# ITEM OPPORTUNITY SYNOPSIS

| | |
|---|---|
| **Scouting Number:** | 2024-219 |
| **Name of the item to be scouted:** | Switchboard |
| **State item to be used in:** | Vermont |
| **Describe the Item:** | |
| **Please describe the item application/the end use of the item.** | Main electrical service equipment for distribution electrical power throughout the building. Consists of pull sections, distribution sections, metering instrumentations and cabinets, contacts, and overcurrent protection devices. |
| **Supplier Information:** | |
| **Type of Supplier Being Sought (select from the list below):** | |
| **Manufacturer** | x |
| **Contract Manufacturer** | |
| **Distributor** | |
| **Other (Please Specify)** | |
| **Reason for Scouting Submission (select from the list below)** | |
| **2nd Supplier** | |
| **Price** | |
| **Re-Shore** | |
| **Past supplier no longer available** | |
| **New Product Startup** | |
| **BABA** | x |
| **Other (Please Specify)** | |
| **Summary of Technical Specifications and Performance Requirements:** | |
| **Describe the manufacturing processes (elaborate to provide as much detail as possible)** | The switchboard consists of floor free standing enclosure and busbar assembly. The busbar assembly includes copper busses that are tied together with metal clips, bolts and rubber insulations. The busbar assembly is then screwed in placed within a fabricated sheet metal enclosure. The switchboard's metal enclosure is compartmentalized into sections with fabricated sheet metal barriers. The switchboard sections would include equipment such as meter and associated instrumentation, circuit breakers, and relays. |
| **Provide dimensions / size / tolerances / performance specifications of the item** | Refer to specification section 264400 for switchboard information |
| **List required materials needed to make the product, including materials of product components, if applicable** | Fabricated sheet metals for enclosures, copper busbars, rubber insulators, and circuit breakers including electronics. |
| **Are there applicable certification requirements?** | |
| **Yes** | x |
| **No** | |
| **Please explain:** | IEEE<br>ISO 9001<br>UL<br>Other<br>? ANSI ? ASTM ? ADA ? AEIC ? CSA ? EEI ? EPA ? FM ? FCC ? FIPS Pub 94 ? ICEA ? IBC ? IEC ? IECC ? OSHA ? NEC ? NESC ? NEMA ? NFPA |
| **Are there any applicable regulations that apply to the production of this item?** | |
| **Yes** | x |
| **No** | |
| **Please explain:** | See provided specifications 263210 (1.4) QUALITY ASSURANCE for more information. |
| **Are there any other standards / requirements?** | |
| **Yes** | |
| **No** | x |
| **Please explain:** | |
| **NAICS CODES:** | |
| **NAICS 1** | 335313 Switchgear and switchboard apparatus manufacturing |
| **NAICS 2** | |

| | |
|---|---|
| **Additional Comments:** | |
| **Additional technical comments:** | |
| **Volume and Pricing:** | |
| **Estimated Potential Business Volume (i.e. #units per day, month, year):** | 1 Switchboard is needed for this project. |
| **Estimated Target Price/Unit Cost Information:** | Switchboard - $40,000 |
| **Delivery Requirements:** | |
| **When is it needed by? (Immediate, 30 days, 6 months, etc.)** | Construction is scheduled to start in February of 2025. |
| **Describe packaging requirements (i.e. individually/group packaging, etc.)** | Palletized |
| **Where will this item be shipped?** | Norwich University, Northfield, VT |
| **Additional Comments:** | |
| **Is there other information you would like to include?** | Contact information for questions including BABA/Buy American compliance: Jones Architecture Alya Staber alya@jonesarch.com Please copy scouting@nist.gov on all correspondence. |

SECTION 264400

SWITCHBOARDS AND PANELBOARDS

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Provide indicated switchboards and panelboards.

B. Provide switchboard barriers between sections, and protective covers on all panelboard (incoming) terminals to isolate live connections.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary General Conditions and other Division 01 specification sections, apply to this Section and to all Contractors, Subcontractors, or other persons supplying materials and/or labor, entering into the Project site and/or premises, directly, or indirectly.

B. The Specifications and Drawings are intended to be complementary. A particular section, paragraph or heading in a Division may not describe each and every detail concerning work to be done and materials to be furnished. The Drawings are diagrammatic and may not show all of the work required or all construction details. Dimensions are shown for critical areas only; all dimensions and actual placements are to be verified in the field. It is to be understood that the best trade practices of the Division will prevail. It remains the responsibility of the Contractor or Subcontractor to provide all items, equipment, construction, and services required to the proper execution and completion of the Work.

C. Reference listings are provided as a convenience to the Contractor or Subcontractor providing the Work of this Section and may not contain all the requirements affecting this Section. It remains the responsibility of the Contractor or Subcontractor to locate and comply with all requirements of the Contract Documents.

1.3 SUBMITTALS

A. Submit product data in accordance with Section 260100.

B. Submit as a minimum data including current, voltage and interrupting ratings and layout drawing including dimensions.

C. Submit time-current curves for all overcurrent protective devices with applicable settings indicated.

D. Submit complete surge protection specifications.

E. Submit test results in accordance with Section 260800.

F. Certifications: Provide manufacturer’s certification that all applicable products were manufactured in United States and meet the requirements of the Build America, Buy America Act (BABA) (part of Infrastructure Investment and Jobs Act).

1.4 QUALITY ASSURANCE

A. All specified items or systems shall be designed, manufactured, tested, and installed in compliance with applicable provisions of all governing codes, rules, laws, and ordinances in accordance with Section 260100.

1. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to all applicable documents and to the most recent release when developing the proposal for installation.
2. This document does not replace any code, either partially or wholly. The Contractor must be aware of local codes that may impact this project.
3. The minimum AIC rating of equipment shall be as indicated on the Drawings. It shall be the responsibility of the equipment supplier to coordinate all secondary breaker interrupting capacities and to indicate them on applicable submittals. AIC ratings of equipment shall be based on a fully rated system.

B. Build America, Buy America Act (BABA) Requirements: All applicable products shall be manufactured in United States and shall meet the requirements of the Build America, Buy America Act (BABA) (part of Infrastructure Investment and Jobs Act).

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following:

1. Switchboards and circuit breaker panelboards:

a. Siemens
b. General Electric
c. Square D
d. Cutler-Hammer

A. Substitutions: Items of equal quality, function and performance may be proposed for substituting by following the procedures outlined in Section 260100.

2.2 SWITCHBOARD

A. Provide dead front, NEMA 1, front accessible, rear aligned, self-supporting, group mounted distribution switchboard constructed of heavy-gauge steel. Unit shall be braced for symmetrical amperes as indicated on the drawings. Adequate lifting means shall be provided.

B. Switchboard busbars shall be high conductivity copper with bolted connections between sections and shall have the capability for future extension to an additional section. Provide full capacity neutral. A ground bus shall be provided in each switchboard section.

C. Circuit breakers shall be manufactured such that amperages shall be clearly visible on all breakers (stamped or labeled) without having to remove any components of the switchboard to obtain this information.

D. Main Section:

1. The main switchboard section shall have provisions for feeder conductor terminations and contain current and voltage meters and the service entrance circuit breaker.
2. The main section shall be bottom or top fed as needed, capable of terminating the indicated feeder cables. Cable connectors shall be mechanical compression style and suitable for the intended purpose.
3. Voltage and current meters shall have phase selector switches.
4. Main overcurrent device shall be a draw out molded case [power] circuit breaker rated as indicated on the Drawings, suitable for service entrance applications with electronic tripping means and AIC rating as indicated on the drawings. Breaker shall have adjustable long and short time trip settings.
5. The main service circuit breaker shall be equipped with a protective trip unit system to protect against overloads, short circuits and ground faults. The protective trip unit shall consist of a solid-state, microprocessor-based programmer, tripping means, current sensors, power supply and other devices required for proper operation. Trip unit shall be equipped with adjustable long-time, short-time, instantaneous and ground fault.
6. All circuit breakers rated 1200 amps or larger shall include an Arc Flash Reduction Maintenance System as required by NEC 240.87. The Arc Flash Reduction Maintenance System Technology shall be provided in a system that shall reduce the trip unit Instantaneous pickup value when activated. The Arc Flash Reduction Maintenance System shall not compromise breaker phase protection even when enabled. Once the unit is disabled, the recalibration of trip unit phase protection shall not be required. Activation and deactivation of the Arc Flash Reduction Maintenance trip setting shall be accomplished without opening the circuit breaker door and exposing operators to energized parts. The device shall provide a clearing time of 0.04 seconds, adjustable with a minimum of five settings ranging from 2.5X to 10X of the sensor value. The Arc Flash Reduction Maintenance System shall be provided with a switchgear panel mounted enable padlockable selector switch and indication via pilot light. The selector switch and pilot light shall be clearly identified to describe its use and function using laminated phenolic nameplates.
7. Service entrance switchboards shall be provided with voltage surge protection rated and suitable for the service.
8. The main section cabinet shall be provided with barriers placed such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing the distribution section cabinet.

E. Surge Suppression:

1. Suppressors shall be listed in accordance with UL 1449 and UL 1283.
2. Suppressors shall provide redundant suppression modules between each phase conductor and the neutral conductor, between each phase conductor and the ground and between the neutral conductor and ground.
3. Suppressor manufacturer shall provide certified test data confirming a "fail-short" failure mode.
4. Visible indication of proper suppressor connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable.
5. The suppressor shall incorporate copper bus bars for the surge current path. Surge current diversion modules shall use bolted connections to the bus bars for reliable low impedance connections.
6. Suppressors shall meet or exceed the following criteria:

    a. Maximum single impulse current rating shall be no less than 240kA per phase.

b. Pulse life test: Capable of protecting against and surviving 5000 ANSI/IEEE C62.41 Category C transients without failure or degradation of UL 1449 clamp voltage by more than 10%.
c. UL 1449 clamping voltage must not exceed the following:

| Voltage | L-N | L-G | N-G | L-L |
|---|---|---|---|---|
| 208/120 | 330V | 330V | 330V | 700V |

d. The ANSI/IEEE C62.41-1991 Category C3 clamping voltage shall not exceed the following:

| Voltage | L-N | L-G | N-G |
|---|---|---|---|
| 208/120 | 520V | 520V | 520V |

7. The SPD shall be constructed using surge current modules (MOV based). Each module shall be fused with user-replaceable 200,000 AIC rated fuses. The status of each module shall be monitored on the front of the SPD enclosure as well as on the module.
8. The SPD shall be installed internal to electrical distribution equipment by the electrical distribution equipment manufacturer.
9. The SPD shall be equipped with an audible alarm which shall actuate when any one of the surge current modules has failed. An alarm on/off switch shall be provided to silence the alarm and an alarm push-to-test switch shall be provided to test the alarm. Both switches and audible alarm shall be located on the front panel of the switchboard.
10. The suppressor shall have a response time no greater than 0.5 nanoseconds for any of the individual protection modes.
11. The suppressor will have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.
12. The suppressor shall include an internal UL listed disconnect switch.

F. Distribution Section:

1. The switchboard distribution section shall contain distribution circuit breakers as indicated on the Drawings.
2. The vertical main bus shall be full length furnished with provisions for future branch devices so that the entire available vertical space may be utilized.
3. The distribution section shall have provisions for a future additional distribution section. This includes appropriate space and bolt holes on the horizontal main bus and side panels.
4. Provide a minimum of two (2) 400A and (2) 250A full-size three-pole spaces for future equipment and additional spaces as indicated on the Drawings.

a. All feeders breakers shall be Electronic Trip Circuit Breakers:
b. Basis of Design: "PowerPact H-, J-, L-, P- and R-Frame" (200 amperes to 3000 amperes) as manufactured by Square D by Schneider Electric.
c. Current trip ratings shall be as indicated on the Drawings.
d. Circuit breaker trip system shall be a MICROLOGIC electronic trip unit with true RMS sensing.
e. Current transformers shall be used to ensure accurate measurements from low current up to high currents.
f. Electronic trip unit shall be fitted with thermal imaging.
g. The following monitoring functions shall be integral parts of electronic trip units:

1) A test connector shall be installed for checks on electronic and tripping mechanism operation using an external device.

2) LED for load indication at 105 percent.
3) LED for load indication at 90 percent of load for applications 600A and smaller.
4) LED for visual verification of protection circuit functionality for applications 600A or smaller.
5) Optional: LED for trip indication for applications above 600A.

h. MICROLOGIC trip unit functions shall consist of adjustable protection settings with the capability to be set and read locally by rotating a switch.

1) Long-time pick-up shall allow for adjustment to nine (9) long-time pick-up settings. This adjustment must be at least from 0.4 to 1 times the sensor plug (In), with finer adjustments available for more precise settings to match the application.
2) Adjustable long-time delay shall be in nine (9) bands. At six times Ir, from 0.5 to 24 seconds above 600A, and 0.5 to 16 seconds for 600A and below.
3) Short-time pick-up shall allow for nine (9) settings from 1.5 to 10 times Ir.
4) Short-time delay shall be in nine (9) bands from 0.1–0.4 I 2 t ON and 0–0.4 I 2 t OFF.
5) Instantaneous settings on the trip units with LSI protection shall be available in nine (9) bands.
6) Above 600A, from 2 to 15 times In

a) 600A, from 1.5 to 11 times In
b) 400A from 1.5 to 12 times In
c) 250A and below, from 1.5 to 15 times In

i. It shall be possible to fit the trip unit with a seal to prevent unauthorized access to the settings in accordance with NEC Section 240-6(b).
j. Trip unit shall provide local trip indication and capability to locally and remotely indicate reason for trip, i.e., overload, short circuit, or ground fault.

G. Ground Fault Protection:

1. Switchboard main shall have integral zero sequence ground fault protection with adjustable pickup current and time delay. The ground fault relay shall initiate an instantaneous trip when a fault occurs downstream of it and will block all upstream devices from tripping for a preset adjustable delay time. This will allow the downstream breaker to clear the fault and provide system coordination.

H. Phase Failure Relay:

1. Provide protection against phase failure of three-phase supply by opening main electronic trip circuit breaker. Provide three-phase sensing relay, control power transformer and control fuses.

I. Metering:

1. Provide Microprocessor-based, door-mounted monitoring and protective device designed to perform compete electrical metering and system voltage protection.
2. Direct reading metered values shall include:

a. AC ampere - Phase 1, Phase B, Phase C

b. AC Voltage - Phase A-N, Phase B-N, Phase C-N - Phase A-B, Phase B-C, Phase C-A, and N-G
c. Watts
d. Vars
e. VA
f. Power Factor
g. Frequency
h. Watt demand
i. Watthours
j. Frequency
k. % THD
l. Distortion factory
m. K-factor
n. User configurable custom screens
o. Voltage phase imbalance
p. Current phase imbalance

3. Unit shall be wired to the building automation system (BAS). Coordinate requirements with the BAS contractor. Unit shall be capable of being connected to an energy management system.
4. Unit shall operate with self-contained potential transformers and five (5) current transformers (provide neutral and ground current transformers).
5. Unit shall have harmonic analysis screens, cable to capture a high-speed wave form of two (2) cycles.
6. Web based.

J. All steel surfaces are to be chemically cleaned and treated, providing a bond between paint and metal surfaces to help prevent the entrance of moisture and the formation of rust under the paint. Finish coat shall be manufacturer's standard color.

K. If more distribution sections are needed than what is indicated on the Drawings to provide space needed for the required overcurrent protection devices, such sections shall be provided at no additional cost to the Owner and the Engineer shall be contacted for approval.

2.3 PANELBOARDS

A. Panelboards shall be of a dead front safety type, equipped with thermal magnetic bolt-on molded case circuit breakers or Type CCPB-compact circuit protector as indicated on the Drawings. All panels shall be of the same manufacture.

B. Panelboards on the drawings shall be provided with barriers, and/or protective covers, placed such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations.

C. Gutter space shall be a minimum of 4" on all sides.

D. Panelboards shall have full capacity neutral bus and ground bus.

E. All buses including neutral and ground buses shall be of high conductivity copper.

F. Service entrance panelboards shall be provided with voltage surge protection rated and suitable for the service.

G. Provide isolated/insulated ground bus where indicated on the Drawings.

H. Provide surge suppression where indicated on the Drawings.

I. Provide double neutral bus where indicated on the Drawings.

J. Panelboard Enclosures:

1. Enclosures shall be fabricated from 16-gauge minimum galvanized or equivalent rust-resistant steel with rust-inhibiting primer and baked-enamel finish.
2. Panels shall be furnished with standard doors and locks. Key all locks alike and furnish two sets of keys.
3. Enclosure for panels rated 100 amperes and over shall have a hinged front cover so as to be a "door-on-door" arrangement.

K. Circuit Breakers:

1. Circuit breakers shall be molded case, bolt on heavy-duty type having quick make, quick break manually operated toggle mechanism. Handle shall be trip free with three positions that clearly indicate when the breakers are "on," "off," or "tripped." Multiple pole circuit breakers shall operate on a common trip principle. All circuit breakers shall provide overcurrent and short circuit protection.
2. Circuit breakers shall be manufactured such that amperages shall be clearly visible on all breakers (stamped or labeled) without having to remove any components of the panelboard to obtain this information.
3. Where new circuit breakers are to be added to existing panelboards, they shall be compatible with the panelboard. Where new circuit breakers are not part of an existing or new panelboard, they shall be housed in a NEMA 1 enclosure for dry locations and NEMA 3R for damp or exterior locations.
4. Where sprinklers are provided in the elevator shaft, provide shunt trip unit on circuit breaker for elevator power.
5. Special requirements shall be as indicated, including ground fault current interrupting (GFCI), shunt trip, arc fault, etc., on circuit breakers for indicated branch circuits on local distribution panels.
6. Provide 30mA GFCI circuit breakers for use on all heat trace circuits.
7. Circuit breakers shown as service entrance protection on the Drawings shall be rated for such use.
8. Circuit breaker(s) for the fire alarm system shall be mechanically protected, have a red marking (be accessible to only authorized personnel), and be identified as "FIRE ALARM CIRCUIT", as required by NFPA 72.

L. Surge Suppression:

1. Suppressors shall be listed in accordance with UL 1449 and UL 1283.
2. Suppressors shall provide redundant suppression modules between each phase conductor and the neutral conductor, between each phase conductor and the ground and between the neutral conductor and ground.
3. Suppressor manufacturer shall provide certified test data confirming a "fail-short" failure mode.
4. Visible indication of proper suppressor connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable.
5. The suppressor shall incorporate copper bus bars for the surge current path. Surge current diversion modules shall use bolted connections to the bus bars for reliable low impedance connections.
6. Suppressors shall meet or exceed the following criteria:

a. Maximum single impulse current rating shall be no less than 240kA per phase.
b. Pulse life test: Capable of protecting against and surviving 5000 ANSI/IEEE C62.41 Category C transients without failure or degradation of UL 1449 clamp voltage by more than 10%.
c. UL 1449 clamping voltage must not exceed the following:

| Voltage | L-N | L-G | N-G | L-L |
|---|---|---|---|---|
| 208/120 | 330V | 330V | 330V | 700V |

d. The ANSI/IEEE C62.41-1991 Category C3 clamping voltage shall not exceed the following:

| Voltage | L-N | L-G | N-G |
|---|---|---|---|
| 208/120 | 520V | 520V | 520V |

7. The SPD shall be constructed using surge current modules (MOV based). Each module shall be fused with user-replaceable 200,000 AIC rated fuses. The status of each module shall be monitored on the front of the SPD enclosure as well as on the module.
8. The SPD shall be installed internal to electrical distribution equipment by the electrical distribution equipment manufacturer.
9. The SPD shall be equipped with an audible alarm which shall actuate when any one of the surge current modules has failed. An alarm on/off switch shall be provided to silence the alarm and an alarm push-to-test switch shall be provided to test the alarm. Both switches and audible alarm shall be located on the front panel of the switchboard.
10. The suppressor shall have a response time no greater than 0.5 nanoseconds for any of the individual protection modes.
11. The suppressor will have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.
12. The suppressor shall include an internal UL listed disconnect switch.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. Switchboard and panelboard installation shall conform to NEC requirements, in particular Article 110-16.

B. Floor-mounted switchboards shall be mounted on 4-inch high concrete housekeeping pads.

C. Install switchboards and panelboards according to manufacturer's recommendations.

D. Test switchboards and panelboards in accordance with Section 260800.

E. Provide filler pieces for unused spaces in switchboards and panelboards.

F. Prepare and affix typewritten directory to inside cover of switchboard and panelboard doors indicating loads controlled by each circuit. Protect directory with plastic. Use of Engineer's panelboard schedule for panelboard directory is not allowed.

G. All panels shall be mounted in accordance with Section 260700.

H. Unless otherwise indicated on the Drawings, install all switchboards and panelboards with the top breaker handle 6'6" maximum above the finished floor, or concrete pad.

I. Verify exact wall dimensions in field to ensure that standard panelboard cabinets specified can be arranged in the space allocated.

J. All scratched or marred surfaces shall be repaired to match original condition.

K. All switchboards and panelboards shall have permanently affixed circuit numbers at each circuit space.

L. Provide two (2) spare 1" conduits from each new flush-mounted panelboard to accessible area above ceiling.

END OF SECTION

# Power-Style™ Low Voltage Switchboards

## QED-2 and Speed-D Merchandised Service Section Switchboards

Catalog
2700CT1101

# 2012

Class 2710, 2741, 2742

**CONTENTS**



SQUARE D™

by Schneider Electric

**PowerPact™ R-frame Main Circuit Breaker on Left with I-Line™ Distribution Section on Right**

## Features

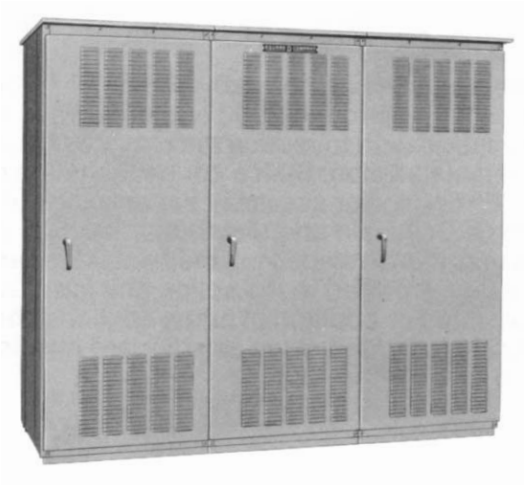
- Sections rated to 5000 A horizontal bus, 3000 A vertical bus
- Single mains to 5000 A
- Six subdivision mains to 4000 A
- Individually mounted feeders to 4000 A
- Suitable for service entrance or distribution
- NEMA Type 1 or Type 3R enclosures
- Front or front and rear accessible
- 91.5 in. (2324 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
- Hot or cold sequence utility metering
- Customer metering
- Surge protective devices (SPD)

Power-Style™ 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. Power-Style 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.

## Structures



**NEMA Type 3R Enclosure Over Three 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.

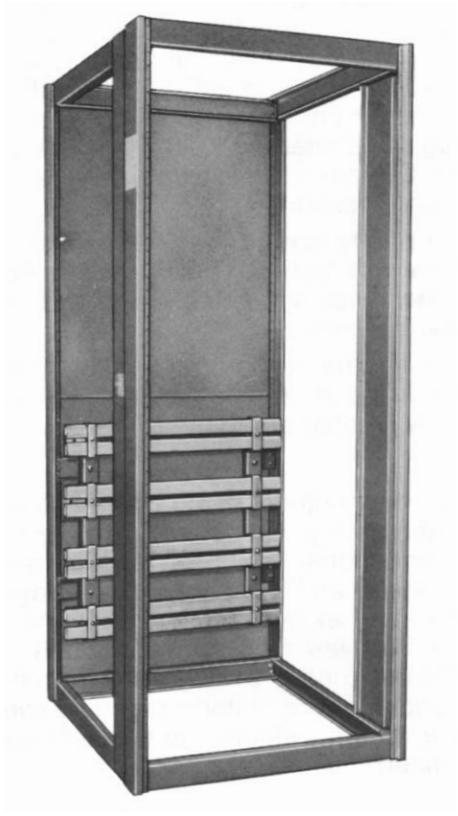
Section dimensions are determined by the type, size, quantity, and arrangement of the components and devices being installed.

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.

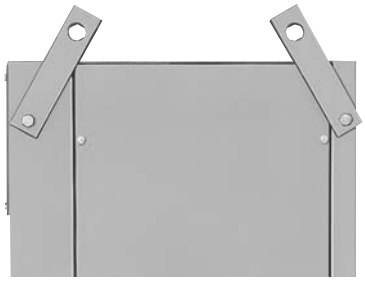
The standard paint finish on all Power-Style QED-2 switchboards is an ANSI #49 medium light gray baked enamel over an iron phosphate pretreatment. Non-standard finishes are an available option when specified.

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



**QED-2 Frame and Through Bus**

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.



**Lifting Bars Can Be Used On QED-2 NEMA Type 1 Sections Up To 3000 A**

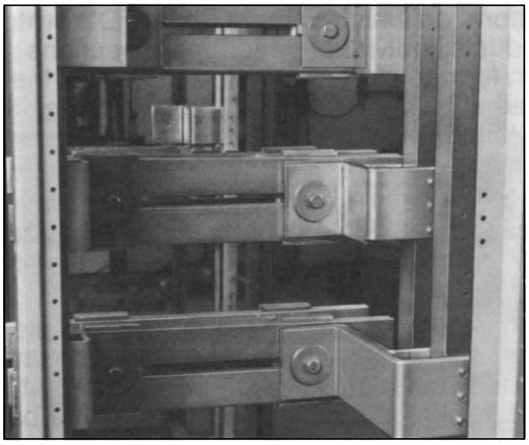
## Bussing

### 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 1200–5000 A. Power-Style QED-2 through bus uses aluminum or copper rectangular 0.25 in. x 1.5 in. (6 mm x 38mm) or 0.25 in. x 2 in. (6 mm x 51 mm) bus bars. Through bus rated 4000 A has eight bus bars per phase. Connections are made by using an “E” connector assembly.

Bus ampacity 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.

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.



**4000 A Through Bus Assembly**

### “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.

**“E” Connector on 2500 A Through Bus**

### 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.

**Captive Splice Bus, Distribution To Distribution**

## Main Sections

**3000 A Masterpact NW 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 Power-Style 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™ NW (stored energy) circuit breaker is available to a maximum of 5000 A and Bolt-Loc™ fusible 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 NW circuit breakers. Ground fault protection is available on Bolt-Loc switches with the Type GC ground fault system. Section width varies with mains and options. The Masterpact NW 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 (5000 A max.)
  - — Bolt-Loc (electric or manual trip) (4000 A max.)
- Top or bottom feed
- Busway connection available
- Suitable for use as service entrance
- Ground fault protection (not available on PowerPact M-frame)
  - — Micrologic trip unit (residual)
  - — Bolt-Loc Ground-Censor Type GC (zero sequence)
- Customer metering
  - — PowerLogic circuit monitor (communications available)
  - — 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 NW circuit breakers, or Bolt-Loc fusible switches. All six subdivision mains are connected to the through bus, which is available in ratings up to 5000 A.

**I-Line Distribution Section**

- 3000 A maximum plated copper vertical bus
- 1600 A maximum plated 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

**QMB Distribution Section with Neutral**

- 3000 A maximum vertical bus
- Plated aluminum or copper vertical bus
- 72 in. (1829 mm) of switch mounting space
- 30–400 A QMB switches mount in 36 in. (914 mm) wide section
- 30–1200 A QMB switches mount in 42 in. (1067 mm) wide section

## Group-Mounted Distribution Sections

Power-Style QED-2 switchboard distribution sections are available with either an I-Line™ or QMB 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 QMB vertical bus assembly or 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.

QMB fusible switches are group mounted in QED-2 switchboards. The QMB switches are mounted to steel rails and electrically connected by plug-on jaws to the vertical bus. QMB switches through 600 A come standard with Class H fuse clips or with Class R, J, or T clips available as an option. Class L fuse clips are standard on 800 A and 1200 A QMB switches.

QMJ fusible switches are also available and offer a space saving design. These switches come standard with Class J fuse clips.

### Large Feeders

Power-Style 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 circuit breakers, or Bolt-Loc fusible switches to a maximum of 4000 A. Ground fault protection is available through Micrologic trip units on PowerPact M-, P-, and R-frame and Masterpact NW circuit breakers. Ground fault protection is available on Bolt-Loc switches with the Type GC ground fault system. Zone interlocking is available as an option between the feeders and main.

## 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. However, due to 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 pages 23–26.

### 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.

## 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 System*s.

**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 (A) | Width | Depth |
|---|---|---|
| 800–2000 | 24 in. (610 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)
- SIS control wire
- Strip heater and thermostat
- Surge arrestor

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

# Customer Metering

## PowerLogic™ Power Monitoring and Control

**NOTE:** Please refer to www.schneider-electric.us, Solutions, Power Management Systems for a complete and up-to-date list of feature availability. Some features are optional.

For available configurations/placement options for power meters, circuit monitors, and ION meters, see page 12. For additional clarification, contact your local Schneider Electric representative.

### Power Meter

| Class | Type | Description |
|---|---|---|
| 3020 | PM-820 | Power meter module with display 0.25% accuracy with logging, alarms, I/O modules |
| | PM-850 | Same as PM-820 plus trending/forecasting, steady state waveform capture |
| | PM-870 | Same as PM-850 plus disturbance waveform capture, sag/swell metering |

### Circuit Monitors

| Class | Type | Description |
|---|---|---|
| 3020 | CMDLC | Liquid crystal display used for both circuit monitors |
| | CMDVF | Upgrade to vacuum fluorescent display with infrared port |
| | CM4250 | Multi-function, digital instrumentation, data acquisition, control device, cycle-by-cycle event recording |
| | CM4000T | Same as CM4250 plus transient voltage monitoring, flicker IEC 61000-4-15 |

### ION 7550/7650 Meters

| Catalog No. | Description |
|---|---|
| S7550A0C0B6A0A0A | Basic unit: Integrated display, instrumentation, power quality, waveform capture, one RS232/RS485 port, one RS-485 jack, one Type 2 optical port, eight digital inputs, four digital outputs, and three onboard relays |
| S7550A0C0B6E0A0A | Basic unit plus Ethernet |
| S7650A0C0B6A0A0A | Basic unit plus additional ION7650 features |
| S7650A0C0B6E0A0A | Basic unit plus Ethernet and additional ION7650 features |
| S7650A0C0B6C1A0A | Basic unit plus Ethernet, internal modem, and additional ION7650 features |
| S7650B1C0B6C1A0A | Basic unit plus Ethernet, 1,024 samples/cycle instead of 512, 10 MB of logging instead of 5 MB, internal modem, and additional ION7650 features |

### Input/Output Modules

| Class | Type | Description |
|---|---|---|
| 3020 | IOC44 | I/O card with 4 status in, 3 relay out, and 1 KYZ out |
| | IOX2411 | I/O extender module with 4 DC status inputs, 2 DC digital outputs, and 1 analog output |
| | IOX0404 | I/O extender module with 4 status inputs and 4 analog inputs |
| | IOX08 | I/O extender module with 8 status inputs (120 Vac) |
| | IOX | I/O extender module only, no installed I/O |
| | PM8-ECC | Ethernet communications card with HTML capabilities for PM8 family |
| | ECC21 | Ethernet communications card with HTML capabilities, for CM3/4 family |
| Not applicable | PM8M2222 | 2 digital outputs, 2 digital inputs, 2 analog outputs, and 2 analog inputs |
| | PM8M26 | 2 digital outputs and 6 digital inputs |
| | PM822 | 2 digital outputs and 2 digital inputs |

### Instrument Transformer Requirements ▲

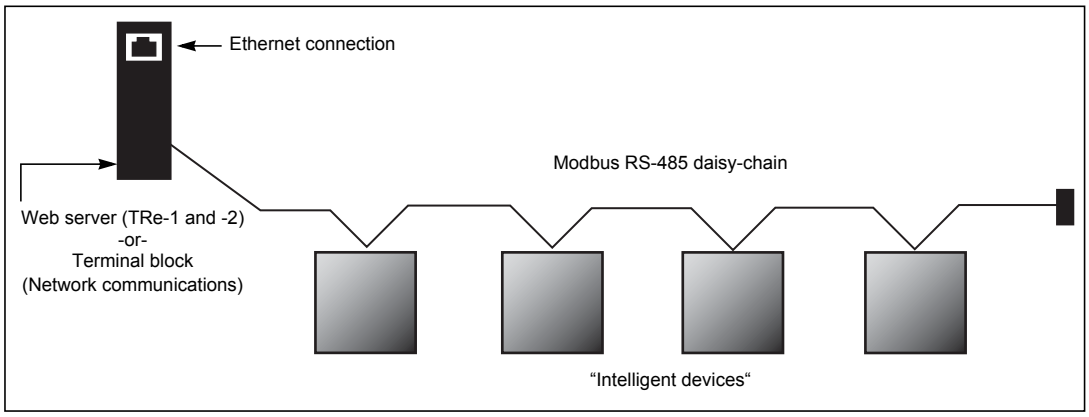
| Device | 1Ø3W 120/240 V | 3Ø3W Delta | 3Ø4W | | | |
|---|---|---|---|---|---|---|
| | | | Wye | | | Delta |
| | | | 208Y/120 | 480Y/277 | 600Y/347 | |
| Circuit monitor | 2 CTs | 2 CTs, 1 CPT ■ | 3 CTs | 3 CTs | 3 CTs, 1 CPT | 3 CTs |
| Power meter | 2 CTs | 2 CTs, 1 CPT ■ | 3 CTs | 3 CTs | 3 CTs | 3 CTs |
| Ion meter ♦ | 2 CTs, 2 PTs | 2 CTs, 1 CPT ■, 3 PTs | 3 CTs | 3 CTs, 1 CPT, 3 PTs | 3 CTs, 1 CPT, 3 PTs | 3 CTs, 1 CPT, 3 PTs |

▲ Drawout circuit breakers require three CTs for all voltages.

■ CPT is not required for 240 V Delta.

♦ PTs are necessary only when Canadian Standards Association (CSA) certification is required.

## Transparent Ready™ Equipment (TRe)




Network Communications

One or more “intelligent devices” such as circuit monitors, circuit breakers, or relays are wired in an RS-485 daisy-chain network as a basis for all Transparent Ready Equipment (TRe). In some cases, the web server is external or reserved for the future. In this case, the RS-485 communications are wired to a terminal block for the end user.

In TRe-1 and TRe-2, HTML web pages designed specifically for the power equipment lineup are loaded into the equipment at the factory. In the past, this type of functionality required the development of “custom” HTML pages by an integrator or an HTML-savvy end user. Today, Schneider Electric pre-defines the most popular web pages and provides these “custom” HTML web pages as part of our standard offer.

TRe-1 (with ECC)

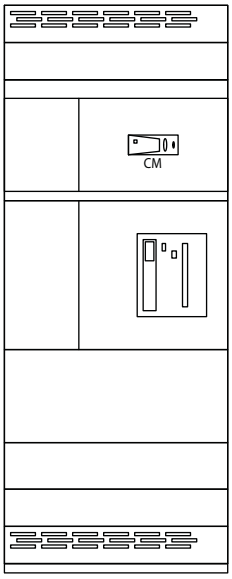
Some TRe-1 applications require the use of a PowerLogic™ circuit monitor, Series 3000 or 4000, and an Ethernet communications card (ECC) that slides into an option slot of the circuit monitor. CM3000 and CM4000 circuit monitors with ECC have been available in most Square D™ brand power equipment since July 2002.

Other TRe-1 applications require the use of a Series 800 PowerLogic power meter and an ECC (PM8ECC). PM800 power meters with PM8ECC have been available in most Square D™ brand power equipment since January 2008.

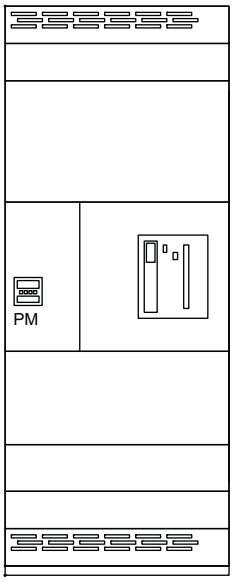
TRe-1 and TRe-2 (with EGX)

Some TRe-1 and all TRe-2 use a PowerLogic EGX (Ethernet communications gateway) to provide real-time power equipment lineup data. Ethernet gateways have been available in Square D™ brand power equipment since 1995.

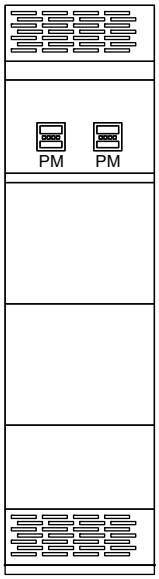
## Metering Configurations (mains shown are non-EUSERC)



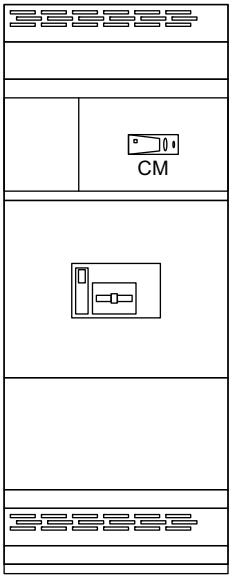

Masterpact NW with Circuit Monitor



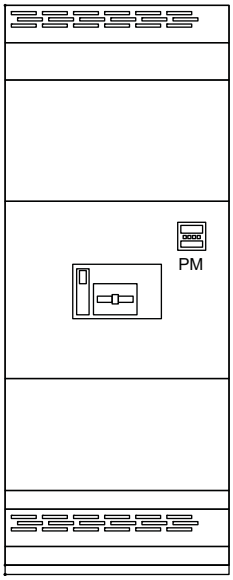

Masterpact NW with Power Meter




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



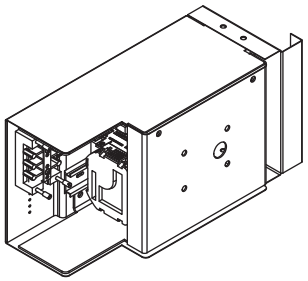

PowerPact R-frame with Circuit Monitor




PowerPact R-frame with Power Meter

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.



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

# Electronic Trip Systems

M-frame circuit breakers are available with the ET 1.0 electronic trip system. P-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 (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. Such 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 x In) with no intentional time delay.

ET1.0I (P-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.

ET1.0M (P-Frame only)

The ET1.0M trip system is only available on P-frame motor circuit protectors and provides protection for short circuit conditions only. The trip unit has a single adjustment for instantaneous pickup that, if exceeded, trips the circuit breaker with no intentional delay. Instantaneous trip dial settings are 2–16 x In for 600 A circuit breakers and 1.5–12 x In for 800–1200 A circuit breakers.

## 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.

**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.

### Micrologic Trip Unit Features

| Feature | Micrologic Trip Unit (X = Standard Feature; O = Available Option) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Standard | | Ammeter | | | Power | | Harmonics | |
| | 3.0 | 5.0 | 3.0A | 5.0A | 6.0A | 5.0P | 6.0P | 5.0H | 6.0H |
| Field-installable ▲ | X | X | X | X | X | X | X | X | X |
| LI | X | | X | | | | | | |
| LSI | | X | | X | | X | | X | |
| LSIG/Ground-Fault Trip ■ | | | | | X | | X | | X |
| Ground-Fault Alarm/No Trip ■,♦ | | | | | | X | | X | |
| Ground-Fault Alarm and Trip ■,♦ | | | | | | | 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 ★ | | | | X | X | X | X | X | X |
| Communications | | | O | O | O | 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 ■ | | | | | | 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 | | | | | | | | X | X |
| Waveform Capture | | | | | | | | X | X |

▲ I-Line circuit breakers are only available with non-interchangeable trip units.

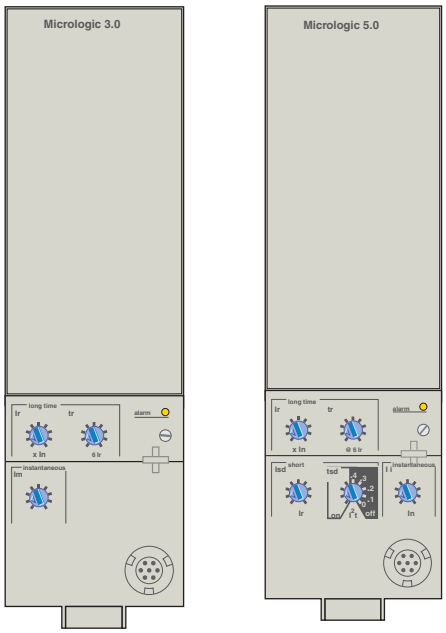
■ Requires neutral current transformer on 3-phase, 4-wire circuits.

♦ Requires M6C Programmable Contact Module.

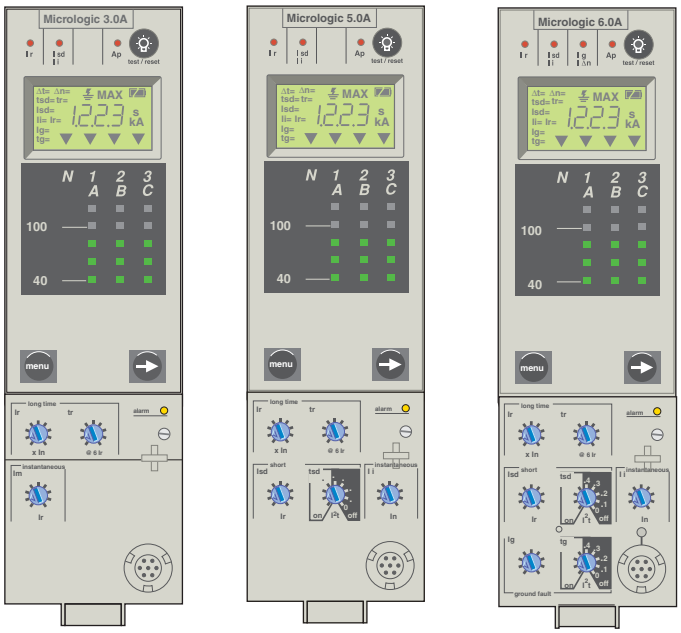
★ Not available for 2.0A trip unit as upstream devices.

### Rating Plugs for Micrologic 3.0, 5.0, 6.0 A/P/H Trip Units

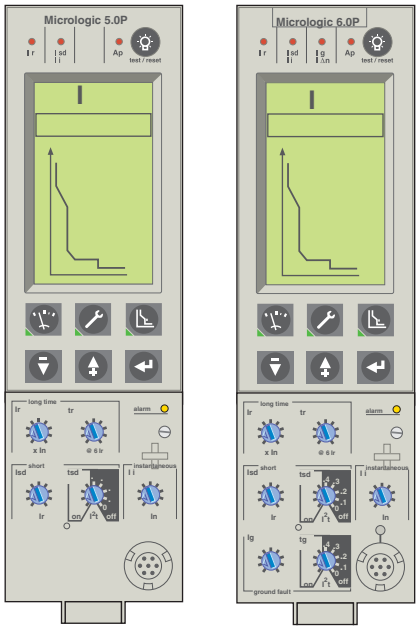
| Standard | Option | Settings (Tolerance 1.05-1.2) |
|---|---|---|
| UL/ANSI | Plug A | 0.40 - 0.45 - 0.50 - 0.60 - 0.63 - 0.70 - 0.80 - 0.90 - 1.0 |
| | Plug B | 0.40 - 0.44 - 0.50 - 0.56 - 0.63 - 0.75 - 0.88 - 0.95 - 1.0 |
| | Plug C | 0.42 - 0.50 - 0.53 - 0.58 - 0.67 - 0.75 - 0.83 - 0.95 - 1.0 |
| | 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 - 0.7 0- 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 |



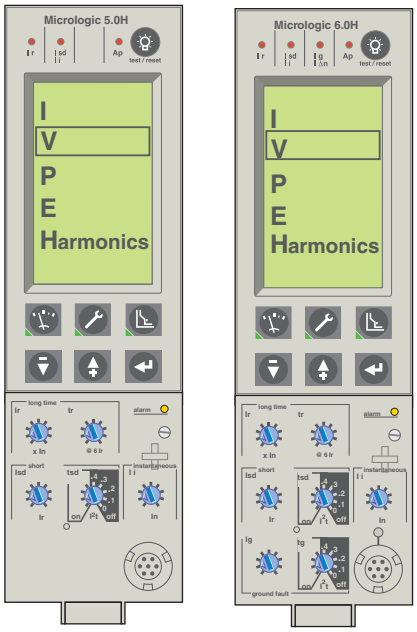

Micrologic 3.0 and 5.0 Standard Trip Units



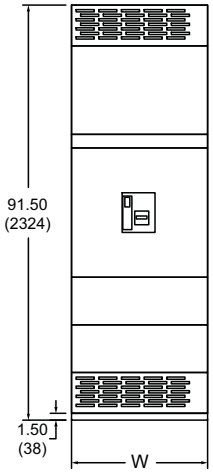

Micrologic 3.0A, 5.0A and 6.0A Trip Units




Micrologic 5.0P and 6.0P Trip Units




Micrologic 5.0H and 6.0H Trip Units




For conduit area, see page 40.

## Main or Branch Circuit Breaker Selection

### Individually Mounted Mains

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 catalog # 0612CT0101, *PowerPact M-frame, P-frame, R-frame and NS630b-NS3200 Electronic Trip Circuit Breakers.*

### Individually Mounted Circuit Breakers

| Breaker Type | % rated | Frame Size | Ampacity Range (A) | SCCR (x 1000) | | | Dimensions | | Line/Load Lug Information ■ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 240 V | 480 V | 600 V | Width (W) | Depth (D) ▲ | |
| MG | 80% | 800 | 400–800 | 65 | 35 | 18 | 30 in. (767 mm) | 24 in. (610 mm) | (3) #3/0-500 kcmil Al or Cu |
| MJ | | | | 100 | 65 | 25 | | | |
| PG | 80% | 1200 | 500–1200 | 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 | 500–2500 | 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% | | | | | | | | |

▲ "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. (13mm) to the depth in rear. Increased depth is required for lug in/lug out on the same side. For PowerPact M- and P-frame circuit breakers, the depth increases to 48 in. (1219 mm); for PowerPact R-frame, the depth increases to 60 in. (1524 mm).

■ Optional lugs may be available. Contact your local Schneider Electric or distributor representative for more information.

### 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

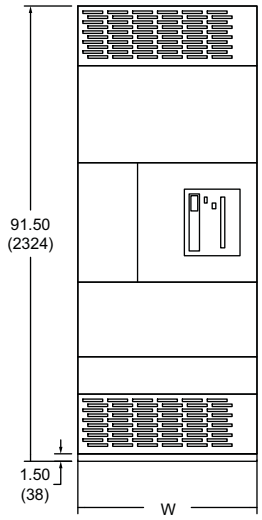
### Additional Accessories and Trip Unit Options for Micrologic Trip Circuit Breakers

- 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 pages 13-15 for details on Electronic Trip Systems for PowerPact M-, P-, and R-frame circuit breakers.




For conduit area,
see page 40.

### Available Accessories ▲

- Additional auxiliary switches—up to 12
- 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—2 or 6 contacts
- Open/Close push-button lock
- Drawout breaker shutter
- Shutter padlock
- Shutter position indicator
- Cradle cell key interlock
- Masterpact test kit
- Circuit breaker lifting and transport truck

▲ Contact your local Schneider Electric representative for additional accessories.

## Individually Mounted Mains and Feeders

Masterpact NW (Stored Energy) Circuit Breakers

For more information, see catalog # 0613CT0001, *Masterpact NT/NW Universal Power Circuit Breakers*.

### UL489 and UL 1066 (ANSI Rated)—100% Rated Stationary or Drawout Mounted

| Frame Size | Dimensions | | Line/Load Lug Information | |
|---|---|---|---|---|
| | Width (W) | Depth (D) ■ | Quantity (per phase) | Size (kcmil) |
| 800 | 36 in. (914 mm) | Stationary Mounted 36 in. (914 mm) Drawout Mounted 48 in. (1220 mm) | 3 | #3/0 - 750 |
| 1600 | | | 5 | |
| 2000 | | | 6 | |
| 2500 | | | 8 | |
| 3000 | | | 9 | |
| 4000 ♦ | 42 in. (1067 mm) | 48 in. (1220 mm) | 12 | |
| 5000 ♦ | 48 in. (1220 mm) | | 15 | |

■ "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.

♦ Use ANSI type for fixed-mounted 4000 A and 5000 A NW.

### UL 489 Breaker Ratings for Masterpact NW

| Breaker Type ★ | RMS Sym. Amperes (in thousands) | | |
|---|---|---|---|
| | 240 V | 480 V | 600 V |
| WL1, YL1 | 65 | 65 | 50 |
| WL3, YL3 | 85 | 100 | 100 |
| WL7, YL7 ▼ | 200 | 150 | 100 |

★ WL1, WL3, WL7: 800–3000 A
YL1, YL3, YL7: 4000–5000 A

▼ WL7 and YL7 are only available in drawout construction.

### UL 1066 (ANSI Rated) Breaker Ratings for Masterpact NW

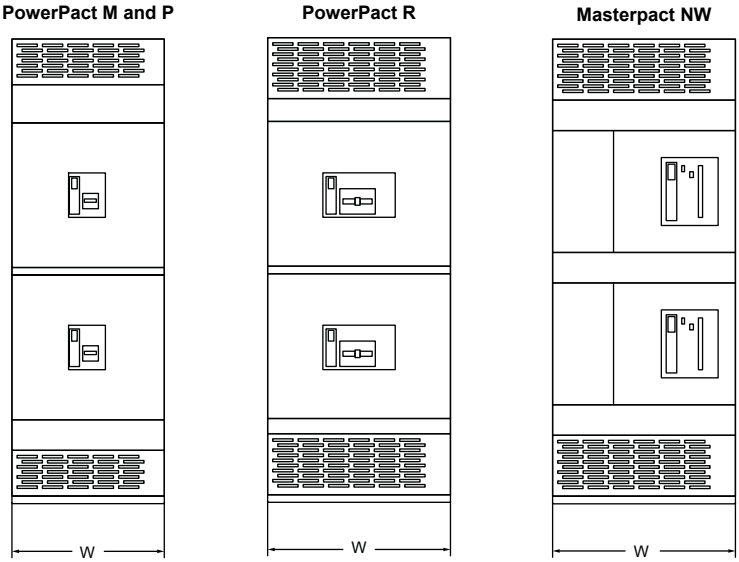
| Breaker Type △ | RMS Sym. Amperes (in thousands) | | |
|---|---|---|---|
| | 240 V | 480 V | 600 V |
| WA2 | 42 | 42 | 42 |
| WA4, YA4 | 65 | 65 | 65 |
| WA5, YA5 | 85 | 85 | 85 |
| WA6, YA6 | 100 | 100 | 100 |
| WA8, YA8 □ | 200 | 200 | 130 |

△ WA2, WA4, WA8: 800–3200 A
WA5, WA6: 800–4000 A
YA4, YA8: 4000–5000 A
YA5, YA6: 5000 A

□ WA8 and YA8 are not available in stationary mount.

See pages 13-15 for details on Electronic Trip Systems for Masterpact NW circuit breakers.

## Stacked Devices




For conduit area,
see page 40.

| Device Type ▲ | 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 NW (fixed mounted) | 3000 | 2000 | 2000 | | 36 |
| | 4000 | | | | 48 |
| Masterpact NW (drawout) | 3000 | | | | |
| | 4000 | | | | |

▲ Cannot stack different device types. For example, MG/PG is acceptable, but PG/RG is not. NWF and NWD cannot be stacked together.

## Load Lug Information

| Circuit Breaker | Ampacity (A) | Quantity (per phase) | Lug Size (kcmil) |
|---|---|---|---|
| PowerPact M- and P-frame | 800 | 3 | 3/0 - 500 |
| | 1200 | 4 | |
| PowerPact R-frame | 1200 | 4 | 3/0 - 600 |
| | 1600 | 5 | |
| | 2000 | 6 | |
| Masterpact NW | 800 | 3 | 3/0 - 750 |
| | 1200 | 4 | |
| | 1600 | 5 | |
| | 2000 | 6 | |

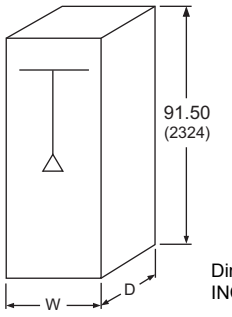
## Underground Pull Sections (UGPS) and Main Sections

### Underground Pull Sections

| Ampacity (A) | Dimensions | | Main Lug Information ▲ | |
|---|---|---|---|---|
| | Width (W) | Depth (D) ■ | Quantity (per phase) | Size (kcmil) |
| 400–800 | 30 in. (762 mm) | 24 in. (610 mm) | 3 | #3/0 - 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 | |

▲ Lugs or studs are provided, based on utility requirements.

■ "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.




Dimensions given in INCHES (millimeters).

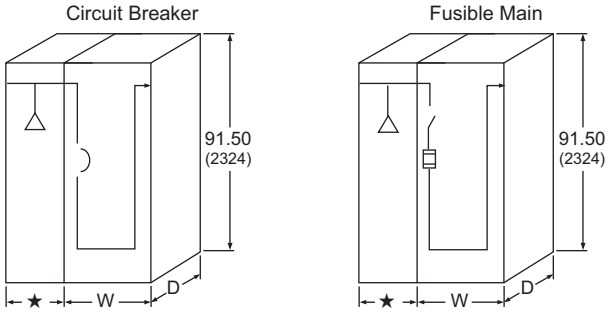
For conduit area, see page 40.

### Main Sections (Split Bus) ♦

For Reverse Feed Mains, see page 21.

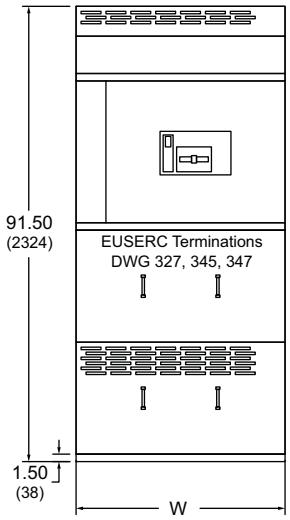
| Type | Ampacity (A) | Dimensions | |
|---|---|---|---|
| | | Width (W) | Depth (D) |
| **Circuit Breaker Mains** | | | |
| R | 2500 | 42 in. (1067 mm) | 36 in. (914 mm) |
| NW | 3000 | 48 in. (1219 mm) | 48 in. (1219 mm) |
| | 4000 | | |
| **Fusible Main Switches—Fuse Type L** | | | |
| BP | 2000–2500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

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




★ See *Underground Pull Section* table above.

Dimensions given in INCHES (millimeters).




**PowerPact R-frame Circuit Breaker**

For conduit area,
see page 40.

## Main or Branch Circuit Breaker Selection (EUSERC)

EUSERC = Electric Utility Service Equipment Requirements Committee

### Individually Mounted Mains

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 catalog # 0612CT0101, *PowerPact M-frame, P-frame, R-frame and NS630b-NS3200 Electronic Trip Circuit Breakers*.

### Reverse Feed Mains ▲

| Breaker Type ■ | Ampacity (A) ♦ | SCCR (kA) | | Dimensions | | Main Lug Information | |
|---|---|---|---|---|---|---|---|
| | | 240 V | 480 V | Width (W) | Depth (D)★ | Quantity (per phase) | Size (kcmil) |
| MG | 400–800 | 65 | 35 | 36 in. (914 mm) | 24 in. (610 mm) | 1 (400 A)<br>2 (600 A)<br>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)<br>6 (2000 A) | |
| RK | | 65 | 65 | | | | |
| RJ | | 100 | 65 | | | | |
| RL | | 125 | 100 | | | | |

▲ A power meter can be mounted with the main, but a circuit monitor or Surge Protective Device (SPD) requires a trailing auxiliary section.

■ 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.

♦ 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.

★ "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 pages 13-15 for details on Electronic Trip Systems for PowerPact M-, P-, and R-frame circuit breakers.

## Group Mounted Main or Branch Circuit Breakers

Thermal Magnetic Circuit Breakers

- FA, FH, HD, HG, HJ, HL, QB, QD, QG, QJ, JD, JG, JJ, JL, LA, LH, LC, LI

For more information, see catalog # 0601CT9101, *Thermal-Magnetic / Magnetic Only Circuit Breakers*.

Electronic Trip Molded Case Circuit Breakers

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

For more information, see catalog # 0612CT0101, *PowerPact M-frame, P-frame, R-frame and NS630b-NS3200 Electronic Trip Circuit Breakers*.

Micrologic Electronic Trip Molded Case Circuit Breakers

- 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, P-frame, R-frame and NS630b-NS3200 Electronic Trip Circuit Breakers*.

**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 | |
| FA (240 V) | 80% | 100 | 15–100 | 10 | — | — | 4.5 | 3 | 1.5 | 15–30 A<br>#14-#4 AWG Cu or<br>#12-#4 AWG Al |
| FA | | | | 25 | 18 | 14 | | | | 35–100 A<br>#14-#1/0 AWG Cu or<br>#12-#1/0 AWG Al |
| FH | | | | 65 | 25 | 18 | | | | |
| HD | | 150 | 15–150 | 25 | 18 | 14 | | | — | #14-#3/0 AWG Al or Cu |
| HG | | | | 65 | 35 | 18 | | | | |
| HJ | | | | 100 | 65 | 25 | | 4.5 | | |
| HL | | | | 125 | 100 | 50 | | | | |
| QB | | 225 | 70–225 | 10 | — | — | | 3 | | #4-300 kcmil Al or Cu |
| QD | | | | 25 | | | | | | |
| QG | | | | 65 | | | | | | |
| QJ | | | | 100 | | | | | | |
| JD | | 250 | 150–250 | 25 | 18 | 14 | | 4.5 | | 150–175 A<br>#1/0-#4/0 AWG Al or Cu |
| JG | | | | 65 | 35 | 18 | | | | |
| JJ | | | | 100 | 65 | 25 | | | | 200 A<br>#3/0-350 kcmil Al or Cu |
| JL | | | | 125 | 100 | 50 | | | | |
| LA | | 400 | 125–400 | 42 | 30 | 22 | 6 | 6 | | (1) #1 AWG-600 kcmil or<br>(2) #1 AWG-250 kcmil |
| LH | | | | 65 | 35 | 25 | | | | |
| LC | | 600 | 300–600 | 100 | 65 | 35 | 7.5 | 7.5 | | (2) #4/0 AWG-500 kcmil |
| FI | | 100 | 20–30 | 200 | 200 | 100 | 4.5 | 4.5 | | #14-#4 AWG Cu or #12-#4 AWG Al |
| | | | 35–100 | | | | | | | #14-#4 AWG Cu or #12-#1/0 AWG Al |
| KI | | 250 | 110–175 | 200 | 200 | 100 | 4.5 | 4.5 | | (1) #4 AWG-350 kcmil Al or Cu |
| | | | 200–250 | | | | | | | (1) #1/0 AWG-350 kcmil Al or Cu |
| LI | | 600 | 300–600 | 200 | 200 | 100 | 7.5 | 7.5 | | (2) #4/0 AWG-500kcmil |
| MG | | 800 | 300–800 | 65 | 35 | 18 | 9 | 9 | | (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<br>(3) for 250–800 A<br>(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-C | 100% ■ | 2500 | 240–1200 | 65 | 35 | 18 | 15 | 15 | | (4) #3/0 AWG-600 kcmil |
| RK-C | 100% ■ | | | | 65 | 65 | | | | |
| RJ-C | 100% ■ | | | 100 | | 25 | | | | |
| RL-C | 100% ■ | | | 125 | 100 | | | | | |

▲ Optional lugs are available. Contact your local Schneider Electric representative.

■ Can't group mount 100% rated 1000 A and 1200 A PowerPact P-frame circuit breakers. Use PowerPact R-frame circuit breakers for this application.

For I-Line interior selection and section dimensions, see page 23.

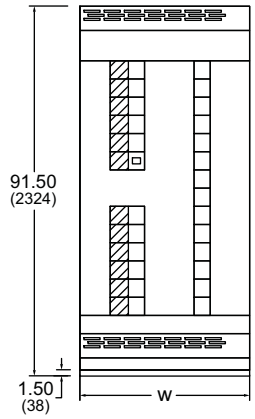
See pages 13-15 for details on Electronic Trip Systems for PowerPact M- P-, and R-frame circuit breakers.

## Group-Mounted Interiors

**NOTE:** All sections have a minimum depth of 24 in., unless noted.

**Full-Height I-Line Distribution Sections** (For conduit area, see page 40.)

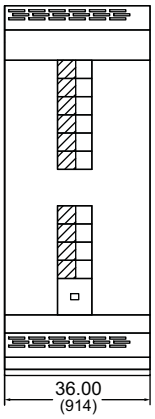
**2000 A Interior ▲**




| Width (W) | Max. C/B Frame (A) | |
|---|---|---|
| | Left Side | Right Side |
| 36 in. | Q: 250 | F: 100 |
| 42 in. | L: 600 | J,Q: 250 |
| 48 in. | R: 1200 | J,Q: 250 |

Mounting space: L = 54 in.
R = 63 in.

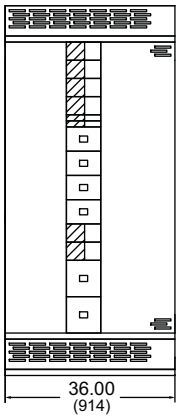
**2000 A Interior ▲**




| Max. C/B Frame (A) |
|---|
| R: 1200 |

Mounting space = 54 in.

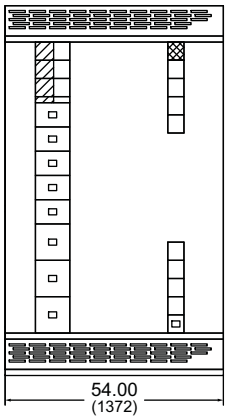
**2000 A Interior ▲**




| Max. C/B Frame (A) |
|---|
| R: 1200 |

Mounting space = 72 in.

**3000 A Interior ▲**

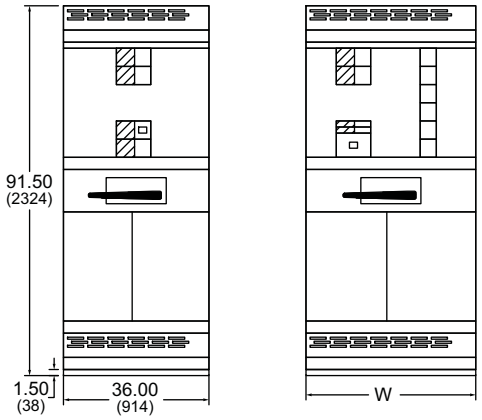



| Max. C/B Frame (A) | |
|---|---|
| Left Side | Right Side |
| R: 1200 | J,Q: 250 |

Mounting space: L = 72 in.
R = 40.5 in.
Minimum depth is 36 in.

**Combination Main or UCT and I-Line Distribution Sections ■**

**1000 A, 1600 A, or 2000 A Interior (Based on Main Ampacity)▲**



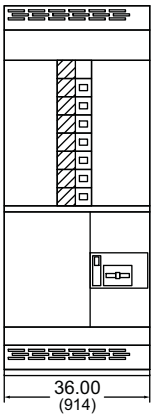

**1600 A Max BP—Lug In**
**2000 A Max BP—Through Bus In**

| Max. C/B Frame (A) |
|---|
| P: 1200 |

Mounting space = 18 in.

| Width (W) | Max. C/B Frame (A) | |
|---|---|---|
| | Left Side | Right Side |
| 36 in. | J,Q: 250 | F: 100 |
| 42 in. | L: 600 | J,Q: 250 |
| 48 in. | R: 1200 | J,Q: 250 |

Mounting space = 45 in.

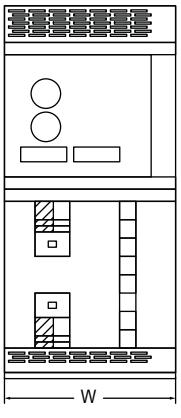



**Main = PowerPact M, P, or R**

| Max. C/B Frame (A) |
|---|
| P: 1200 |

Mounting space = 36 in.

**1000 A Interior ▲**

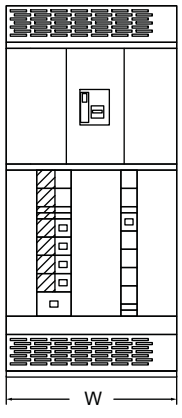



**Utility in Combination with I-Line Distribution**

| Width (W) | Max. C/B Frame (A) | |
|---|---|---|
| | Left | Right |
| 36 in. | J,Q: 250 | F: 100 |
| 42 in. | L: 600 | J,Q: 250 |
| 48 in. | P: 1200 | J,Q: 250 |

Mounting space = 63 in.

**42 in. W = 1200 A Interior ▲**
**48 in. W = 2000 A Interior ▲**




**Main = PowerPact M, P, or R**

| Width (W) | Max. C/B Frame (A) | |
|---|---|---|
| | Left | Right |
| 36 in. | — | — |
| 42 in. | P: 1200 | J,Q: 250 |
| 48 in. | R: 1200 | J,Q: 250 |

Mounting space = 63 in.

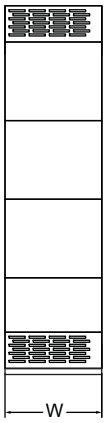
▲ With unknown loading, the minimum ampacity of the interior bus is as follows per UL 891: 1 device = 100% of rating; 2–3 devices = 80% of sum of ratings; 4–6 devices = 70% of sum of ratings; 7–12 devices = 60% of sum of ratings; over 12 devices = 50% of sum of ratings.

■ The main can be on top or bottom, depending on the feed direction. The distribution is at the opposite end.

**NOTE:** R main circuit breakers are not available for 42 in. (1067 mm) wide enclosures.

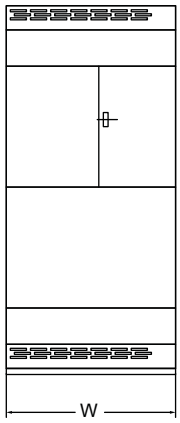
## Auxiliary Sections, NEMA Utility, and Individually Mounted Mains

### Bussed Auxiliary Sections




| Ampacity (A) | Width (W) |
|---|---|
| 800–2000 | 24 in. |
| 2500 | 36 in. |
| 3000–4000 | 42 in. |
| 5000 | 48 in. |

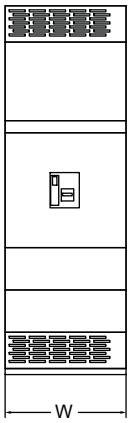
### NEMA Full Height Utility Compartment




| Ampacity (A) | Width (W) |
|---|---|
| 400–1200 | 36 in. |
| 1600–4000 | 42 in. |

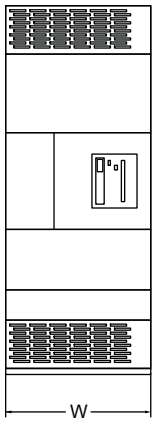
### Individually Mounted Mains

#### PowerPact M, P, and R




| Type | Ampacity (A) | Width (W) |
|---|---|---|
| M | 800 | 30 in. |
| P | 1200 | |
| R | 2500 | 36 in. |

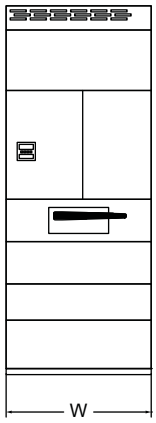
#### Masterpact NW




| Ampacity (A) | Width (W) | Depth (D) |
|---|---|---|
| 800–3000 | 36 in. | 36 in. |
| 4000 | 42 in. | 48 in. |
| 5000 | 48 in. | |

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

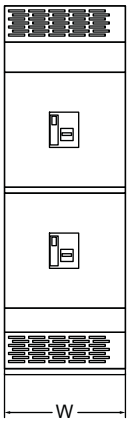
#### BP Switch



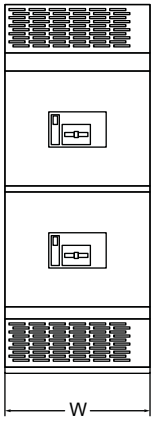

| Ampacity (A) | Width (W) |
|---|---|
| 800–2000 | 36 in. |
| 2500–3000 | 42 in. |
| 4000 | 48 in. |

## Stacked Mains

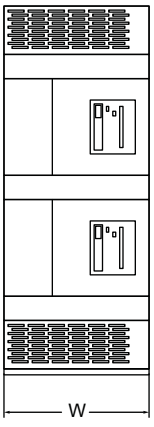
### PowerPact M and P




### PowerPact R

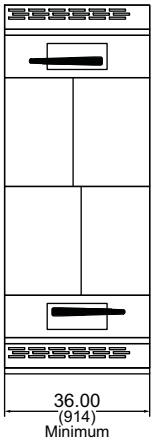



### Masterpact NW




| 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 NW | 2000 | 2000 | |

### BP Switch




See the “Stacked Devices—Type BP” table on page 27 for maximum switch ampacity and dimensions.

### Depth Dimensions

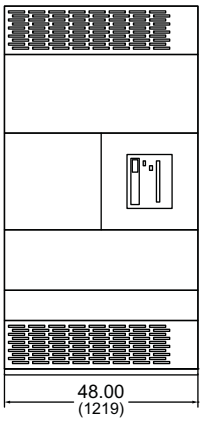
| System Ampacity (A) | Depth ▲ |
|---|---|
| 400–2500 | 24 in. (610 mm) |
| 3000 | 36 in. (914 mm) |
| 4000–5000 | 48 in. (1219 mm) |
| **Close-Coupled to Transformer** | |
| up to 5000 | 60 in. (1524 mm) |

▲ 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.

## Quick Layout Guide

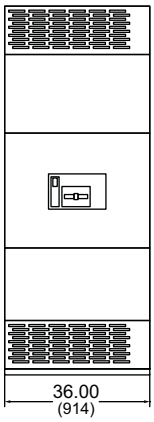
### Tie Devices

**Masterpact NW and PowerPact R Tie**



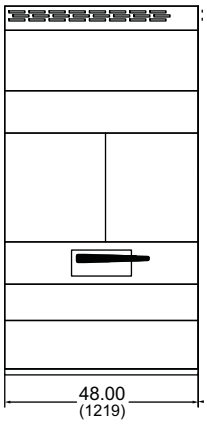

**48 in. (1219 mm) Deep**

**PowerPact P Tie**




**24 in. (610 mm) Deep**

**BP Switch Tie**




**36 in. (914 mm) Deep**

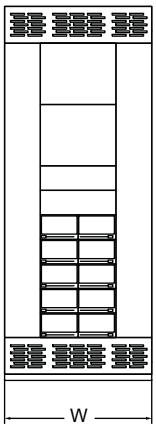
### Depth Dimensions

| System Ampacity (A) | Depth ▲ |
|---|---|
| 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) |

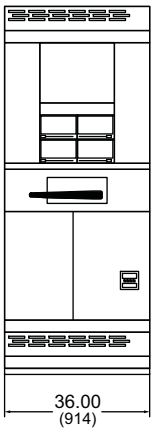
▲ For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm) to depth in front and 0.50 in. (13 mm) to depth in rear.

### Group Mounted Fusible and Lever Bypass CMM

**QMB Distribution**

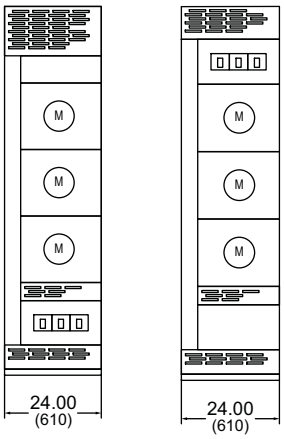



**BP Combo with QMB Distribution**




**2000 A max. (1600 A max. if BP switch is at top)**

**Commercial Multi-Metering (CMM) Lever Bypass ■**




**Hot Sequence** **Cold Sequence**

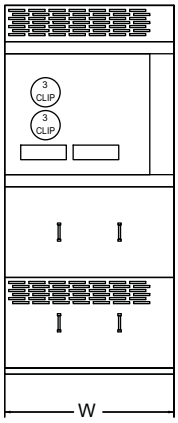
■ For non-EUSERC applications only. See page 26 for EUSERC CMM options.

| Maximum Switch Ampacity (A) | Width (W) | Interior Ampacity (A) |
|---|---|---|
| 400 | 36 in. (914 mm) | 2000 |
| 1200 | 42 in. (1067 mm) | |
| (2) 1200 | 48 in. (1219 mm) | 3000 |

# EUSERC Switchboards

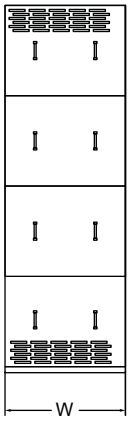
## UGPS and Utility/Main Combination Sections

**Reverse Feed Utility Compartment**



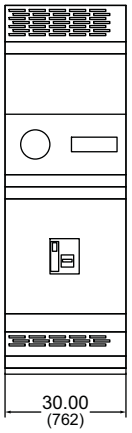

| Ampacity (A) | Width (W) |
|---|---|
| 1000 | 36 in. |
| 1200–2000 | 42 in. |
| 2500–3000■ | 48 in. |
| 4000■ | 54 in. |

**Utility UGPS**

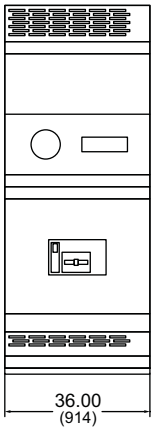



| Ampacity (A) | Width (W) |
|---|---|
| 400–800 | 30 in. |
| 1000–1200 | 36 in. |
| 1500–2000 | 42 in. |
| 2500–4000 | 48 in. |

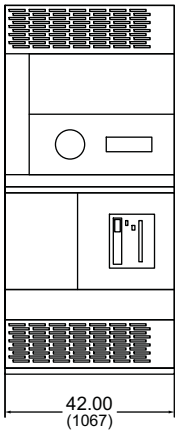
**Combination Utility Compartment / PowerPact M and P ▲**



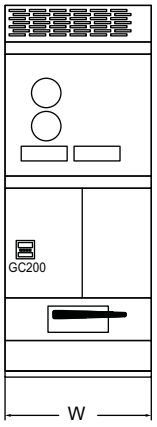

**Combination Utility Compartment / PowerPact R ▲**




**Combination Utility Compartment / Masterpact NW ▲**




**Combination Utility Compartment / BP Fusible Switch ▲**




| Ampacity (A) | Width (W) |
|---|---|
| 2000 | 36 in. |
| 3000 | 42 in. |
| 4000 | 48 in. |

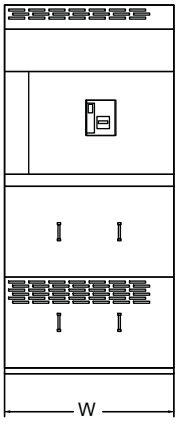
▲ Requires bottom-feed, full-height UGPS.

■ EUSERC limit is 2000 A. Check your local utility for 2500, 3000, and 4000 A acceptability.

## Reverse Feed Mains and CMM

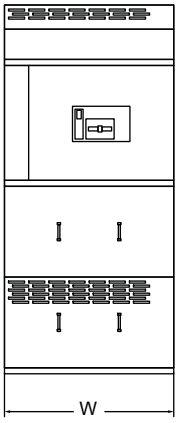
**Individually Mounted, Reverse Feed Mains**

**PowerPact M and P**



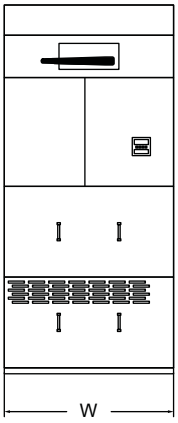

| Type | Maximum Ampacity (A) | Width (W) |
|---|---|---|
| M | 800 | 36 in. |
| P | 1200 | 42 in. |

**PowerPact R**




| Type | Maximum Ampacity (A) | Width (W) |
|---|---|---|
| R | 2000 | 42 in. |

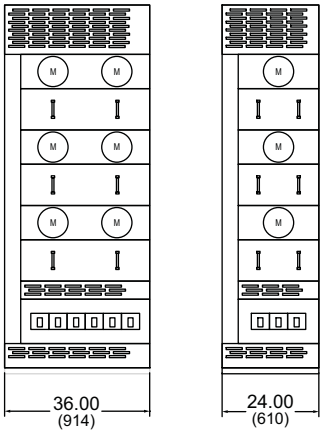
**BP Switch**




| Ampacity (A) | Width (W) |
|---|---|
| 800–1600 | 42 in. |

**Commercial Multi-Metering (CMM)**

**Hot Sequence**




**6-socket Section** **3-socket Section**

# Fusible Switch Selection (non-EUSERC)

## BP Main and Branches

### Individually Mounted Bolt-Loc Type BP Switches (100% Rated)

| Switch Type | Switch Rating (A) | Mounting Height | | | Section Dimensions | Main Lug Size (kcmil) |
|---|---|---|---|---|---|---|
| | | Middle | Top | Bottom | Width (W) | |
| Bolt-Loc Type BP<br>Fuse Type L<br>Rated 100 kA | 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 |

### Stacked Devices—Type BP

| System Ampacity (A) | Maximum Switch Ampacity (A) | | Minimum Section Dimensions | |
|---|---|---|---|---|
| | Top | Bottom | Width | Depth ▲ |
| 2000 | 800 | 1200 | 36 in. (914 mm) | 36 in. (914 mm) |
| 2500 | 1200 | 1200 | | |
| | 800 | 1600 | | |
| 3000 | 800 | 2000 | | |
| | 1200 | 1600 | | |
| 4000 | 800 | 2000 | | 48 in. (1067 mm) |
| | 1200 | 1600 | | |

▲ With top or bottom through bus, the minimum depth is 48 in.

### 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 | |

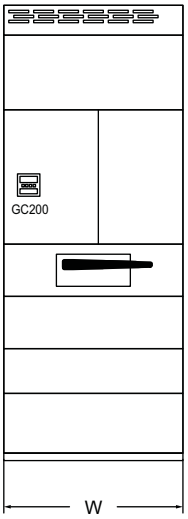
### Depth Dimensions

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

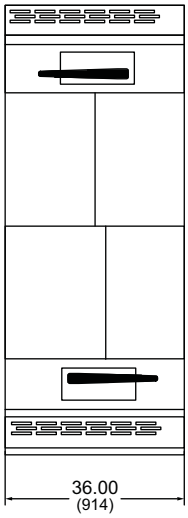
■ For NEMA Type 3R (outdoor) construction, add 11.50 in. (292 mm) to depth in front, and 0.50 in. (13 mm) to depth in rear.

### Fusible Switch 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
- Schneider Electric key interlock
- Padlock attachment
- Zone selective interlocking interface
- Phase monitor—for voltage imbalance, low voltage, or phase reversal
- Auxiliary switch




**2500 A BP Fusible Switch with Ground Fault Protection**




**BP Switch Stacked Devices**

For conduit area, see page 40.

### Reverse Feed Fusible Mains

| Type | Ampacity (A) | SCCR | | Width (W) | Main Lug Information | |
|---|---|---|---|---|---|---|
| | | Fuse Type | 240/480 V | | Quantity (per phase) | Size (kcmil) |
| MCS ♦ | 400–800 | J, T | 100 kA | 36 in. (914 mm) | 3 | #3/0 - 750 |
| | 800 | L | | | | |
| BP | 800–1600 | | | 42 in. (1067 mm) | 4 | |

♦ MCS = molded case switch.

For additional information or clarification on Type BP fusible switches, see instruction bulletin # 9810-1, *Bolt-Loc Type BP Switches, Series 2,* or contact your local Schneider Electric representative.

## QMB/QMJ Main and Branches

Short circuit rating of QMB/QMJ switches and panel is equal to the lowest fuse interrupting rating to be installed in the switches. Fuses are not included.

DC ratings available on 2-pole switches only. For dc short circuit current rating, contact the fuse manufacturer.

A twin fusible switch equipped with a blank cannot be equipped with a fusible switch in the future.

## Section Options

- Full height single main with distribution. See the “Single Main Fusible Switch” table below for feeder mounting availability.
- Full height distribution: 72 in. of QMB/QMJ mounting.
- BP switch main in combination with partial height distribution (400 A maximum): 30 in. of QMB/QMJ mounting.
- Utility compartment in combination with group mounted multiple main QMB/QMJ switches (400 A maximum): 30 in. of QMB/QMJ mounting. See the “Utility Compartment with QMB/QMJ Switches b” table below.
- See switch mounting requirements in the “Group Mounted Switches” table on page 29.

**Single Main Fusible Switch—Up to 600 Vac or 250 Vdc Maximum**

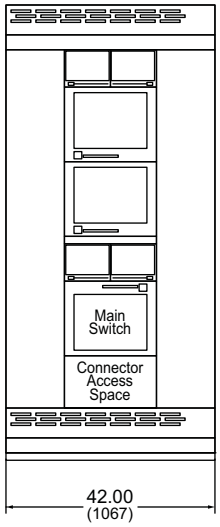
| Switch Type | Ampere Rating (A) | Class H, J, R, or L Fuse Provisions | | | | |
|---|---|---|---|---|---|---|
| | | QMB | Feeder Mounting (Inches) | | Line Lug Information | |
| | | Size (Inches) | Top Feed | Bottom Feed | Quantity (per phase) | Size (Kcmil) |
| Single switch | 400 | 25.5 in. (648 mm) | 46.5 in. (1181 mm) | 45 in. (1143 mm) | 1 | #3/0 - 600 |
| | 600 ▲ | | | | 2 | |
| | 800 | | | | 3 | |

▲ 100,000 A short circuit current rating with Class R fuses to 600 Vac.

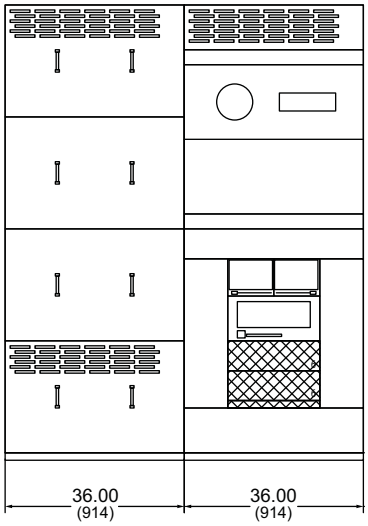
**Utility Compartment with QMB/QMJ Switches ■**

| CT Comp. Maximum (A) | Mains Maximum 800 A | Total Mounting Space | Minimum Width (W) | Pull Section Left or Right Bottom Entry | Line Lug Information (per phase) | |
|---|---|---|---|---|---|---|
| | | | | | Quantity | Size (kcmil) |
| 400–600 | QMB/QMJ | 30 in. (762 mm) | 36 in. (914 mm) | 30 in. (762 mm) | 2 | #3/0 - 750 |
| 800 | | | | | 3 | |
| 1000 | | | | 36 in. (914 mm) | 4 | |

■ Not available with non-EUSERC utilities.




**Single Main Fusible Switch**




**Utility Compartment with QMB/QMJ Distribution**

### Group Mounted Switches

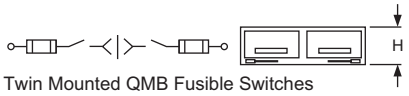
| Switch Type | Ampere Rating (A) | Mounting Height (H) | | | | Load Lug Information | |
|---|---|---|---|---|---|---|---|
| | | 240 Vac / 250 Vdc max | | 600 Vac / 250 Vdc max | | | |
| | | Class H, J, R, or L Fuse Provisions | | | | | |
| | | QMB | QMJ | QMB | QMJ | Quantity (per phase) | Size (Kcmil) |
| Twin switch | 30 - 30 | 4.5 in. (114 mm) ▲ | 4.5 in. (114 mm) | 4.5 in. (114 mm) | 4.5 in. (114 mm) | 1 | #12 - #2 AWG |
| | 30 - Blank | | — | | | | |
| | 30 - 60 | — | | 6 in. (152 mm) | 6 in. (152 mm) | | |
| | 30 - 100 | | | 7.5 in. (191 mm) | 7.5 in. (191 mm) | | — |
| | 60 - 60 | 4.5 in. (114 mm) ▲ | 6 in. (152 mm) | 6 in. (152 mm) | 6 in. (152 mm) | | #12 - #2 AWG |
| | 60 - Blank | | — | | | | |
| | 60 - 100 | — | | 7.5 in. (191 mm) | 7.5 in. (191 mm) | | — |
| | 100 - 100 | 6 in. (152 mm) ▲ | 6 in. (152 mm) | | 6 in. (152 mm) | | #14 - 1/0 AWG |
| | 100 - Blank | | | | | | |
| | 200 - 200 | — | 7.5 in. (191 mm) | — | 7.5 in. (191 mm) | | #3/0 - 600 |
| Single switch | 200 | 9 in. (229 mm) ▲ | — | 9 in. (229 mm) | — | | |
| | 400 | 15 in. (381 mm) | 9 in. (229 mm) | 15 in. (381 mm) | 9 in. (229 mm) | | |
| | 600 ■ | 15 in. (381 mm) | 15 in. (381 mm) | 15 in. (381 mm) | 15 in. (381 mm) | 2 | |
| | 800 | 15 in. (381 mm) | 15 in. (381 mm) | 15 in. (381 mm) | 15 in. (381 mm) | 3 | |
| | 1200 ♦ | 24 in. (610 mm) | 24 in. (610 mm) | 24 in. (610 mm) | 24 in. (610 mm) | 4 | |

▲ Use 600 Vac size for QMB with Class J fuse provisions.

■ 100,000 A short circuit current rating with Class R fuses to 600 Vac.

♦ 1200 A is a branch switch or group mounted six disconnect main with Class L fuses. This switch is suitable for use on systems to 600 Vac maximum at 100,000 A rms. A single main switch 1200 A must be a Bolt-Loc switch (see page 27).


**Group Mounted Switches**




Twin Mounted QMB Fusible Switches


Single Mounted QMB Fusible Switch

| Width (W) | Max. Switch Size |
|---|---|
| 36 in. (914 mm) | 400 A |
| 42 in. (1067 mm) | 1200 A |
| 48 in. (1219 mm) | (2) 1200 A |

## 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 breaker, or BP fusible switch unless stated.

- Ameren (MO)
- American Electric Power (OH)
- Appalachian Power Company (VA)
- Baltimore Gas & Electric ▲, ■
- Central Illinois Light Company (IL)
- Cincinnati Gas & Electric (OH)
- Columbus Southern Power (OH)
- Commonwealth Edison Company (IL)
- Dayton Power & Light Company (OH)
- Detroit Edison Company (MI)
- Fort Collins, City of (CO)
- Holy Cross Energy (CO)
- Indiana and Michigan Power (IN)
- Indianapolis Power & Light Company (IN) ▲
- Kansas City Power & Light Company (MO)
- Kentucky Power Company (KY)
- Kingsport Power Company (TN)
- Louisville Gas and Electric Company (KY) ▲
- Metropolitan Edison Company (PA)
- NEMA Standard Design
- Ohio Power Company (OH)
- Virginia Electric Power Company (VA) ▲
- Wheeling Power Company (WV)
- Xcel Energy Inc (MN)

**Cold Sequence Utilities**

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

▲ Large tenant mains are not available for this utility.

■ Can only be used in combination with a PowerPact R-frame main circuit breaker.

## Unlisted Utilities

There are two ways to have utility compartments built for utility companies that are not listed.

1. The unlisted utility company has no specific design, and just a bussed compartment in the service entrance equipment is required for installing CTs.

   For this application, select the listed utility company that best meets the unlisted utility requirements and provide the name of the unlisted utility company. Schneider Electric will build the utility compartment to the design standards of the listed utility selected. The “record” drawings will show the name of the unlisted utility.

2. The unlisted utility has a specific design and does not allow deviation.

   For this application, custom design and fabrication are required. The specific utility requirements will have to be provided for pricing and design.

## 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.

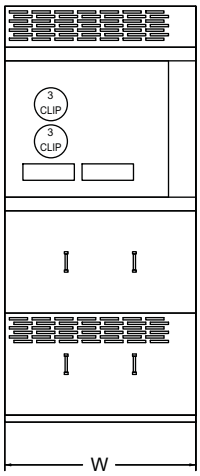
Hot Sequence Metering—In hot sequence metering, the main disconnecting device is placed behind (on the load side of) the current transformer compartment. In this arrangement, the current transformer compartment is always energized.

## 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, Oregon, Utah, Wyoming, and Washington.

### Reverse Feed Utility Compartment

| Ampacity (A) ▲ | Width (W) | Depth (D) ■ | Incoming Lug Information ♦ | |
|---|---|---|---|---|
| | | | Qty. | Size |
| 400 | 36 | 24 | 1 | #3/0-750 |
| 600 | | | 2 | |
| 800 | | | 3 | |
| 1000 | | | 4 | |
| 1200 | 42 | | | |
| 1600 | | | 5 | |
| 2000 | | | 6 | |
| 2500 ★ | 48 | | 8 | |
| 3000 ★ | | 36 | 9 | |
| 4000 ★ | 54 | 48 | 12 | |




▲ 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.

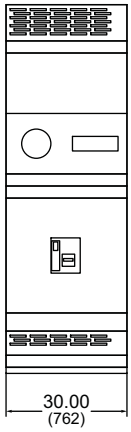
■ "D" represents the NEMA Type 1 dimension. For NEMA Type 3R construction, add 11.50 in. (292 mm) to the depth in front and 0.50 in. (13 mm) to the depth in rear.

♦ Lugs or studs are provided based on utility requirements.

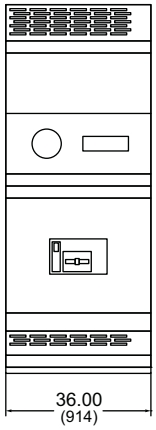
★ EUSERC limit is 2000 A. Check your local utility for 2500, 3000, and 4000 A acceptability.

### Utility/Main Combination Sections ▼

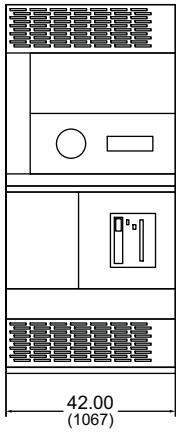
**Combination Utility Compartment / PowerPact M and P △**



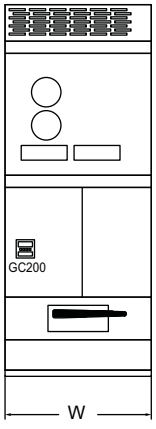

**Combination Utility Compartment / PowerPact R △**




**Combination Utility Compartment / Masterpact NW △**




**Combination Utility Compartment / BP Fusible Switch △**




▼ **Restrictions:**
Lugs Out—Max 2000 A circuit breaker or 1200 A BP fusible switch
Through Bus Out—Up to 4000 A for circuit breaker or BP fusible switch

△ Requires bottom-feed, full-height UGPS.

| Ampacity (A) | Width (W) |
|---|---|
| 2000 | 36 in. |
| 3000 | 42 in. |
| 4000 | 48 in. |

Underground Pull Sections—see page 20
Reverse Feed Mains—see page 21

## Large Tenant Mains > 400–2000 A

### Circuit Breaker Ratings and Section Dimensions

| Type ▲ | Ampacity (A) | SCCR | | Dimensions | | Load Lug Information | |
|---|---|---|---|---|---|---|---|
| | | 240 V | 480 V | Width (W) | Depth (D) ■ | 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 | | | | |

▲ 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.

■ "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.

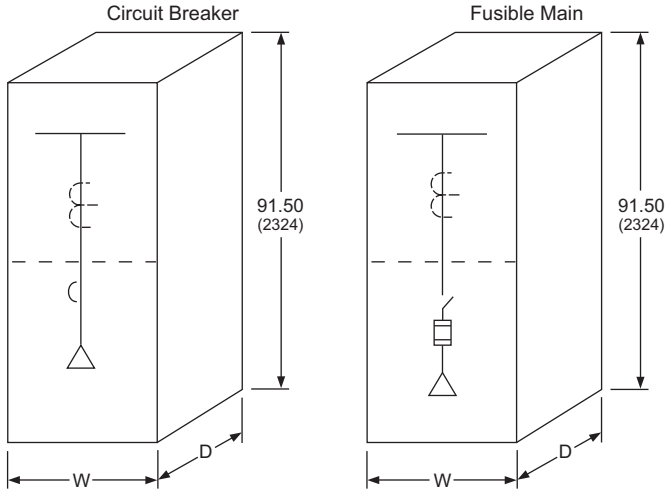
### Fusible Switch Ratings and Section Dimensions

| Type | Ampacity (A) | SCCR | | Dimensions | | Load Lug Information | |
|---|---|---|---|---|---|---|---|
| | | Fuse Type | 240/480 V | Width (W) | Depth (D) ♦ | Quantity (per phase) | Size (kcmil) |
| MCS ★ | 400-600 | J, T | 100 kA | 30 in. (762 mm) | 24 in. (610 mm) | 3 | 3/0 - 500 |
| | 800 | L | | | | | |
| BP ▼ | 800-1600 | | | 36 in. (914 mm) | | 4 | |

♦ "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.

★ MCS = molded case switch.

▼ Not available with load lugs, only available with load through bus.




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

A loadside wireway section with a minimum width of 12 in. (305 mm) can be used for top exit of load cables. A 12 in. (305 mm) wide section can only accommodate cables for one LTM. A minimum width of 24 in. (610 mm) is required between two LTMs and for NEMA Type 3R applications. Rear load wireway is only available for LTMs; it requires 12 in. (305 mm) of increased depth for other sections in the lineup.

For conduit area, see page 40.

## EUSERC Meter Section—Tenant Mains ≤ 200 A (Hot Sequence)

### Circuit Breaker Ratings

| Type | Ampacity (A) | SCCR | | Load Lug Information ▲ |
|---|---|---|---|---|
| | | 240 V | 480 V | |
| FAL | 60–100 | 22 kA | 18 kA | #12 - 1/0 AWG Al or Cu |
| FHL | | 65 kA | 18 kA | |
| HJL | | 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■ | 110–200 | 22 kA | N/A | |
| QGL■ | | 65 kA | N/A | |
| QJL■ | | 100 kA | N/A | |

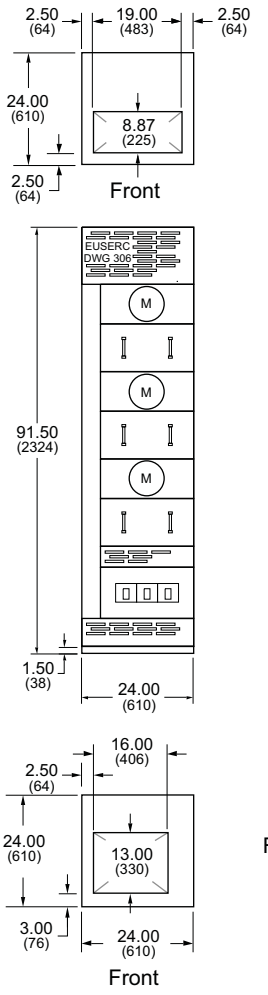
▲ Neutral lug terminations are #6 - 350 kcmil.

■ A shunt trip is not available for PowerPact Q-frame circuit breakers.

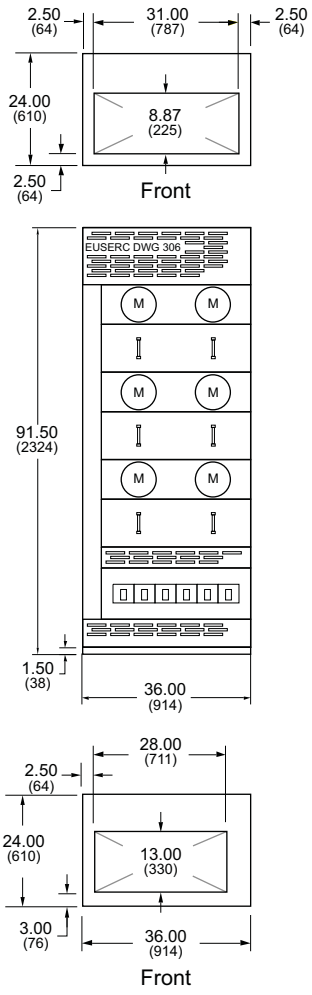
### Fusible Pullout Ratings

| Type | Ampacity (A) | SCCR | | Load Lug Information ▲ |
|---|---|---|---|---|
| | | 240 V | 480 V | |
| FTL3100 | 100 | 100 kA | N/A | #14 - 1/0 AWG |
| FTL3200 | 200 | 100 kA | N/A | #4 - 250 kcmil |
| FTL43060 | 60 | N/A | 100 kA | #14 - #2 |
| FTL43100 | 100 | N/A | 100 kA | #14 - 1/0 AWG |
| FTL43200 | 200 | N/A | 100 kA | 1/0 AWG - 300 kcmil |

3-Socket Main




6-Socket Main




Top View

Floor Plan

Front

Front

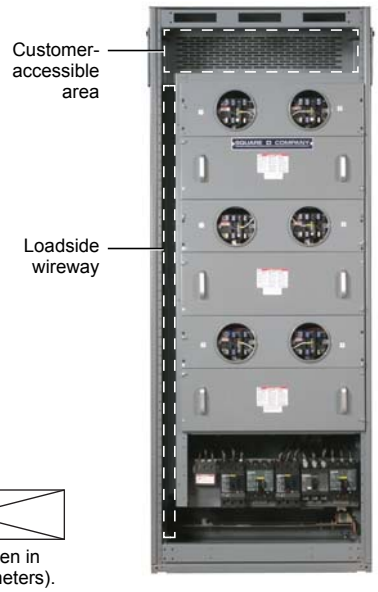
### Depth Dimensions

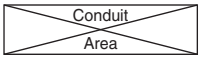
| System Ampacity (A) | Depth ♦ |
|---|---|
| 400–2500 | 24 in. (610 mm) |
| 3000 | 36 in. (914 mm) |
| 4000 | 48 in. (1219 mm) |

♦ 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.

#### 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.




Dimensions given in INCHES (millimeters).

## Non-EUSERC Lever Bypass Meter Section—Tenant Mains ≤ 200 A (Hot and Cold Sequence)

### Circuit Breaker Ratings

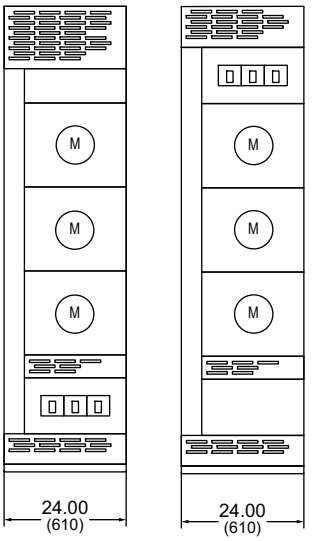
| Type | Ampacity (A) | SCCR | | Load Lug Information ▲ |
|---|---|---|---|---|
| | | 240 V | 480 V | |
| FAL | 60–100 | 22 kA | 18 kA | #12 - 1/0 AWG Al or Cu |
| FHL | | 65 kA | 18 kA | |
| HJL | | 100 kA | 65 kA | #4-3/0 kcmil Al or Cu |
| HDL | 110–150 | 22 kA | 18 kA | |
| HGL | | 65 kA | 35 kA | |
| 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 | |

▲ Neutral lug terminations are #6 - 350 kcmil.

### Fusible Pullout Ratings

| Type | Ampacity (A) | SCCR | | Load Lug Information ▲ |
|---|---|---|---|---|
| | | 240 V | 480 V | |
| FTL43060 | 60 | N/A | 100 kA | #14 - #2 |
| FTL43100 | 100 | N/A | 100 kA | #14 - 1/0 AWG |
| FTL43200 | 200 | N/A | 100 kA | 1/0 AWG - 300 kcmil |

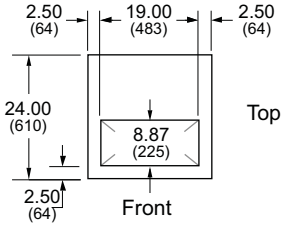
### 3-Socket Main



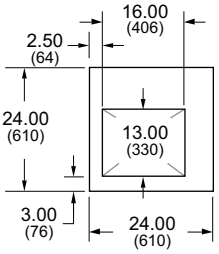

Hot Sequence




Cold Sequence




Top View




Floor Plan

Conduit Area

Dimensions given in INCHES (millimeters).

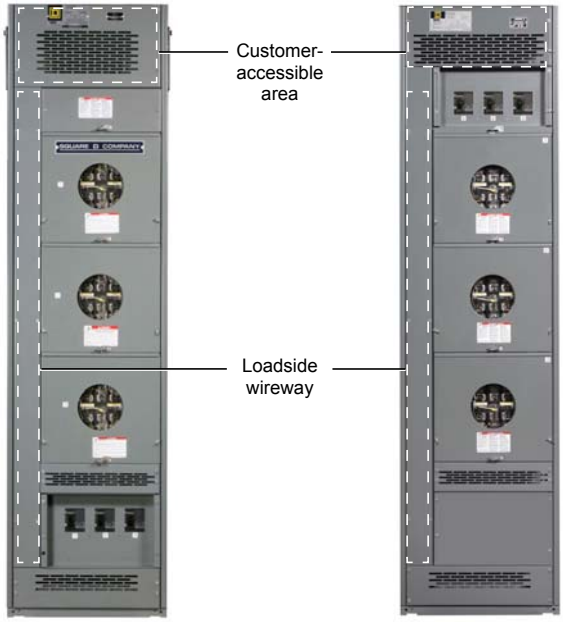
### Depth Dimensions

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

♦ 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.

#### 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.




Hot Sequence

Cold Sequence

# QED-2 Quick Connect Generator Switchboards

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.

### Specifications for Generator Circuit Breaker Section ▲

| 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 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 |

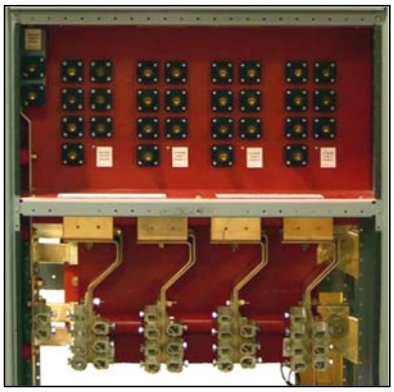
▲ 1200–2500 A use PowerPact R-frame circuit breakers; 3000 and 4000 A use Masterpact NW circuit breakers.

### 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 Receptacle) |
|---|---|---|---|---|---|---|---|
| 1200 | 65 k | 1 | 36 | 24 or 36 | Yes | Yes | 3 |
| 1600 | | | | | | | 4 |
| 2000 | | | | | | | 5 |
| 2500 | | | | | | | 7 |
| 3000 | | | 42 | 36 | | | 9 |
| 4000 | | | | 48 | | | 12 |

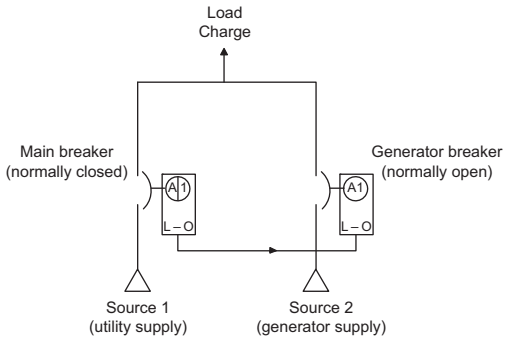
Quick Connect Generator Switchboard NEMA Type 3R Section

Hubbell Separable Connectors with Type W Cable Installed



Quick Connect Compartment Showing Hubbell Plug-In Receptacles and Lugs for Type W Cable

## 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 breakers.
2. Open the main breaker and rotate the key A1 to lock the breaker in the open position; key is now removable.
3. Remove generator breaker receptacles cover or generator breaker lugs cover.
4. Connect generator cables to either the receptacles or to the generator 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 breaker.
7. Rotate key A1 to unlock generator 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 breaker, close appropriate distribution breakers.

**Return of Utility Power**

1. Open distribution breakers.
2. Open generator breaker and rotate the key A1 to lock the breaker in the open position; key is now removable.
3. Remove key from the lock and insert into the lock on the main 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 breaker; key is now held captive.
8. Close main breaker, close all distribution 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, QMB mount, or individual mount in the instrument compartment.

### Common Features

- UL 1449 Recognized, 3rd edition
- Copper internal bus for the 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

  **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

- Surge Counter
- Remote Monitor

I-Line SPD

### I-Line Mount SPD

- Comes with circuit breaker disconnect
- Requires 13.5 in. interior mounting space

### QMB Mount SPD

- Comes with QMB unit disconnect
- Requires 9 in. of interior mounting space

QMB SPD

### 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.

# Automatic Throwover Systems

## Standard Features

The following features are standard for a Square D™ brand automatic throwover system. The standard system features a Modicon™ microprocessor, plug-in technology for ease of retrofit/installation, and programmable capability.

| Description | Main-Tie-Main | Main-Main | Main-Generator | Main-Tie-Generator |
|---|---|---|---|---|
| Automatic transfer to alternate source, automatic retransfer to normal source | ✔ | — | ✔ | ✔ |
| Automatic transfer to alternate source, manual return normal source | — | ✔ | — | — |
| Bypass of retransfer delay if emergency fails | ✔ | ✔ | ✔ | ✔ |
| Electrically interlocked | ✔ | ✔ | ✔ | ✔ |
| Manual circuit breaker close buttons inhibited | ✔ | ✔ | ✔ | ✔ |
| Transition delay (2 seconds), open and closed transition | ✔ | ✔ | ✔ | ✔ |
| Source loss delay (3 seconds), before transfer | ✔ | ✔ | ✔ | ✔ |
| Source stabilization timer (10 seconds) before retransfer | ✔ | ✔ | ✔ | ✔ |
| Undervoltage sensing on both sources, standard 100% nominal, 10% differential, adjustable | ✔ | ✔ | ✔ | ✔ |
| Phase sequence sensing on both sources, 2 cycles | ✔ | ✔ | ✔ | ✔ |
| Phase imbalance, 2%, adjustable | ✔ | ✔ | ✔ | ✔ |
| Phase loss, 68% phase loss | ✔ | ✔ | ✔ | ✔ |
| Auto/manual keyed switch w/ white light for auto and blue light for manual | ✔ | ✔ | ✔ | ✔ |
| Control power transfer | ✔ | ✔ | ✔ | ✔ |
| Full automatic mode with drawout breakers in the test position | ✔ | ✔ | ✔ | ✔ |
| Open (green) / close (red) lighted push buttons | ✔ | ✔ | ✔ | ✔ |
| Test switch—simulates loss of source | ✔ | ✔ | ✔ | ✔ |
| Circuit breaker electrical trip lockout w/ amber light indication | ✔ | ✔ | ✔ | ✔ |
| Uninterruptible power supply for 120 Vac control power | ✔ | ✔ | ✔ | ✔ |
| UPS bypass relay | ✔ | ✔ | ✔ | ✔ |
| Sources available (white) lights | ✔ | ✔ | ✔ | ✔ |
| Operator interface panel | ✔ | ✔ | ✔ | ✔ |
| Wire labels | ✔ | ✔ | ✔ | ✔ |
| Fused control circuits with individual blown fuse indication | ✔ | ✔ | ✔ | ✔ |
| Over-voltage sensing on generator (59),Standard 125% of nominal, 15% differential, adjustable | — | — | ✔ | ✔ |
| Frequency sensing on generator (81), standard 3 Hz differential, 0.1–3 Hz, adjustable | — | — | ✔ | ✔ |
| Engine start contacts, 5 A @ 120 Vac | — | — | ✔ | ✔ |
| Open transition | ✔ | ✔ | ✔ | ✔ |
| Remote alarm contact wired (system inoperative), 5 A @ 120 Vac | ✔ | ✔ | ✔ | ✔ |
| Generator exercising unloaded, 30 minutes, once per week | ✔ | ✔ | ✔ | ✔ |
| Time delay for engine cool down, 15 minutes unloaded standard | — | — | ✔ | ✔ |

**NOTES:** For Masterpact NW arrangements, an automatic throwover system is approved for use as a transfer switch per UL1008 for main-main and main-generator construction only. 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.

### Optional Features

| Description | Main-Tie-Main | Main-Main | Main-Generator | Main-Tie-Generator |
|---|---|---|---|---|
| Closed transition on retransfer | | | | |
| Sync check (25), 2-seconds maximum paralleling when sources synchronized | ✔ | ✔ | ✔ | ✔ |
| Voltage 10%–30% adjustable, phase relationship is 6° to 20° and frequency is 0.15 Hz to 0.5 Hz | | | | |
| Generator exercise with load switch | — | — | ✔ | ✔ |
| Preferred source selector (Left-Off-Right), Left is standard | ✔ | ✔ | — | — |
| Automatic retransfer to normal switch | ✔ | ✔ | ✔ | ✔ |
| Touchscreen HMI | ✔ | ✔ | ✔ | ✔ |
| Remote alarm contact (system inoperative), 5 A @ 120 Vac | ✔ | ✔ | ✔ | ✔ |
| Closed transition on retransfer<br>Sync check (25), 2-seconds maximum paralleling when sources synchronized, voltage 10%–30% adjustable, phase relationship is 6° to 20° and frequency is 0.15 Hz to 0.5 Hz | | ✔ | | |
| Time delay for engine cool down, 15 minutes unloaded standard | — | — | ✔ | ✔ |
| Generator exercise with load switch | — | — | ✔ | ✔ |
| Preferred source selector (Left-Off-Right), Left is Standard | ✔ | ✔ | — | — |
| Automatic retransfer to normal switch | ✔ | — | — | — |

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)

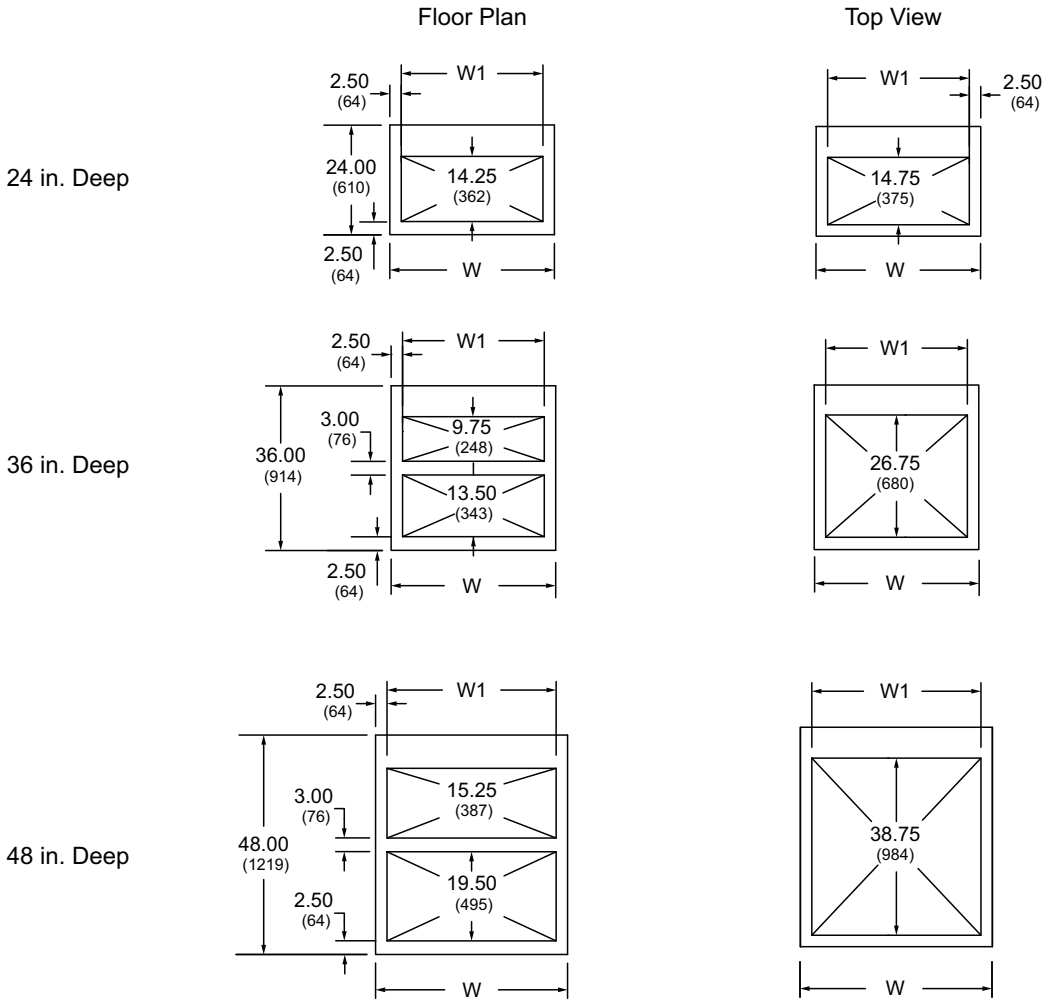
Automatic throwover systems are complex and can require adjustments during start-up.

## Automatic Transfer Switches

Ratings, standard widths, and depths are not available due to variations between manufacturers. Please contact your local Schneider Electric representative for detailed information.

## 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

Dimensions given in INCHES (millimeters).

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

| | | | | | |
|---|---|---|---|---|---|
| Width (W) | 30 in. (762 mm) | 36 in. (914 mm) | 42 in. (1087 mm) | 48 in. (1219 mm) | 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) |

## Main Circuit Breaker QED-2 Switchboards

The following table contains UL Tested and Certified series combination ratings for Square D™ brand QED-2 Switchboards. The line-side circuit breaker may be a submain, an integral main, or a remote main located in a separate enclosure. The load-side circuit breaker may be a branch, a submain, or an integral main used on the load side of a remote main. These series-combination, short-circuit current ratings (SCCR) shall not exceed the rating of the line-side circuit breaker.

**QED-2 Switchboards: Main Circuit Breaker with I-Line or NQ Distribution**

| Maximum System Voltage (AC) | Maximum SCCR in RMS Symm Amps (kA) | Line-Side Circuit Breaker | Load Side | |
|---|---|---|---|---|
| | | | Square D™ Brand Circuit Breaker | Poles |
| 240 | 35 | MG | FA | 1 |
| | 42 | MA, LA | QD (225 A max.) | 2, 3 |
| | 50 | MG | FA | |
| | | MG | FA (25 A max.) | 1 |
| | 65 | LH (400 A max.) | QD (225 A max.) | 2, 3 |
| | | MH, PA (1600 A max.) | QD (225 A max.) | |
| | | MG | KA, QD (225 A max.) | |
| | | PG, RG (1200 A max.) | QD (225 A max.) | |
| | | DG | MA (600 A Max.), FH, HD, JD, KA, LA | |
| | | LG | MA (600 A Max.), HD, JD, KA, LA | |
| | | | LD | 3 |
| | 85 | RL | FH, KH | 2, 3 |
| | 100 | FC, KC | FA, FH, FD, FG, FJ | |
| | | LC, LX | FH, FD, FG, FJ | |
| | | KC, LC | KA, KH | |
| | | MJ, LC | LA, LH | |
| | | LX | LA, KA | |
| | | PJ | QD (225 A max.) | |
| | | PH (1600 A max.) | QD (225 A max.) | |
| | | RJ (1200 A max.) | QD (225 A max.) | |
| | | LC, LX | MG | |
| | | DJ | MA (600 A max.), MG (600 A max.), FH, HD, HG, JD, JG, KA, LA | |
| | | DL | MG (600 A max.) | |
| | | LJ | MA (600 A max.), MG (600 A max.), FH, HD, HG, JD, JG, KA, LA | |
| | | | LD, LG | 3 |
| | 125 | RL | HD, HG, JD, JG, RG | |
| | 200 | FI, KI | FA, FH, FC, FD, FG, FJ, HD, HG, HJ | |
| | | LI | FH, FC, HD, HG, HJ, KC, LA, LH, KA, KC, KH, HD, HG, HJ, JD, JG, JJ | |
| | | LXI | FH, HD, HG, HJ, LA | |
| | | LXI, KI | KA, KH, HD, HG, HJ, JD, JG, JJ | |
| | | KI, LI, LXI | QD (225 A max.) | |

**QED-2 Switchboards: Main Circuit Breaker with I-Line or NQ Distribution**

| Maximum System Voltage (AC) | Maximum SCCR in RMS Symm Amps (kA) | Line-Side Circuit Breaker | Load Side | |
|---|---|---|---|---|
| | | | Square D™ Brand Circuit Breaker | Poles |
| 277V | 18 | LD | FY | 1 |
| | 35 | DG | FH, FY | |
| | | LG | FH, FY | |
| | 65 | FC, KC | FA, FH, FY, FD, FG | |
| | | LC, LX (400 A max.) | FH | |
| | | LC, LX (600 A max.) | FY, FD, FG | |
| | | DJ | FH, FY | |
| | | DL | FY | |
| | | LJ | FH, FY | |
| | | LL | FY | |
| | 100 | DL | FH, FJ | |
| | | LL | FH, FJ | |
| | 200 | FI, KI | FA, FH, FY, FD, FG, FJ | |
| | | LI, LXI (400 A max.) | FH, HD, HG, HJ | |
| | | LI, LXI (600 A max.) | FY, FD, FG, FJ | |
| 480V | 22 | MG | FA | 2,3 |
| | 30 | KH, LA, MA, MX | FH, HD | |
| | | PA, PC, PX | FH | |
| | | LA, MA, PA, PC, PX | KA | |
| | | MG | FA (25 A max.), FH, KA | |
| | 35 | MG, PG | HD, JD | |
| | | DG | MA (600 A max.), FH, HD, JD, KA, LA | |
| | | LG | MA (600 A max.), FH, HD, JD, KA, LA | |
| | | | LD | 3 |
| | 42 | MJ | FH (25 A max.) | 2,3 |
| | 50 | MJ | KH | |
| | 65 | FC, KC | FA, FH | |
| | | LC, LX (400 A max.) | FH, HD, HG | |
| | | KC, LC | KA, KH | |
| | | LC | LA, LH | |
| | | LX | KA, LA | |
| | | DJ | MA (600 A max.), FH, HD, HG, JD, JG, KA, LA | |
| | | LJ | MA (600 A max.), FH, HD, HG, JD, JG, KA, LA | |
| | | | LD, LG | 3 |
| | 100 | LI | KA, KH | 2,3 |
| | | LXI (600 A max.) | KA | |
| | | RL | RG | |
| | | DL | MA (600 A max.), FH, HD, HG, HJ, JD, JG, JJ, KA, LA | |
| | | LL | MA (600 A max.), FH, HD, HG, HJ, JD, JG, JJ, KA, LA | |
| | | | LD, LG, LJ | 3 |
| | 200 | FI, KI | FA, FH, FC | |
| | | LXI (400 A max.) | FH, HJ, HL | |
| | | LI | FH, FC, HJ, HL, KC, LA | |
| | | KI, LI | KA, KH | |
| 480Y/277V | 25 | FH, KA | FD | |
| | 35 | KH, LH | FD | |
| | 65 | FC, KC, LC, LX (600 A max.) | FD, FG | |
| | 200 | FI, KI, LI, LXI (600 A max.) | FD, FG, FJ | |

## Fusible Main QED-2 Switchboards

The following table contains UL Tested and Certified series-combination ratings for Square D™ brand QED-2 Switchboards. The line-side fused switch may be a submain, an integral main or a remote main located in a separate enclosure. The load-side circuit breaker may be a branch, a submain, or an integral main used on the load side of a remote main. These series-combination, short-circuit current ratings (SCCR) shall not exceed the rating of the line-side fused switch.

**QED-2 Switchboards: Fusible Main with I-Line or NQ Distribution**

| Maximum System Voltage (AC) | Maximum SCCR in RMS Symm Amps (kA) | Line-Side Fuse | | Load Side |
|---|---|---|---|---|
| | | Maximum Amperage | Fuse Class | Square D™ Brand Circuit Breaker (2- or 3-pole) |
| 240 | 65 | 600 | J or R | QD |
| | | 800 | T (600 V) | QD |
| | | 1200 | L | QD |
| | 100 | 600 | J | HD, HG, HJ, HL, JD, JG, JJ, JL |
| | | | J or R | QD, QG (2-pole) |
| | | | L or T (600 V) | FA, FH, KA, KH, KC, LA, LH, MA, MH, MX, PG |
| | | | R | FH, HD, HG, HJ, HL, KA, KH, JD, JG, JJ, JL, LA, LH, MA, MH, MX, PG |
| | | 800 | T (600 V) | QD, QG (2-pole) |
| | | | L or T (600 V) | FH, KA, KH, LA, LH, MA, MH, MX, PG |
| | | 1200 | T (600 V) | HD, HG, HJ, HL, JD, JG, JJ, JL |
| | | 1200 | L | QD, QG (2-pole) |
| | | | | FH, KH, LA, LH, MA, MH, MX, PG |
| | | 2000 | | KH, MA, MH, MX, PG |
| | 200 | 600 | J | FA (3-pole only), FH, FC, HD, HG, HJ, HL, KA, KH, KC, JD, JG, JJ, JL, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 600 | T (600 V) | FA (3-pole only), FH, FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 600 | R | FH, FC, HD, HG, HJ, HL, KH, KC, JD, JG, JJ, JL, LA, LH, LC, MA, MH, MX, NC, NX, PG, PJ, PL |
| | | 800 | T (600 V) | FH, FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 800 | L | FH, FC, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 1200 | T (600 V) | HD, HG, HJ, HL, JD, JG, JJ, JL |
| | | 1200 | L | FC, KH, KC, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 2000 | | NA, NC, NX, PJ, PL |

**QED-2 Switchboards: Fusible Main with I-Line or NQ Distribution**

| Maximum System Voltage (AC) | Maximum SCCR in RMS Symm Amps (kA) | Line-Side Fuse | | Load Side |
|---|---|---|---|---|
| | | Maximum Amperage | Fuse Class | Square D™ Brand Circuit Breaker (2- or 3-pole) |
| 480V | 100 | 600 | J | FC, HJ, HL, KA, KH, KC, JJ, JL, LA, LH, LC, MA, MH, MX, NA, PG, PJ |
| | | 600 | T (600 V) | FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ |
| | | 600 | R | FC, HJ, HL, KA, KH, KC, JJ, JL, LA, LH, LC, MA, MH, MX, NA, PG, PJ |
| | | 800 | L or T (600 V) | FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ |
| | | 1200 | T (600 V) | HJ, HL, JJ, JL |
| | | 1200 | L | FC, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ |
| | | 1600 | | KC, LC, MA, MH, MX, NA, PG, PJ |
| | | 2000 | | KC, LC, MG, MH, MJ, MX, NA, PG, PJ |
| | 200 | 400 | J | FA, FH, FC, HJ, HL, KA, KH, KC, JJ, JL, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 400 | T (600 V) | FA, FH, FC, HJ, HL, KA, KH, KC, JJ, JL, LA, LH, LC, MA, MH, MX, NA, NC, NX |
| | | 600 | J | FC, KA, KH, KC, LA, LH, LC, MA, MG, MH, MJ, MX, NA, NC, NX, PG, PJ, PL |
| | | 600 | T (600 V) | KA, KH, KC, LA, LH, MA, MH, MX, NA, NC, NX |
| | | 600 | R | KC, LA, LH, LC, MA, MG, MH, MJ, MX, NC, NX, PG, PJ |
| | | 800 | T (600 V) | KA, KH, KC, LA, LH, MA, MG, MH, MJ, MX, NA , NC, NX, PG, PJ, PL |
| | | 800 | L | KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL |
| | | 1200 | | KC, LC, MA, MG, MH, MJ, MX, NA, NC, NX, PG, PJ, PL |
| | | 2000 | | NA, NC, NX |

# Specifications

## General

Furnish and install the switchboard(s) as herein specified and shown on the associated electrical drawings. The switchboard(s) shall meet Underwriters Laboratories (UL) requirements and be furnished with a UL service entrance label.

## Structures

The switchboard shall be enclosed, dead front, free standing, front and rear aligned with front and rear accessibility. The switchboard shall be NEMA Type (1 General Purpose) (3R Non-Walk-in Outdoor). The framework shall be of UL gauge steel secured together to support all cover plates, bussing, and component devices during shipment and installation. Formed removable closure plates shall be used on the front, rear, and sides. All closure plates are to be single tool, screw removable. Ventilation shall be provided when required. Each section shall include a single-piece removable top plate.

## Finish

All painted parts shall be pretreated and provided with a corrosion-resistant, UL Listed acrylic baked paint finish. The paint color shall be ANSI #49 medium light gray per ANSI standard Z55.1-1967.

NEMA Type 3R enclosures shall be treated with the same process except that all exterior parts shall be of galvannealed steel. All exterior hardware on NEMA Type 3R enclosures shall be plated steel.

## Ability to Withstand a Fault

The entire switchboard shall be suitable for operation at the specified available fault current. The switchboard shall be labeled to indicate the maximum available fault current rating, taking into account the structure, bussing, switchboard main disconnect(s), and switchboard branch circuit devices. The short circuit current rating of the switchboard(s) shall not be less than _____ rms symmetrical amperes. The switchboard branch circuit devices short circuit current rating shall be fully rated or determined by UL labeled series connected ratings.

## Bussing

The switchboard through bus shall be (tin-plated aluminum) (tin-plated copper) (silver-plated copper). The switchboard bussing shall be of sufficient cross-sectional area to meet UL Standard 891 for temperature rise. The through bus shall have a maximum ampacity of (1200) (1600) (2000) (2500) (3000) (4000) (5000) A and extend the full length of the switchboard. The through bus shall be 100% rated. Provisions shall be provided for future splicing of additional sections from either end. The neutral bus shall be 100% rated.

The switchboard distribution section bus shall be of the same material as the through bus and shall be rated (1200) (1600) (2000) (3000) A. The distribution section neutral plate shall be of copper provided with Cu/Al lugs for the devices installed and future specified devices. The ground bus shall be sized per UL Standard 891 and be of the same material as the through bus.

## Utility Metering Compartments

The switchboard utility metering compartment shall be located in the service entrance section of the switchboard and connected for (hot) (cold) sequence metering. The utility metering compartment shall be (barriered) (unbarriered) and covered with a (single hinged door) (double hinged door) with sealing provisions.

### Main Disconnect Devices

The main disconnect device(s) shall be a (molded case circuit breaker) (solid-state trip, molded case circuit breaker) (fused bolted pressure switch). With the main device, (ground fault protection) (with zone interlocking) (undervoltage trip) (phase failure protection) (capacitor trip) (alarm switch) (auxiliary switches) (long time, short time) (long time, short time, instantaneous) shall be provided. Fuses for the bolted pressure switch are to be supplied by the (manufacturer) (user). A PowerLogic (power meter) (circuit monitor) (ION meter) with the appropriate transformers shall be provided, as required.

### Group Mounted Branch Devices

The switchboard group-mounted (fusible) (circuit breaker) branch devices are to be front accessible and front connectable. The (fusible) (circuit breaker) connections to the distribution panel bussing shall be of a “blow-on” design such that the connections grip the bus bars firmly under high fault conditions.

### Individually Mounted Circuit Breakers

Individually mounted branch circuit breakers shall be of the (molded case)(stored energy) type and be positioned vertically with the operating handles accessible through the hinged front cover plates of the section. Each circuit breaker shall be individually fed by connectors from the main bus of the switchboard.

### Surge Protective Device (SPD)

- Listed and Component Recognized in accordance with UL 1449, 3rd edition, to include Section 37.3 highest fault current category. SPD devices shall be UL 1283 listed.
- Provide surge current diversion paths for all modes of protection—L-N, L-G, and N-G—in Wye systems.
- Modular in design. Each mode, including N-G, shall be fused with a 200 kAIR, UL-classified surge-rated fuse and incorporate a thermal cutout device.
- Provide audible diagnostic monitoring by way of audible alarm. Alarm shall activate upon a fault condition. Provide push-to-test switch, and alarm on/off switch to silence alarm.
- If a dedicated breaker for the SPD is not provided, the SPD shall include a UL-classified disconnect switch.
- Meet or exceed the following criteria:
  - Minimum surge current capability (single pulse rated) per phase: (480 kA) (320 kA) (240 kA) (200 kA) (160 kA) (120 kA) (100 kA).
  - UL 1449 suppression voltage rating, voltage L-N, L-G, N-G: (208Y/120 V; 400 V) (480Y/277 V; 600 V).
- EMI/RFI Filtering: up to -30dB 100 kHz with insertion ratio of 50:1 using MIL-STD-220A methodology.
- Provide with one set of NO/NC dry contacts.
- Accessories:
  - Six-digit transient-counter set to total transient surges that deviate from the sine-wave envelope by more than 125 V.

### Shipping Splits

Switchboards shall be separated into shipping blocks. Each switchboard section shall be capable of being handled individually with the use of removable lifting bars (where practical) or rollers, and shall be clearly labeled with proper handling procedures.

EUSERC UCT,
Single Main Circuit Breaker
with I-Line Distribution Panel

EUSERC UCT,
Fusible Multiple Mains

## Features

- Ready-to-Install merchandise offering, available from an authorized Schneider Electric distributor or warehouse stock. Some sections are factory assembled only.
- Hot sequence utility compartment per EUSERC requirements
- Suitable for use as service entrance equipment, in either circuit breaker or fusible designs
- UL Listed
- Mains rating 400, 600, or 800A
- Voltage: 120/240, 208Y/120, 240/120, or 480Y/277 Vac
- Systems: 1Ø3W or 3Ø4W
- Maximum SCCR 200 kA fusible, 65 kA circuit breaker
- NEMA Type 1 or Type 3R enclosures
- Full height add-on or stand-alone distribution section
- Distribution interiors in either NQ lighting (240 Vac) or I-Line power (480 Vac) platforms
- Accessories include:
  - Underground pull sections
  - Loadside wireway
  - Bus links for donut-type current transformers
  - Double padlock hasp attachments
  - I-Line plug-on distribution panel for QO circuit breakers
  - Sub-feed circuit breakers from 100 to 225 A

Speed-D service section switchboards are Schneider Electric's quick delivery, merchandised, low-voltage switchboard offer. Speed-D provides a compact design by combining a EUSERC utility CT compartment, a single main circuit breaker or main fusible disconnect, and a distribution panelboard all in one section. A EUSERC utility CT compartment with fusible multiple mains is also available for six disconnect applications.

## Structures

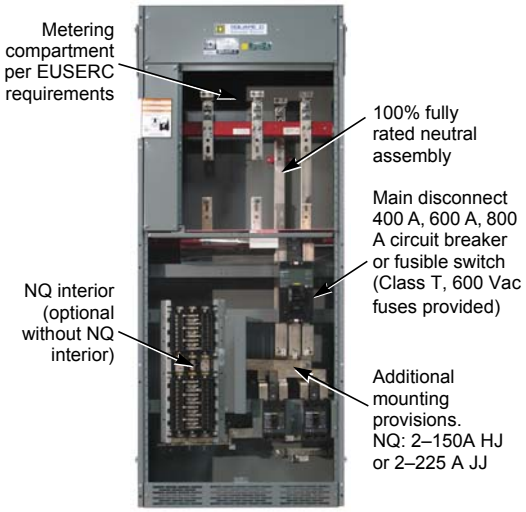
Speed-D switchboard enclosures are totally enclosed and front accessible with an ANSI 49 gray, baked-enamel finish. Dimensions are:

- 90 in. H x 14 in. D x 36 in.W for indoor (NEMA Type 1) enclosures
- 90 in. H x 24.5 in.D x 36 in. W for outdoor (NEMA Type 3R) enclosures

Underground pull sections, with and without lug landing, are designed to mount interchangeably on either side of the service section.

Loadside wireway is available for indoor applications to help reduce installation time by providing additional access for top exit of loadside cables.

**NEMA Type 1**




**NEMA Type 3R**

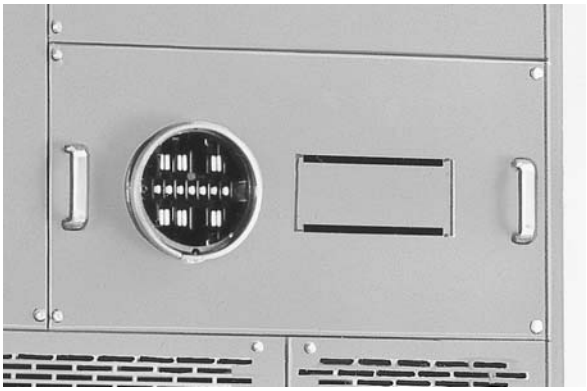
## Bussing

The main circuit breaker version of the Speed-D switchboard comes standard with all copper bus. The main fusible disconnect version comes standard with aluminum/copper bus.

## Metering

Incoming cable lugs are for top feed with one two-barrel #2-600 kcmil lug per phase and neutral, suitable for aluminum or copper cables. An optional single barrel 3/0-750 kcmil lug is available.

Utility metering compartments have provisions for either two, 15-inch blank meter doors or one, 30-inch blank meter door. A 15-inch meter door can accommodate one meter socket and test block. A 30-inch high door can accommodate two meter sockets and test blocks. Meter sockets can be 6-, 8-, 13-, or 15-jaw ringless type, with test block, based on application.



Typical 15-inch meter door with
socket and test block provisions.

## Mains

Main circuit breaker types are either LH or MJ. The main fusible device uses a PJ molded case switch and is supplied with Class T fuses. Multiple main or group-mounted fusible devices use QMB/QMJ plug-on fusible switches. Speed-D switchboards can also be ordered as main circuit breaker or main fusible switch without a distribution panel.

## Distribution Panel and Branches

Speed-D switchboards offer provisions for either an NQ distribution lighting panelboard or an I-Line power panelboard.

- NQ panelboard bus is rated 400 A and provides mounting space for QO™/QOB Type (150 A maximum) circuit breakers. The panel interior provides space for mounting 42 single-pole circuit breakers. One or two individually mounted 225 A maximum circuit breakers can be added with bus connectors.
- I-Line distribution bus is rated 400 A, 600 A, or 800 A and will accept 27 inches of I-Line circuit breakers on the left side with a maximum J or K frame size. The right side will accept either a QO plug-on distribution panel (240 V only) or a LA or LH I-Line circuit breaker.

## Layout Instructions

All dimensions and arrangments shown in this manual are for estimating purposes only and may change without notice due to changes in equipment design. The most current PAD drawings are available by visiting the Speed-D product page on www.schneider-electric.us.

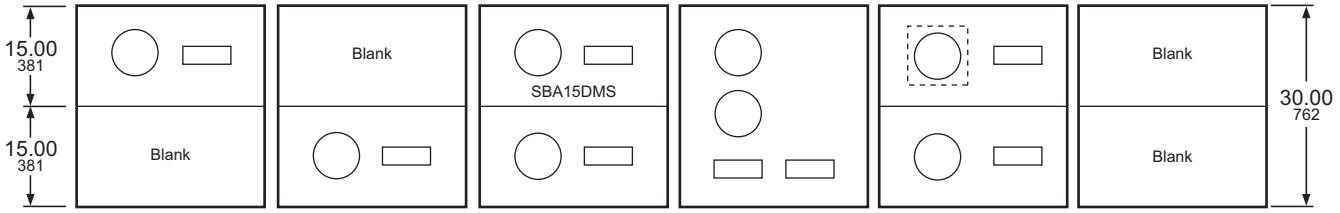
For available utility meter door configurations, see page 50. For quick layout and conduit drawings, see page 51.

Information on available series ratings can be found on page 52.

## Ordering Information

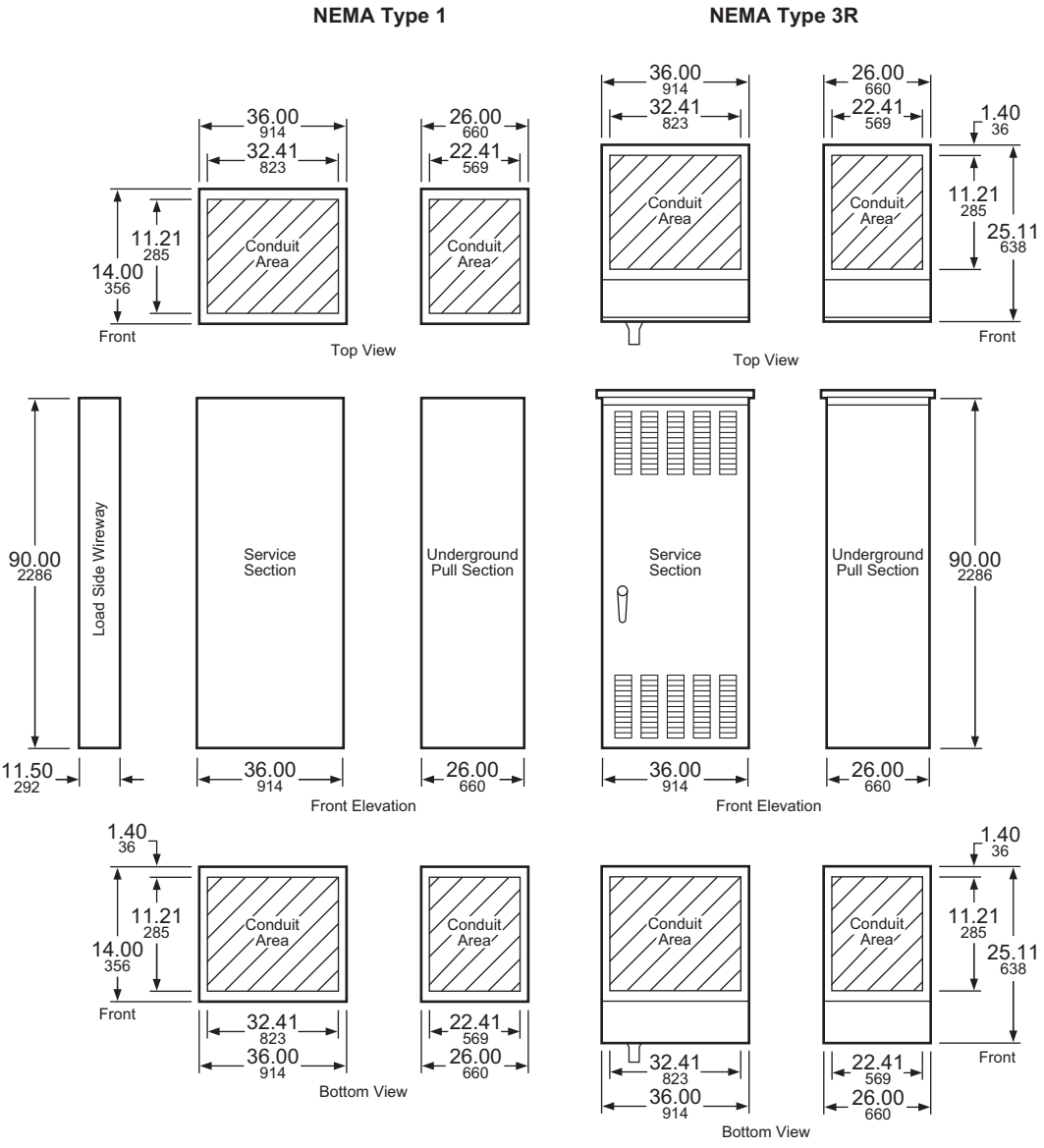
Please refer to the Switchboards and Switchgear section of the Schneider Electric Digest for ordering instructions and a complete list of available catalog numbers and pricing. For questions or assistance in product selection, contact your local authorized Schneider Electric distributor or sales representative.

## Utility Meter Door Configuration




| EUSERC Utilities | | Meter Door(s) | | | | | | | | | | Socket Jaw Quantity | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 120/240 V 1Ø3W | 208Y/120 V 3Ø4W | | | 240/120 V 3Ø4W | | | 480Y/277V 3Ø4W | | | 120/240 V 1Ø3W | 208Y/120 V 3Ø4W | 240/120 V 3Ø4W | 480Y/277 V 3Ø4W |
| | | | 400 A | 600 A | 800 A | 400 A | 600 A | 800 A | 400 A | 600 A | 800 A | | | | |
| Anaheim, CA, City of | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Arizona Public Service | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Burbank, CA, City of | | B | B | B | B | B | B | B | B | B | B | 4 | 13 | 13 | 13 |
| Clark County PUD | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Glendale, CA, City of | | B | B | B | B | N/A | N/A | N/A | B | B | B | 5 | 15 | N/A | 15 |
| Hawaii Electric Light Company | | B | B | B | B | B | B | B | B | B | B | 8 | 13 | 13 | 13 |
| Hawaiian Electric Company | | B | B | B | B | N/A | N/A | N/A | B | B | B | 8 | 13 | N/A | 13 |
| Imperial Irrigation District | | N/A | B | B | B | B | B | B | B | B | B | N/A | 15 | 15 | 13 |
| Intermountain Rural Electric Assn. | | B | B | B | B | B | B | B | B | B | B | 8 | 15 | 15 | 13 |
| Lodi, CA, City of | | B | B | B | B | B | B | D | B | D | D | 6 | 15 | 15 | 15 |
| Los Angeles, DWP | | B | B | B | B | B | B | B | B | B | B | 6 | 13/15 | 13/15 | 13/15 |
| Maui Electric Company Ltd | | B | B | B | B | N/A | N/A | N/A | B | B | B | 8 | 13 | N/A | 13 |
| Modesto Irrigation District | | B | B | B | B | B | B | B | B | B | B | N/A | 13 | 13 | 13 |
| Nevada Power Company | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Pacificorp | NEMA 1 | B | B | B | B | B | B | B | B | B | B | N/A | N/A | N/A | N/A |
| | NEMA 3R | C | C | C | C | C | C | C | C | C | C | 6 | 13 | 13 | 13 |
| Pacific Gas & Electric | Standard | B | B | B | B | B | B | B | B | D | D | 6 | 15 | 15 | 15 |
| | Below | B | B | B | B | B | B | B | B | D | D | 6 | 15 | 15 | 15 |
| Palo Alto, CA, City of | | N/A | B | B | B | B | B | B | B | B | B | N/A | 13 | 13 | 13 |
| Pasadena, CA, City of | | B | B | B | B | N/A | N/A | N/A | B | B | B | 5 | 13 | N/A | 13 |
| Portland General Electric | NEMA 1 | F | F | F | F | F | F | F | F | F | F | N/A | N/A | N/A | N/A |
| | NEMA 3R | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Puget Sound P&L | NEMA 1 | F | F | F | F | F | F | F | F | F | F | N/A | N/A | N/A | N/A |
| | NEMA 3R | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Redding, CA, City of | | C | C | C | C | C | C | C | C | C | C | 13 | 13 | 13 | 13 |
| Riverside, CA, City of | | A | A | A | A | A | A | A | A | A | A | 6 | 13 | 13 | 13 |
| Roseville, CA, City of | | B | B | B | B | B | B | B | B | D | D | 6 | 13 | 13 | 13 |
| Sacramento Municipal Utility | | B | B | B | B | B | B | B | B | D | D | 6 | 13 | 13 | 13 |
| Salt River Project | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| San Diego Gas & Electric | | A | A | A | A | A | A | A | A | A | A | 6 | 15 | 15 | 15 |
| Silicon Valley Power | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Seattle City Light | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Sierra Pacific Power Company | | B | B | B | B | B | B | B | B | B | B | 6 | 15 | 13 | 13 |
| Snohomish County PUD | NEMA 1 | F | F | F | F | F | F | F | F | F | F | N/A | N/A | N/A | N/A |
| | NEMA 3R | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Southern California Edison | | B | B | B | D | B | D | D | D | D | D | 5 | 15 | 15 | 15 |
| Tacoma, WA, City of | NEMA 1 | F | F | F | F | F | F | F | F | F | F | N/A | N/A | N/A | N/A |
| | NEMA 3R | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |
| Tucson Electric Power Company | NEMA 1 | F | F | F | F | F | F | F | F | F | F | N/A | N/A | N/A | N/A |
| | NEMA 3R | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 8 | 13 |
| Turlock Irrigation District | | B | B | B | B | B | B | B | B | B | B | 6 | 13 | 13 | 13 |

## Conduit Area Information



## Speed-D Service Section Switchboards

The main or distribution device within these switchboards, up to 200 kA, will be the remote line side main for the series combination. Additional ratings are shown in the following tables for circuit breakers located within the service section.

### Type SB Service Section Switchboards: Main Circuit Breaker with I-Line or NQ Distribution

| Maximum System Voltage (Vac) | Maximum SCCR | Line Side Circuit Breaker | Maximum Amperes (A) | Load Side | | |
|---|---|---|---|---|---|---|
| | | | | Circuit Breaker | Amperes (A) | Poles |
| 120 | 42 kA | LH | 400 | FY | 15–20 | 1 |
| | | MJ | 600 | FH | 15–25 | 2,3 |
| 208Y/120 | 65 kA | MJ | 800 | QD | 70 -225 | 2,3 |
| 240 | 42 kA | LH | 400 | Q2-H | 100–225 | 2 |
| | | | | Q4 | 250–400 | 2 |
| | | MJ | 600 | HD | 15–150 | 2,3 |
| | | | | JD | 175–225 | 2,3 |
| | 65 kA | LH | 400 | QD | 70–225 | 2 |
| | | MJ | 600 | QD | 70–225 | 2 |
| | | MJ | 800 | QD | 70–225 | 2,3 |
| | | | | HD | 15–150 | 2,3 |
| | | | | JD | 175–225 | 2,3 |
| 480 | 30 kA | MJ | 800 | FH | 30–100 | 2,3 |
| | 42 kA | | | | 15–25 | 2,3 |

### Type SF Service Section Switchboards: Fusible Main with I-Line or NQ Distribution

| Maximum System Voltage (Vac) | Maximum SCCR | Line Side Class T Fuse ▲ Maximum Current Rating (A) | Load Side | | |
|---|---|---|---|---|---|
| | | | Circuit Breaker | Amperes (A) | Poles |
| 120/240 | 42 kA | 400 | QO-VH | 15–30 | 1 |
| 208Y/120 | 100 kA | 600 | QD | 70–225 | 2,3 |
| 240 | 42 kA | 400 | QO-VH | 15–100 | 2,3 |
| | | 600 | Q4 | 250–400 | 2 |
| | | 800 | FA | 15–100 | 1,2,3 |
| | | | Q4 | 250–400 | 2,3 |
| | 65 kA | 800 | QD | 70–225 | 2,3 |
| | 100 kA | 400 | HD | 15–150 | 1,2 |
| | | | HG | 15–150 | 1,2 |
| | | | JD | 150–250 | 1,2 |
| | | | JG | 150–250 | 1,2 |
| | | 800 | QD | 70–225 | 2,3 |
| 480 | 65 kA | 800 | LA, LH | 125–400 | 2,3 |
| | 100 kA | 400 | HD | 15–150 | 1,3 |
| | | | HG | 15–150 | 1,3 |
| | | | JD | 150–250 | 1,3 |
| | | | JG | 150–250 | 1,3 |

▲ 600 V.

## 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, see pages 54 and 55. Contact your local Schneider Electric representative to obtain a seismic certificate.

## Switchboards

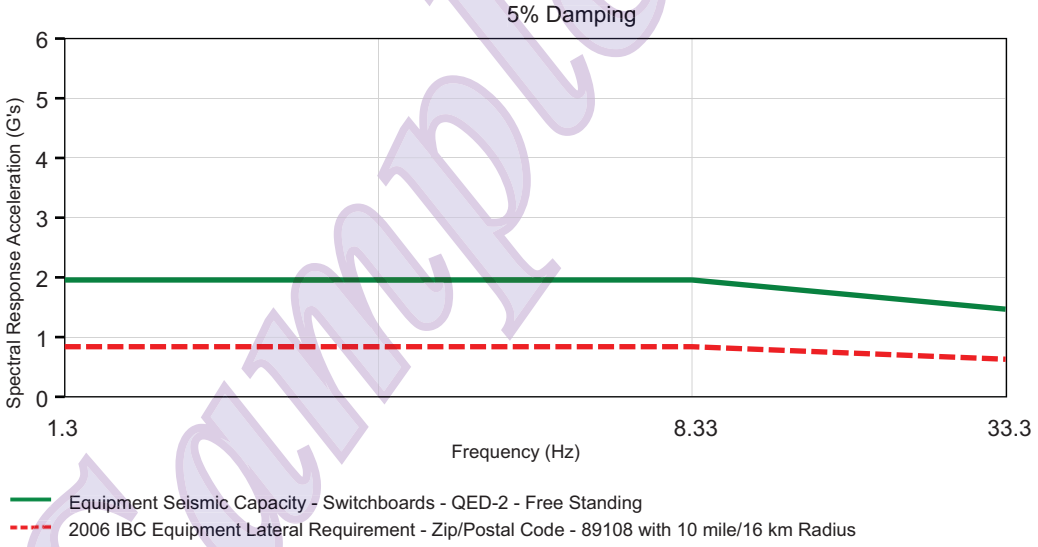
The Schneider Electric equipment referenced in this certificate has been qualified to the site-specific requirements of the listed model building code and/or standard. This certification is based on tri-axial shake table test results conducted in accordance with the AC156 test protocol3 (Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components):

**International Building Code (IBC), 2006 ICC Edition**

**Product Platform:** Switchboards
**Product Description:** QED-2
**Product Type:** Free Standing

| | |
|---|---|
| Site-Specific Location[1]: | Zip/Postal Code - 89108 with 10 mile/16 km Radius |
| Code Requirement[2]: | $F_P$ / $W_P$ = 0.84 G's, ($S_{DS}$ = 0.52) |
| Equipment Capacity[3]: | $F_P$ / $W_P$ = 1.96 G's, ($S_{DS}$ = 1.22) |
| Importance Factor[4]: | $I_P$ = 1.5 |
| Installation Restrictions[5]: | None - Ground level or roof level installations permitted |

Plot of Tested Equipment vs. Code Acceleration Demand








Certificate
11149

## Switchboards

Compliance Notes

1. The site-specific location is defined as the final geographic location of equipment installation. The seismic certification contained herein is valid for equipment installations located within the following US region, state(s), or geographic coordinate: Zip/Postal Code - 89108 With 10 mile/16 km Radius - Lat/Lon (36.211690,-115.220219). For the purpose of this document, the location is defined as a circle centered at the latitude and longitude with the radius indicated.

2. By reference to ASCE 7-05, the 2006 IBC specifies seismic demand requirements for nonstructural equipment in terms of a lateral force coefficient, $F_P$ / $W_P$. The lateral force coefficient is defined in terms of a site-specific ground spectral acceleration factor, $S_{DS}$, which varies with geographic location and is adjusted for geotechnical site class effects per Chapter 11 of ASCE 7-05. The lateral force coefficient is also defined in terms of the component amplification factor, $a_p$, and a maximum value of two-and-a-half ($a_p$ = 2.5) is assumed. The maximum $S_{DS}$ value for Site Class D (code default site class) was determined using the USGS ground motion data, as required by ASCE 7-05, for the specified location(s) and is used as the 2006 IBC requirement for this seismic certification.

3. Equipment capacity was determined from tri-axial seismic shake table test results as defined in the International Code Council (ICC) Acceptance Criteria for Seismic Qualification by Shake-Testing of Nonstructural Components and Systems (AC156). Per Section 13.2.5 of ASCE 7-05, seismic qualification by testing based upon a nationally recognized testing standard procedure, such as ICC ES AC156, shall be deemed to satisfy the design and evaluation requirements provided that the tested seismic capacity equals or exceeds the seismic demands determined in accordance with Sections 13.3.1 and 13.2.2.

4. An equipment importance factor of 1.5 ($I_P$ = 1.5) indicates that equipment functionality was verified before and after seismic simulation testing. This importance factor is indicative of critical facilities where maximizing the probability of post event functionality is a priority.

5. Seismic qualification of nonstructural components by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment will be intact and functional after a seismic event. During a seismic event the equipment must be able to transfer the loads that are created through the mounting pad and anchorage to the load-bearing path of the building structural system. Anchorage of equipment to the primary building structure is required to validate this seismic certification. The structural engineer or design engineer of record is responsible for detailing the equipment anchorage requirements for the given installation. The installer and manufacturers of the anchorage system are responsible for assuring that the mounting requirements are met. Schneider Electric is not responsible for the specification and performance of anchorage systems.

This document is typical of the seismic certifications available for the referenced product and standards. Actual performance may be configuration dependent. Certificates must be signed and numbered to be valid for construction. Contact your local Schneider Electric representative for additional information or to obtain actual seismic certificates.

## Methodology and Intended Use

Short-circuit currents are calculated by dividing the secondary full load current of the transformer, based on the self-cooled kVA rating, by the arithmetic sum of the transformer and primary system per unit impedances (assumes transformer X/R identical to primary system X/R). Vectorial addition of per unit impedances produces slightly higher short-circuit currents.

Motor contribution adds to the available short-circuit current. Motor contribution is based on four times the motor full load current (assumes average motor impedance of 25%). Connected motor load is assumed to be 50% at 208 V or 100% for 240 V and above based on the full load amperes of the transformer.

Short-circuit values are based on the percent impedance (%Z) shown. Per NEMA and ANSI standards, actual %Z can vary +/-7.5% due to manufacturing tolerances for transformers shown with 5.75 %Z (2.0 %Z and 4.5 %Z are minimum values). If desired, account for the minimum tolerance by multiplying the XFRMR (Transformer) Alone short-circuit values in the table by 1.081 if the %Z is 5.75%. Motor contribution can be added using the previously mentioned methodology.

Due to transformer design differences, %Z can vary for different types of transformers of the same kVA rating.

Short-circuit currents in the table apply when system power factor is greater than the tested value (X/R is less than the tested value) for the type equipment involved.

## Test pf and X/R Ratio

Short-circuit currents in the table are given in RMS symmetrical amperes. For a system X/R ratio greater than the test X/R ratio of the overcurrent device in question, the available fault current equivalent RMS symmetrical duty for comparison must be adjusted by a multiplying factor greater than 1.0. The fault current will increase.

See IEEE Std. 242-2001 (Buff Book) and IEEE Std. 1015-1997 (Blue Book) for details.

| Device Type | Test pf | Test X/R |
|---|---|---|
| UL Molded Case Circuit Breaker Interrupting Rating | | |
| Greater than 20 kA | 20% | 4.899 |
| Greater than 10 kA to 20 kA | 30% | 3.179 |
| 10 kA and less | 50% | 1.732 |
| ANSI Power Circuit Breaker, Fused | 20% | 4.899 |
| ANSI Power Circuit Breaker, Unfused | 15% | 6.591 |

## Secondary Full Load and Short Circuit Currents

### Secondary Full Load and Short Circuit Currents

| Transformer 3Φ kVA (%Z) | Available Primary Short Circuit kVA | Secondary Distribution Voltage—3 Phase | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 208 | | | 240 | | | 480 | | | 600 | | |
| | | Full Load Amps | Short Circuit RMS Sym. Amps | | Full Load Amps | Short Circuit RMS Sym. Amps | | Full Load Amps | Short Circuit RMS Sym. Amps | | Full Load Amps | Short Circuit RMS Sym. Amps | |
| | | | XFRMR Alone | Plus 50% Motor Load | | XFRMR Alone | Plus 100% Motor Load | | XFRMR Alone | Plus 100% Motor Load | | XFRMR Alone | Plus 100% Motor Load |
| 225 (2%) | 50,000 | 625 | 25,491 | 26,740 | 542 | 22,092 | 24,258 | 271 | 11,046 | 12,129 | 217 | 8,837 | 9,703 |
| | 100,000 | | 28,069 | 29,318 | | 24,327 | 26,492 | | 12,163 | 13,246 | | 9,731 | 10,597 |
| | 150,000 | | 29,048 | 30,297 | | 25,175 | 27,340 | | 12,588 | 13,670 | | 10,070 | 10,936 |
| | 250,000 | | 29,882 | 31,131 | | 25,898 | 28,063 | | 12,949 | 14,031 | | 10,359 | 11,225 |
| | 500,000 | | 30,540 | 31,789 | | 26,468 | 28,633 | | 13,234 | 14,316 | | 10,587 | 11,453 |
| | Unlimited | | 31,227 | 32,476 | | 27,063 | 29,228 | | 13,532 | 14,614 | | 10,825 | 11,691 |
| 300 (4.5%) | 50,000 | 833 | 16,328 | 17,993 | 722 | 14,151 | 17,037 | 361 | 7,075 | 8,519 | 289 | 5,660 | 6,815 |
| | 100,000 | | 17,348 | 19,014 | | 15,035 | 17,922 | | 7,518 | 8,961 | | 6,014 | 7,169 |
| | 150,000 | | 17,717 | 19,383 | | 15,355 | 18,242 | | 7,678 | 9,121 | | 6,142 | 7,297 |
| | 250,000 | | 18,024 | 19,690 | | 15,621 | 18,508 | | 7,810 | 9,254 | | 6,248 | 7,403 |
| | 500,000 | | 18,261 | 19,927 | | 15,826 | 18,713 | | 7,913 | 9,357 | | 6,331 | 7,485 |
| | Unlimited | | 18,505 | 20,170 | | 16,038 | 18,924 | | 8,019 | 9,462 | | 6,415 | 7,570 |
| 500 (4.5%) | 50,000 | 1388 | 25,234 | 28,010 | 1203 | 21,869 | 26,681 | 602 | 10,935 | 13,340 | 482 | 8,748 | 10,672 |
| | 100,000 | | 27,757 | 30,533 | | 24,056 | 28,868 | | 12,028 | 14,434 | | 9,623 | 11,547 |
| | 150,000 | | 28,714 | 31,490 | | 24,886 | 29,697 | | 12,443 | 14,849 | | 9,954 | 11,879 |
| | 250,000 | | 29,529 | 32,305 | | 25,592 | 30,403 | | 12,796 | 15,202 | | 10,237 | 12,161 |
| | 500,000 | | 30,171 | 32,947 | | 26,148 | 30,959 | | 13,074 | 15,480 | | 10,459 | 12,384 |
| | Unlimited | | 30,841 | 33,617 | | 26,729 | 31,540 | | 13,365 | 15,770 | | 10,692 | 12,616 |
| 750 (5.75%) | 50,000 | 2082 | 28,714 | 32,878 | 1805 | 24,886 | 32,103 | 903 | 12,443 | 16,051 | 722 | 9,954 | 12,841 |
| | 100,000 | | 32,028 | 36,191 | | 27,757 | 34,974 | | 13,879 | 17,487 | | 11,103 | 13,990 |
| | 150,000 | | 33,309 | 37,472 | | 28,868 | 36,084 | | 14,434 | 18,042 | | 11,547 | 14,434 |
| | 250,000 | | 34,410 | 38,573 | | 29,822 | 37,039 | | 14,911 | 18,519 | | 11,929 | 14,815 |
| | 500,000 | | 35,285 | 39,448 | | 30,580 | 37,797 | | 15,290 | 18,898 | | 12,232 | 15,119 |
| | Unlimited | | 36,205 | 40,369 | | 31,378 | 38,595 | | 15,689 | 19,297 | | 12,551 | 15,438 |
| 1,000 (5.75%) | 50,000 | 2776 | 35,816 | 41,367 | 2406 | 31,040 | 40,663 | 1203 | 15,520 | 20,331 | 963 | 12,416 | 16,265 |
| | 100,000 | | 41,122 | 46,673 | | 35,639 | 45,261 | | 17,819 | 22,631 | | 14,256 | 18,105 |
| | 150,000 | | 43,258 | 48,809 | | 37,490 | 47,113 | | 18,745 | 23,556 | | 14,996 | 18,845 |
| | 250,000 | | 45,134 | 50,685 | | 39,116 | 48,738 | | 19,558 | 24,369 | | 15,646 | 19,495 |
| | 500,000 | | 46,651 | 52,202 | | 40,431 | 50,053 | | 20,215 | 25,027 | | 16,172 | 20,021 |
| | Unlimited | | 48,273 | 53,825 | | 41,837 | 51,459 | | 20,918 | 25,730 | | 16,735 | 20,584 |
| 1,500 (5.75%) | 50,000 | 4164 | 47,584 | 55,911 | 3609 | 41,239 | 55,673 | 1805 | 20,620 | 27,837 | 1444 | 16,496 | 22,269 |
| | 100,000 | | 57,429 | 65,756 | | 49,772 | 64,205 | | 24,886 | 32,103 | | 19,909 | 25,682 |
| | 150,000 | | 61,683 | 70,010 | | 53,458 | 67,892 | | 26,729 | 33,946 | | 21,383 | 27,157 |
| | 250,000 | | 65,568 | 73,895 | | 56,826 | 71,260 | | 28,413 | 35,630 | | 22,730 | 28,504 |
| | 500,000 | | 68,820 | 77,147 | | 59,644 | 74,077 | | 29,822 | 37,039 | | 23,857 | 29,631 |
| | Unlimited | | 72,410 | 80,737 | | 62,755 | 77,189 | | 31,378 | 38,595 | | 25,102 | 30,876 |
| 2,000 (5.75%) | 50,000 | 5552 | 56,938 | 68,041 | 4812 | 49,346 | 68,591 | 2406 | 24,673 | 34,296 | 1925 | 19,738 | 27,436 |
| | 100,000 | | 71,632 | 82,734 | | 62,081 | 81,326 | | 31,040 | 40,663 | | 24,832 | 32,530 |
| | 150,000 | | 78,373 | 89,476 | | 67,924 | 87,169 | | 33,962 | 43,584 | | 27,169 | 34,867 |
| | 250,000 | | 84,755 | 95,858 | | 73,454 | 92,699 | | 36,727 | 46,350 | | 29,382 | 37,080 |
| | 500,000 | | 90,267 | 101,370 | | 78,232 | 97,477 | | 39,116 | 48,738 | | 31,293 | 38,991 |
| | Unlimited | | 96,547 | 107,650 | | 83,674 | 102,919 | | 41,837 | 51,459 | | 33,470 | 41,168 |
| 2,500 (5.75%) | 50,000 | 6940 | 64,552 | 78,430 | 6015 | 55,945 | 80,001 | 3008 | 27,972 | 40,001 | 2406 | 22,378 | 32,000 |
| | 100,000 | | 84,113 | 97,991 | | 72,898 | 96,954 | | 36,449 | 48,477 | | 29,159 | 38,782 |
| | 150,000 | | 93,564 | 107,442 | | 81,089 | 105,145 | | 40,544 | 52,572 | | 32,435 | 42,058 |
| | 250,000 | | 102,805 | 116,683 | | 89,097 | 113,154 | | 44,549 | 56,577 | | 35,639 | 45,261 |
| | 500,000 | | 111,029 | 124,908 | | 96,225 | 120,281 | | 48,113 | 60,141 | | 38,490 | 48,113 |
| | Unlimited | | 120,684 | 134,562 | | 104,592 | 128,649 | | 52,296 | 64,324 | | 41,837 | 51,459 |
| 3,000 (5.75%) | 50,000 | 8328 | 70,870 | 87,524 | 7217 | 61,420 | 90,288 | 3609 | 30,710 | 45,144 | 2887 | 24,568 | 36,115 |
| | 100,000 | | 95,168 | 111,822 | | 82,479 | 111,346 | | 41,239 | 55,673 | | 32,991 | 44,538 |
| | 150,000 | | 107,447 | 124,102 | | 93,121 | 121,989 | | 46,561 | 60,994 | | 37,248 | 48,795 |
| | 250,000 | | 119,815 | 136,470 | | 103,840 | 132,707 | | 51,920 | 66,354 | | 41,536 | 53,083 |
| | 500,000 | | 131,136 | 147,791 | | 113,652 | 142,519 | | 56,826 | 71,260 | | 45,461 | 57,008 |
| | Unlimited | | 144,820 | 161,475 | | 125,511 | 154,378 | | 62,755 | 77,189 | | 50,204 | 61,751 |
| 3750 (5.75%) | 50,000 | 10409 | 78,558 | 99,376 | 9022 | 68,084 | 104,168 | 4511 | 34,042 | 52,084 | 3609 | 27,234 | 41,667 |
| | 100,000 | | 109,568 | 130,386 | | 94,959 | 131,043 | | 47,479 | 65,522 | | 37,984 | 52,417 |
| | 150,000 | | 126,169 | 146,987 | | 109,347 | 145,431 | | 54,673 | 72,716 | | 43,739 | 58,172 |
| | 250,000 | | 143,572 | 164,390 | | 124,429 | 160,513 | | 62,214 | 80,257 | | 49,772 | 64,205 |
| | 500,000 | | 160,138 | 180,956 | | 138,786 | 174,871 | | 69,393 | 87,435 | | 55,514 | 69,948 |
| | Unlimited | | 181,025 | 201,843 | | 156,889 | 192,973 | | 78,444 | 96,487 | | 62,755 | 77,189 |
| 5,000 (5.75%) | 50,000 | — | 88,118 | 115,875 | — | 76,369 | 124,482 | — | 38,185 | 62,241 | — | 30,548 | 49,793 |
| | 100,000 | | 129,103 | 156,861 | | 111,890 | 160,002 | | 55,945 | 80,001 | | 44,756 | 64,001 |
| | 150,000 | | 152,792 | 180,549 | | 132,420 | 180,532 | | 66,210 | 90,266 | | 52,968 | 72,213 |
| | 250,000 | | 179,079 | 206,836 | | 155,202 | 203,314 | | 77,601 | 101,657 | | 62,081 | 81,326 |
| | 500,000 | | 205,609 | 233,366 | | 178,195 | 226,307 | | 89,097 | 113,154 | | 71,278 | 90,523 |
| | Unlimited | | 241,367 | 269,124 | | 209,185 | 257,297 | | 104,592 | 128,649 | | 83,674 | 102,919 |

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