modbus TCP / IP) in QED-2 Switchboards.
- MicroLogic trip units offer excellent measurement accuracy, using a new generation of current transformers combining "iron-core" sensors for self-powered electronics and "air-core" sensors (Rogowski coils) for measurements. The protection functions are managed by an ASIC component that is independent of the measurement functions. This independence ensures immunity to conducted and radiated disturbances and a high level of reliability.
- An LED on the front of the electronic trip units indicates the result of the self-test running continuously on the measurement system and the tripping release. When the green LED is flashing, the links between the CTs, the processing electronics and the Mitop release are operational. The circuit breaker is ready to protect. A minimum current of 15 to 50 A, depending on the device, is required for this function. The dual adjustment for protection functions on MicroLogic 5 / 6 consists of:
  - An adjustment using rotary switches sets the maximum value.
  - An adjustment, made using the keypad or remotely, fine-tunes the setting. This setting may not exceed the first one. It can be read directly on the MicroLogic screen, to within one ampere and a fraction of a second.

NOTE: All the trip units have a transparent sealable cover that protects access to the adjustment rotary switches.

Circuit Breaker Range/ Frame(7)	**Trip Units Types Available**			
				
15-150 A H-frame	Thermal Magnetic, LI	Electronic Standard Trip Unit, LI and LSI(8)	Electronic Ammeter Trip Unit, LSI and LSIG	Electronic Energy Trip Unit, LSI and LSIG
175-250 A J-frame	Thermal Magnetic, LI	Electronic Standard Trip Unit, LI and LSI(8)	Electronic Ammeter Trip Unit, LSI and LSIG	Electronic Energy Trip Unit, LSI and LSIG
300-600 A L-frame		Electronic Standard Trip Unit, LI and LSI(8)	Electronic Ammeter Trip Unit, LSI and LSIG	Electronic Energy Trip Unit, LSI and LSIG

For more information on H-, J- and L-frame circuit breakers, refer to Catalog #0611CT1001 PowerPacT H-, J-, and L-Frame Circuit Breakers Catalog.

Figure 28 - LA / LH Frame

LA / LH frame circuit breakers available in QED–2 Switchboards are available for 125-400 A, long time and instantaneous (LI) trip applications. They are thermal-magnetic

(7) 80% rated as standard, 100% rated option, L-frame only thru 250-400A
(8) On Standard Trip Unit with "LSI" Trip Function the ST and LT delays are FIXED. If adjustable Short Time and Long Time is required, then use an Ammeter Trip Unit.

molded case circuit breakers and provide a means to manually open a circuit and automatically open a circuit under overload or short circuit conditions. Thermal-magnetic circuit breakers use bimetals and electromagnetic assemblies to provide overcurrent protection. Their characteristic inverse time tripping under overload conditions is ideally suited for many applications varying from residential to heavy industrial loads. For higher level (short circuit) overcurrents, instantaneous trip characteristics allow molded case circuit breakers to interrupt with no intentional delay. LA / LH-frame circuit breakers are applied for short circuit ratings ranging up to 100 kA @240 V (see ratings table, page 102). For more information on LH frame circuit breakers, refer to Catalog 0601CT1901 Square D LH I-Line Circuit Breaker Catalog.

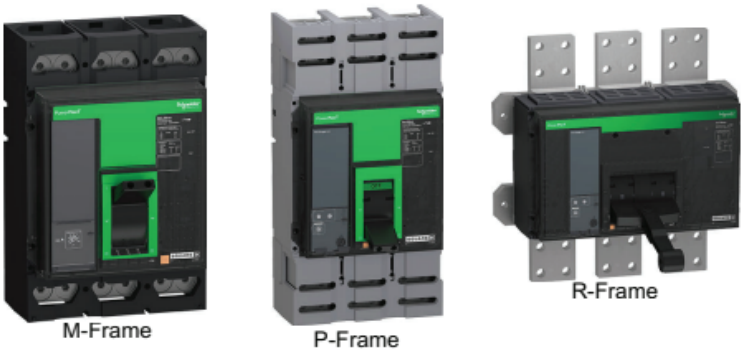
Figure 29 - Q-Frame with Thermal Magnetic Trip Unit 70-250 A

3–Pole Q-Frame with Thermal-Magnetic Trip Unit 70–250 A

Q-frame circuit breakers available in QED–2 Switchboards are available for 240 Vac only and for 70-250 A, long time and instantaneous (LI) trip applications. They are thermal-magnetic molded case circuit breakers and provide a means to manually open a circuit and automatically open a circuit under overload or short circuit conditions. Thermal-magnetic circuit breakers use bimetals and electromagnetic assemblies to provide overcurrent protection. Their characteristic inverse time tripping under overload conditions is ideally suited for many applications varying from residential to heavy industrial loads. For higher level (short circuit) overcurrents, instantaneous trip characteristics allow molded case circuit breakers to interrupt with no intentional delay. QB / QD / QJ / QL circuit breakers are applied for short circuit ratings ranging up to 100 kA@240 V (see Ratings Table, page 102). For more information on Q-frame circuit breakers, refer to Catalog 0734CT0201 Square D PowerPacT Q-Frame Circuit Breakers and Switches.

Figure 30 - M-, P- and R-Frame

Refer to “Electronic Trip Systems, PowerPacT M-, P- and R-Frames” section of this catalog or Circuit Breaker Catalog 0612CT0101 PowerPacT M-, P-, and R-frame and NS Circuit Breaker Catalog



M-Frame P-Frame R-Frame

Energy Reduction Maintenance Settings (ERMS) Switch

QED-2 Switchboards with PowerPacT P- or R-Frame and MasterPacT NW/MTZ circuit breakers are available with an optional locally mounted ERMS, two position selector switch and integral status indicating blue pilot light located on the door (trim cover) of individually mounted main or feeder circuit breakers. An I/O module is added in the breaker cell for interface with the door mounted selector switch (not required for MasterPacT MTZ). MasterPacT MTZ is provided with ERMS digital module and ESM interface on the circuit breaker. This feature is available with or without a communications network.

Circuit breakers require MicroLogic P or H or X/Xi trip units. ERMS is not compatible with standard or Ammeter trip units 1200 A and above.

This feature is available on Main, Tie or Feeder Breakers which also includes Main and Tie Breakers when Zone Selective Interlocking (ZSI) is specified.

Adjustment of the ERMS setting can be done via EcoStruxure Power Commissioning software (free download) on a PC with cable and can be adjusted from 2X (default) to 10X of trip unit sensor rating.

When a user needs to service downstream equipment, the Energy Reduction Maintenance Setting Switch feature is used to reduce the current and/or time required to trip a circuit breaker. The ERMS function is used to reduce the Instantaneous protection setting of the circuit breaker which allows for the reduction of the fault clearing time so that the circuit breaker can trip quicker. If a fault occurs, ability for the breaker to trip quicker thus reduces the Arc Flash Incident Energy (AFIE) level of potential exposure.

IMPORTANT CONSIDERATIONS:

In order to quantify the AFIE reduction, an arc flash analysis must first be performed. Values must be calculated for the possible maintenance setting to determine if any practical changes to maintenance procedures, such as reduction of PPE levels, is even possible.

The ERMS system can only affect the AFIE downstream of the circuit breaker. Multiple source systems that incorporate one or more ERMS systems must have each source considered when ERMS is ON to ensure the AFIE reduction can be achieved at the desired location.

Refer to the following for additional information: Energy Reduction Maintenance Setting (ERMS) System Installation and User Guide NHA67346

The Article 240.87 on Arc Energy Reduction for 1200 A or higher circuit breaker, the following methods to reduce clearing time or approved equivalent are listed:

- Zone Selective Interlocking
- Differential Relaying
- Energy Reducing Maintenance Switching with a local status indicator
- Energy Reducing Active arc flash mitigating system

- An approved equivalent means

Informational Note 1 states the energy reducing maintenance switch allows a worker to set circuit breaker trip unit to “No Intention Delay” while working within the arc flash boundary and then to set the trip unit back to normal settings after the work is complete.

An ERMS device can also be added to a group mounted branch circuit breaker (P or R-Frame) in a Main with 36 inch I-Line Combo section. An I-Line Enable Module is used to add the ERMS function to the I-Line mounted circuit breaker. An I-Line Enable Module is a 6 inch modular unit that contains all of the components required for an Energy Reduction Maintenance Setting Switch. The space-saving unit fits into the I-line bus in place of a circuit breaker without the need to take up space within an instrument compartment.

ERMS I-Line Enable Modules can only be used on circuit breakers 1200 A and above, P and R frame with MicroLogic P or H trip units.

The ERMS I-Line Enable Module meets NEC 2014 code (Section 240.87) requirements and reduces arc energy during maintenance to improve electrical contractor safety. ERMS trip setting offers electronic adjust ability for coordination.

Figure 31 - ERMS I-Line Enable Module

Maintenance Mode Settings (MMS) Switch

The MMS switch is similar to the existing ERMS solution. It is a simpler way to comply to the NEC 240.87 due to its technical attributes. National Electric Code (NEC) requires Arc Energy Reduction solution on any circuit breaker with a trip rating of 1200 A or higher. The MMS switch is locally mounted. The two position selector switch and integral status indicating blue pilot light are located on the door (trim cover) of individually mounted main or feeder circuit breakers.

MMS Switch Feature Offering and Benefits

- Available with or without a communications network

- Available on Main, Tie, or Feeder Breakers
- Not available on a circuit breaker with Zone Selective Interlocking with Short Time
- The switch can reduce a circuit breaker's Short-time Delay (STD) setting from 0.3 seconds to 0.08 seconds or less

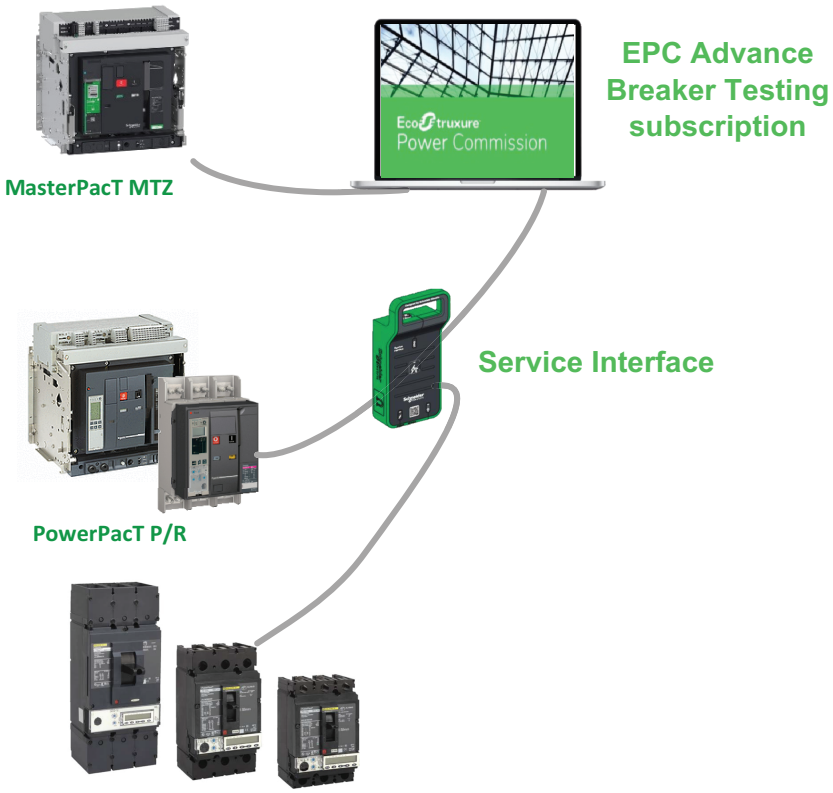
NOTE: In order to quantify the AFIE reduction, an arc flash analysis must first be performed. Values must be calculated for the possible maintenance setting to determine if any practical changes to maintenance procedures, such as reduction of PPE levels, is even possible.

An MMS device can also be added to a group mounted branch circuit breaker (P or R-Frame) in a group-mounted distribution section or main with 36 inch I-Line Combo section. An I-Line Enable Module is used to add the MMS function to the I-Line mounted circuit breaker. An I-Line Enable module is a 6 inch modular unit that contains all of the components required for an Maintenance Mode Setting Switch. The space-saving unit fits into the I-Line bus is place of a circuit breaker without the need to take up space within an instrument compartment. MMS I-Line Enable modules can only be used on circuitbreakers 1200 A and above, P and R frame with MicroLogic P or H trip units.

Figure 32 - MMS I-Line Enable Module

Circuit Breaker Test Solution

This consists of complete test solution with subscription service to enable advanced testing of circuit breakers as shown below.



Type of Breaker	Service Subscription Required	Service Interface Kit (LV48550)
MasterPacT MTZ	Yes	No
MasterPacT NW/NT	Yes	Yes
PowerPacT H/J/L/P/R	Yes	Yes

The Service Interface with part number LV485500 is a portable instrument for field testing. The Service Interface is used:

- For configuration of Enerlin'X devices.
- For testing and configuration of MicroLogic trip units mounted in the following low voltage circuit breakers:
  - MasterPacT NT/NW circuit breakers
  - PowerPacT P- and R- frame circuit breakers
  - PowerPacT H-, J-, and L-frame circuit breakers

NOTE: EcoStruxure Power Commission (EPC) software is used for testing the circuit breakers and communication accessories through the Service Interface.

The main features of Service Interface are:

- Single connector interface for testing different circuit breakers
- 24 Vdc at 120 mA power output for external devices
- 12 kV safety impulse protection between user interface and test port
- Magnet mountable
- EPC user interface for test and configuration

Refer to Service Interface User Guide DOCA0170EN-06 for more information.

Layout Instructions

All dimensions and arrangements shown in this manual are for estimating purposes only and may change without notice due to changes in equipment design. Certified drawings showing the arrangement and dimensions of any switchboard can be supplied by Schneider Electric upon request.

All section depths shown are considered minimum for most switchboard arrangements. Because of complicated equipment or bussing arrangements, it is sometimes necessary to increase the switchboard depth beyond that indicated in this manual.

Schneider Electric cannot supply switchboards with smaller dimensions than those considered by the company to be the minimum necessary to (1) obtain satisfactory operation or (2) permit ease of installation of the switchboard with reasonable effort by the customer.

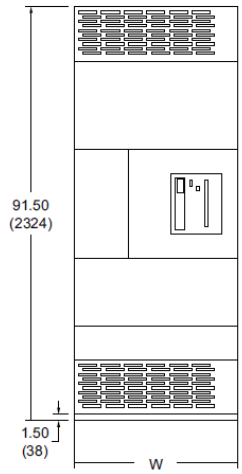
For quick layout drawings, see Group Mounted Interiors, page 61.

Layout Selection Procedure

When determining a layout for Power-Style switchboards, use the following procedure:

1. Determine the physical location of the switchboard and the connected loads it is to supply.
2. Make a single-line diagram of the components.
3. Determine the bus rating required and the minimum ratings for the switchboard (based on voltage, available short circuit current, and load).
4. If equipment is a service entrance switchboard, coordinate with the power company regarding feeder equipment and metering provisions.
5. Determine method of incoming power (I-Line busway, cable, etc.), and select the main device.
6. Determine utility and/or customer metering, if necessary.
7. Decide on branch devices to use; select from branch device section.
8. Determine any special cubicle or bussing features.
9. Sketch a front elevation, including single-line diagram.
10. Write specifications or ordering information.
11. Provide cable lug details and conduit entry/exit location for mains and feeders.

Individually Mounted Circuit Breakers



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Individually Mounted Mains and Feeders

Electronic Trip Molded Case circuit breakers

- MG, MJ, PG, PK, PJ, PL

MicroLogic Electronic Trip Molded Case circuit breakers

- PG, PG-C, PK, PK-C, PJ, PJ-C, PL, PL-C, RG, RG-C, RK, RK-C, RJ, RJ-C, RL, RL-C

For more information, see catalog0612CT0101, PowerPacT M-frame, R-Frame, R-Frame and NS630b-NS3200 Electronic Trip circuit breakers.

Table 7 - Individually Mounted Circuit Breakers

Breaker Type	% rated	Frame Size	Ampacity Range (A)	SCCR (x 1000)			Dimensions		Line/Load Lug Information[9]
				240 V	480 V	600 V	Width (W)	Depth (D)[10]	
MG	80%	800	300–800	65	35	18	30 in. (767 mm)	24 in. (610 mm)	(3) #3/0-500 kcmil Al or Cu
MJ				100	65	25			
PG		1200	100–1200	65	35	18			#3/0-500 kcmil Al or Cu (3) for 250–800 A (4) for 1000–1200 A
PG-C	100%								
PK	80%				50	50			
PK-C	100%								
PJ	80%			100	65	25			
PJ-C	100%								
PL	80%			125	100	25			
PL-C	100%								
RG	80%	2500	250–2500	65	35	18	36 in. (914 mm)		(4) #3/0 AWG-600 kcmil
RG-C	100%								
RK	80%			65	65	65			
RK-C	100%								
RJ	80%			100	65	25			
RJ-C	100%								
RL	80%			125	100	25			
RL-C	100%								

Available Accessories/Options

- Shunt trip
- Undervoltage trip
- Control power transformer (if 120 V control source is not available)
- Auxiliary switches
- Alarm switch
- Key interlock
- Cylinder lock
- Electrical operator (for MG, MJ, PG, PK, PJ, PL)
- Phase failure with capacitor trip
- Padlock attachment

Additional Accessories and Trip Unit Options for MicroLogic Trip circuit breakers

- Circuit breaker Test Solution
- Ground fault push-to-test feature, factory wired for 120 Vac
- Zone selective interlocking interface
- 24 Vdc power supply (Powers the trip unit. Required for harmonic trip unit; recommended for ammeter and power trip unit.)

Trip Unit Options

- LI, LS, LSI, LIG, LSG, LSIG

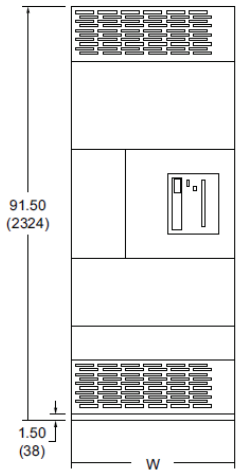
See Electronic Trip Systems for PowerPacT M-, P-, and R-Frame and MasterPacT NW/NT, page 29.

Contact your local Schneider Electric representative for additional accessories.

(9) Optional lugs may be available. Contact your local Schneider Electric or distributor representative for more information.
(10) "D" represents the NEMA Type 1 dimension. For NEMA Type 3R construction, add 11.50 in. (292 mm) to the depth in front and 0.50 in. (13 mm) to the depth in rear. Increased depth is required for lug in/lug out on the same side: for PowerPacT M- and R-Frame circuit breakers, the depth increases to 48 in. (1219 mm); for PowerPacT R-Frame, the depth increases to 60 in. (1524 mm).

Individually Mounted Mains and Feeders

MasterPacT NW/MTZ (Stored Energy) Circuit Breakers



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For more information, see catalog 0613CT0001, MasterPacT NT/NW Universal Power Circuit Breakers or catalog #0614CT1701, MasterPacT MTZ circuit breakers and Switches.

Table 8 - UL489 and UL 1066 (ANSI Rated) — 100% Rated Stationary or Drawout Mounted

Frame Size	Dimensions		Line/Load Lug Information	
	Width (W)	Depth (D) (11) 11.4 inch (292 mm) to the depth in front and 0.50 in. (13 mm) to the depth in rear.	Quantity (per phase)	Size (kcmil)
800	36 in. (914 mm)	Stationary Mounted 36 in. (914 mm) Drawout Mounted 48 in. (1220 mm)	3	Mechanical Typ, Al or Cu: # 3.0–750kcmil Compression Type, Al: # 2/0–600kcmil Compression Type, CU: # 3/0–750kcmil
1600			5	
2000			6	
2500			8	
3000			9	
4000 (12)	42 in. (1067 mm)	48 in. (1220 mm)	12	
5000 (12)	48 in. (1220 mm)		15	

Table 9 - UL 489 Circuit Breaker Ratings for MasterPacT

Interrupting Rating Code(13)	RMS Sym. Ampreres (kA)		
	240 V	480 V	600 V
N	65	65	50
H	100	100	85
L (14)	200	150	100

(11) "D" represents the NEMA Type 1 dimension. For NEMA Type 3R construction, add 11.50 in.
(12) Use ANSI type for fixed-mounted 4000 A and 5000 A MasterPacT
(13) Interrupting Code N available from 800–2000 A. Interrupting Codes H and L are available from 800–5000 A.
(14) The "L" interrupting code is only available in drawout construction

Available Accessories[15]

Table 10 - UL 1066 (ANSI Rated) Circuit Breaker Ratings for MasterPacT

Interrupting Rating Code [16]	RMS Sym. Amperes (in thousands)		
	240 V	480 V	600 V
N1	42	42	42
H1	65	65	65
H2	85	85	85
H3	100	100	85
L1 [17]	200	200	130

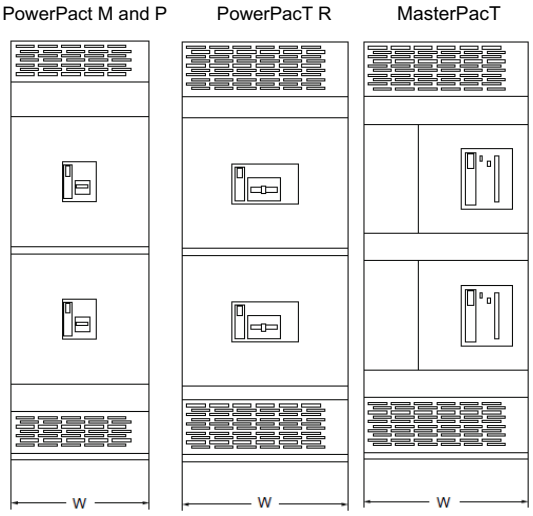
- Additional auxiliary switches–up to twelve
- Spring charging motor
- Shunt trip
- Shunt close
- Undervoltage trip with or without time delay
- Key interlock
- Padlock attachment
- Phase failure with capacitor trip
- Communications–wired or unwired
- Operations counter
- Transparent breaker cover
- Electric reset
- Programmable contact module–two or six contacts
- Open/Close push-button lock
- Drawout circuit breaker shutter
- Shutter padlock
- Shutter position indicator
- Cradle cell key interlock
- Circuit breaker lifting and transport truck
- Circuit breaker Test Solution

See Electronic Trip Systems for MasterPacT MTZ (MicroLogic X/Xi), page 35

(15) Contact your local Schneider Electric representative for additional accessories.
(16) Interrupting Code N1 available from 800–1600 A. Interrupting Codes H1/H2/H3 and L1 are available for 800–3200. A Interrupting codes H2/H3/L1.
(17) L1 interrupting Rating Code is available in drawout construction only.

Stacked Devices

Table 11 - Stacked Devices



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Device Type (18)	Maximum System Ampacity (A)	Maximum C/B Rating (A)		Minimum Section Width (in.)	Minimum Section Depth (in.)
		Top	Bottom		
MG, MJ, PG, PJ, PK, PL	2500	1200	1200	30	24
	3000				36
	4000				48
RG, RJ, RK, RL	2500	1200	2500	36	24
		2000	2000		
	3000	1200	2500		36
		2000	2000		
	4000	1200	2500		48
		2000	2000		
MasterPacT (fixed mounted)	3000	2000	2000		36
	4000				48
MasterPacT (drawout)	3000				
	4000				

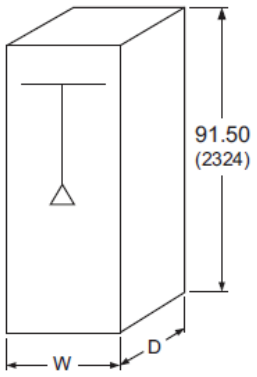
(18) Cannot stack different device types. For example, PG/RG or NW Fixed/NW Drawout is not acceptable to be stacked together.

Table 12 - Load Lug Information

Circuit Breaker	Ampacity (A)	Quantity (per phase)	Lug Size (kcmil)
PowerPacT M- and R-Frame	800	3	3/0–500
	1200	4	
PowerPacT R-Frame	1200	4	3/0–600
	1600	5	
	2000	6	
MasterPacT NW/MTZ2	800	3	3/0–750
	1200	4	
	1600	5	
	2000	6	

Underground Pull Sections (UGPS) and Main Sections

Figure 33 - Underground Pull Sections



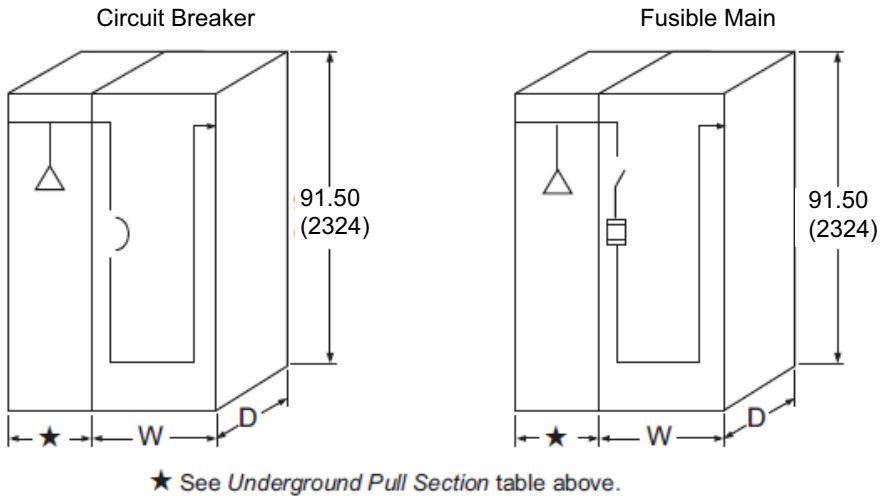
Dimensions provided in inches (millimeters).

See Conduit Layout, page 98

Ampacity (A)	Dimensions[19]		Main Lug Information[20]	
	Width (W)	Depth (D)	Quantity (per phase)	Size (kcmil)
400-800	30 in. (762 mm)	24 in. (610 mm)	3	33/0-750
1000-1200	36 in. (914 mm)		4	
1600	42 in. (1067 mm)		5	
2000			6	
2500	48 in. (1219 mm)		8	
3000		36 in. (914 mm)	9	
4000		48 in. (1219 mm)	12	

(19) "D" represents NEMA Type 1 dimension without rear wireway. For NEMA Type 3R construction, add 11.50 in. (292 mm) to depth in front and 0.50 in. (13 mm) to depth in rear.
(20) Lugs or studs are provided, based on utility requirements.

Figure 34 - Main Sections (Split Bus) (21)



Dimensions given in inches (millimeters).

See Reverse Feed Mains, page 55.

Type	Ampacity (A)	Dimensions	
		Width (W)	Depth (D)
Circuit Breaker Mains			
R	2500	42 in. (1067 mm)	36 in. (914 mm)
MasterPacT	3000–5000	48 in. (1219 mm)	48 in. (1219 mm)
Fusible Main Switches-Fuse Type L			
Boltswitch	2000–2500	48 in. (1219 mm)	24 in. (610 mm)
	3000		36 in. (914 mm)
	4000		48 in. (1219 mm)

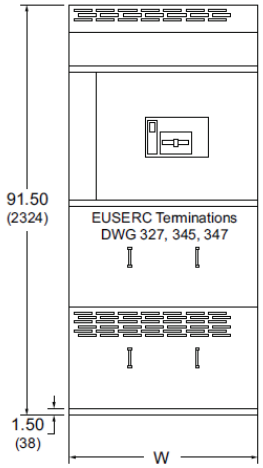
(21) For split-bus mains < 2000 A, contact your local Schneider Electric representative.

Main or Branch Circuit Breaker Selection (EUSERC)

EUSERC = Electric Utility Service Equipment Requirements Committee

Individually Mounted Mains

Figure 35 - PowerPacT R-Frame Circuit Breaker



Electronic Trip Molded Case circuit breakers

- MG, MJ, PG, PK, PJ, PL

MicroLogic Electronic Trip Molded Case circuit breakers

- PG, PK, PJ, PL, RG, RK, RJ, RL

For more information, see catalog 0612CT0101, PowerPacT M-frame, R-Frame, R-Frame and NS630b-NS3200 Electronic Trip circuit breakers.

Table 13 - Reverse Feeds Main (22)

Circuit Breaker Type (23)	Ampacity (A) (24)	SCCR (kA)		Dimensions		Main Lug Information	
		240 V	480 V	Width (W)	Depth (D) (25)	Quantity (per phase)	Size (kcmil)
MG	400-800	65	35	36 in. (914 mm)	24 in. (610 mm)	1 (400 A) 2 (600 A) 3 (800 A)	#3/0- 750
MJ		100	65			4	
PG	1000-1200	65	35	42 in. (1067 mm)			
PK		65	50				
PJ		100	65				
PL		125	100				
RG	1600-2000	65	35			5 (1600 A) 6 (2000 A)	
RK		65	65				
RJ		100	65				
RL		125	100				

(22) A power meter can be mounted with the main, but an ION Meter Touchscreen Display or Surge Protective Device (SPD) requires a trailing auxiliary section.
(23) P- and R-Frame circuit breakers are available with a 100% rating. To order, add -C to the end of the breaker type, for example, RK-C.
(24) Salt River Project (SRP) and Imperial Irrigation District (IID) are limited to 1000 A maximum for reverse feed. City of Riverside (California) is limited to 1200 A maximum for reverse feed.
(25) "D" represents the NEMA Type 1 dimension. For NEMA Type 3R construction, add 11.50 in. (292 mm) to the depth in front and 0.50 in. (13 mm) to the depth in rear.

Available Accessories/Options

- Shunt trip
- Undervoltage trip
- Control power transformer (if 120 V control source is not available)
- Auxiliary switches
- Alarm switch
- Key interlock
- Cylinder lock
- Electrical operator (for MG, MJ, PG, PK, PJ, PL)
- Phase failure with capacitor trip
- Padlock attachment (standard on EUSERC applications)

Additional Accessories and Trip Unit Options for MicroLogic Trip Circuit Breakers

- Universal test set
- Ground fault push-to-test feature, factory wired for 120 Vac
- Zone selective interlocking interface
- 24 Vdc power supply (Powers the trip unit. Required for harmonic trip unit recommended for ammeter and power trip unit.)

Trip Unit Options

- LI, LS, LSI, LIG, LSG, LSIG

See details on Electronic Trip Systems: PowerPacT M-, P-, and R-Frames and MasterPacT NW/NT, page 29

Group Mounted Main or Branch Circuit Breakers

Thermal Magnetic circuit breakers

- BG, BK, HD, HG, HJ, HL, QB, QD, QG, QJ, JD, JG, JJ, JL, LA, LH

For more information, see catalog 0601CT9101, Thermal-Magnetic / Magnetic Only circuit breakersor catalog 0611CT1001, PowerPacT H-, J-, and L-frame circuit breakers.

Electronic Trip Molded Case circuit breakers

- MG, MJ, PG, PK, PJ, PL

For more information, see catalog 0612CT0101, PowerPacT M-frame, R-Frame, R-Frame and NS630b-NS3200 Electronic Trip circuit breakers.

MicroLogic Electronic Trip Molded Case circuit breakers

- HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LD, LG, LJ, LL, LR, PG, PG-C, PK, PK-C, PJ, PJ-C, PL, PL-C, RG-C, RK-C, RJ-C, RL-C

For more information, see catalog 0612CT0101, PowerPacT M-frame, R-Frame, R-Frame and NS630b-NS3200 Electronic Trip circuit breakers or catalog 0611CT1001, PowerPacT H-, J-, and L-Frame circuit breakers.

Table 14 - Group Mounted I-Line Circuit Breakers

Breaker Type	% Rated	Frame Size	Ampacity Range (A)	SCCR (x 1000)			Mounting Height (inches)			Load Lug Information
				240 V	480 V	600 V	3–pole	2–pole	1–pole	
BJ	80%	125	15–125	100	65 (Wye rated only)	25	4.5	3	1.5	#14-1/0 AWG Al or Cu (26)
BK				100	65 (Wye rated only)	65				#14-1/0 AWG Al or Cu (26)
HD		150	15–150	25	18	14		3	—	#14-#3/0 AWG Al or Cu (26)
HG				65	35	18		3		
HJ								4.5		
HL				100	65	25				
HR				200	200	100		—		
QB		225	70–227	10	—	—		3	—	#4-300 kcmil Al or Cu (26)
QD				25						
QG				65						
QJ				100						
JD		250	150–250	25	18	14		4.5	—	150–175 A #1/0-#4/0 AWG 200-250A #3/0 AWG-350 kcmil Al or Cu (26)
JG				65	35	18				
JJ				100	65	25				
JL				65	35	18				

(26) Optional lugs are available. Contact a local Schneider Electric representative.

Table 14 - Group Mounted I-Line Circuit Breakers (Continued)

Breaker Type	% Rated	Frame Size	Ampacity Range (A)	SCCR (x 1000)			Mounting Height (inches)			Load Lug Information
				240 V	480 V	600 V	3–pole	2–pole	1–pole	
JR				200	200	100		—		
LA		400	125–400	42	30	22	6	6	—	(1) #1 AWG-600 kcmil or (2) #1 AWG-250 kcmil (27)
LH				65	35	25				
LD		250	70–250	25	18	14				
LG				65	35	18				
LJ				100	65	25			—	(1) #2 AWG-600 kcmil Cu or (1) #2 AWG — 500 kcmil Al (27)
LL				125	100	50				
LR	80% or 100%			200	200	100				
LD		400	125–400	25	18	14				
LG				65	35	18				
LJ				100	65	25	6	—		
LL				125	100	50				
LR				200	200	100			—	(2) #3/0 AWG-500 kcmil Al or Cu(27)
LD		600	200-600	25	18	14				
LG				65	35	18				
LJ				100	65	25				
LL	80%			125	100	50				
LR				200	200	100				
MG		800	300–800	65	35	18	9	9	—	(3) #3/0-500 kcmil Al or Cu (27)
MJ				100	65	25				
PG		1200	100–1200	65	35	18	9	9	—	#3/0 AWG- 500 kcmil Al or CU (3) for 100-800 A (4) for 1000-1200A (27)
PG-C	100% (28)									
PK	80%				50	50				
PK-C	100% (28)									
PJ	80%			100	65	25				
PJ-C	100% (28)									
PL	80%			125	100	25				
PL-C	100% (28)	1200	100-1200							
RG-C		2500	240–1200	65	35	18	15	15	—	(4) #3/0 AWG-600 kcmil (27)
RK-C					65	65				
RJ-C				100	65	25				
RL-C				125	100					

For I-Line interior selection and section dimensions, see Breaker SC Ratings, page 102.

See Electronic Trip Systems for PowerPacT M- P-, and R-Frame and MasterPacT NW/NT, page 29.

(27) Optional lugs are available. Contact a local Schneider Electric representative.
(28) Cannot group mount 100% rated 1000 A and 1200 A PowerPacT P-Frame circuit breakers. Use PowerPacT R-Frame circuit breakers for this application.

Quick Layout Guide

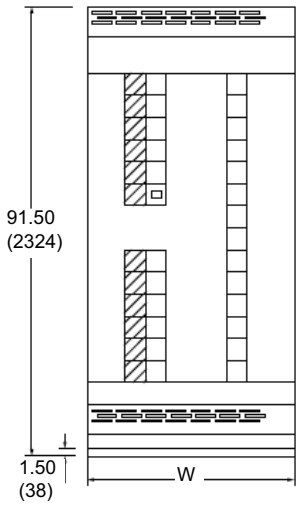
Group Mounted Interiors

NOTE: All sections have a minimum depth of 24 in. (609.6 mm), unless noted.

See Conduit Layout, page 98.

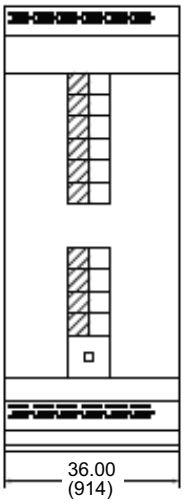
Table 15 - Full-Height I-Line Distribution Sections

2000 A Interior(29)



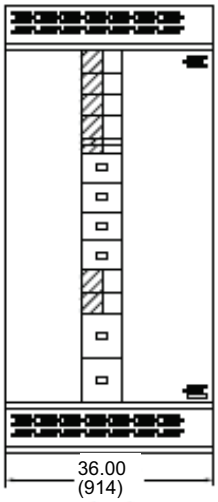
Width (W)	Max. C/B Frame (A)	
	Left Side	Right Side
36 in. (914 mm)	Q: 250	B: 125
42 in. (1066 mm)	L: 600	J, Q: 250
48 in. (1219 mm)	R: 1200	J, Q: 250
Mounting Space: L = 54 in. (1371 mm), R= 63 in. (1600 mm).		

2000 A Interior(29)



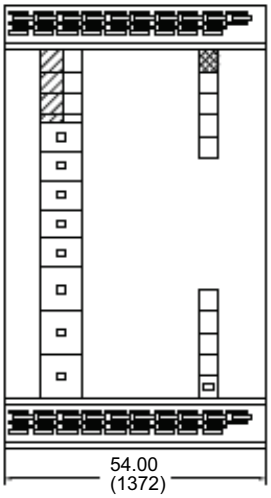
Max. C/B Frame (A)
R: 1200
Mounting Space: = 54 in. (1371 mm).

2000 A Interior(29)



Max. C/B Frame (A)
R: 1200
Mounting Space: = 72 in. (1828 mm).

3000 A Interior(29)



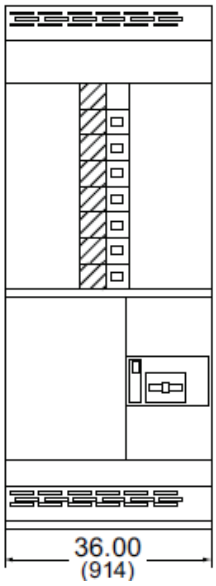
Max. C/B Frame (A)	
Left Side	Right Side
R: 1200	J, Q: 250
Mounting Space: L = 72 in. (1828 mm), R= 40.5 in.(1028 mm), Minimum depth is 36 in. (762 mm)	

(29) With unknown loading, the minimum ampacity of the interior bus is as follows per UL 891: 1 device = 100% of rating; 2–3 devices = 80% of sum of ratings; 4–6 devices = 70% of sum of ratings; 7–12 devices = 60% of sum of ratings; over 12 devices = 50% of sum of ratings.

Table 16 - Combination Main or UCT and I-Line Distribution Sections (30)

1200 A Interior

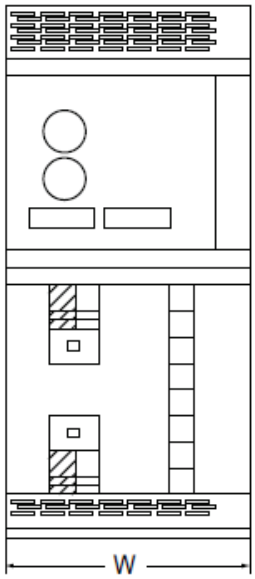
2000 A Interior



Main = PowerPacT M, P, or R

Max. C/B Frame (A)
P: 1200
Mounting Space = 36 in. (914 mm)

1000 A Interior(31)

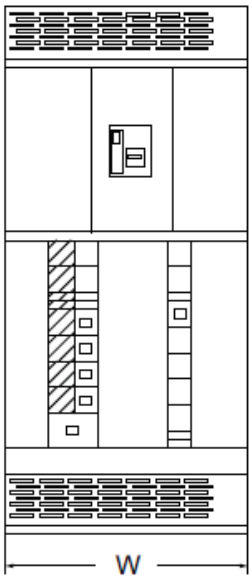


Utility in Combination with I-Line Distribution

Width (W)	Max. C/B Frame (A)	
	Left	Right
36 in. (914 mm)	J, Q: 250	B: 125
42 in. (1066 mm)	L: 600	J, Q: 250
48 in. (1219 mm)	P: 1200	J, Q: 250
Mounting Space = 63 in. (1600 mm)		

42 in. W = 1200 A interior(31)

48 in. W = 2000 A interior(31)



Main = PowerPacT M, P, or R

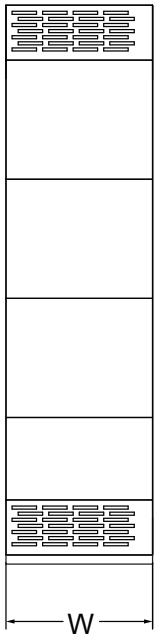
Width (W)	Max. C/B Frame (A)	
	Left	Right
36 in. (914 mm)	—	—
42 in. (1066 mm)	P; 1200	J, Q: 250
48 in. (1219 mm)	R: 1200	J, Q: 250
Mounting Space = 63 in. (1600 mm)		

(30) The main can be on top or bottom, depending on the feed direction. The distribution is at the opposite end.
(31) With unknown loading, the minimum ampacity of the interior bus is as follows per UL 891: 1 device = 100% of rating; 2–3 devices = 80% of sum of ratings; 4–6 devices = 70% of sum of ratings; 7–12 devices = 60% of sum of ratings; over 12 devices = 50% of sum of ratings.

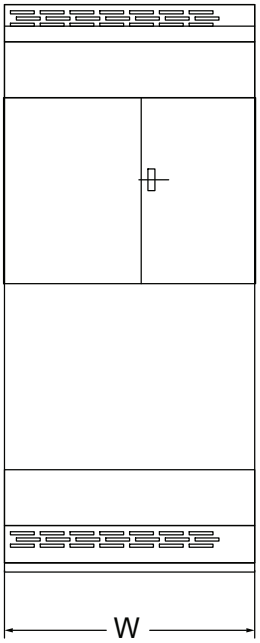
Auxiliary Sections, NEMA Utility, and Individually Mounted Mains

Table 17 - Auxiliary Sections, NEMA Utility, and Individually Mounted Mains

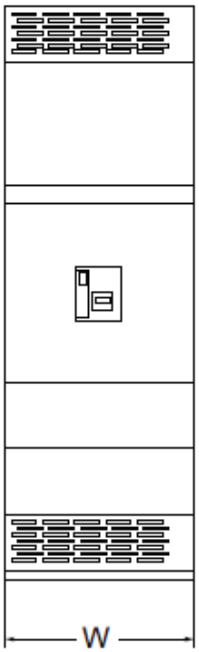
Bused Auxilliary Sections



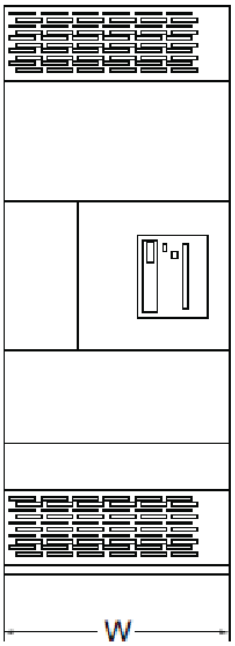
NEMA Full Height Utility Compartment



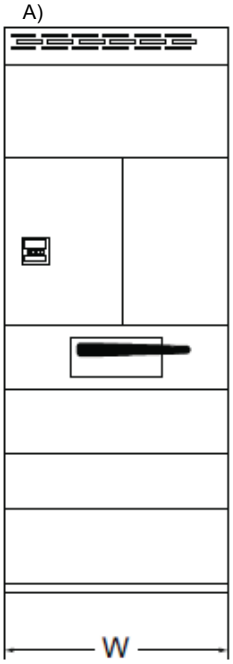
PowerPacT M, P and R



Individually Mounted Mains MasterPacT NW/MTZ2, 3



Fused Power Device (Boltswitch @ 4000 A)



Amp.	Width (W)
800–2000	24 in. (609 mm)
2500	36 in. (914 mm)
3000–4000	42 in. (1066 mm)
5000	48 in. (1219 mm)

Amp.	Width (W)
400–1200	36 in. (914 mm)
1600–4000	42 in. (1066 mm)

Type	Amp. (A)	Width (W)
M	800	30 in. (762 mm)
P	1200	
R	2500	36 in. (914 mm)

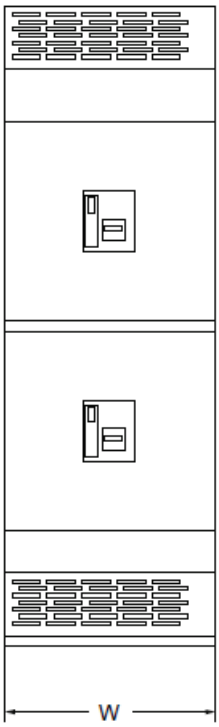
Amp.	Width (W)	Depth (D)
800–3000	36 in. (914 mm)	36 in. (914 mm)
4000	42 in. (1066 mm)	48 in. (1219 mm)
5000	48 in. (1219 mm)	

Amp.	Width (W)
800–2000	36 in. (914 mm)
2500–3000	42 in. (1066 mm)
4000	48 in. (1219 mm)

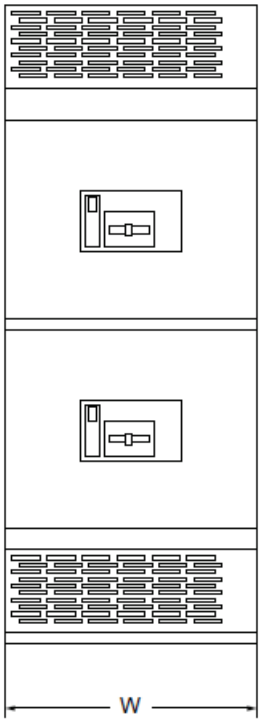
NOTE: All drawout MasterPacT circuit breakers are 48 in. (1219 mm) deep.

Table 18 - Stacked Mains

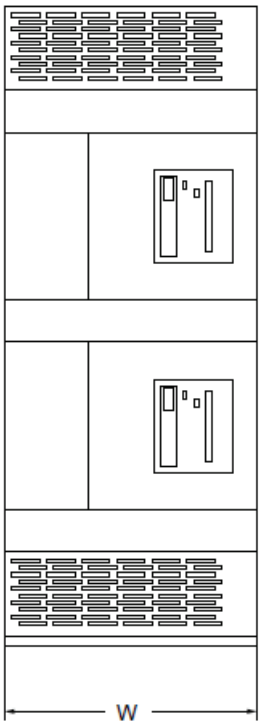
PowerPacT M and P



PowerPacT R



MasterPacT



Stacked Circuit Breakers	Max. C/B Rating (A)		Width (W)
	Top	Bottom	
PowerPacT M- or P-Frame	1200	1200	30 in. (762 mm)
PowerPacT R-Frame	1200	2500	36 in. (914 mm)
	2000	2000	
MasterPacT	2000	2000	

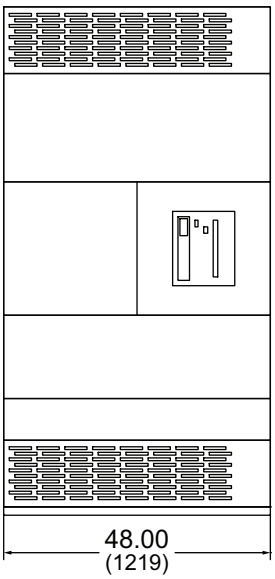
Table 19 - Depth Dimensions

System Ampacity (A)	Depth(32)(33)
400–2500	24 in. (914 mm)
3000	36 in. (914 mm)
4000–5000	48 in. (1219 mm)
Close-Coupled to Transformer	
up to 5000	60 in. (1524 mm)

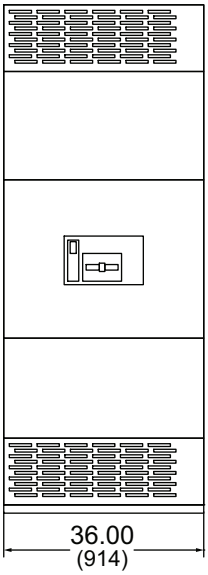
(32) For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm)to depth in front and 0.50 in. (13 mm)to depth in rear.
(33) For non-EUSERC applications only.

Table 20 - Tie Devices

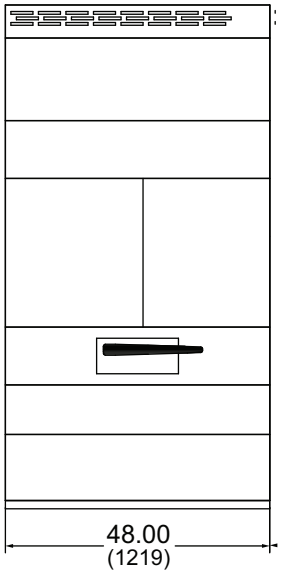
MasterPacT and PowerPacT R-Frame Tie



PowerPacT P-Frame Tie



BoltSwitch Tie



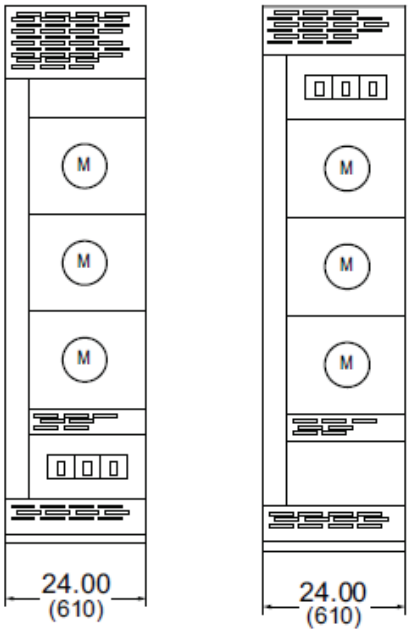
Depth Dimensions

System Ampacity (A)	Depth[34]
400–2500	24 in. (610 mm)
3000	36 in. (914 mm)
4000–5000	48 in. (1219 mm)
Close-Coupled to Transformer	
up to 5000	60 in. (1524 mm)

(34) For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm)to depth in front and 0.50 in. (13 mm)to depth in rear.

Figure 36 - Commercial Multi-Metering (CCM) Lever Bypass

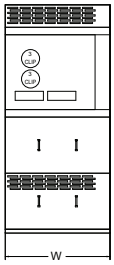
(35)



EUSERC Switchboards

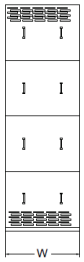
Table 21 - UGPS and Utility / Main Combination Sections

Reverse Feed Utility Compartment



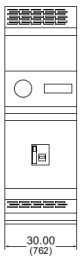
Amp.	Width (W)
1000	36 in. (914 mm)
1200-2000	42 in. (1066 mm)
2500-3000 (37)	48 in. (1219 mm)
4000 (37)	54 in. (1371 mm)

Utility UGPS

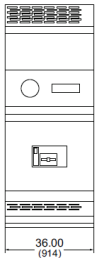


Amp.	Width (W)
400-800	30 in. (762 mm)
1000-1200	36 in. (914 mm)
1500-2000	42 in. (1066 mm)
1500-4000	48 in. (1219 mm)

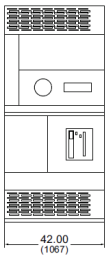
Combination Utility Compartment / PowerPacT M and P(36)



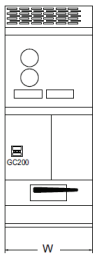
Combination Utility Compartment / PowerPacT R(36)



Combination Utility Compartment / MatsrePacT NW/MTZ2, 3(36)



Combination Utility Compartment / Fused Switch(36)



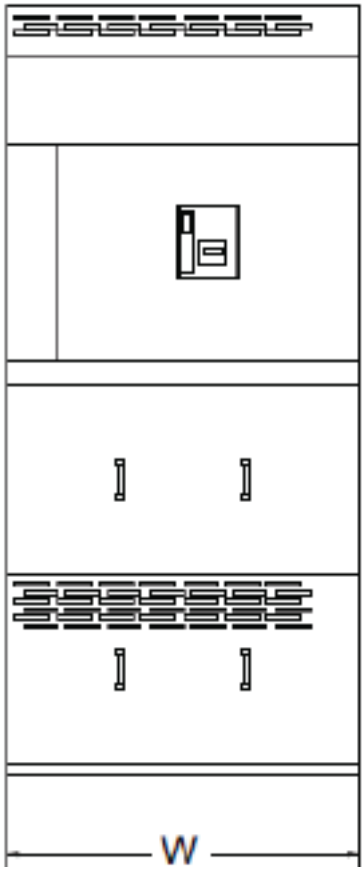
Amp.	Width (W)
2000	36 in. (914 mm)
3000	42 in. (1066 mm)
4000	48 in. (1219 mm)

(35) For non-EUSERC applications only.
(36) Requires Bottom-feed, full height Underground Pull Section (UGPS).
(37) EUSERC limit is 2000 A. Check your local utility for 2500, 3000, and 4000 A acceptability.

Table 22 - Reverse Feed Mains and CMM

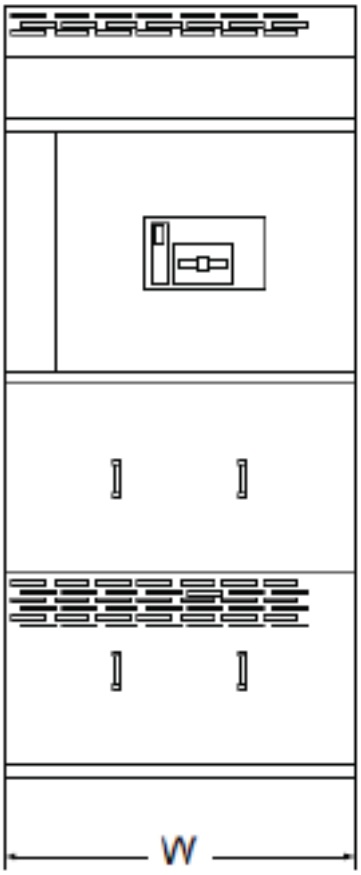
Individually Mounted, Reverse Feed Mains

PowerPacT M and P



Type	Maximum Amp.	Width (W)
M	800	36 in. (914 mm)
P	1200	42 in. (1066 mm)

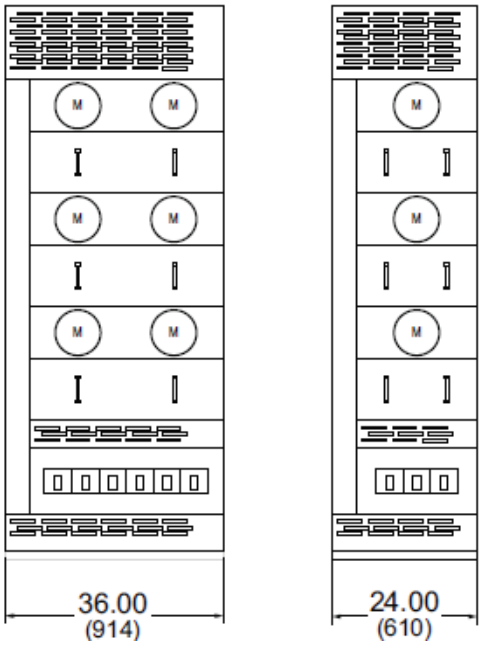
PowerPacT R



Type	Maximum Amp.	Width (W)
R	2000	42 in. (1066 mm)

Commercial Multi- Metering (CMM)

Hot Sequence

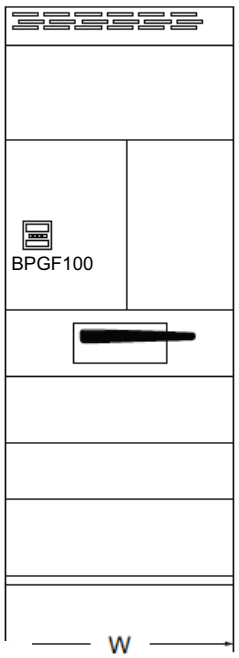


6–socket Section **3–socket Section**

Fused Power Device Selection (Non-EUSERC)

Table 23 - Individually Mounted Fused Power Devices (100% Rated)

Switch Type	Switch Rating (A)	Mounting Height			Section Dimensions	Main Lug Size (kcmil)
		Middle	Top	Bottom	Width (W)	
Fused Power Device	800 - 1600	45 in. (1144 mm)	36 in. (914 mm)	36 in. (914 mm)	36 in. (914 mm)	(4) #3/0- 750
	2000		N/A	45 in. (1144 mm)		(5) #3/0- 750
	2500				42 in. (1067 mm)	(6) #3/0- 750
	3000					(8) #3/0- 750
	4000				48 in. (1219 mm)	(9) #3/0- 750



4000 A Boltswitch Fused with Ground Fault Protection

See Conduit Layout, page 98.

Table 24 - Reverse Feed Fusible Main

Type	Ampacity (A)	SCCR		Width (W)	Main Lug Information	
		Fuse Type	240/480 V		Quantity (Per phase)	Size (kcmil)
MCS (38)	400–800	J, T	100 kA	36 in. (914 mm)	3	#3/0–750
	800	L				

Table 25 - Load Lug Information

Switch Ampacity (A)	Quantity (per phase)	Lug Size (kcmil)
800	3	3/0–500
1200	4	
1600	5	3/0–600
2000	6	

Table 26 - Depth Dimensions

System Ampacity (A)	Depth (39)
400–2500	24 in. (610 mm)
3000	36 in. (914 mm)
4000	48 in. (1219 mm)

(38) MCS = molded case switch.
(39) For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm) to depth in front, and 0.50 in. (13 mm) to depth in rear.

Fused Power Device Accessories

- Electric trip—requires CPT or 120 Vac external power
- Control power transformer
- Capacitor trip power supply
- Blown main fuse detector—requires electric trip and 120 Vac power source for tripping switch
- Unfused switch
- Ground fault push-to-test interface (single source only)
- Schneider Electric key interlock
- Control power transformer
- Padlock attachment
- Phase monitor—for voltage imbalance, low voltage, or phase reversal
- Auxiliary switch

Utility Metering

U.S Utilities (Non-EUSERC)

The utilities listed are the only ones for which Schneider Electric Design Engineering currently maintains records. They are available in full height or in combination with a PowerPacT M-, P-, or R-Frame main circuit breaker, or in full height only with Fused Power Device.

- Ameren (MO)
- American Electric Power (OH)
- Appalachian Power Company (VA)
- Baltimore Gas & Electric (40)(41)
- Central Illinois Light Company (IL)
- Cincinnati Gas & Electric (OH)
- Central Illinois Light Company (IL)
- CILCO Group
- Columbus Southern Power (OH)
- Commonwealth Edison Company (IL)
- Con Edison (NY) Spec 298
- Con Edison (NY) Spec 377
- Dayton Power & Light Company (OH)
- Detroit Edison Company (MI)
- Eversource (CT-Western MA)
- Eversource (Eastern MA)
- Eversource (NH)
- Fort Collins, City of (CO)
- Holy Cross Energy (CO)
- Indiana and Michigan Power (IN)
- Indianapolis Power & Light Company (IN) (40)
- Kansas City Power & Light Company (MO)
- Kentucky Power Company (KY)
- Kingsport Power Company (TN)
- Louisville Gas and Electric Company (KY) (40)
- Metropolitan Edison Company (PA)
- NEMA Standard Design
- Ohio Power Company (OH)
- Potomac Electric Power (MD/DC)
- PPL Electric (PA)
- PS&G (NJ)
- PSEG Long Island (NY)
- Virginia Electric Power Company (VA) (40)
- We Energies (WI)
- Wheeling Power Company (WV)

(40) Large tenant mains are not available for this utility.
(41) Can only be used in combination with a PowerPacT R-Frame main circuit breaker.

- Xcel Energy Inc (MN)

Cold Sequence Utilities

- New York State Electric & Gas Corp. (NY)
- Niagara Mohawk Power (NY)
- Northeast Utilities (CT)

NOTE: Contact local Schneider Electric Sales for applications for utilities not listed here.

Definitions

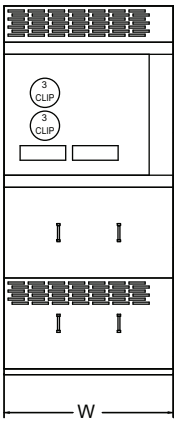
Cold Sequence Metering—In cold sequence metering, the main disconnecting device is placed ahead of (on the line side of) the current transformer compartment. In this arrangement, the current transformer compartment can be de-energized by switching the main circuit breaker to the OFF position.

Hot Sequence Metering—In hot sequence metering, the main disconnecting device is placed behind (on the load side of) the current transformer compartment. In this arrangement, the current transformer compartment is always energized.

EUSERC Utilities

The Electric Utility Service Entrance Requirements Committee (EUSERC) consists of member utilities in the following states: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, Wyoming, and Washington.

Table 27 - Reverse Feed Utility Compartment

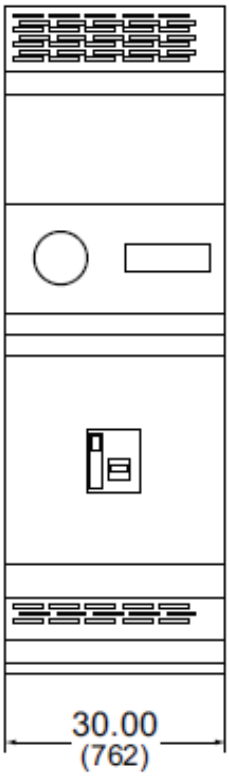
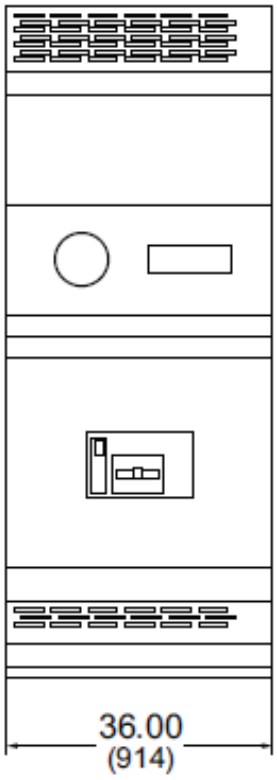
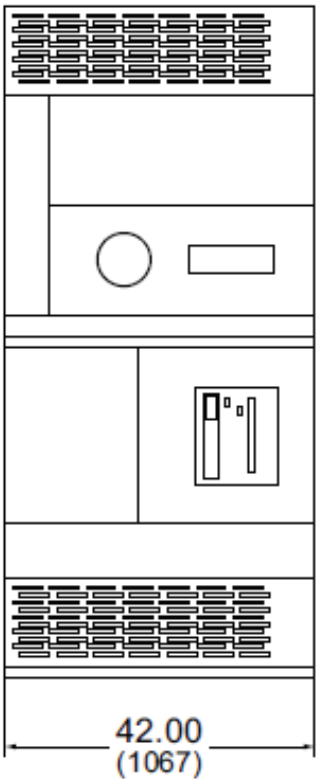


Ampacity (A)(42)	Width (W)	Depth (D)(43)	Incoming Lug Information(44)	
			Quantity	Size
400	36	24	1	#3/0-750
600			2	
800			3	
1000			4	
1200	42			
1600			5	
2000			6	
2500 (45)	48		8	
3000 (45)		36	9	
4000 (45)	54	48	12	

(42) Salt River Project (SRP) and Imperial Irrigation District (IID) are limited to 1000 A maximum for reverse feed. City of Riverside (California) is limited to 1200 A maximum for reverse feed.
(43) "D" represents the NEMA Type 1 dimension. For NEMA Type 3R construction, add 11.50 in. (292 mm) to the depth in front and 0.50 in. (13 mm) to the depth in rear.
(44) Lugs or studs are provided based on utility requirements.
(45) EUSERC limit is 2000 A. Check your local utility for 2500, 3000, and 4000 A acceptability.

Table 28 - Utility/Main Combination Sections

Restrictions:(46)(47)

Combination Utility Compartment / PowerPacT M and P	Combination Utility Compartment / PowerPacT R	Combination Utility Compartment / MasterPacT
		

See Underground Pull Sections (UGPS) and Main Sections (CPT), page 55

See EUSERC Switchboards, page 66

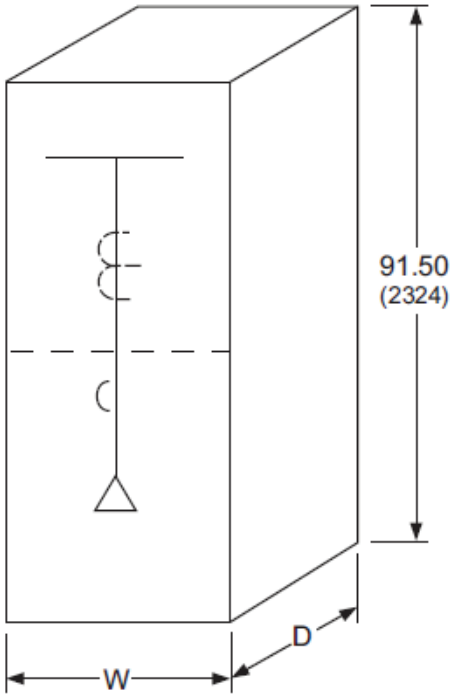
(46) Lugs Out—Max 2000 A circuit breaker through Bus Out—Up to 4000 A for circuit breaker.
(47) Requires bottom-feed, full-height UGPS.

Large Tenant Mains > 400-2000 A

Table 29 - Circuit Breaker Ratings and Section Dimensions

Type[48]	Ampacity (A)	SCCR		Dimensions		Load Lug Information	
		240 V	480 V	Width (W)	Depth (D)[49]	Quantity (per phase)	Size (kcmil)
MG	400–800	65 kA	35 kA	30 in. (762 mm)	24 in. (610 mm)	3	3/0–500
MJ		100 kA	65 kA				
PG	1000–1200	65 kA	35 kA	36 in. (914 mm)		4	
PK		65 kA	50 kA				
PJ		100 kA	65 kA				
PL		100 kA	100 kA				
RG	1600–2000	65 kA	35 kA			6	3/0–750
RK		65 kA	65 kA				
RJ		100 kA	65 kA				
RL		100 kA	100 kA				

Circuit Breaker



See Conduit Layout, page 98.

Top Exit of Load Cables for Large Tenant Main (LTM)

A loadside wireway section with a minimum width of 12 inch (305 mm) can be used for top exit of load cables. A 12 inch (305 mm) wide section can only accommodate cables for one LTM. A minimum width of 24 inch (610 mm) is required between two

(48) P- and R-Frame circuit breakers are available with a 100% rating. To order, add -C to the end of the circuit breaker type, for example, RK-C.
(49) "D" represents NEMA Type 1 dimension without rear wireway. For rear wireway add 12 in. (305 mm) to depth. For NEMA Type 3R construction, add 11.50 in. (292 mm) to depth in front, and 0.50 in. (13 mm) to depth in rear.

LTMs and for NEMA Type 3R applications. Rear load wireway is only available for LTMs; it requires 12 inch (305 mm) of increased depth for other sections in the lineup.

Commercial Multi-Metering

EUSERC Meter Section - Tenant Mains Less Than or Equal to 200 A (Hot Sequence)

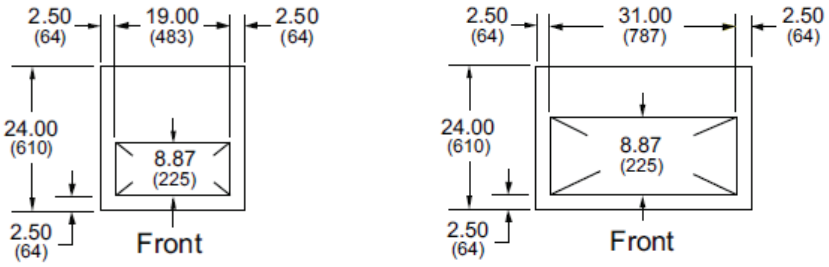
EUSERC Meter Section-tenant Mains ≤ 200 A (Hot Sequence)

Table 30 - Circuit Breaker Ratings

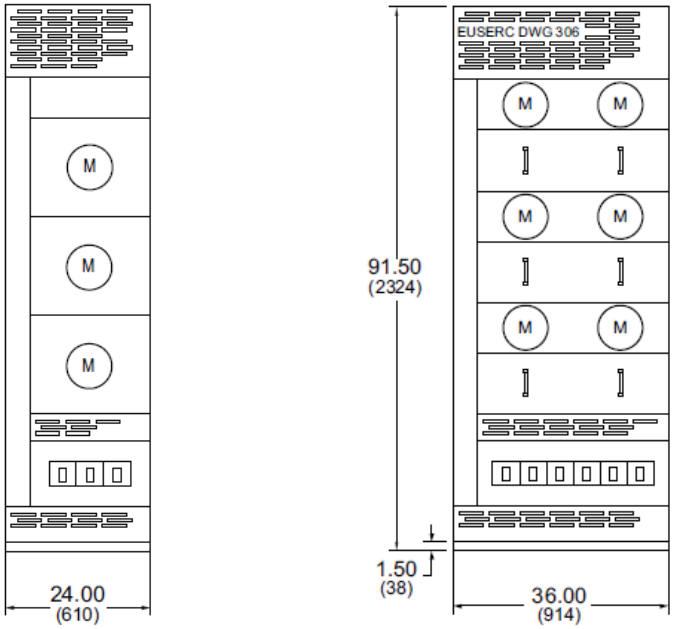
Type	Ampacity	SCCR		Load Lug Information(50)
		240 V	480 V	
HJL	60–100	100 kA	65 kA	#4-3/0 kcmil Al or Cu
HDL	110–150	22 kA	18 kA	
HGL		65 kA	35 kA	
HJL		100 kA	65 kA	
HLL		100 kA	100 kA	
JDL	175–200	22 kA	18 kA	#4-300 kcmil Al or Cu
JGL		65 kA	35 kA	
JJL		100 kA	65 kA	
JLL		100 kA	100 kA	
QDL(51)	110–200	22 kA	N/A	
QGL(51)		65 kA	N/A	
QJL(51)		100 kA	N/A	

(50) Neutral lug terminations are # 6 - 350 kcmil.
(51) A shunt trip is not available for PowerPacT Q-frame circuit breakers.

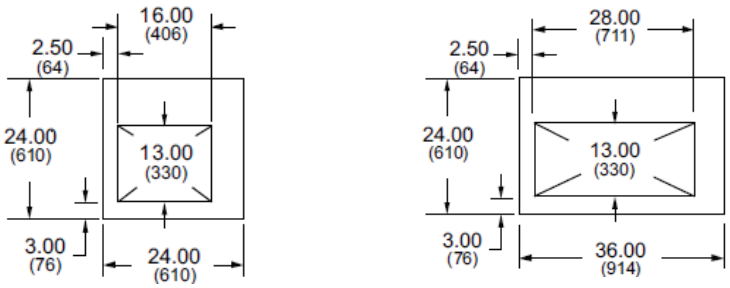
3–Socket Main **6–Socket Main**



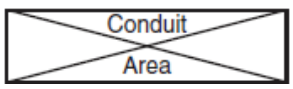
Front



Floor Plan

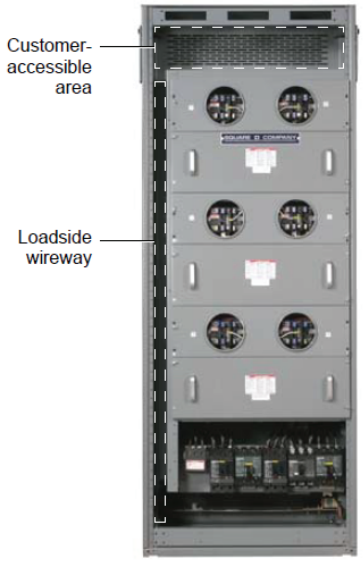


Front



Dimensions given in inches (millimeters).

Figure 37 - Depth Dimensions



Top Exit of Load Cables

Tenant metering sections come standard with a front accessible loadside wireway in each section for routing of load cables for top exit. Rear load wireway is not required for top exit applications.

Table 31 - Depth Dimensions

System Ampacity (A)	Depth(52)
400–2500	24 in. (610 mm)
3000	36 in. (914 mm)
4000	48 in. (1219 mm)

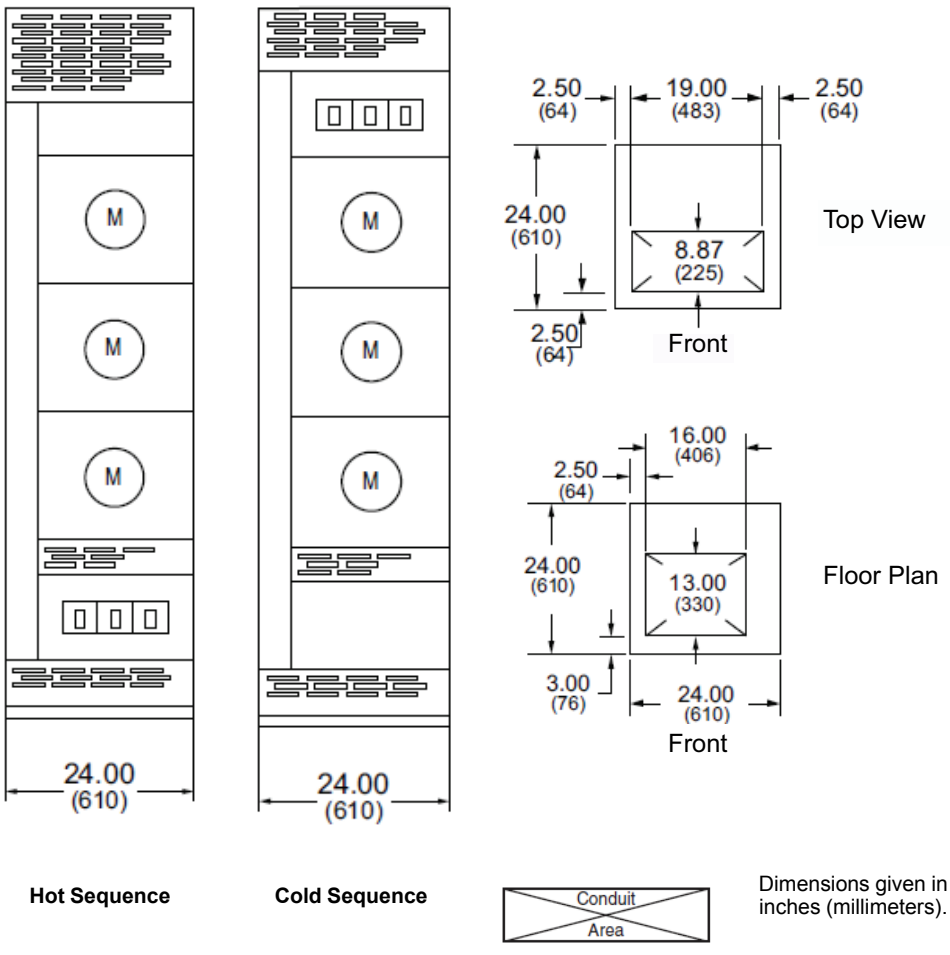
(52) For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm) to depth in front, and 0.50 in. (13 mm) to depth in rear.

Non-EUSERC Lever Bypass Meter Section - Tenant Mains Less Than or Equal to 200 A (Hot and Cold Sequence)

Table 32 - Circuit Breaker Ratings

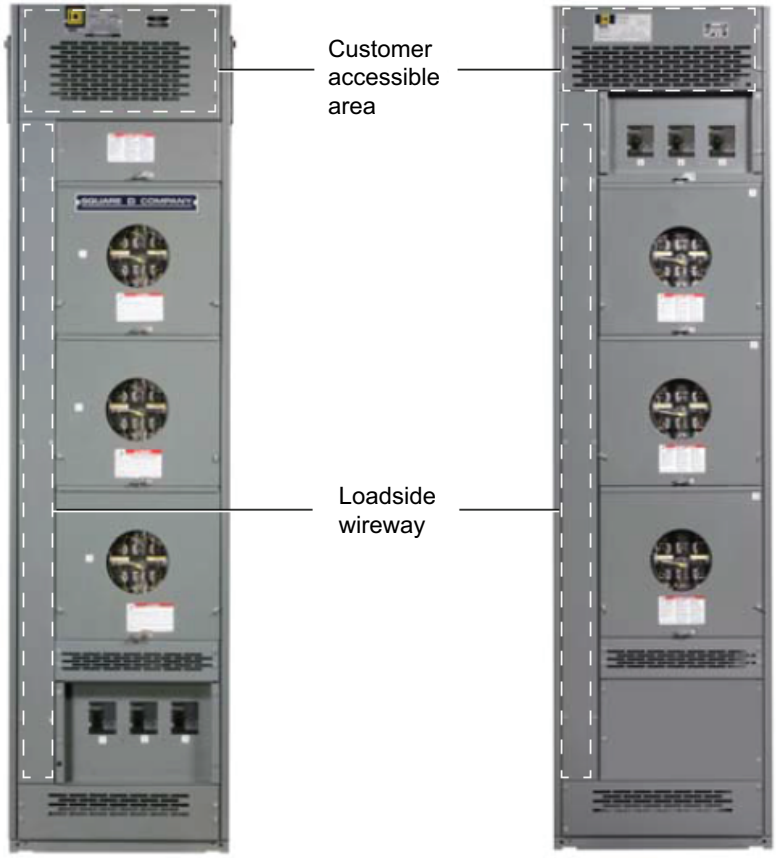
Type	Ampacity (A)	SCCR		Load Lug Information(53)
		240 V	480 V	
HJL	60–100	100 kA	65 kA	#4-3/0 kcmil Al or Cu
HDL	110–150	22 kA	18 kA	
HGL		65 kA	35 kA	
HJL		100 kA	65 kA	
HLL		100 kA	100 kA	
JDL	175–200	22 kA	18 kA	#4-300 kcmil Al or Cu
JGL		65 kA	35 kA	
JJL		100 kA	65 kA	
JLL		100 kA	100 kA	

Figure 38 - 3–Socket Main



(53) Neutral lug terminations are # 6 - 350 kcmil.

Figure 39 - Depth Dimensions



System Ampacity (A)	Depth(54)
400–2500	24 in. (610 mm)
3000	36 in. (914 mm)
4000	48 in. (1219 mm)

Top Exit of Load Cables

Tenant metering sections come standard with a front accessible loadside wireway in each section for routing of load cables for top exit. Rear load wireway is not required for top exit applications.

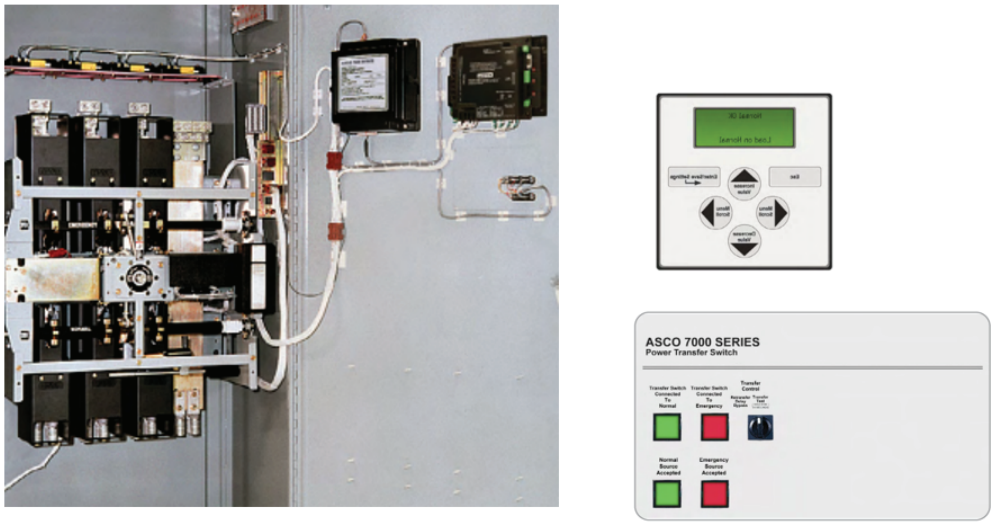
(54) For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm) to depth in front, and 0.50 in. (13 mm) to depth in rear.

Automatic Transfer Switches (ASCO)

General Description

ASCO Transfer Switches in QED–2 Switchboards are widely used in the most complex mission-critical hospital and healthcare facilities, enterprise and cloud-based data centers, telecommunication networks, water treatment plants, and any facility that requires the highest levels of power availability. ASCO Transfer Switches make backup power possible. They enhance power availability by transferring electrical loads to alternate sources of power.

Figure 40 - ASCO 7000 Series Automatic Transfer Switch, ASCO Group 5 Controller and Control Panel



The transfer switch will include a section where the transfer switch solution (transfer switch and controller) and required accessories and meters will be installed. The standard controller for this solution will be the ASCO Group 5. QED–2 Transfer Switch solutions are available from 600 A - 3000 A in the following dimensions as shown below.

Current Rating of ATS	Section Width	Section Depth(55)
600 — 2000 A	48 in. (1219 mm)	48 in. (1219 mm)
2500 — 3000 A	48 in. (1219 mm)	60 in. (1524 mm)

The circuit breaker for the normal will be the main section for the line up and it will be bussed to the transfer switch. The breaker for the emergency source will be at the source and not within line up.

(55) For NEMA 3R, the enclosure depth will be increased by 12 in. (304 mm)

Figure 41 - Typical One Line Diagram for ASCO Automatic Transfer Switch in QED–2, 2000 A Main Breaker with I-Line Distribution

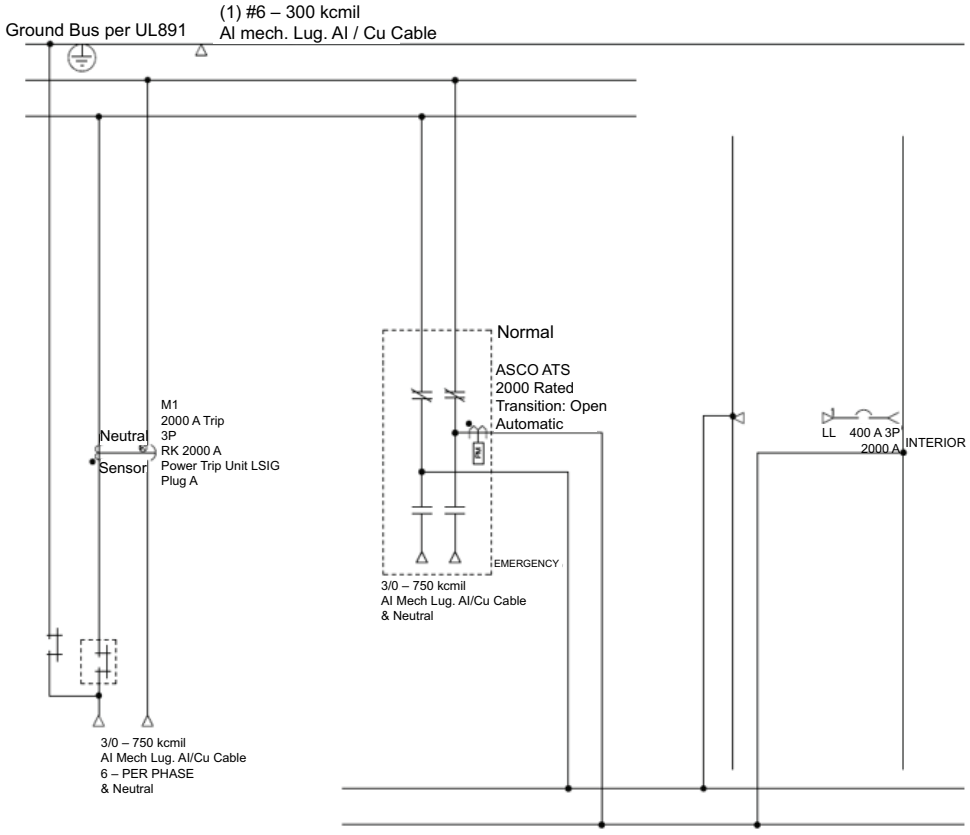
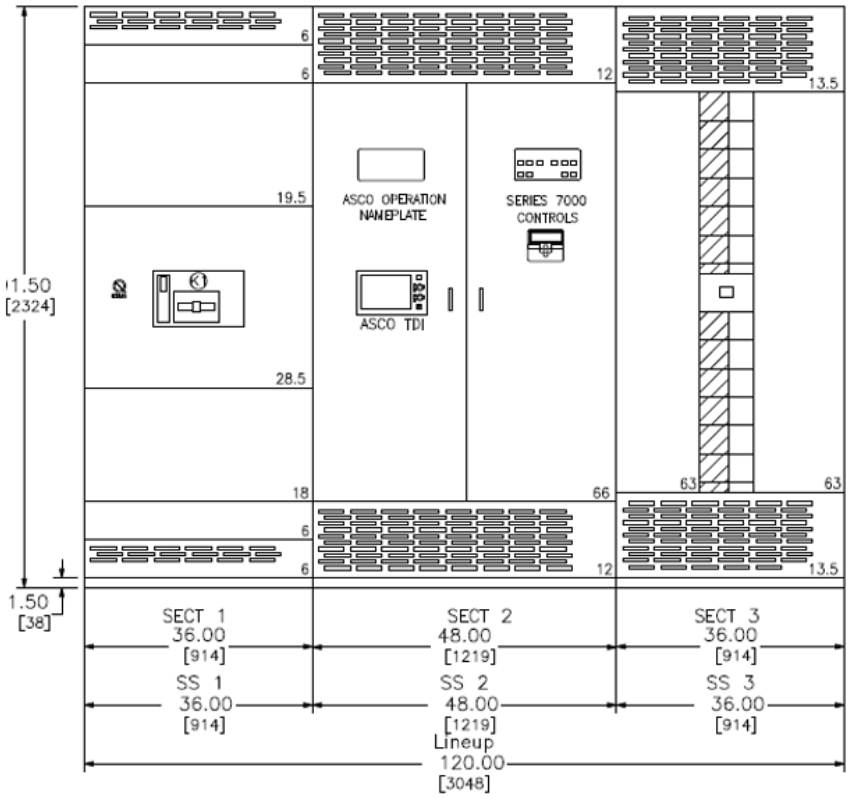


Figure 42 - Typical Front Elevation View for ASCO Automatic Transfer Switch in QED–2, NEMA 1, 2000 A Main Circuit Breaker with I-Line Distribution



Accessories available as options with the ASCO ATS include:

Type of Control

- **Automatic** – Fully automatic and when the normal source is lost, controller automatically initiates the start of the back-up power system and switches over when it becomes acceptable. For use in critical, emergency, and legally required standby power systems as defined in NEC Article 700, 701, and 708.
- **Non-automatic** – Same controller monitors the power sources but the transfer from one source to the other must be initiated by a local or remote pushbutton(s)/ signal. The controller will only allow transfers to a present and acceptable source. Only for use for optional standby systems as defined in the NEC Article 702.

ATS Neutral Type

- **None** – There are no neutral wire connections inside the ATS section.
- **Solid** – The neutrals from both sources are solidly bused (connected) inside the ATS section.
- **Switched** – The neutrals from both sources inside the ATS section are disconnected/connected as the ATS switches from one source to the other.
    - **Overlapping** – The neutral inside the ATS section will connect to the new source prior to the ATS switching sources. The neutrals from both source will be connected briefly as the ATS transfers from one source to the other. Once the new source is connected, the neutral will disconnect from the old source.

Emergency Cable Entrance

User must specify the location where the emergency cables will be entering the ATS section (top or bottom).

1G - Auxiliary Power Connections

Auxiliary power connections provides for connection of external 24 Vdc source to power control panel when normal and emergency sources are not present. Allows for use of full range of extended engine starting time delay feature 1C (0-60 min. 59 sec.).

This option is not required and should not be selected if the Power Meter Bundle option has already been selected as there is a version of this accessory already included in the bundle.

2C- Extended Time Delay

Extended time delay on engine start adjustable from .05 to 10 minutes. Factory set to 1 minute unless otherwise specified.

Includes adjustable external acc 2E engine cool down timer (TR1) adjustable from 0-60 minutes. Factory set at 5 minutes delay on engine start cool down unless otherwise specified.

6DL - Retransfer to Normal Mode Selector

Retransfer to normal mode selector. Maintained two position selector switch permits selection of manual or automatic retransfer. Manual retransfer requires a second selector switch 6B or 6C be momentarily closed to initiate a retransfer to the normal source. While in manual retransfer mode if an emergency source failure should occur and the normal source is still available manual retransfer will be automatically by-passed. A pilot light indicates manual retransfer mode.

18B-18G One Source Present Contact

2 pole D/T contacts that operate when emergency and normal source voltage is present at the transfer switch terminals

This feature is not actually an option. It is standard for every ASCO Transfer switch application in QED–2.

29A Manual Selection Between Two Utilities

Manual selection between two utilities as to which utility will be designated as the preferred source.

NOTE: Feature 5 is removed and feature 6B becomes pushbutton.

31Z Pre and / or Post Transfer Signal

Selective Load disconnect circuit to provide a pre-transfer and/or post transfer signal when transferring from emergency to normal and/or normal to emergency. The signal can be programmed to occur during all transfers or only when the transfer is occurring between two live sources. The length of the pre and post transfer delays can be set to 0-5 minutes 59 seconds.

This feature is not actually an option as it is standard for every ASCO Transfer switch application in QED–2.

34A-34B Normal / Emergency Transfer Inhibit

Requires a customer supplied remote, normally closed set of contacts (one for inhibit transfer to normal and the other for inhibit transfer to emergency). Opening of a contact will prohibit the transfer switch from transferring to the normal source (Feature 34A) or to the emergency source (Feature 34B). Connected to the field connections terminal block.

If this option is selected, then the ASCO Transfer Switch application will not be emergency rated.

72EE2 Communication Module

Provides a single point of interface and communication for on site use and shall be shown in the ASCO provided wiring drawing.

This option is not required and should not be selected if the Power Meter Bundle option has already been selected as there is a version of this accessory already included in the bundle.

99 Additional Signal Lights (Push– to– Test)

Addition of Test Lamp pushbutton(s) to determine if all signal lights are functioning.

Power Meter Bundle

Bundle package for use with ATS switches to monitor the transfer switch loads.

150A8 - Load PM8000 Bundle

- PM8000 meter with display and additional digital IO module (Acc. 148L1)
- Backup Power source (Acc. 1PS1)
- Communication Module (Acc. 72EE2)

150AT8 - Load PM8000 Bundle w/TDI

- PM8000 meter with upgraded ASCO 5370 Touch Display Interface (Acc. 148LD)
- Backup Power source (Acc. 1PS1)
- Communication Module (Acc. 72EE2)

150A - Load ASCO Meter Bundle

- ASCO Power Meter (Acc. 135L)
- Backup Power source (Acc. 1PS1)
- Communication Module (Acc. 72EE2)

150AT - Load ASCO Meter Bundle w/TDI

- ASCO Power Meter with upgraded ASCO 5370 Touch Display Interface (Acc. 135L)
- Backup Power source (Acc. 1PS1)

- Communication Module (Acc. 72EE2)

Optional accessories 1G and 72EE2 are included with the Power Meter Bundle.

107G - 5701 Gateway CPMA

5701 Gateway CPMA will be mounted in an ASCO Transfer Switch to function as a communication gateway to the Transfer Switch (controller and metering) and site equipment. Provides external communication for remote client access or notification (webpage, email or open protocols) or monitoring of site equipment. This option requires 72EE2 or a Power Meter Bundle be selected.

146G - Serial to Ethernet

A Mgate MB3170i RS-485 Serial to Ethernet Gateway mounted within a switch so that a customer can wire serial communication from an external device into our Ethernet network.

This option requires 72EE2 or a Power Meter Bundle be selected.

31BG - Status Relay Bundle

Status Relay Bundle - Provides 1 relay (3 total) for each of the following statuses, Normal Source Acceptability, Emergency Source Acceptability, Pre & Post Transfer Signal. Each relay has 2 NO/NC (Form C) sets of contacts rated for 6 A at 120 Vac, 250 Vac Max.

31BG1 - Status Relay Bundle

Status Relay Bundle- Provides dry contacts for each of the following statuses, (2) Form-C contacts for Normal Source Acceptability, (2) Form-C contacts for Emergency Source Acceptability, and (4) Form-C Contacts for Pre/Post Transfer Signaling. Each set of contacts is rated for 6 A at 120 Vac, 250 Vac Max.

Contact local Schneider Electric Sales office for custom requirements from above features and options. Common customizations include:

- Multiple Source Line Ups: Main Tie Main, Main Tie Gen, Double Mains, Main-Gen, Six Circuit Mains, and Remote Mains
  - Rear Connected Transfer Switches
  - Lower Ampacity Switches as needed (J– frames)
  - Emergency circuit breaker to be mounted within the line designation facing up.
  - Cabled solutions instead of Bussed
  - Manual Transfer Switch (only door is changed, and controller is removed)
  - Controller based transfer schemes
  - Additional accessories for ATS
  - Configurations above 3000 A
  - Configurations with complex iso bypasses

Automatic Transfer PLC Controlled Option

(Available on MasterPacT Main Circuit Breakers)

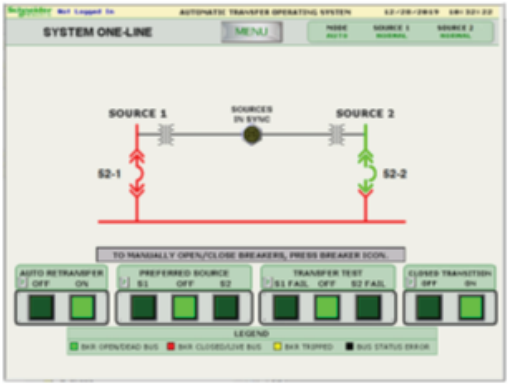
Automatic transfer systems minimize power interruption by transferring the load from the normal source to an alternate source when the normal source is temporarily unavailable. The system uses multiple connections to power sources, usually utility

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 Main Generator Option, page 88 circuit breaker configuration and Main-Tie-Main or Main — Tie Generator Option, page 89 circuit breaker configuration. 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 43 - HMI Touchscreen Shown on Switchboard / Switchgear Door

Figure 44 - One-Line Screen View for HMI with Automatic Transfer System



Transition Types Options

Open

An open transition switch brings a “break before make” switch function. This means that the connection is established with the generator before utility is shut off, and then the swap is made quickly once the connection has been safely established. Open Transition Type will be the pre-set default answer for a Switchboard Automatic Throwover System. This is often the most cost-effective approach.

> **NOTE:** Open-transition systems require a mechanical interlock between the two main circuit breakers; both circuit breakers must be in the same section or in adjoining sections. Both sources are paralleled during a closed transition. Short circuit contribution is additive from both sources.

Closed

Closed transition automatic transfer switches perform a similar but slightly different function, using “make before break” features that make use of advancements in modern electrical technology. With these systems, the two power sources (utility and generator/backup) are allowed to briefly overlap, which limits or removes the momentary stutter in power that open systems can occasionally create. Convenient for periodic system testing or retransfer events with minimal load impact.

Recommended for applications that demand no interruption, can be used for Peak Shaving Applications and motor loads. May require relays and shunt trips.

UL 1008 Option

There is a growing need for emergency backup power systems in data centers, hospitals and many other facilities. A critical component of many of those systems is the transfer switch. UL 1008 requires rigorous testing of transfer switches to ensure reliability and durability. UL 1008 Listed Automatic Throwover systems DO NOT allow the inclusion of a Tie Breaker. Therefore the UL 1008 option is only available for Main-Main and Main-Generator Source Descriptions.

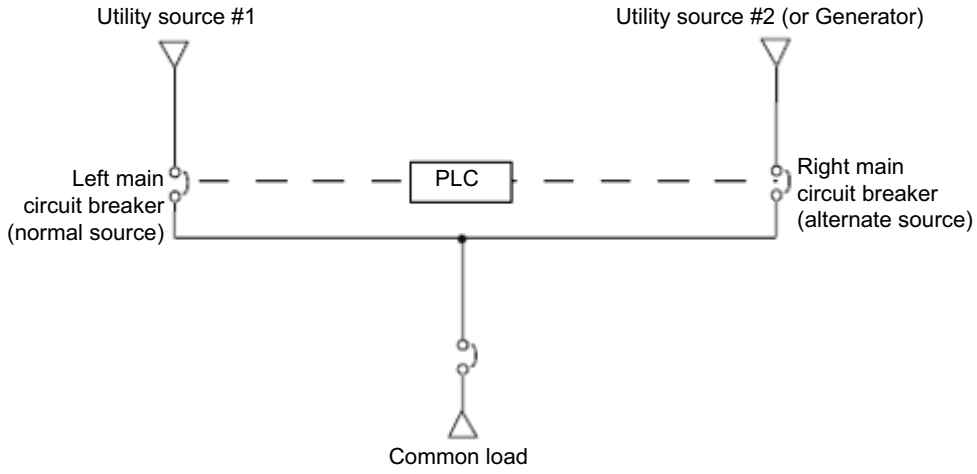
Main-Main or Main-Generator Option

Each main circuit breaker connects to a utility source or one main circuit breaker connects to a utility source and the other man 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 circuit breaker can be either the left or right located main circuit breaker.

Figure 45 - Main-Main (or Generator) Circuit Breaker Configuration



The PLC based, circuit breaker-based automatic transfer design from Schneider Electric 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 46 - Main-Tie-Main (or Generation) Circuit Breaker Configuration

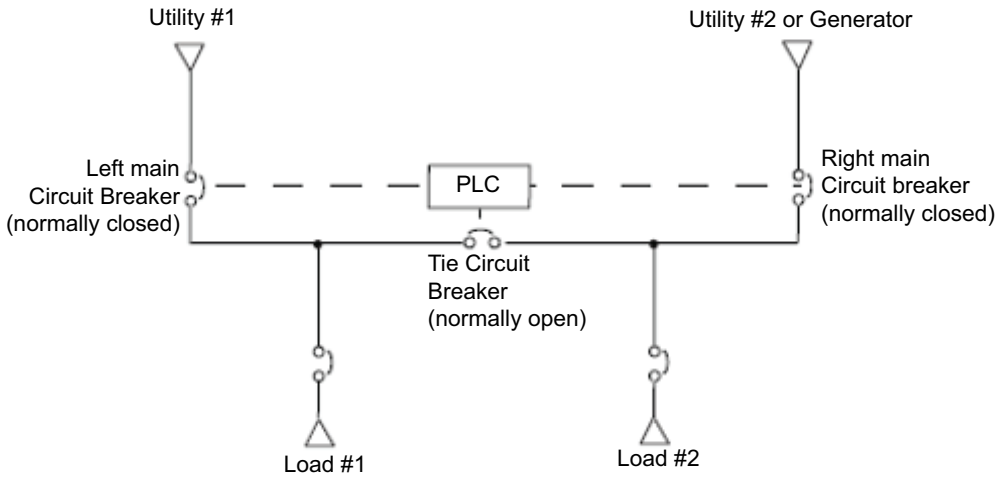
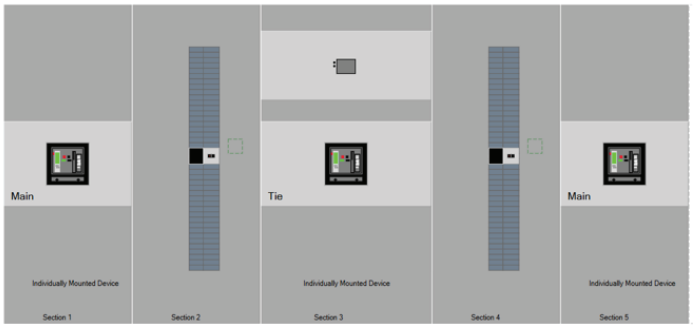


Figure 47 - Layout Arrangement for Main-Tie -Main QED- 2 Lineup Automatic Transfer PLC Solution



The tables below show the functions available for the various applications with Automatic Throwover selected. Details of the standardized controls and sequences of operation documents are available by contacting your local Schneider Electric Sales office and are provided with each order. Instruction bulletins 80330-001 Square D PZ4 / QED–6 / QED–2 PLC Automatic Throw–Over System User Guide or 80332-001 Square D PZ4 / QED–6 / QED–2 ATS–NW Automatic Transfer Switch User Guide also provide additional information.

Table 33 - Standard Functions

FEATURE DESCRIPTION	Main-Tie-Main	Main-Main	Main-Generator	Main-Tie-Generator
Touchscreen HMI Operator Interface mounted on gear door	X	X	X	X
Automatic Transfer to Alternate Source, Automatic Retransfer to Normal Source	X	X	X	X
Retransfer Hold (Selectable via HMI)	X	X	X	X
Manual Retransfer to Normal Source (Selectable via HMI)	X	X	X	X
Open Transition	X	X	X	X
Electrically Interlocked for open transition only systems	X	X	X	X
Mechanical circuit breaker Close Buttons Inhibited	X	X	X	X
Time Delay on Transfer (3 seconds) Adjustable on HMI	X	X	X	X
Time Delay on Retransfer (2 seconds), Adjustable on HMI	X	X	X	X
Source Stabilization Timer (10 minutes) before Retransfer, Adjustable on HMI	X	X	X	X
Bypass of Retransfer Delay if Emergency Source Fails	X	X	X	X
Undervoltage (ANSI 27) sensing on Both Sources, 85% of nominal fixed.	X	X	X	X
Phase Unbalance/ Sequence (ANSI 47) Sensing on Both Sources, (5-15% of nominal, 1% reset)	X	X	X	X
Auto/Manual Keyed Switch w/White Light for Auto and Blue Light for Manual	X	X	X	X
Control Power Transfer Circuitry	X	X	X	X
Bypass Contacts on Drawout Breakers	X	X	X	X
Manual breaker control, via HMI	X	X	X	X
Test Switch --- Simulates Loss of Source, via HMI	X	X	X	X
Circuit breaker Electrical Trip Lockout w/ Indication	X	X	X	X
Remote Alarm Contact Wired (System Inoperative), 5 A @ 120 Vac	X	X	X	X

Table 33 - Standard Functions (Continued)

FEATURE DESCRIPTION	Main-Tie-Main	Main-Main	Main-Generator	Main-Tie-Generator
Uninterruptible Power Supply for 120 Vac Control Power	X	X	X	X
UPS Bypass Relay	X	X	X	X
Fused Control Circuits	X	X	X	X
Frequency Sensing (81) on Generator, (50 Hz-60 Hz adjustable) Differential, 0.1-3 Hz, Adjustable	–	–	X	X
Engine Start Contacts, 5 A @ 120 Vac	–	–	X	X
Time Delay for Engine Cool Down, 5 Minutes Unloaded Standard	–	–	X	X
Engine Generator Exercising with Load, 15 minutes once per week standard	–	–	X	X

Table 34 - Optional Functions

FEATURE DESCRIPTION	Main-Tie-Main	Main-Main	Main-Generator	Main-Tie-Generator
Closed Transition on Retransfer with Sync Check (ANSI 25), Set at 2 seconds default (maximum is 4 seconds). paralleling when sources synchronized, Voltage 10% - 30% Adjustable, Phase Relationship is 6 degree to 20 degrees and Frequency is 0.15 Hz to 0.5 Hz	X	X	X	X
UL1008 Listed Transfer Switch	–	X	X	–
CSA C22.2 No. 178. Listed Transfer Switch	–	X	X	–

The following circuit breaker accessories are required for automatic throwover system:

1. 120 Vac electrical operation (includes shunt close, shunt trip and electrical operator)
2. One set of auxiliary switches (one normally open and one normally closed)
3. Alarm switch (one normally open contact)
4. Cell position switch (one normally open required for drawout circuit breakers)

Automatic throwover systems are complex and can require adjustments during start-up. Therefore, it is encouraged that each PLC AutoThrowover system include Schneider Services Start Up Commissioning.

For custom applications or functions, contact your local Schneider Electric Sales office.

QED-2 Quick Connect Generator Switchboards

Figure 48 - Quick Connect Generator Switchboard NEMA Type 1 Section

The Square D™ brand Power-Style™ QED-2 Quick Connect Generator Switchboard from Schneider Electric addresses the growing market need for switchboards with quick connect terminals to facilitate connecting generators for temporary back-up power. Common applications include facilities such as nursing homes, hospitals (supplemental equipment not fed by emergency power), and stores with perishable products, that are sensitive to power outages, but typically do not have or require backup power sources.

Customers have become more sensitive to the need for temporary back-up power to reduce the duration of disruptions due to hurricanes, tornadoes, snow storms, brownouts, and other circumstances that can result in prolonged power outages. In these situations, a mobile generator can be brought in to get a facility back on line quickly.

Table 35 - Specifications for Generator Circuit Breaker Section(56)

Ampacity (A)	SCCR (Max)	Number of Sections	Width (Inches)	Depth (Inches)	Incoming Generator Lugs Only	Incoming Lugs and Plug-In Receptacles	Terminals Per Phase / Neutral (Lug or Plug-In Receptacle)
1200	65 k	1	36	24 or 36	Yes	Yes	3
1600							4
2000							5
2500							7
3000	50 k		42	36			9
4000				48			12

(56) 1200–2500 A use PowerPacT R-Frame circuit breakers; 3000 and 4000 A use MasterPacT circuit breakers.

Figure 49 - Quick Connect Generator

Quick Connect Generator Switchboard NEMA Type 3R Section

Hubbell Seperable Connectors with Type W Cable Installed

Quick Connect Compartment Showing Hubbell Plug-in Receptacle and Lugs for Type W Cable

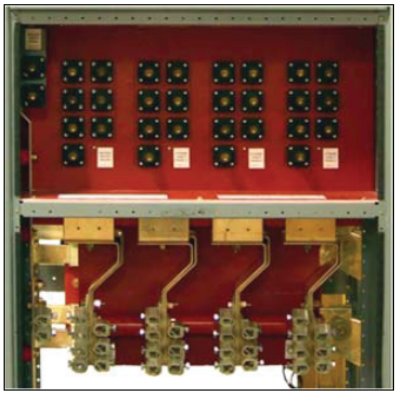
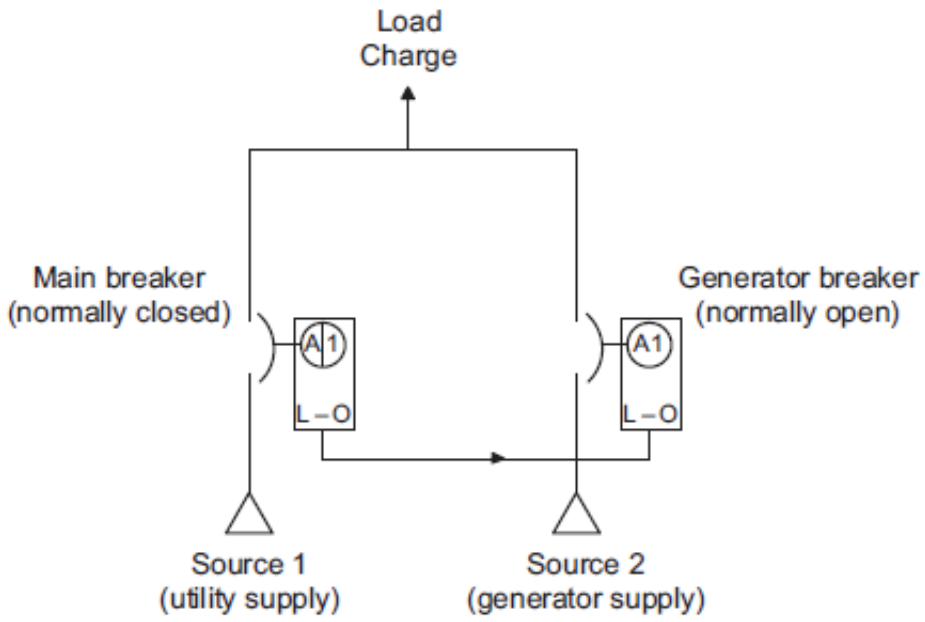


Table 36 - Specifications for Terminal Section (without Circuit Breakers)

Ampacity (A)	SCCR (Max)	Number of Sections	Width (Inches)	Depth (Inches)	Incoming Generator Lugs Only	Incoming Generator Lugs and Plug-In Receptacles	Terminals Per Phase / Neutral (Lug or Plug-In Receptacles)
1200	65 k	1	36	24 or 36	Yes	Yes	3
1600							4
2000							5
2500							7
3000			42	36			9
4000				48			12

Figure 50 - Sequence of Operation



The nameplate on each Quick Connect Generator circuit breaker section provides complete Sequence of Operation instructions. A one-line diagram clearly shows the key interlock scheme for additional clarification. Both the diagram and instructions are written in English and French. An English version of the diagram and sample instructions are shown below.

Loss of Utility Power

1. Open all distribution circuit breakers.
2. Open the main circuit breaker and rotate the key A1 to lock the circuit breaker in the open position; key is now removable.
3. Remove generator circuit breaker receptacles cover or generator circuit breaker lugs cover.
4. Connect generator cables to either the receptacles or to the generator circuit breaker incoming lugs per the connection sequence label.
5. Verify proper phase and voltage connection.
6. Remove key from the lock and insert it into the lock on the generator circuit breaker.
7. Rotate key A1 to unlock generator circuit breaker; key is now held captive.
8. Start generator.
9. Verify proper voltage L–L and L–N and proper phase rotation.
10. Close generator circuit breaker, close appropriate distribution circuit breakers.

Return of Utility Power

1. Open distribution circuit breakers.
2. Open generator circuit breaker and rotate the key A1 to lock the circuit breaker in the open position; key is now removable.
3. Remove key from the lock and insert into the lock on the main circuit breaker.
4. Shut down generator.
5. Disconnect generator cables per the connection sequence label.
6. Replace all covers.

7. Rotate key A1 to unlock the main circuit breaker; key is now held captive.
8. Close main circuit breaker, close all distribution circuit breakers.

For more information, see data bulletin 4620DB0701, Power-Style™ QED-2 Quick Connect Generator Switchboard, or contact your local Schneider Electric representative.

Surge Protective Devices (SPD)

These devices help protect AC electrical circuits from the effect of lightning-induced currents, substation switching transients, and internally generated transients resulting from inductive or capacitive load switching. They are available in I-Line mount, or individual mount in the instrument compartment.

Common Features

- UL 1449 Recognized, 3rd edition
- Copper internal bus for the Surge Protective Devices (SPD)
- Individually fused suppression modules
- On-Line diagnostics continuously monitor unit
- Thermal cut-out
- Solid state, bi-directional
- Front panel alarm with test / silence switch
- Front panel operational indicators (LEDs) to indicate loss of protection or circuit fully operational including N-G
- High energy parallel design for Category A, B, and C3 applications
- AC tracking filter with EMI / RFI filtering up to -50 dB from 100 kHz to 100 MHz
- Ratings available (per phase): 100 kA, 120 kA, 160 kA, 200 kA, 240 kA, 320 kA, 480 kA
- Surge Counter

NOTE: 320 kA and 480 kA devices can only be mounted in an instrument compartment. If you have a utility compartment, please contact your local Schneider Electric representative.

Options

- Remote Monitor

I-Line Mount SPD

- Comes with circuit breaker disconnect
- Requires 13.5 in. interior mounting space
- 60 A I-Line plug-on circuit breaker

Instrument Compartment SPD

- Comes with circuit breaker disconnect
- Requires a 19.5 in. instrument compartment

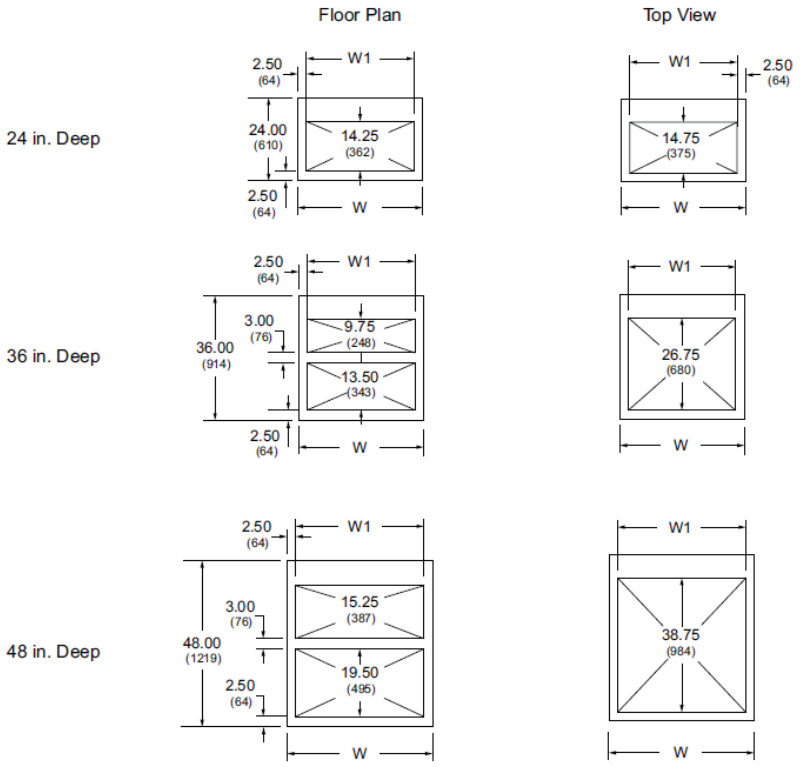
Reducing Impedance with Internal and Integral SPDs

Internal SPDs do not require the extra several feet of conductor used by externally mounted devices. This is key, because every foot of conductor can increase potentially damaging let-through voltage by as much as 160 V.

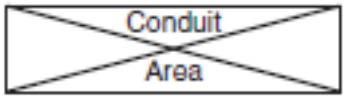
Integral SPDs are an internal installation where the suppression modules are mounted directly to the phase bus bars. The elimination of cables and their impedance in the SPD connection gives the lowest possible let-through voltage.

Conduit Layout

These drawings are valid for all mains, feeders, and distribution sections based on depth and width. For mains and feeders, top conduit area is not available for bottom exit / entry nor is bottom conduit area available for top exit / entry.



Conduit area is based on a minimum of 10 in. (254 mm) to any obstruction.



Dimensions given in inches (millimeters).

Width (W)	30 in. (762 mm)	36 in. (914 mm)	42 in. 1087 mm)	48 in. (1219)	54 in. (1372 mm)
Width (W1)	25 in. (635 mm)	31 in. (787 mm)	37 in. (940 mm)	43 in. (1092 mm)	49 in. (1245 mm)

Specifications

For QED-2 Switchboard sample specifications search SE.com for 26 24 13.11 QED-2 Switchboards CSI Specification.

QED–2 Low Voltage Switchboards

Seismic Qualifications

Seismically Qualified Switchboards

Power-Style low voltage switchboards have been seismically qualified to meet the seismic provisions of the International Building Code (IBC), California Building Code (CBC), Office of Statewide Health Planning and Development (OSHPD), and ASCE/SEI 7 based on triaxial shake table testing following the code recognized test protocol ICC ES AC156. An independent test facility conducted all qualification shake table testing to verify compliance to an Ip = 1.5 by verifying post test equipment functionality as required by ASCE 7 for equipment which is part of a seismic designated system.

The shake table earthquake simulation subjected the Power-Style switchboard test specimens to dynamic demands which can be more severe than the code design earthquake for most locations. A certificate of self certification is available on request from your local Schneider Electric representative. The certificate is based on site specific code defined seismic demand requirements for the installed location information supplied to Schneider Electric.

The qualified Power-Style switchboard equipment must be installed, anchored, and restrained in accordance with Schneider Electric installation guidelines (see factory supplied drawings and current instruction manual for additional technical information) and the engineer of record. Anchorage of equipment to the primary building structure is required to validate seismic certification of the equipment. The structural engineer or design engineer of record is responsible for design of the code compliant seismic restraint system for the building equipment. Schneider Electric is not responsible for the specification and performance of seismic restraint and anchorage systems.

Manufacturer's Certification

As long as the seismic capacity of the equipment exceeds the site-specific demand, a certificate can be generated and issued.

Schneider Electric ensures that code compliance verification is as simple as supplying the job site address. Our certificate clearly states the code requirement and our equipment capability.

This simplicity eliminates the need for the design professional to translate code criteria into an equipment requirement, and then sort out less-than-clear manufacturers' test results to verify compliance to the site-specific code requirement of the project.

For sample certificate and compliance notes, contact your local Schneider Electric representative to obtain a seismic certificate.

Seismic Certified

United States –International Building Code (as per ASCE 7 –2024 Edition

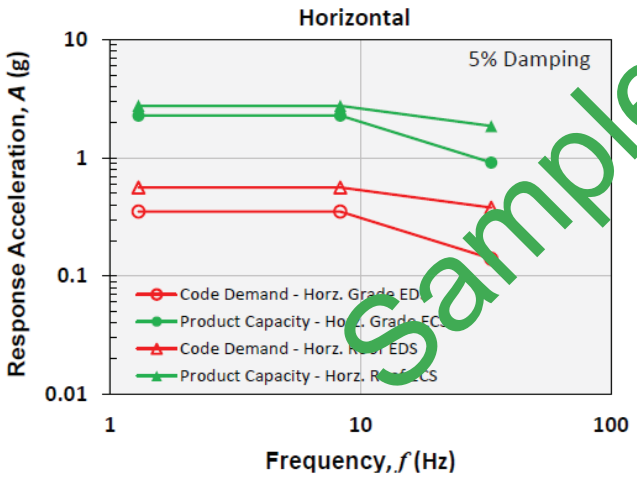
The Schneider Electric equipment referenced in this Certificate of Compliance has been certified to the requirements of the above listed regional building code and/or seismic design standard. This certification is based on tri-axial shake-table test results conducted in accordance with globally recognized equipment test protocols (4). Assessment of earthquake demands and equipment seismic capacity follows the guidelines contained in ISO 3010 and ISO 13033 respectively.

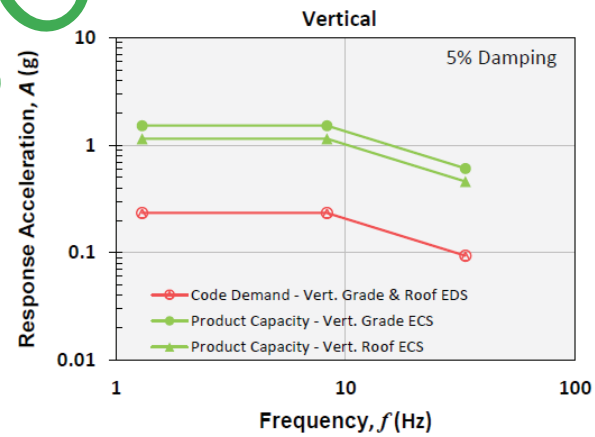
QED-2 Power-Style Switchboard, 400 A to 5000 A Indoor and Outdoor Enclosures

Product Category:	Switchboard, Low Voltage
Product Model:	QED-2 Power-Style Switchboard
Product Type:	400 A to 5000 A, Indoor and Outdoor Enclosures
Product Mounting:	Rigid Floor Mount
Equipment Location	Country or Region → United States

1	Street Address → —— City, Street, Zip Code → Frankling, TN 37067 Latitude/Longitude Coordinates → 35.9046545, –86.7718017				
Code Specified Site Hazard Spectrum 2	Hazard Type → Hazard Level → Hazard Exceedance Probability →	$S_a(T)$ Response Acceleration S^{ps} = 0.35 2% in 50 yrs	$S^a(T)$ Max = 0.39	Site Hazard Spectrum Peak G → 0.35 g Site Hazard Spectrum PGA → 0.14 g	
Equipment Demand 3	Grade → Roof →	S_{ps} = 0.35 S_{ps} = 0.35	Grade EDS → Roof EDS →	A_{FLX-H} = 0.35 A_{FLX-H} = 0.56	A_{RIG} = 0.14 A_{RIG} = 0.38
Equipment Capacity 4	Grade → Roof →	S_{ps} = 02.28 S_{ps} = 1.72	Grade EDS → Roof EDS →	A_{FLX-H} = 02.28 A_{FLX-H} = 2.76	A_{RIG} = 0.91 A_{RIG} = 1.86
Importance Factor 5	Ip = 1.5		Designated seismic systems in essential buildings and critical infrastructure.		
Installation Restriction 6	None - Grade elevation and roof elevation equipment installations permitted.				

Graphs of tested Equipment Capacity (ECS) Vs. Code Equipment Demand (EDS)





United States 2024 IBC per ASCE 7–22 Code Compliance Notes for:

QED–2 Power–Style Switchboard, 400 A to 5000 A, Indoor and Outdoor Enclosures

1 Equipment location is defined as the final geographic location of equipment installation. Earthquake demands are prescribed based on building site location using code specified hazard maps and site geotechnical classification. The seismic certification contained herein is valid for equipment installations located at the identified United States address and associated geographic Latitude/Longitude coordinate. Earthquake hazard design ground motion parameters are prescribed based on the identified geographic coordinates or are based onsite-specific geotechnical ground motion assessments.

2 The referenced United States building code specifies seismic demand requirements in terms of a ground-level site hazard response spectrum used for seismic design in accordance with ASCE7-22 seismic provisions. Site-specific hazard spectra are defined as either two-period format using SDS parameter or multi-period format using Sa parameter. The relationship that converts muti-period peak response into two-period format design spectra is the SDS parameter for the two-period spectrum is 90% of the maximum value of Sa for the multi-period spectrum at any period within the range from 0.2 to 5s, inclusive for a given site classification. Equipment certification is based on two-period format design spectra with PeakG set equal to the greater of SDS or 0.9 times Sa|Max response acceleration and PGA is set equal to 0.4 times the greater of SDS or 0.9 times Sa|Max to maintain a constant ratio of 2.5 between peak response and zero period response accelerations. A two-thirds reduction factor is used to convert maximum considered earthquake (MCER) to design level earthquake assuming a 2% in 50 years probability of exceedance. Geotechnical site classification for this certification assumes Site Class Default ground motion values.

3	The equipment demand spectrum (EDS) is defined as the peak response, PeakG, from the site hazard spectrum multiplied by an in-structure building amplification factor, (Hf/Ru), to account for dynamic amplification effects for equipment installations located above grade plane elevation. The default maximums for building amplification are assumed resulting in (Hf/Ru) equals 1.0 at grade plane elevation and below and (Hf/Ru) equals 2.7 at roof height elevation. The EDS shape profile is defined as a broadband spectrum with energy content from 1.3 to 33.3Hz and is the seismic test input for nonstructural equipment certification. The EDS is defined at both grade (z/h=0) and roof height (z/h=1) elevations, for the specified geographic location, and is used as the reference United States building code demand requirement for this certification.
4	Equipment capacity is established with tri-axial seismic shake-table test results in accordance with the International Code Council (ICC) Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components (AC156, dated February 2025). To satisfy the EDS, the corresponding shake-table drive signals are nonstationary, multi- frequency random excitations. An equipment capacity spectrum (ECS) is derived from shake-table test data results for horizontal and vertical input motions. The tested seismic capacity equals or exceeds the seismic demands determined in accordance with referenced United States building code.
5	An equipment importance factor, Ip, that is greater than one (Ip=1.5) is assumed and indicates that equipment functionality is required after a seismic event and after seismic simulation testing. This importance factor is applicable for designated seismic systems (i.e., special certification requirements) servicing critical infrastructure where post-earthquake equipment functionality is a requirement.
6	Equipment location is defined as the final geographic location of equipment installation. Earthquake demands are prescribed based on building site location using code specified hazard maps and site geotechnical classification. The seismic certification contained herein is valid for equipment installations located at the identified United States address and associated geographic Latitude/Longitude coordinate. Earthquake hazard design ground motion parameters are prescribed based on the identified geographic coordinates or are based onsite-specific geotechnical ground motion assessments..

Issue Date: 11/17/2025

FO, Catalog or SKU Number: sample

All questions and inquiries regarding the use of this certificate should be addressed through the local Schneider Electric Field Sales Office. Additional details regarding equipment qualification can be found at: https://www.se.com/ww/en/download/document/Buildings_512_en/

Authorization Signature

Name: Landon Boyer

Position: VP Engineering Power Products

Signature:

Certification Number: 0–10040565

Circuit Breaker SC Ratings

Breaker	Pole	Amperage	Interrupting Ratings				
Frame	Quantity	Range	@Voltage				
			240 V	480Y/277 Vac	480 Vac	600Y/347Vac	600 Vac
BJ	1	15–125	100 kA	65kA	n/a	25 kA	n/a
BJ	2, 3	15–125	100 kA	65kA	65 kA	25 kA	n/a
BK	1	15–30	100 kA	65 kA	n/a	65 kA	n/a
BK	2	15–30	100 kA	65 kA	65 kA	65 kA	n/a
HL	2, 3	15–150	125 kA	100 kA	100 ka	50 kA	50 kA
HR	2, 3	15–150	200 kA	200 kA	200 kA	100 kA	100 kA
JL	2, 3	70–250	125 kA	100 kA	100 kA	50 kA	50 kA
JR	2, 3	70–250	200 kA	200 kA	200 kA	100 kA	100 kA
QB	2, 3	70–250	10 kA	n/a	n/a	n/a	n/a
QD	2, 3	70–250	25 kA	n/a	n/a	n/a	n/a
QG	2, 3	70–250	65 kA	n/a	n/a	n/a	n/a
QJ	2, 3	70–250	100 kA	n/a	n/a	n/a	n/a
LL	2, 3	70–600	125 kA	100 kA	100 kA	50 kA	50 kA
LR	2, 3	70–600	200 kA	200 kA	200 kA	100 kA	100 kA
LA	2, 3	125–400	42 kA	30 kA	30 kA	22 kA	22 kA
LH	2, 3	125–400	65 kA	35 kA	35 kA	25 kA	25 kA
MG	2, 3	300–800	65 kA	35 kA	35 kA	18 kA	18 kA
MJ	2, 3	300–800	100 kA	65 kA	65 kA	25 kA	25 kA
PG	2, 3	100–1200	65 kA	35 kA	35 kA	18 kA	18 kA
PJ	2, 3	100–1200	100 kA	65 kA	65 kA	25 kA	25 kA
PK	2, 3	100–1200	65 kA	50 kA	50 kA	50 kA	50 kA
PL	2, 3	100–1200	100 kA	100 kA	100 kA	n/a	n/a
RG	2, 3	250–2500	65 kA	35 kA	35 kA	18 kA	18 kA
RJ	2, 3	250–2500	100 kA	35 kA	35 kA	25 kA	25 kA
RK	2, 3	250–2500	65 kA	65 kA	65 kA	65 kA	65 kA
RL	2, 3	250–2500	1025 kA	100 kA	100 kA	50 kA	50 kA
UL NW-N	3	100–2000	65 kA	65 kA	65 kA	50 kA	50 kA
UL NW-H	3	100–2000	100 kA	100 kA	100 kA	85 kA	85 kA
UL NW-L	3	100–2000	65 kA	150 kA	150 kA	100 kA	100 kA
UL NW-H	3	640–3000	100 kA	100 kA	100 kA	85 kA	85 kA
UL NW-L	3	640–3000	65 kA	150 kA	150 kA	100 kA	100 kA
UL NW-H	3	1200–6000	100 kA	100 kA	100 kA	85 kA	85 kA
UL NW-L	3	1200–6000	200 kA	150 kA	150 kA	100 kA	100 kA
ANSI NW-N1	3	800–1600	42kA	42 kA	42 kA	42 kA	42 kA
ANSI NW-H1	3	800–1600	65 kA	65 kA	65 kA	65 kA	65 kA
ANSI NW-H2	3	800–1600	85 kA	85 kA	85 kA	85 kA	85 kA
ANSI NW-H3	3	800–1600	100 kA	100 kA	100 kA	85 kA	85 kA
ANSI NW-L1	3	800–1600	200 kA	200 kA	200 kA	130 kA	130 kA

ANSI NW-H1	3	2000	65 kA	65 kA	65 kA	65 kA	65 kA
ANSI NW-H2	3	2000	85 kA	85 kA	85 kA	85 kA	85 kA
ANSI NW-H3	3	2000	100 kA	100 kA	100 kA	85 kA	85 kA
ANSI NW-L1	3	3200	200 kA	200 kA	200 kA	130 kA	130 kA
ANSI NW-H1	3	3200	65 kA	65 kA	65 kA	65 kA	65 kA
ANSI NW-H2	3	3200	85 kA	85 kA	85 kA	85 kA	85 kA
ANSI NW-H3	3	3200	100 kA	100 kA	100 kA	85 kA	85 kA
ANSI NW-L1	3	3200	200 kA	200 kA	200 kA	130 kA	130 kA
ANSI NW-H2	3	4000–5000	85 kA	85 kA	85 kA	85 kA	85 kA
ANSI NW-H3	3	4000–5000	100 kA	100 kA	100 kA	85 kA	85 kA
ANSI NW-L1	3	4000–5000	200 kA	200 kA	200 kA	130 kA	130 kA

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