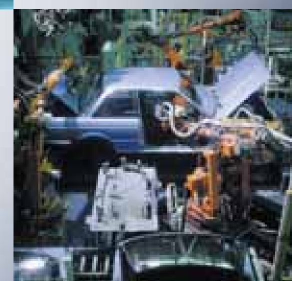
Selection and Application Guide



powerful ideas
RELIABLE SOLUTIONS

SENTRON™ Switchboards Front Connected

SIEMENS

Global network of innovation

Contents

SB1, SB2 and SB3 Switchboards

Maximum Flexibility At Minimum Cost
Whether the design is for a 240V ac, 400 ampere system; a 600V ac, 6000 ampere system; or something in between, Siemens switchboards should be considered. Every aspect of design has been aimed at improving layout convenience, reducing installation costs, and minimizing the impact and cost of system changes. These switchboards provide the rugged construction and service flexibility necessary in systems for industrial plants, hi-rise complexes, hospitals, and commercial buildings, and are built to UL 891 and NEMA PB-2 standards.

Type SB1 For Limited Space Applications
The SB1 switchboard has been specifically designed for those applications where floor space is at a premium. The rear of all sections align so the switchboard can be installed against a wall. The SB1 contains front-connected main protective devices and through-bus ratings up to 2000 amperes at 600V ac.

Type SB2 For Increased Service And More Load Cable Room
Siemens SB2 switchboard can have extra depth behind the vertical bus in each distribution section, and contains main protective devices and through-bus rated up to 4000 amperes at 600V ac. The rear of all sections align as a standard. Front and rear alignment is available as an option.

Distribution Sections Are Available In A Broad Range Of Sizes
All standard distribution sections are 90 inches high and 32, 38 or 46 inches wide. Optional 70 inch height is available.

SB1 distribution sections are 20 inches deep. For deeper sections, SB2 and SB3 switchboards must be chosen.

Type SB3 For Custom Options
The SB3 switchboard is available with main bus up to 6000 amperes. Options include, but are not limited to, incoming and outgoing busway, ACCESS™ communication and cold sequence utility current transformer compartments.

SB3 distribution sections have a standard depth of 20 inches but can also be specified in depths of 28 inches and 38 inches when additional space is required. Rear access is required to make use of the additional depth of the SB3 switchboards that are deeper than 38 inches, and to provide access to bus connections, where required. SB3 may be installed against a wall. (Up to a max. depth of 38")

SENTRON SB Switchboards Available Features	SB1	SB2	SB3
Maximum Bus Rating	2000A	4000A	6000A
Main Devices	MCCB, VB, HCP, BPS	MCCB, VB, HCP, BPS, WL (Fixed)	MCCB, VB, HCP, BPS, WL (Fixed & Drawout)
Feeder Devices	MCCB, VB, HCP, BPS	MCCB, VB, HCP, BPS, WL (Fixed)	MCCB, VB, HCP, BPS, WL (Fixed & Drawout)
Solid State MCCB	No	100,000 AIC	200,000 AIC
Customer Metering	Yes	Yes	Yes
Utility Metering	Yes	Yes	Yes
Density Rated Bussing	No	Yes	Yes
Accessible	Front	Front	Front up to 38" (965mm) Deep / Front & Rear Above 38" (965mm) Deep
Aligned	Rear	Rear Standard / Front & Rear Optional	Rear Standard / Front & Rear Optional

SB1, SB2 and SB3 Switchboards

Main Devices

Switchboard Type	Mounting		Molded Case Circuit Breaker Fixed	Vacu-Break Fusible Switch Fixed ①	HCP Insulated Switch Fixed	Bolted Pressure Fusible Switch Fixed	WL UL489 Breaker
	Individual	Panel					
SB1	Yes		400-2000A	800-1200A	400-1200A	800-2000A	—
		Yes	400-1200A	400-600A	400-1200A	—	
SB2	Yes		400-3000A ②	400-1200A	400-1200A	800-4000A	800-4000A ③
		Yes	400-1200A ②	400-600A	400-1200A	—	—
SB3	Yes		400-3000A ②	400-1200A	400-1200A	800-6000A ④	800-5000A ⑤
		Yes	400-1200A ②	400-600A	400-1200A	—	—

Branch Devices

Switchboard Type	Mounting		Molded Case Circuit Breaker Fixed	Vacu-Break Fusible Switch Fixed ⑥	HCP Insulated Switch Fixed	Bolted Pressure Fusible Switch Fixed	WL UL489 Breaker
	Individual	Panel					
SB1		Yes	15-1200A	30-600A	400-1200A	—	—
	Yes		1600-2000A	800-1200A	—	—	—
SB2	Yes		1600-2000A ②	800-1200A	400-1200A	800-4000A	800-4000A ③
		Yes	15-1200A ②	30-600A	400-1200A	—	—
SB3	Yes		400-3000A ②	800-1200A	400-1200A	800-6000A ④	800-5000A ⑤
		Yes	15-1200A ②	30-600A	400-1200A	—	—

Distribution Sections

Switchboard Type	Access	Dimensions in Inches (mm)					
		Height		Width		Depth	
		Std.	Opt.	Std.	Opt.	Std.	Opt.
SB1	Front	90 (2286)	—	38 (965)	32 or 46 (813 or 1168)	20 (508)	—
SB2	Front	90 (2286)	—	38 (965)	32 or 46 (813 or 1168)	20 (508) ⑦	28 or 38 (711 or 965) ⑦
SB3	Front & Rear	90 (2286)	70 (1778)	38 (965)	32 or 46 (813 or 1168)	20 (508) ⑦ ⑧	28, 38, 48 or 58 (711, 965, 1219 or 1473) ⑦ ⑧

Voltage Chart for SB1, SB2, SB3, RCIII

SB1	SB2	SB3	RCIII	
•	•	•	•	208Y/120 3Ø4W AC
•	•	•	•	480Y/277 3Ø4W AC
•	•	•	•	240 3Ø3W Delta AC
•	•	•	•	480 3Ø3W Delta AC
•	•	•	•	600 3Ø3W Delta AC
•	•	•	•	347 3Ø3W Delta AC
•	•	•	•	240/120 3Ø4W Delta B phase High Leg
•	•	•	•	240/120 3Ø4W Delta C phase High Leg
		•	•	120/240 2Ø5W Single Neutral AC
		•	•	120/240 1Ø3W Ground Neutral
		•	•	240 3Ø3W Grounded B Phase
		•	•	120 1Ø2W Ground Neutral AC
		•	•	240 1Ø2W No Neutral AC
		•	•	125 1Ø2W Ground Neutral AC
		•	•	125 2W DC
		•	•	250 2W DC
		•	•	500 2W DC
•	•	•	•	220Y/127 3Ø4W AC
•	•	•	•	380Y/220 3Ø4W AC
•	•	•	•	415Y/240 3Ø4W AC
•	•	•	•	440Y/250 3Ø4W AC
•	•	•	•	600Y/347 3Ø4W AC
•	•	•	•	230 3Ø3W Delta AC
•	•	•	•	380 3Ø3W Delta AC

① 1200A Vacu Break main devices are not available at voltages above 240.
② Includes Thermal Magnetic and Solid State Circuit Breakers.
③ Fixed mounted only.
④ 5000 and 6000 amp BPS not UL Listed.
⑤ Drawout or fixed mounted.
⑥ Service disconnect 1200A Vacu-Break devices are not available at voltages above 240V. 1200A Vacu Break branch devices are available at all voltages when protected by a main device.
⑦ Distribution section with two high 800 or 1200A Vacu-Break is 28 inches (711 mm) deep.
⑧ Distribution section with two high WL breakers is 28 inches deep minimum and distribution section with two high bolted pressure switches is 38 inches deep minimum.

SB1, SB2 and SB3 Switchboards

Service Sections

Typical switchboards require one or more service main disconnects. The main disconnects are mounted into a Service Section and typically feed one or more distribution sections.

In some applications, the main service disconnect is required to be located remote to distribution portion of the equipment and is considered a Remote Main.

Service sections can be fed by a variety of means such as cable, busway, vault stubs, and transformers.

To provide additional room for top line cable routing where needed, pull box extensions are available in heights of 10, 15, 20, 25, 30 inches to mount on top of any standard service section.

When fed from underground, a separate pull section is usually added. The service section is then fed from the adjacent underground pull section.

Disconnect devices, molded case circuit breakers, Vacu-Break® switches, HCP switches, and bolted pressure switches equipped for bottom feed will accept cable directly from underground into the service section.

Choose Bussed or Non-Bussed Pull Sections

With Siemens switchboards, non-bussed pull section, or a bussed pull section for underground feed can be selected. The unique bussed section permits cable to be run straight from underground to the bus bars at the top of the section.

Non-bussed pull sections have openings for carrying the underground feed cables to the service section bus.

Bussed and non-bussed pull sections may be used with overhead services.

Service Sections House A Variety of Equipment

Utility Metering

In addition to the main disconnect, the service section usually contains utility metering provisions. "Hot" metering (current transformers on the line side of the main disconnect) is normal, but "cold" metering provisions (current transformers on the load side of main disconnect) can also be furnished.

Whether hot or cold metering is required, the current transformers provided by the utility company will be mounted in a completely separate compartment. The compartment will be built to utility company standards, with hinged doors and provisions for metering equipment provided by the utility.

Customer Metering

The service section often provides space for many user instrument requirements. Either analog or digital metering can be mounted in the service section along with the main disconnect. A separate section would be needed only if a large instrument or an unusual number of instruments are required.

Main Disconnect Options Provide Flexibility

Main protective devices can be mounted individually for quick access in an emergency. SB1, SB2 and SB3 switchboards will accommodate a variety of main protective devices. Selection depends on the characteristics of your individual electrical system.

SENTRON Series Molded Case Circuit Breakers

Standard Interrupting

Standard interrupting capacity up to 65,000 AIC thermal-magnetic breakers, 400-1200 amperes, 240V, 480V or 600V ac, provide protection that allows "immediate restoration of power" for normal system requirements. A wide range of accessory options are available, including shunt trip, motor operator, auxiliary switches, alarm switches, and others.

High Interrupting

High-interrupting-capacity up to 200,000 AIC thermal-magnetic breakers, 400-2000 amperes, 240V, 480V or 600V ac, provide increased protections where high available fault currents exist, with the same convenience and accessory features offered in standard interrupting capacity breakers.

Solid-State

Full function Sensitrip® breakers 400-3000 amperes, 240V, 480V or 600V ac, have solid-state circuitry which assures minimal damage through the quick interruption control of fault currents, and includes short-time delay and ground fault trip for branch device coordination.

Fuseless Current Limiting

Energy limiting molded case breakers, 400-1600A, 240V, 480V or 600V ac, with thermal-magnetic protection provide coordinated protection for branch devices and circuits where extremely high fault currents are available. Solid state current limiting molded case breakers are also available in ratings of 400-1200 ampere.

Fusible Switches

Vacu-Break Fusible Switches, 400-1200 amperes, and HCP fusible switches, 400-1200 amperes, 600V ac, provide protection, coordination with branch protective fusible switches, and application flexibility in systems where high available fault currents are encountered.

Bolted Pressure Switches

Bolted pressure switches, 800-6000 amperes, 480V ac, combine economy with extremely high interrupting capacity in conjunction with Class L fuses. Options include shunt trip, ground fault relaying, and a wide range of other accessories.

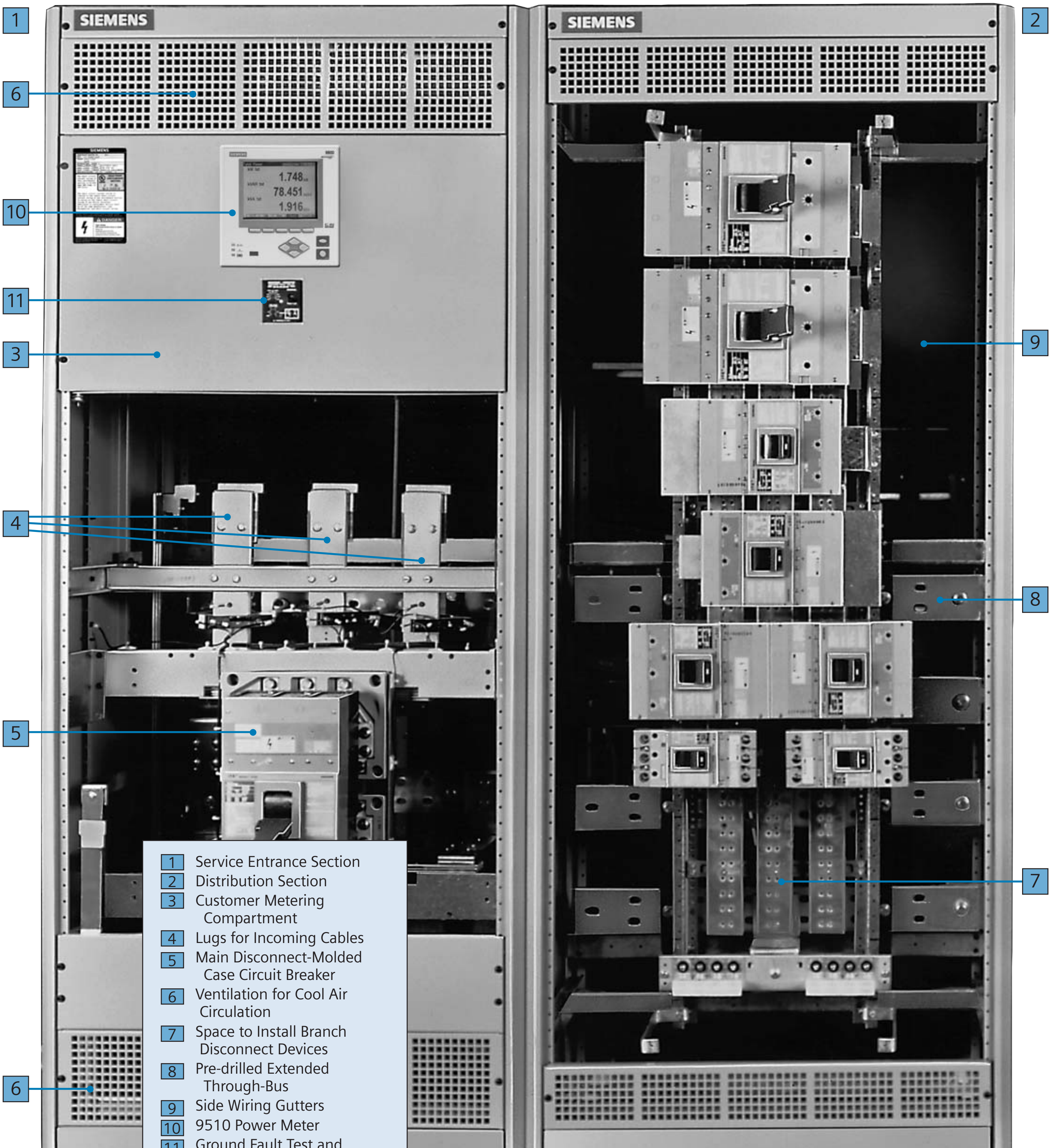
WL UL489 Insulated Case Circuit Breakers

Insulated case circuit breakers, 800-5000 amperes, 600V ac, with solid-state trip devices, offer stored-energy tripping plus optional ground fault protection, selective tripping and a broad range of accessories.

All main protective devices, except Vacu-Break fusible switches, can be equipped with ground fault relays to comply with the National Electrical Code (Section 230.95) ground fault protection requirements.

Versatile, Simplified System Design

Front View



1. Service Entrance Section
2. Distribution Section
3. Customer Metering Compartment
4. Lugs for Incoming Cables
5. Main Disconnect-Molded Case Circuit Breaker
6. Ventilation for Cool Air Circulation
7. Space to Install Branch Disconnect Devices
8. Pre-drilled Extended Through-Bus
9. Side Wiring Gutters
10. 9510 Power Meter
11. Ground Fault Test and Monitor Panel

SB1, SB2 and SB3 Switchboards

Distribution Sections For Expanded Wiring Room And Exceptional Accessibility
Generous top and bottom gutters have been created by locating through-bus in the rear center of the distribution section. In cable entrance sections, no obstructions are less than 8 inches above the floor, and no live bus bars are located less than 10 inches off the floor. So there is plenty of room to run cables into the distribution section to make connections.

Standard bolted gutter covers give complete access to load conductors. Hinged gutter covers can be furnished where quick access to load connectors is desired.

Heavy channels form a rigid ring at the base and top of each section, and heavy gauge structural members are used for the vertical corner posts so there is no encroachment of additional bracing into the top and bottom gutter areas.

To provide additional room for top load cable routing where needed, pull box extensions are available in heights of 10, 15, 20, 25, and 30 inches to mount on top of any standard distribution section.

Top plates on all sections are easily removed in the field for drilling, punching, and cutting conduit entry holes.

Distribution Sections Designed With The Future In Mind
Because all distribution sections can accommodate any combination of panel-mounted branch devices, including molded case circuit breakers, Vacu-Break fusible switches, HCP fusible switches and motor starters, future system modifications are easier to handle without adding switchboard sections.

To make additional distribution sections easier to install when they are necessary, the through-bus in each distribution section is extended, and the end is predrilled to accept splice plate bolts. To add a section to an existing switchboard, set the new section flush against the side of the existing distribution section, secure frames and bolt together the bus bar splice plates.

Operating Temperature in Accordance With UL Standard 891
All distribution sections contain louvers at both the top and bottom to assure cool operation.

Motor Starter Switchboards Combine Power Distribution And Motor Control
Type SB3 switchboards offer a complete line of group-mounted starters that provide a compact and convenient method of combining power distribution and control circuits in one location.

Motor starter units are available with fully bussed circuit breaker or fusible Vacu-Break units, factory-wired on the load side to full voltage, non-reversing starters to reduce installation time.

Type A wiring is standard without terminal blocks. The fusible switch, circuit breaker, or starter unit is factory wired; however, control and load cabling is connected by the installer directly onto the starter.

Type B wiring is available as an option. Control wiring is brought out to terminal blocks and identified. Starter load terminals are conveniently located near the vertical wiring gutters and adjacent to control terminal blocks. No wiring external to the unit is furnished.

Type C wiring is not available in motor starter switchboards.

Distribution Sections Take Any Type Of Protective Device
Distribution sections of SB1, SB2, and SB3 switchboards can accept any combination of molded case circuit breakers and fusible switches. If the system calls for a mixture of these devices, there is the option of grouping the devices in logical patterns within a single section. A separate section is not needed for each type of device. And because all types of devices can be put in a single section, the total number of sections required in the system can be reduced.

Future modifications are easier, too. Devices can be added or changed as the system grows and changes. If a motor starter has to be added after the installation, an entire switchboard section need not be provided to house it. It can be installed in any distribution section with available unit space.

Modular, Bolted-Frame Construction Saves Labor
Modular construction of all service and distribution sections allows the switchboard to be designed into the building. SENTRON switchboards can even be continued around corners, where necessary. Rigid, bolted frames can be shipped individually and moved into the building in sections that are easy to maneuver without special equipment, then quickly assembled in place with minimal labor.

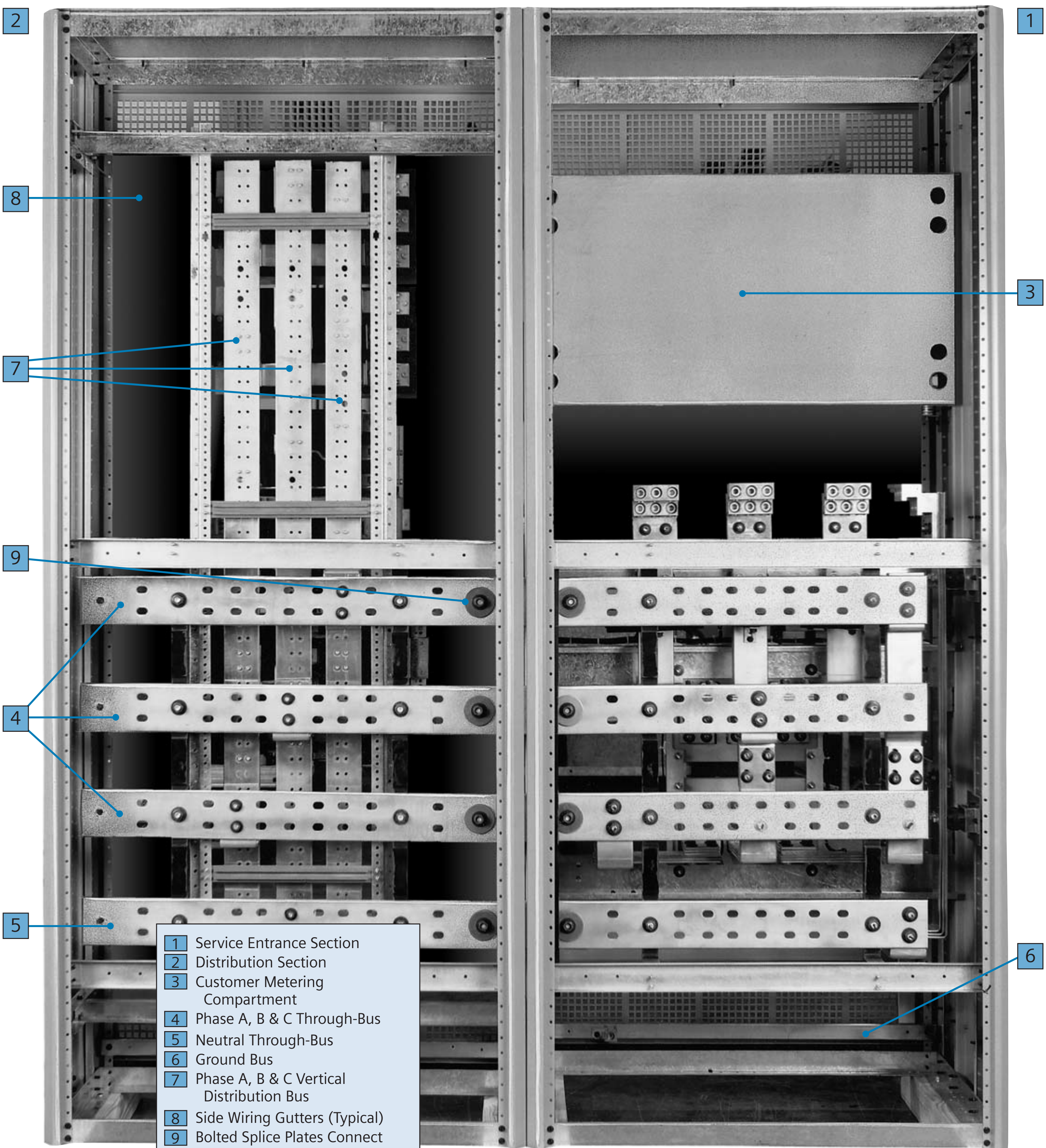
Even the front, back and side covers of SB1, SB2 and SB3 are light, easy-to-handle, formed steel pieces that fit flush to the cabinet sides. No heavy, unwieldy flat plate must be removed to gain interior access.

Bus Location Permits Quick and Easy Installation and Maintenance
All through-bus to adjoining sections are located in the rear center of distribution section. This design provides large, unobstructed wiring gutters at the top and bottom of each section. Wiring takes less time, costs less to install, and is easier to service.

Distribution Sections

Engineered For Accessibility and Expanded Use

Rear View



1	Service Entrance Section
2	Distribution Section
3	Customer Metering Compartment
4	Phase A, B & C Through-Bus
5	Neutral Through-Bus
6	Ground Bus
7	Phase A, B & C Vertical Distribution Bus
8	Side Wiring Gutters (Typical)
9	Bolted Splice Plates Connect Through-Bus

More Labor Saving Design Features

SB1, SB2 And SB3 Switchboards Suit A Wide Range Of Applications
SENTRON Switchboards will accommodate systems up to 6000 amperes, 600V ac maximum in all system configurations. Distribution system vertical bus can be specified for 600-3000 ampere ratings, and branch circuit provisions allow intermixing any combination of:

- 15-1200 ampere molded case circuit breakers
- 30-600 ampere Vacu-Break fusible switches for branch protection
- 400-1200 ampere HCP fusible switches
- Sizes 0 to 4 motor starters

All components can be built into standard Type 1 indoor enclosures, or into optional Type 3R outdoor construction.

Bus Bars Carefully Designed to Complement Switchboard Function
Bus bars are available in standard tin-finished aluminum or optional silver-finished copper. Standard bus is sized on the basis of heat rise criteria, in accordance with the UL 891. All bus bars are sized to limit heat rise to 65°C above an ambient temperature of 40°C.

As an option, conductor material can be sized according to density limits, based on bus material. The applicable limits are:

Copper — 1000 amperes/sq. in.
Aluminum — 750 amperes/sq. in.

Tapered-capacity through-bus is standard in all SENTRON switchboards in accordance with NEMA PB2 and UL891 standards. In compliance with these standards, at each distribution section, the through bus capacity is reduced as load is taken off. The through-bus is tapered to a minimum of one-third the ampacity of the incoming service mains.

If required by special system characteristics, switchboards can be supplied with optional full-capacity bus; i.e., the ampacity of the main through-bus remains at the full ampacity of the main throughout the switchboard.

Splice Plates Are Accessible From The Front
All splice plates can be accessed, bolted and unbolted from the front of the switchboard to make connections of adjacent sections easy. Each splice plate is attached with a 1/2 inch bolt and a 2-inch or 3-inch belville washer on each end. This reduces installation time while increasing contact pressure at the joint.

To make installation and servicing of the splice plates easier, all phase and neutral through-busses are stacked one above the other.

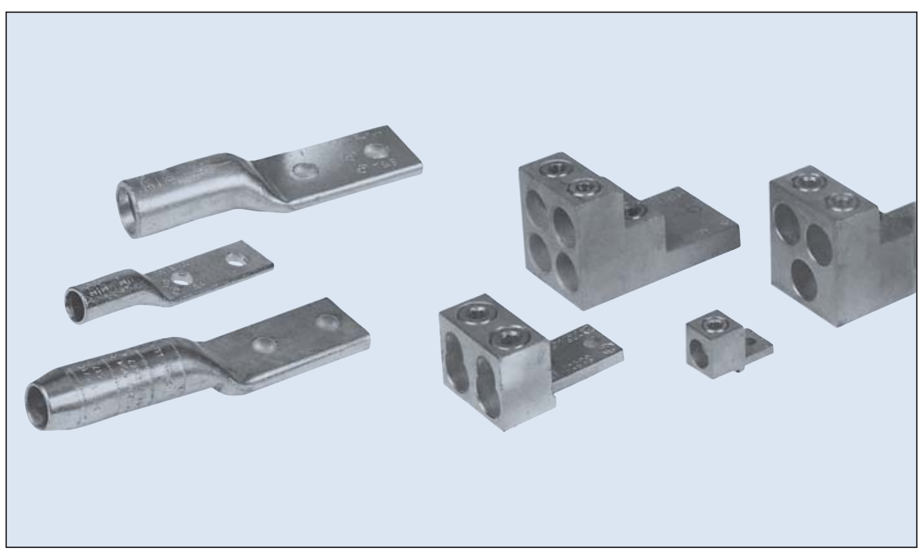
Splice Plates

Disconnect Links Included In Service Entrance Equipment
In switchboard service sections to be used as service equipment on 1 phase 3 wire and 3 phase 4 wire systems, provisions must be included to isolate the neutral bus from the grounded service neutral. This removable link gives you the ability to check branch neutral continuity on the load side of the main disconnect.

To maintain a service ground to the switchboard frame while the link is removed, a bonding strap is connected from the switchboard frame to the neutral bus on the line of the removable link.

UL and “SUSE” (suitable for use as service entrance equipment) labels will be furnished on service sections specified for service entrance.

Two Types Of Cable Terminals Are Available
Screw mechanical connectors (lugs) are provided as standard equipment on all devices. However, compression connectors are available as an option on all main lugs, main bolted pressure switches, main power circuit breakers, and main insulated case circuit breakers.



Cable Terminal

Testing

Provides Production Checks And Design Verification

Testing conducted includes both production testing of switchboard sections for compliance with UL requirements, design verification tests, and quality control testing.

Production Test Check
Structural Integrity
Production tests are performed on all switchboard sections in accordance with UL procedures. A test voltage equal to twice the rated voltage plus 1000 volts ($V_t = 2V_r + 1000$) is applied for one minute to each switchboard section to check the integrity of the conductor and insulator materials, and the switchboard assembly. These tests are performed routinely to verify proper equipment fabrication and assembly.

Design Verification And Development Tests Proved A Variety Of Data
For more sophisticated design verification and developmental testing, a separate laboratory is used. This test lab is fully instrumented for advanced, multi-phase electrical test work over a wide range of system conditions.

Among the tasks performed is the determination of heat rise at bus duct connections, and at protective device terminations on both the line and load side.

All heat rise tests are conducted in strict accordance with applicable UL standards. Heat rise data from the tests are carefully compared to UL allowable heat rise levels.

Another important program conducted in the laboratory is the systematic verification of short circuit withstand capabilities for all switchboard conductor materials. Switchboard bus has been thoroughly tested and is UL Short Circuit Withstand Rated (UL File #E22578). Switchboard sections with design conforming to test specifications will carry a label noting the Short Circuit Current Withstand rating applicable to that section.

Standard Lugs ①

Rating	Range	Wires Per Barrel	Quantity Barrels By Ampere
400A Std.	3/0 - 500	(2) 3/0 - 250 kcmil or (1) 3/0 - 500 kcmil	1
400A Alt.	3/0 - 750	(2) 3/0 - 250 kcmil or (1) 3/0 - 750 kcmil	1
600A Std.	3/0 - 500	(2) 3/0 - 400 kcmil or (1) 3/0 - 500 kcmil	2
600A Alt.	3/0 - 750	(2) 3/0 - 400 kcmil or (1) 3/0 - 750 kcmil	2
800A Std.	3/0 - 500	(2) 3/0 - 400 kcmil or (1) 3/0 - 500 kcmil	3
800A Alt.	3/0 - 750	(2) 3/0 - 400 kcmil or (1) 3/0 - 750 kcmil	3
1200A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	4
1200A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	4
1600A Std. 2000A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	6 7
1600A Alt. 2000A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	5 6
2500A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	9
2500A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	7
3000A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	10
3000A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	8
4000A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	13
4000A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	11
5000A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	17
5000A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	13
6000A Std.	3/0 - 500	(1) 3/0 - 500 kcmil	20
6000A Alt.	3/0 - 750	(1) 3/0 - 750 kcmil	16

Connector and Wire Space Requirements Based on UL 891 and NEC

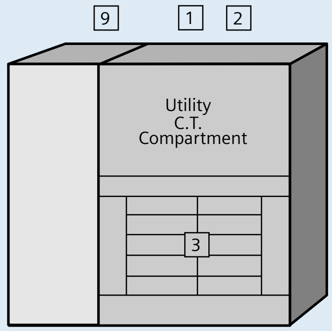
Ampere Rating of Mains or Feeders	Cable Size in kcmil Based on 75° C Aluminum Cable (Par.)					
	250	300	350	400	500	750
225	2	1	—	—	—	—
400	2	2	2	2	2	2
600	3	3	3	3	2	2
800	4	4	4	3	3	3
1000	5	5	4	4	4	3
1200	6	6	5	5	4	4
1600	8	7	7	6	6	5
2000	10	9	8	8	7	6
2500	12	11	10	10	9	7
3000	15	14	12	12	10	8
4000	20	18	16	15	13	11
Amp. Rating Per Single Cable	205	230	250	270	310	385

① Lug quantity based on 75°C cable from NEC Table 310.16.

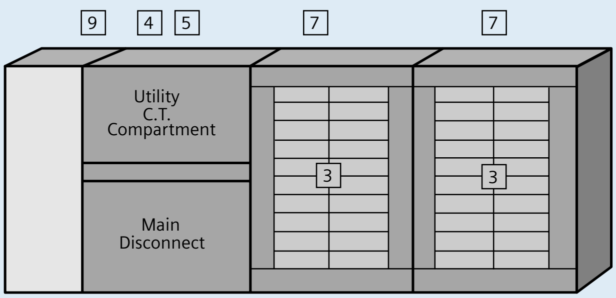
Pictorial Index

For Dimensional Data

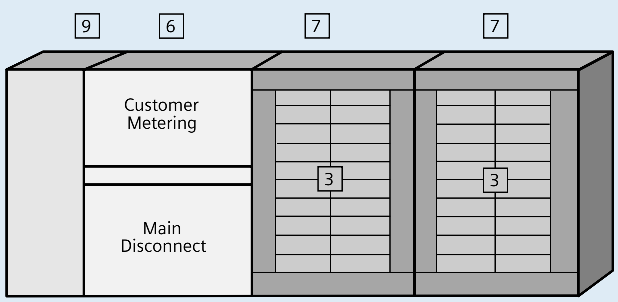
Service Section with Utility Current Transformer Compartment and Multi-Service Disconnects



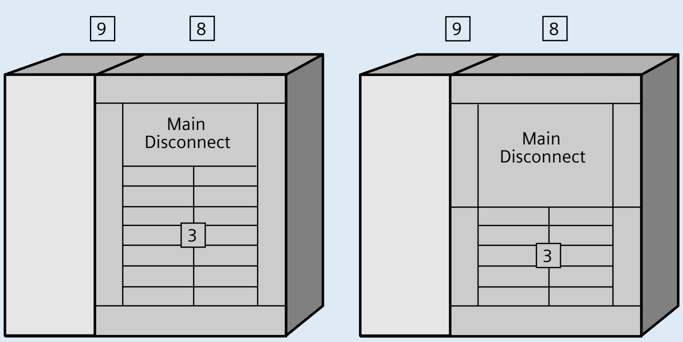
Utility Current Transformer Compartment, Main Disconnect and Distribution Sections



Customer Metering, Main Disconnect and Distribution Sections

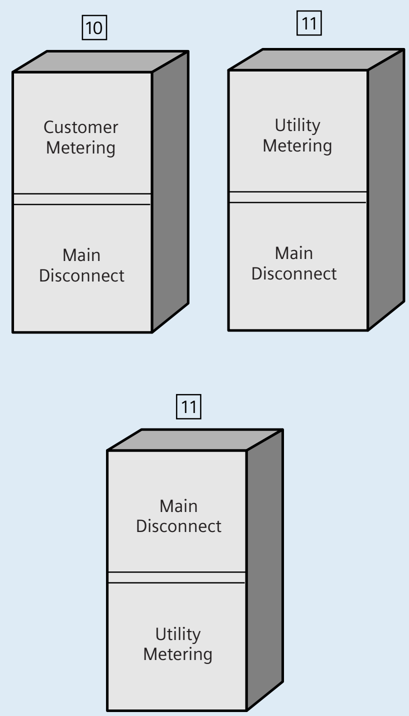


Combination Main Service Disconnect and Distribution Section



- 1 For Multi-Main Service with EUSERC Metering, see page 16.
- 2 For Multi-Main Service Section with Other Utility Metering, see page 16.
- 3 Unit Space for Disconnect Devices: Molded Case Circuit Breakers, see page 27. Vacu-Break Switches, see page 27.
- 4 For Service Section with EUSERC Metering, see page 19.
- 5 For Service Section with Other Utility Metering, see page 17.
- 6 For Service Section with Customer Metering, see page 20.
- 7 For Distribution Section, see pages 25-29.
- 8 For Combination Service Disconnect and Distribution Section, see pages 21-24.
- 9 For Bussed and Non-Bussed Pull Sections, see pages 25-26.
- 10 For Enclosed Device with Customer Metering, see page 20.
- 11 For Enclosed Device with Utility Metering, see pages 18 and 19.

Enclosed Device Remote Main With Either Customer Metering or Utility Metering



Sentron™ Switchboards

Standard Current Transformer Compartments

Standard Utility Metering Compartments
Service entrance switchboards often require that a utility current transformer compartment be included. The National Electrical Manufacturer's Association (NEMA) has created a section covering utility current transformer compartments for inclusion in PB-2, the existing standard for switchboards.

Siemens current transformer compartments have been designed to conform to this standard. All specific utility requirements take precedence but in the absence of any special requirements, the standard will be used.

Hot sequence metering has the current transformer compartment on line side of main device and cold sequence metering has the current transformer compartment on load side.

PB-2 5.06 Utility Transformer Compartment
Switchboard assemblies containing current transformer compartments for utility metering shall be arranged as shown in Figures 1 through 4. All indicated dimensions are minimum except the mounting for the current transformer. Mounting shall be for either bar or window type transformers.

The front of the compartment shall be accessible through a sealable hinged, single or double door or removable cover.

Barriers shall be installed as required to prevent access through other than sealable doors or covers.

EUSERC Member Utilities
For all cases where incoming service is from below, underground pull sections are required.

For EUSERC member utilities, underground pull sections require non-bussed sections for 400 ampere, lug landings for 600 and 800 ampere and bussed pull sections above 800 ampere.

Other Utilities
For all other utilities, non-bussed or bussed pull sections are required per local utility and code requirements.

Notes:
The utility current transformer compartments may be in the upper or lower portion of the Service Section.

Neutral may be located to the rear alongside ØA or ØC; — alternate rear location between ØA and ØB, or ØB and ØC.

All dimensions are shown in inches and mm.

The neutral need not be located in the current transformer compartment, provided its location complies with 2002 NEC article 300.20, and with UL as they relate to induced currents.

Quantity and size of aluminum and copper bus per UL 891, or manufacturers' UL Listed sizes, based on temperature rise.

Barrier material and thickness per UL 891.

This standard is intended for current transformers built to ANSI C12.11-1978.

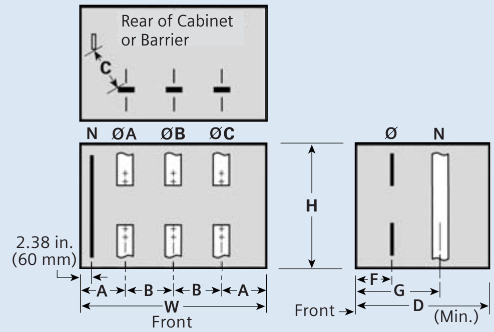


Figure 1

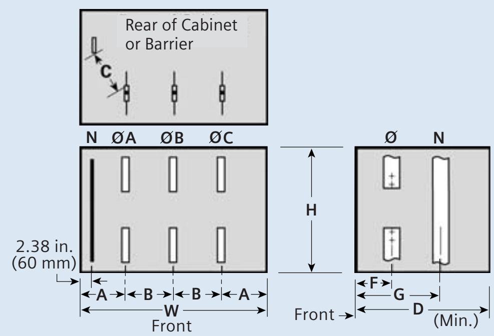


Figure 2

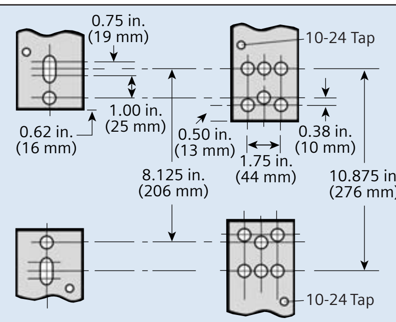


Figure 3 Figure 4

NEMA Standard Only

Ampere Rating	Fig.	Compartment Dimensions In Inches (mm)			Bus Drilling Figure	Dimensions In Inches (mm)				
		H	W	D		A	B	C	F	G
400–800	1	30 (762)	38 (965)	20 (508)	3	10.00 (254)	9.00 (229)	6.44 (164)	7.50 (191)	10.50 (267)
400–800	2	30 (762)	38 (965)	28 (711)	3	10.00 (254)	9.00 (229)	10.88 (276)	7.50 (191)	17.50 (445)
1200–2000	2	30 (762)	38 (965)	28 (711)	4	7.50 (191)	11.50 (292)	6.02 (153)	9.00 (229)	17.50 (445)
1200–2000	2	30 (762)	38 (965)	38 (965)	4	7.50 (191)	11.50 (292)	6.82 (173)	9.00 (229)	19.00 (483)
2500	2	30 (762)	38 (965)	38 (965)	4	7.50 (191)	11.50 (292)	7.07 (180)	9.00 (229)	19.00 (483)
3000–4000	2	30 (762)	38 (965)	38 (965)	4	7.50 (191)	11.50 (292)	7.07 (180)	9.00 (229)	19.00 (483)

Utility Metering

Types SB1, SB2 and SB3

Utility Reference

Electric Utility Company	ED&C Utility Code	480V		240V		SB1	SB2	SB3
		Hot	Cold	Hot	Cold			
Alameda Bureau of Electricity	EUSERC	X		X		X	X	X
Anaheim Public Utilities Department	EUSERC	X		X		X	X	X
Anderson Municipal, IN	AM	X		X				X
Anoka Electric Co., MN	AN	X		X				X
Appalachian Power Co., VA (NEMA)	AP	X		X		X	X	X
Arizona Public Service Company	EUSERC	X		X		X	X	X
Atlantic Electric, NJ	AE	X		X		X	X	X
Austin Electric Dept., TX	AU	X		X				X
Azusa Light and Water Department	EUSERC	X		X		X	X	X
Baltimore Gas & Electric, MD	BG	X		X		X	X	X
Bangor Hydro-Electric Co., ME	BH		X	X				X
Banning Electric Department	EUSERC	X		X		X	X	X
Belmont Municipal, MA	BM		X		X			X
Benton County Public Utility District No. 1	EUSERC	X		X		X	X	X
Benton Rural Electric Association	EUSERC	X		X		X	X	X
Blackstone Valley Elect. Co., RI	BV	X		X				X
Boston Edison Co., MA	BE		X		X	X	X	X
Braintree Elect., Light Co., MA	BL		X		X			X
Burbank Public Service Department	EUSERC	X		X		X	X	X
Burlington Elect., Lighting Dept., VT	BD	X		X				X
Callum County Public Utility District	CP	X		X		X	X	X
Cambridge Electric Co., MA	CA		X		X	X	X	X
Central Colorado Pwr./Centel Corp., CO	CX	X		X				X
Central Hudson Gas & Electric, NY	CH	X		X		X	X	X
Central Illinois Light Co., IL	CT	X		X				X
Central Illinois Public Service, IL	CV	X		X				X
Central Maine Power Co., ME	CM	X		X		X	X	X
Central Vermont Public Service Corp., VT	CR		X		X	X	X	X
Chelan County Public Utility District	EUSERC	X		X		X	X	X
Chicopee Light & Power, MA	CL		X		X			X
Cincinnati Gas & Electric, OH	CG	X		X		X	X	X
Citizens Utility Company Kauat Electric Division	EUSERC	X		X		X	X	X
Clark County Public Utility District	EUSERC	X		X		X	X	X
Cleveland Electric Illuminating Co., OH	CC		X		X			X
Colorado Springs		X		X		X	X	X
Colorado Springs Dept. of Utilities, CO	EUSERC	X		X		X	X	X
Columbus Div. of Electric, OH	CY		X		X			X
Columbus Southern Power, OH	CU		X		X			X
Commonwealth Edison Co., IL	CE	X			X	X	X	X
Commonwealth Electric, MA	CW	X			X	X	X	X
Concord Electric Co., NH	CO		X		X			X
Connecticut Light & Power Co., CT	CN		X		X	X	X	X
Consolidated Edison Co., NY (298-377)	CS	X		X		X	X	X
Consumers Power of Michigan, MI	CF		X		X			X
Coos-Curry Electric Cooperative	EUSERC	X		X		X	X	X
CP National Corporation	EUSERC	X		X		X	X	X
Cornbelt Electric Co-Op., IL	CB	X		X				X
Danvers Elect., Div., MA	DC		X		X			X
Dayton Power & Light Co., OH	DP	X		X		X	X	X
Delaware Power & Light Co., DE	DL	X		X				X
Delmarva Power & Light, DE	DM	X		X				X
Des Moines District		X		X				X
Detroit Edison Co., MI	DE	X		X		X	X	X
Dover, DE	CD	X		X				X
Duquesne Light Co., PA	DU	X		X				X

Utility Metering
Types SB1, SB2 and SB3

Utility Reference Continued

Electric Utility Company	ED&C Utility Code	480V		240V		SB1	SB2	SB3
		Hot	Cold	Hot	Cold			
East Central Electric, MN	EC	X		X				X
Eastern Edison Co., MA	EE	X		X				X
Eugene Water and Electric Board		X		X		X	X	X
Exeter & Hampton Electric Co., NH	EH	X		X		X	X	X
Florida Power and Light (NEMA)		X		X				X
Franklin County Public Utility District	EUSERC	X		X		X	X	X
Freeport Electric Dept., NY	FE	X		X				X
Georgia Power Co., GA (NEMA)	GP	X		X		X	X	X
Glendale Public Service Department	EUSERC	X		X		X	X	X
Granite State, NH (NEMA)	GS		X	X		X	X	X
Grant County Public Utilities District	EUSERC	X		X		X	X	X
Gray's Harbor County District No. 1	EUSERC	X		X		X	X	X
Green Mountain Power Co., VT (NEMA)	GM		X	X		X	X	X
Greenport Electric Dept., NY	GL	X		X				X
Gulf State Utilities Co., TX	GE	X		X		X	X	X
Hampton Power and Light (NEMA)			X	X		X	X	X
Hancock Co., Rural Electric Corp., IA	HC	X		X				X
Hawaii Electric Company	EUSERC	X		X		X	X	X
Hawaii Electric Light Company	EUSERC	X		X		X	X	X
Heraldsburg Electric	EUSERC	X		X		X	X	X
Idaho Power	EUSERC	X		X		X	X	X
Idaho Power Company	EUSERC	X		X		X	X	X
Illinois Power Co., IL	IC	X		X		X	X	X
Imperial Irrigation District	EUSERC	X		X		X	X	X
Indiana & Michigan Electric Co., IN	IM	X		X				X
Indianapolis Power & Light, IN	IP	X		X		X	X	X
Interstate Power Co., IA	IN		X		X			X
Iowa Illinois Gas & Electric, IA	IL		X		X			X
Iowa Public Service, IA	IS		X		X	X	X	X
Iowa Southern Utilities Co., IA	IU		X		X			X
Jacksonville Electric Authority, FL (NEMA)	JE	X		X		X	X	X
Jersey Central Power & Light, NJ	JC		X		X			X
Kansas City Power & Light Co., MO	KC	X		X		X	X	X
Kansas Gas & Electric Co., KS	KG	X		X				X
Kansas Power & Light, KS (NEMA)	KL	X		X				X
Kentucky Power, KY (NEMA)	KP	X		X				X
Kentucky Utilities, KY (NEMA)	KU	X		X				X
Klickitat Company Public Utility District	EUSERC	X		X		X	X	X
Lake Superior District Power Co., MN	LS	X		X				X
Lassen Municipal Utility District	EUSERC	X		X		X	X	X
Laverne Municipal Electric Plant, OK	LM	X		X				X
Lincoln Electric System, NE	LC	X		X				X
Lodi	EUSERC	X		X		X	X	X
Lompoc	EUSERC	X		X		X	X	X
Long Island Lighting Co., NY	LI	X		X				X
Los Angeles Department of Water and Power	EUSERC	X		X		X	X	X
Louisville Gas & Electric Co., KY	LG	X		X		X	X	X
Lubec Water & Electric District, ME	LL		X		X			X
Madison Gas & Electric Co., WI	MG	X		X				X
Maine Public Service Co., ME	MP		X		X			X
Mason County Public Utility District	EUSERC	X		X		X	X	X
Massachusetts Electric Co., MA (NEMA)	MC	X	X	X	X	X	X	X
Maui Electric Company	EUSERC	X		X		X	X	X
McMinnville Water and Light	EUSERC	X		X		X	X	X
Mesa Electric	EUSERC	X		X		X	X	X

Utility Metering

Types SB1, SB2 and SB3

Utility Reference Continued

Electric Utility Company	ED&C Utility Code	480V		240V		SB1	SB2	SB3
		Hot	Cold	Hot	Cold			
Metropolitan Edison Co., PA	ME	X		X		X	X	X
MidAmerica Energy		X		X		X	X	X
Midwest Power Co., IA	MI	X		X				X
Minnesota Power & Light Co., MN	ML	X		X				X
Mississippi Power & Light, MS	MS	X		X				X
Modesto Irrigation Distict	EUSERC	X		X		X	X	X
Monongahela Power Co., WV	MO	X		X				X
Montana Dakota Utilities, MT/ND/SD	MD	X		X				X
Montana Power and Light	EUSERC	X		X		X	X	X
Montana Power Company	EUSERC	X		X		X	X	X
Muscatine Power & Water, IA	MW	X		X				X
Narragansett Electrical Co., RI	NE	X		X		X	X	X
Navopacheelectric Cooperative Incorporated	EUSERC	X		X		X	X	X
NEMA		X		X		X	X	X
Nevada Electric		X		X		X	X	X
Nevada Power Company Incorporated	EUSERC	X		X		X	X	X
New England Power		X		X		X	X	X
New Orleans Public Service, LA	NO	X		X		X	X	X
Newport Electric Corp., RI	NC		X	X				X
New York State Electric & Gas Corp., NY	NY		X	X		X	X	X
Niagara Mohawk Corp., NY	NM		X		X			X
Northern Indiana Public Service, IN	NI	X		X				X
Northern States Power Co., MN/WI/ND/SD	NS	X		X		X	X	X
NorthEast Utility			X		X	X	X	X
Northwestern Public Service, SD	NP	X		X				X
Norwich Dept. of Public Utilities, CT	ND		X		X			X
Norwood Municipal Light Co., MA	NL		X		X			X
Ohio Edison Co., OH	OE	X		X				X
Ohio Power Co., OH	OP	X		X				X
Omaha Public Power District, NE	OM	X		X		X	X	X
Orange & Rockland Utilities, NY	OR	X		X		X	X	X
Otter Tail Power Co., MN	OT	X		X				X
Pacific Gas and Electric	EUSERC	X		X		X	X	X
Pacific Power and Light Company	EUSERC	X		X		X	X	X
Palo Alto Water and Power Department	EUSERC	X		X		X	X	X
Parker Municipal Light Dept., SD	PM	X		X				X
Pasadena Water and Power Department	EUSERC	X		X		X	X	X
Penn Electric		X		X		X	X	X
Peninsular Light Company	EUSERC	X		X		X	X	X
Pennsylvania Electric Co., PA	PE	X		X				X
Pennsylvania Power Co., PA	PY	X		X				X
Pennsylvania Power & Light Co., PA	PL	X		X				X
Philadelphia Electric Co., PA	PH	X		X		X	X	X
Plumas-Sierra Rural Electric Company	EUSERC	X		X		X	X	X
Port Angles City Light	EUSERC	X		X		X	X	X
Portland General Electric	EUSERC	X		X		X	X	X
Potomac Edison Co., MD	PT	X		X		X	X	X
Potomac Electric Power Co., DC	PP	X		X				X
Public Service Electric & Gas Co., NJ	PS	X		X		X	X	X
Public Service of Colorado, CO	PC	X		X		X	X	X
Public Service of Indiana, IN	PI	X		X				X
Public Service of New Hampshire, NH	PU	X		X		X	X	X
Puget Sound Power and Light	EUSERC	X		X		X	X	X
Redding Electric Utility	EUSERC	X		X		X	X	X
Richland	EUSERC	X		X		X	X	X

Utility Metering
Types SB1, SB2 and SB3

Utility Reference Continued

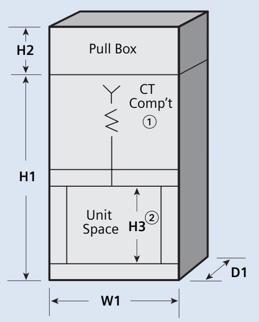
Electric Utility Company	ED&C Utility Code	480V		240V		SB1	SB2	SB3
		Hot	Cold	Hot	Cold			
Riverside Public Utility	EUSERC	X		X		X	X	X
Rochester Gas & Electric Co., NY	RG	X		X				X
Rockland Electric		X		X				X
Rockville Centre Electric Dept., NY	RE	X		X				X
Roseville Electric Department	EUSERC	X		X		X	X	X
Sacramento Municipal Utility District	EUSERC	X		X		X	X	X
Salem Electric	EUSERC	X		X		X	X	X
Salt River Project	EUSERC	X		X		X	X	X
San Diego Gas and Electric	EUSERC	X		X		X	X	X
Santa Clara Electric Department	EUSERC	X		X		X	X	X
Seattle Washington	EUSERC	X		X		X	X	X
Sierra Pacific Power Company	EUSERC	X		X		X	X	X
Snohomish County Public Utility District No. 1	EUSERC	X		X		X	X	X
Southern California Edison Company	EUSERC	X		X		X	X	X
Southern California Water Company	EUSERC	X		X		X	X	X
South Central Elec. Association, MN	SC	X		X				X
South Hadley Electric Light Dept., MA	SH		X		X			X
South Norwalk Electric, CT	SN		X		X			X
Southern Indiana Gas & Electric, IN	SI		X		X			X
Southern Maryland Co-Op, MD	SM	X		X				X
SpringField Utility Board	EUSERC	X		X		X	X	X
St. Louis Municipal Electric, MI	SL	X		X				X
Sulpher Springs Valley Electric Corporation	EUSERC	X		X		X	X	X
Superior Water Light & Power, MN	SW	X		X				X
Tacoma	EUSERC	X		X		X	X	X
Tallahassee Electric (NEMA)		X		X		X	X	X
Trico Electric Cooperative	EUSERC	X		X		X	X	X
Truckee Donner Public Utility District	EUSERC	X		X		X	X	X
Tucson Electric Power Company	EUSERC	X		X		X	X	X
Turlock Irrigation District	EUSERC	X		X		X	X	X
Toledo Edison, OH	TE		X		X			X
Ukia	EUSERC	X		X		X	X	X
Union Electric of St. Louis, MO	UE	X		X		X	X	X
Union Light Heat & Power Co., KY	UL	X		X				X
United Illuminating Co., CT	UI		X		X	X	X	X
Utah Power and Light	EUSERC	X		X		X	X	X
Vermont Public Service, VT	VP	X		X				X
Vernon Water & Electric	EUSERC	X		X		X	X	X
Village of Hamilton, NY	VH		X		X			X
Vineland, NJ	CI		X		X			X
Virginia Electric Power Co., VA	VE	X		X				X
Wakefield Municipal, MA	WM		X		X			X
Washing Water and Power	EUSERC	X		X		X	X	X
Watertown Municipal, NY	WA		X		X			X
Watertown Municipal Utilities, SD	WU	X		X				X
Wellesley Dept. of Public Works, MA	WY		X		X			X
WestField Gas and Electric			X		X	X	X	X
West Penn Power Co., PA	WP	X		X				X
Western Area Power Administration	EUSERC	X		X		X	X	X
Western Gas and Electric			X		X			X
Western Massachusetts Electric Co., MA	WT		X		X	X	X	X
Westerville Electric Co., OH	WR	X		X				X
Wheatland Electric Co-Op., KS	WC	X		X				X
Wisconsin Electric Power Co., WI	WE	X		X		X	X	X
Wisconsin Power & Light Co., WI	WL	X		X				X
Wisconsin Public Service, WI	WS	X		X				X

Service Section

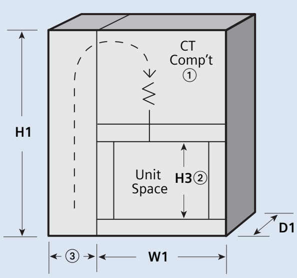
400 – 2000A Utility Metering And Multi-Main Disconnects

(Hot Sequence Utility Metering Only)

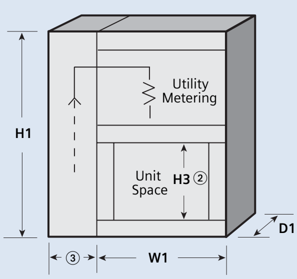
Top Entrance Cables ④ or Busway ⑤



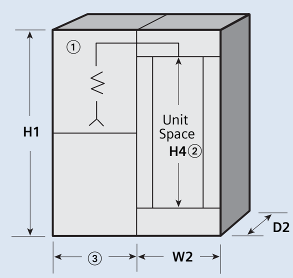
Bottom Entrance Cables Only ④ Non-Bussed Pull Section ⑥



Bottom Fed With Bussed Pull Section Cables Only



Bottom Entrance Cables Invert For Top Feed



Standard Utility Metering

Ampere Rating (MLO)	Dimensions in Inches (mm)														
	Height				Width		Depth - Minimum — Letters Refer To Chart Below								
	All Types H1	Pull Box H2	Unit Space H3 ②	Unit Space H4 ②	Minimum All Types W1	All Types W2	D1 SB1	D1 SB2	D1 SB3	D2 Bussed Pull Section SB1	D2 Bussed Pull Section SB2	D2 Bussed Pull Section SB3	D2 Distribution Section SB1	D2 Distribution Section SB2	D2 Distribution Section SB3
400	90 (2286)	15 (381)	30 (762)	65 (1651)	38 (965)	32 or 38 (813 or 965)	A	C	E	A	C	E	A	C	E
600							A	C	E	A	C	E	A	C	E
800							A	C	E	A	C	E	A	C	E
1000							B	D	F	B	D	F	A	C	E
1200							B	D	F	B	D	F	A	C	E
1600							B	D	F	B	D	F	A	C	E
2000							B	D	F	B	D	F	A	C	E

EUSERC Utility Metering ⑦

Ampere Rating (MLO)	Dimensions in Inches (mm)														
	Height				Width		Depth - Minimum — Letters Refer To Chart Below								
	All Types H1	Pull Box H2	Unit Space H3 ②	Unit Space H4 ②	Minimum All Types W1	All Types W2	D1 SB1	D1 SB2	D1 SB3	D2 Bussed Pull Section SB1	D2 Bussed Pull Section SB2	D2 Bussed Pull Section SB3	D2 Distribution Section SB1	D2 Distribution Section SB2	D2 Distribution Section SB3
400	90 (2286)	⑧	30 (762)②	65 (1651)②	32 or 38 (813 or 965)	32 or 38 (813 or 965)	A	C	E	A	C	E	A	C	E
600							A	C	E	A	C	E	A	C	E
800							A	C	E	A	C	E	A	C	E
1000							A	C	E	A	C	E	A	C	E
1200		20 (508)			38 (965)		—	—	F	B	D	F	A	C	E
1600							—	—	F	B	D	F	A	C	E
2000							—	—	F	B	D	F	A	C	E

① Verify dimensions with local utility requirements.
② See page 27 for unit space of disconnect devices.
③ See page 25 for dimensions.

EUSERC Utility Notes:
④ Not applicable for EUSERC.
⑤ Busway available for SB3 only.
⑥ Not allowed by Los Angeles Department of Water and Power or San Diego Gas & Electric.
⑦ Some jurisdictions do not allow multi-main service equipment.
⑧ 400/1000A FED by 500 kcmil - no pull box required. 400/1000A FED by 750 kcmil - 10 inch (254mm) pull box required.

Depth Reference Chart			
A	20 inches (508 mm)	D	28, 38 (711, 965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)

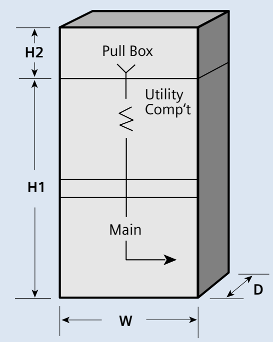
Service Sections

Utility Metering and Single Main Disconnects
Standard Utilities
(Hot Sequence – Utility Compartment on Line Side of Main)

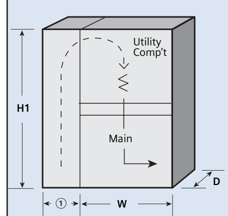
Max. Amp. Rating	Device Type	Device Applies To Switchboard SB1	SB2	SB3	Dimensions in Inches (mm) Height H1	Pull Box H2	H3	Width W	Depth Available (Letters Reference Chart Below) D SB1	SB2	SB3
Molded Case Circuit Breakers											
400	HJXD6, HHJXD6, JXD2 JXD6, JD6, HJD6, HHJD6	•	•	•	90 (2286)	②	②	38 (965)	A	C	E
	SJD6		•	•					—	C	E
	CJD6, SCJD6			•					—	—	E
600	HLXD6, HHLD6, HHLXD6, LXD6, LD6, HLD6	•	•	•					A	C	E
	SLD6	•	•	•					C	E	J
	CLD6, SCLD6			•					—	—	E
800	LMXD6, LMD, HLMXD6, HLMD6, MXD6, MD6, HMD6, HMXD6	•	•	•		10 ③ (254)	④		A	C	E
	SMD6		•	•					—	C	E
	CMD6, SCMD6			•					—	—	E
1000	NXD6, ND6, HND6, HNXD6	•	•	•					B	D	F
	SND6		•	•					—	D	F
	CND6, SCHD6			•					—	—	F
1200	NXD6, ND6, HND6, HNXD6	•	•	•					B	D	F
	SND6		•	•					—	D	F
	CND6, SCND6			•					—	—	F
1600⑤	PXD6, PD6, HPD6, HPXD6	•	•	•			10 ⑨ (254)		B	D	F
	SPD6		•	•					—	D	F
	CPD6, SCPD6			•					—	—	F
2000⑤	RXD6, RD6, HRD6, HRXD6	•	•	•					B	D	F
Insulated Case Circuit Breakers — Stationary Mounted ⑦											
800	Type WL Insulated Case Breaker		•	•	90 (2286)	10 ③ (254)	④	38 (965)	—	D	F
1200			•	•			10 ⑨ (254)		—	D	F
1600⑤			•	•					—	D	F
2000⑤			•	•					—	D	F
2500⑥			•	•		20 (508)	—		—	G	H
3000⑥			•	•					—	G	H
4000⑥			•	•					—	G	H
Fusible Switches											
400	HCP	•	•	•	90 (2286)	②	②	38 (965)	A	C	E
600		•	•	•					A	C	E
800		•	•	•		10 ③ (254)			A	C	E
1200		•	•	•					A	C	E
800⑤	Vacu-Break	•	•	•			④		B	D	F
1000⑤		•	•	•					B	D	F
1200⑤		•	•	•					B	D	F
800	Bolted Pressure	•	•	•			10 ⑨ (254)		B	D	F
1000		•	•	•					B	D	F
1200		•	•	•					B	D	F
1600⑤		•	•	•					—	D	G
2000⑤		•	•	•					—	D	G
2500⑥			•	•		20 (508)	—	46 (1168)	—	D	G
3000⑥			•	•					—	D	G
4000⑥			•	•					—	D	G

Depth Reference Chart					
A	20 inches (508 mm)	D	28, 38 inches (711, 965 mm)	G	38 inches (965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	H	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)	J	48, 58 inches (1219, 1473 mm)

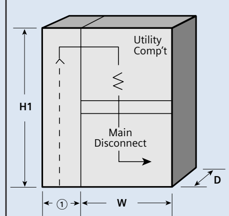
Top Entrance Cables or Busway ⑧



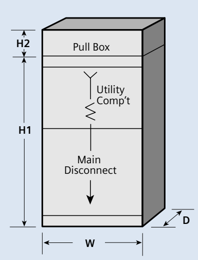
Bottom Entrance with Non-Bussed Pull Section Cables Only



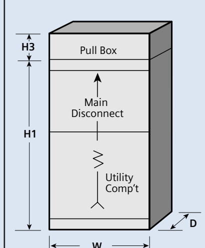
Bottom Entrance with Bussed Pull Section Cables Only



Enclosed Device Top Entry Cables



Enclosed Device Bottom Entry Cables

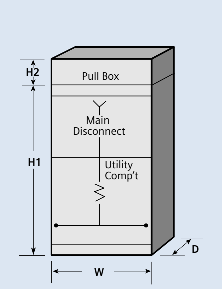


① Refer to Page 25 for dimensions.
② Not required.
③ 800A through 1000A with 500 kcmil - no pull box required. 800A with 750 kcmil - 10.0 inch (254mm) pull box required. 1200A through 2000A with 750 kcmil - 20.0 inch (508mm) pull box required.
④ 10 Inch (245mm) high top mounted pull box required when outgoing cable size is greater than 500kcmil.
⑤ Not Available as an Enclosed Device in bottom feed applications with hot sequence utility metering.
⑥ Not Available as an Enclosed Device with Hot or Cold Sequence Utility Metering.
⑦ For Type SB3, drawout WL breakers breakers are available as an option. Minimum depth SB3 - 38 inches (965 mm).
⑧ Busway available for SB3 only.
⑨ 20 Inch (508mm) high top mounted pull box required when outgoing cable size is greater than 500kcmil.

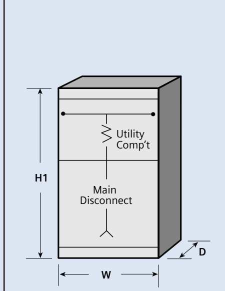
Service Section

Utility Metering and Single Main Disconnects
Standard Utilities
(Cold Sequence – Utility Compartment on Load Side of Main)

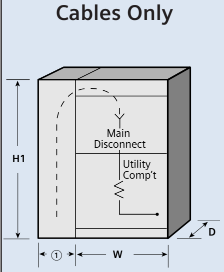
Top Entry Cables or Busway



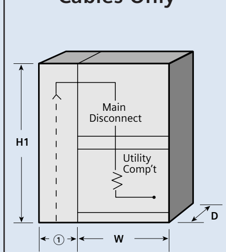
Bottom Fed



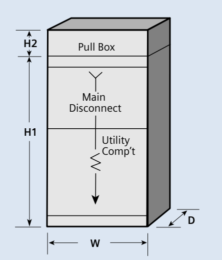
Bottom Fed With Non-Bussed Pull Section Cables Only



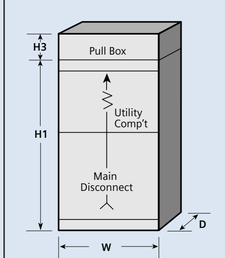
Bottom Fed With Bussed Pull Section Cables Only



Enclosed Device Top Entry Cables



Enclosed Device Bottom Entry Cables



① Refer to Page 25 for dimensions.
② Not required.
③ 28 inch (711mm) minimum depth required for Enclosed Device sections.
④ Not Available as an Enclosed Device in bottom feed applications with cold sequence utility metering.
⑤ A bussed pull section is required to place a utility compartment in the same section as the device or the utility compartment must be installed in an adjacent section.
⑥ For Type SB3, drawout WL breakers are available as an option. Minimum depth SB3 - 38 inches (965 mm).
⑦ With 750 kcmil load connectors, top mounted pull box shall be 20 inches (508mm) high.
⑧ 28 inch (711mm) minimum depth required in top feed applications.

Max. Amp. Rating	Device Type	Device Applies To Switchboard SB1	SB2	SB3	Dimensions in Inches (mm) Height H1	Pull Box H2	Pull Box H3	Width W	Depth Available (Letters Reference Chart Below) D SB1	D SB2	D SB3
Molded Case Circuit Breakers											
400	HJXD6, HHJXD6, JXD2 JXD6, JD6, HJD6, HHJD6	•	•	•	90 (2286)	②	②	38 (965)	A ③	C ③	E
	SJD6		•	•					—	C ③	E
	CJD6, SCJD6			•					—	—	E
600	HLXD6, HHLD6, HHLXD6, LXD6, LD6, HLD6	•	•	•					A ③	C ③	E
	SLD6	•	•	•					A ③	C ③	E
	CLD6, SCLD6			•					—	—	E
800	LMXD6, LMD, HLMXD6, HLMD6, MXD6, MD6, HMD6, HMXD6	•	•	•		15 (381)			A ③	C ③	E
	SMD6		•	•					—	C ③	E
	CMD6, SCMD6			•					—	—	E
1000	NXD6, ND6, HND6, HNXD6	•	•	•					B	D	F
	SND6		•	•					—	D	F
	CND6, SCHD6			•					—	—	F
1200	NXD6, ND6, HNXD6	•	•	•					B	D	F
	SND6		•	•					—	D	F
	CND6, SCND6			•					—	—	F
1600 ④	PXD6, PD6, HPD6, HPXD6	•	•	•			—		B	D	F
	SPD6		•	•					—	D	F
	CPD6, SCPD6			•					—	—	F
2000 ④	RXD6, RD6, HRD6, HRXD6	•	•	•					B	D	F
Insulated Case Circuit Breakers — Stationary Mounted ⑥											
800	Type WL Insulated Case Breaker		•	•	90 (2286)	10 (254)	15 ⑦ (381)	38 (965)	—	D	F
1200			•	•		15 (381)	—		—	D	F
1600 ④			•	•					—	D	F
2000 ④			•	•					—	D	F
2500 ④ ⑤			•	•		20 (508)			—	G	H
3000 ④ ⑤			•	•					—	G	H
4000 ④ ⑤			•	•					—	G	H
Fusible Switches											
400	HCP	•	•	•	90 (2286)	②	15 ⑦ (381)	38 (965)	A ⑧	C ⑧	E ⑧
600		•	•	•		15 (381)			A ⑧	C ⑧	E ⑧
800		•	•	•					A ⑧	C ⑧	E ⑧
1200		•	•	•					A ⑧	C ⑧	E ⑧
800 ④	Vacu-Break	•	•	•			—		B	D	F
1000 ④		•	•	•					B	D	F
1200 ④		•	•	•					B	D	F
800	Bolted Pressure	•	•	•			15 ⑦ (381)		B	D	F
1000		•	•	•					B	D	F
1200		•	•	•					B	D	F
1600		•	•	•			20 (508)		—	D	G
2000		•	•	•					—	D	G
2500 ④			•	•			—	46 (1168)	—	D	G
3000 ④			•	•		20 (508)			—	D	G
4000 ④			•	•					—	D	G

Depth Reference Chart					
A	20 inches (508 mm)	D	28, 38 inches (711, 965 mm)	G	38 inches (965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	H	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)	J	48, 58 inches (1219, 1473 mm)

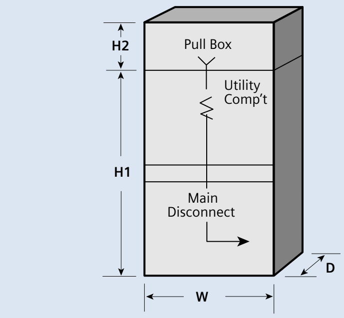
Service Sections

Utility Metering and Single Main Disconnects
EUSERC Utilities
(Hot Sequence – Utility Compartment on Line Side of Main)

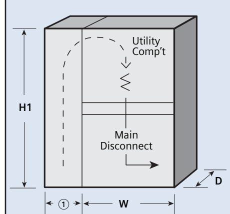
Max. Amp. Rating	Device Type	Device Applies To Switchboard SB1	SB2	SB3	Dimensions in Inches (mm) Height H1	Pull Box H2	Width W	Depth Available – Letters Reference Chart Below D SB1	SB2	SB3
Molded Case Circuit Breakers										
400	HJXD6, HHJD6, HHJXD6, JXD2, JXD6, JD6, HJD	•	•	•	90 (2286)	②	32 (813) ③	A	C	E
	SJD6, SHJD6		•	•				—	C	E
	CJD6, SCJD6			•				—	—	E
600	HLXD6, HHLD6, HHLX6 LXD6, LD6, HLD6	•	•	•				A	C	E
	SLD6	•	•	•				—	C	E
	CLD6, SCLD6			•				—	—	E
800	LMXD6, LMD6, HLMXD6 HLMD6, MXD6, MD6, HMD6, HMXD6	•	•	•				A	C	E
	SMD6		•	•				—	C	E
	CMD6, SCMD6			•				—	—	E
1000	NXD6, ND6, HND6, HNXD6	•	•	•				A	C	E
	SND6		•	•				—	C	E
	CND6, SCND6			•				—	—	E
1200	NXD6, ND6, HND6, HNXD6	•	•	•				B	D	B
	SND6		•	•				—	B	B
	CND6, SCND6			•				—	—	B
1600	PXD6, PD6, HPD6, HPXD6	•	•	•		20 (508)	38 (965)	B	D	B
	SPD6		•	•				—	B	B
	CPD6, SCPD6			•				—	—	B
2000	RXD6, RD6, HRD6, HRXD6	•	•	•				B	D	B
Insulated Case Circuit Breakers — Stationary Mounted ④										
800	Type WL Insulated Case Breaker		•	•	90 (2286)	②	38 (965)	—	D	F
1200			•	•		20 (508)		—	D	F
1600			•	•				—	D	F
2000			•	•				—	D	F
2500			•	•				—	G	H
3000			•	•				—	G	H
4000			•	•			52 (1321)	—	G	H
Fusible Switches										
400	HCP	•	•	•	90 (2286)	②	38 (965)	A	C	E
600		•	•	•				A	C	E
800		•	•	•				A	C	E
1200		•	•	•		20 (508)		A	C	E
800	Vacu-Break	•	•	•		②		B	D	F
1000		•	•	•				B	D	F
1200		•	•	•		20 (508)		B	D	F
800	Bolted Pressure	•	•	•				B	D	F
1000		•	•	•				B	D	F
1200		•	•	•				B	D	F
1600		•	•	•				B	D	F
2000		•	•	•				B	D	F
2500 ⑤			•	•			46 (1168)	—	G	H
3000 ⑤			•	•				—	G	H
4000 ⑤			•	•			52 (1321)	—	G	H

Depth Reference Chart					
A	20 inches (508 mm)	**D**	28, 38 inches (711, 965 mm)	**G**	38 inches (965 mm)
B	28 inches (711 mm)	**E**	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	**H**	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	**F**	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)	**J**	48, 58 inches (1219, 1473 mm)

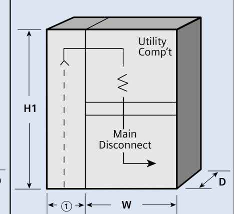
Top Entrance Cables or Busway ⑥



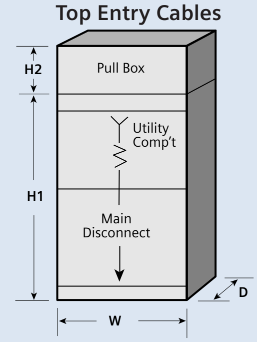
Bottom Entrance with Non-Bussed Pull Section Cables Only



Bottom Entrance with Bussed Pull Section Cables Only



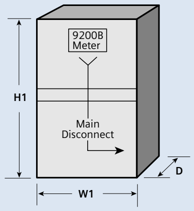
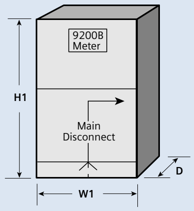
Enclosed Device Top Entry Cables

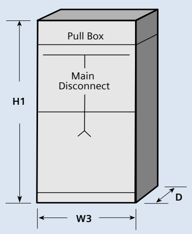
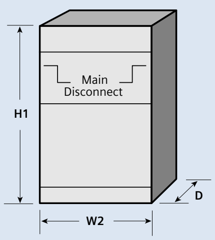


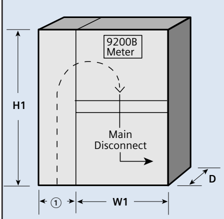
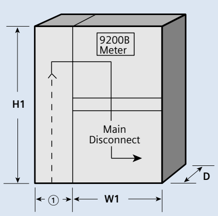
① Refer to page 25 for dimensions.
② 400A through 1000A FED by 500 kcmil - No pull box required. 400A through 1000A FED by 750 kcmil - 10.0 inch (254mm) pull box required.
③ 38 inch (965mm) wide required for outdoor NEMA 3R construction.
④ For Type SB3, drawout WL breakers are available as an option. Minimum depth 38 inches (965mm).
⑤ Not available in Enclosed Device type sections.
⑥ Busway available for SB3 only.

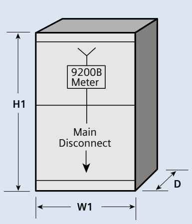
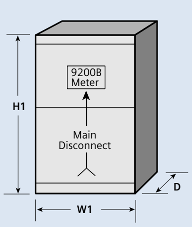
Service Sections

Non-Utility With or Without Customer Metering and Main Disconnect

Top Entrance Cables Pull Box	Bottom Entrance
	

EUSERC Underground Pull Section with Main	Through Main
	

Bottom Entrance with Non-Bussed Pull Section	Bottom Entrance with Bussed Pull Section
	

Enclosed Device Top Entry Cables	Enclosed Device Bottom Entry Cables
	

Max. Amp. Rating	Device Applies Device Type	To Switchboard SB1	To Switchboard SB2	To Switchboard SB3	Dimensions in Inches (mm) Height H1	Width W1	Width W2	Width W3	Depth Available (Letters Reference Chart Below) D SB1	D SB2	D SB3
Molded Case Circuit Breakers											
400	HJXD6, HHJD6, HHJXD6, JXD2, JXD6, JD6, HJD6	•	•	•	90 (2286)	32 ② (813)	32 (813)	32 (813)	A	C	E
	SJD6, SHJD6		•	•					—	C	E
	CJD6, SCJD6			•					—	—	E
600	HLXD6, HHLD6, HHLXD6 LXD6, LD6, HLD6	•	•	•					A	C	E
	SLD6, SHLD6	•	•	•					—	C	E
	CLD6, SCLD6			•					—	—	E
800	MXD6, MD6, HMD6, HMXD6, LMXD6, LMD6, HLDM6, HLMD6, HLMXD6	•	•	•					A	C	E
	SMD6, SHMD6		•	•					—	C	E
	CMD6, SCMD6			•					—	—	E
1000	NXD6, ND6, HND6, HNXD6	•	•	•				38 (965)	A	C ②	E
	SND6, SHND6		•	•					—	C ②	E ②
	CND6, SCND6			•					—	—	E ②
1200	NXD6, ND6, HND6, HNXD6	•	•	•					A ②	C ②	E ②
	SND6		•	•					—	C ②	E ②
	CND6, SCND6			•					—	—	E ②
1600	PXD6, PD6, HPD6, HPXD6	•	•	•		38 (965)	38 (965)	40 (1016)	B	D	F
	SPD6		•	•					—	D	F
	CPD6, SCPD6			•					—	—	F
2000	RXD6, RD6, HRD6, HRXD6	•	•	•					—	—	F
Insulated Case Circuit Breakers — Stationary Mounted ③ ④											
800	Type WL Insulated Case Breaker		•	•	90 (2286)	38 (965)	38 (965)	32 (813)	—	D	F
1200			•	•				38 (965)	—	D	F
1600			•	•				40 (1016)	—	D	F
2000			•	•					—	D	F
2500			•	•				—	—	G	H
3000			•	•					—	G	H
4000			•	•					—	G	H
5000				•					—	—	H
Switches											
400	HCP	•	•	•	90 (2286)	38 (965)	38 (965)	32 (813)	A	C	E
600		•	•	•					A	C	E
800		•	•	•					A	C	E
1200		•	•	•				38 (965)	A	C	E
400	Vacu-Break	•	•	•		—	—	32 (813)	A	C	E
600		•	•	•					A	C	E
800		•	•	•		38 (965)	38 ⑤ (965)	38 (965)	B	D	F
1000		•	•	•					B	D	F
1200		•	•	•					B	D	F
800	Bolted Pressure	•	•	•			38 (965)		B	D	F
1000		•	•	•					B	D	F
1200		•	•	•					B	D	F
1600		•	•	•				40 (1016)	B	D	F
2000		•	•	•					B	D	F
2500			•	•		46 (1168)	46 (1168)	48 (1219)	—	G	H
3000			•	•			52 (1321)	52 (1321)	—	G	H
4000			•	•					—	G	H

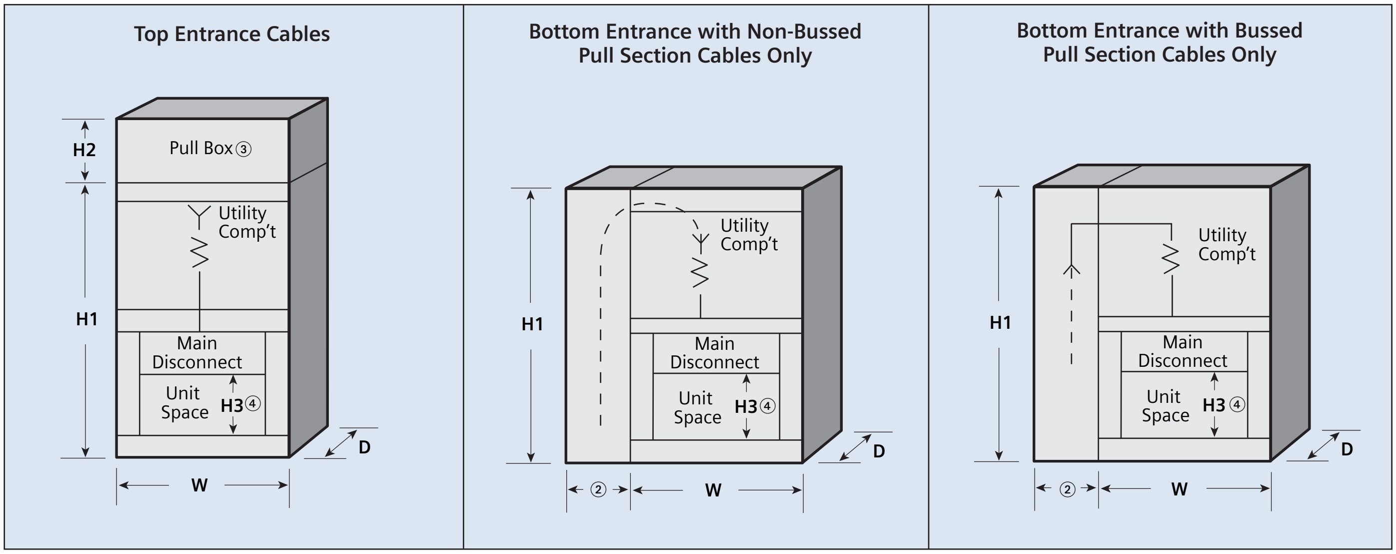
Depth Reference Chart					
A	20 inches (508 mm)	D	28, 38 inches (711, 965 mm)	G	38 inches (965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	H	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)	J	48, 58 inches (1219, 1473 mm)

① Refer to Page 25 for dimensions.
② 28 inch (711mm) deep required for Enclosed Device.
③ For type SB3, drawout breakers are available as an option. Minimum depth 38 inches (965 mm).
④ Insulated Case used as a through main only available in SB3 switchboard applications.
⑤ 400 and 600A Vacu-Break Through Mains are available in 32.0 inch (813mm) wide.

Combination Sections

400A – 1200A EUSERC Utility Compartment with Panel Mounted Main Disconnect And Distribution Sections

(Hot Sequence Only)



Max. Amp. Rating	Device Type	Device Applies To Switchboard SB1	SB2	SB3	Dimensions in Inches (mm) Height H1	Pull Box ③ H2	Unit Space ④ ⑥ H3	Width W	Depth Available (Letters Reference Chart Below) D SB1	SB2	SB3
Molded Case Circuit Breakers											
400	JXD2, JXD6, JD6, HJXD6 HJD6, HHJXD6, HHJD6	•	•	•	90 (2286)	③	17.5 (445)	32 ① (813)	A	C	E
	CJD6		•	•					—	C	E
600	LXD6, LD6, HLXD6, HLD6, HHLXD6, HHLD6	•	•	•					A	C	E
	CLD6		•	•					—	C	E
800	LMXD6, LMD6, HLMXD6, HLMD6, MXD6, MD6, HMD6	•	•	•					A	C	E
	CMD6			•			12.5 (318)		—	C	E
1000 ⑤	NXD6, ND6, HNXD6	•	•	•					—	D	F
	CND6		•	•					—	D	F
1200 ⑤	NXD6, ND6, HNXD6, HND6			•				38 (965)	B	D	F
	CND6		•	•					—	D	F
Switches											
400	HCP	•	•	•	90 (2286)	③	13.75 (349)	32 ① (813)	A	C	E
600		•	•	•					A	C	E
800		•	•	•					A	C	E
1200 ⑤		•	•	•				38 (965)	B	D	F
400	Vacu-Break	•	•	•			11.25 (292)	32 ① (813)	B	D	F
600		•	•	•					B	D	F

① Weather proof sections require 38.0 inch (965mm) wide.
② See Page 25 for dimensions.
③ 400/800 fed by 500kcmil - no pull box is required. 400/800 fed by 750kcmil - 10.0 inch (254mm) pull box required. 1000/1200 required a 20.0 inch (508mm) top mounted pull box when fed by 500 or 850 kcmil.
④ When ground fault is required, reduce unit space by 10 inches (254mm).
⑤ Ground fault required if section is service entrance and system voltage is greater than 150v to ground.
⑥ See page 27 for dimensional information of panel mounted main and branch devices.

Depth Reference Chart					
A	20 inches (508 mm)	D	28, 38 inches (711, 965 mm)	G	38 inches (965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	H	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)	J	48, 58 inches (1219, 1473 mm)

Combination Sections

Combination 400A – 2000A Circuit Breaker Service Disconnect and Distribution Sections

Molded Case Circuit Breaker Main
SB1 and SB2 combination service/distribution sections house both a main service disconnect device and branch distribution disconnects. Switchboards can be furnished with "Suitable for Use as Service Equipment" labels, but include no provisions for utility metering or customer metering.

Branch circuit device unit space varies, depending on the rating and consequent physical size of the main disconnect device. If more unit space is required than is shown in the tables below, one or more additional distribution sections must be added.

400-1200A Main Breaker Without GFP

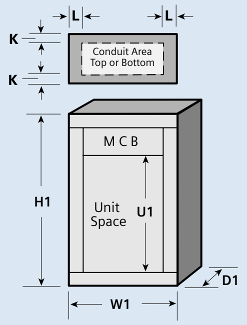


Fig. 1 Top Entrance ①

400-1200A Main Breaker With GFP

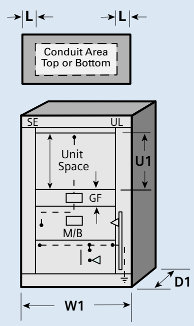


Fig. 2 Bottom Entrance ①

1600-2000A Main Breaker With or Without GFP

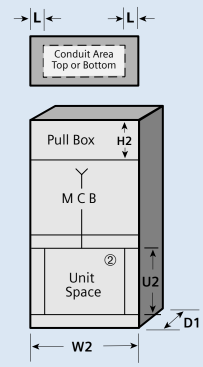


Fig. 3

400-1200A MCCB With Line Through Bus ⑤

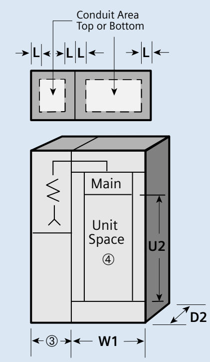


Fig. 4

1600-2000A MCCB With Line Through Bus

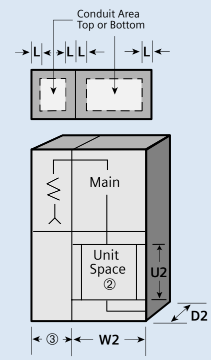


Fig. 5

Max. Amp. Rtg.	Breaker Type	Device Applies To Switchboard SB1	SB2	SB3	Dimensions in inches (mm): Height H1	Pull Box H2	Unit Space U1 ⑥ ⑦ Load Through Bus ⑤ Without	With	Width: Unit Space ⑦ U2	Fig. 1,2 & 4 W1	Fig. 3 & 5 W2	Depth Available Letters Reference Chart Below D1 SB1	D1 SB2	D1 SB3	D2 SB1	D2 SB2	D2 SB3	Conduit Area K	L	Main Location	Main Mtg. Position	Svc. Ent. Lbl.
400	HHJXD6, JXD2, JXD6, HJXD6, JD6, HJD6, HHJD6	•	•	•	90 (2286)	—	56.25 (1429)	53.75 (1365)	46.25 (1175)	32 (813), 38 (895), & 46 (1168)	—	A	C	E	B	D	F	2.50 (64)	3.00 (76)	Top or Bottom	Horiz.	Yes
	SJD6, SHJD6		•	•								—	C	E	B	D	F					
	CJD6, SCJD6			•								—	—	E	B	D	G					
600	HHLXD6, LXD2, LXD6, HLXD6	•	•	•								A	C	E	B	D	F					
	HLD6, SLD6, HHLD6		•	•								—	C	E	B	D	F					
	CLD6, SCLD6			•								—	—	E	B	D	F					
800	LMD, HLMD, LMXD6, HLMXD6	•	•	•			53.75 (1365)	53.75 (1365)	45 (1143)			A	C	E	B	D	F					
	MXD6, MD6, HHMD6, HMXD6	•	•	•			52.50 (1334)	52.50 (1334)		38 (965) & 46 (1168) ⑧		A	C	E	B	D	F					
	SMD6		•	•			40.00 (1016)	40.00 (1016)				—	C	E	B	D	F					
	CMD6, SCMD6			•			52.50 (1334)	52.50 (1334)				—	—	E	B	D	F					
1000	NXD6, ND6, HND6, HNXD6	•	•	•			52.50 (1334)	52.50 (1334)				A	C	E	B	D	F					Yes ⑨
	SND6		•	•			40.00 (1016	40.00 (1016				—	C	E	B	D	F					
	CND6, SCND6			•			52.50 (1334)	52.50 (1334)				—	—	E	B	D	F					
1200	NXD6, ND6, HND6, HNXD6	•	•	•			52.50 (1334)	52.50 (1334)				A	C	E	B	D	F					
	SND6		•	•			40.00 (1016)	40.00 (1016)				—	C	E	B	D	F					
	CND6, SCND6			•			52.50 (1334)	52.50 (1334)				—	—	F	B	D	F					
1600	PXD6, PD6, HPD6, HPXD6	•	•	•		⑩	—	—	30 (762)	—	38 (965)	B	D	F	B	D	F			Top	Vert.	
	SPD6		•	•								—	D	F	B	D	F					
	CPD6, SCPD6			•								—	—	F	B	D	F					
2000	RXD6, RD6, HRD6, HRXD6	•	•	•								B	D	F	B	D	F					

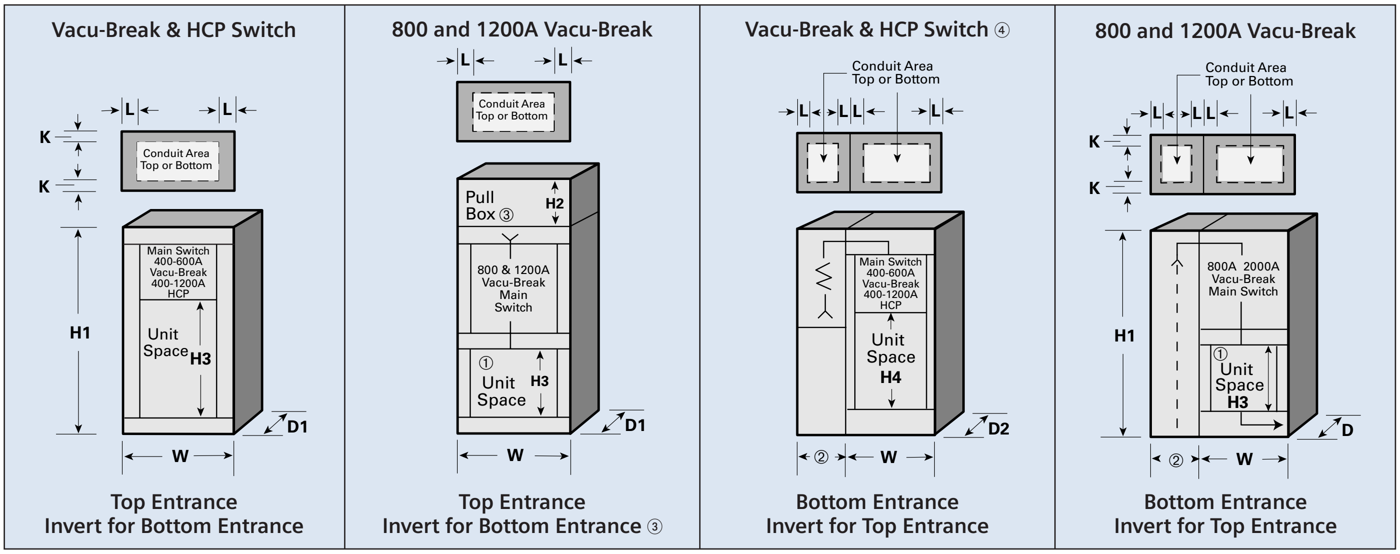
Depth Reference Chart			
A	13.75④, 20 inches (349④, 508 mm)	D	28, 38 (711, 965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)

① Unit may be inverted for bottom-feed applications.
② Load cables must exit bottom.
③ Refer to page 25 for dimensions.
④ Not available with load through bus.
⑤ Not available in 13.75 inch (349 mm) deep.
⑥ Dimensions shown are reduced by 10 inches (254mm) when ground fault is required.
⑦ See page 27 for dimensional information of panel mounted main and branch devices.
⑧ When incoming cables are greater than 500 kcmil, 46 inch (1168mm) wide section required.
⑨ Service entrance label at 480V requires ground fault.
⑩ Pull box height:
Standard 500 kcmil lugs = 10 inch (254 mm).
Alternate 750 kcmil lugs = 15 inch (381mm).

Combination Sections

Combination 400A – 1200A Fusible Service Disconnect and Distribution Sections

Main Vacu-Break®& HCP Switch



400–1200A Vacu-Break Switch Main

Maximum Ampere Rating	Applies To Switchboard			Dimensions in Inches (mm) — Height						Width	Depth Available — Letters Refer To Chart Below						Conduit Area		Main Location	Service Entrance Label
					Top Pull Box	Unit Space - H3 ⑤		Unit Space			D1			D2						
						Without Load Through Bus	With Load Through Bus													
	SB1	SB2	SB3	H1	H2 ③			H4 ⑤⑥		W	SB1	SB2	SB3	SB1	SB2	SB3	K	L		
400	•	•	•	90.00 (2286)	—	43.75 (1111)	36.25 (921)	43.75 (1111)		38.00 ⑥ (965)	A	C	E	B	D	F	2.50 (64)	3.00 (76)	Top or Bottom	Yes
600	•	•	•			41.25 (1048)	33.75 (857)				A	C	E	B	D	F				
800	•	•	•		10.00① (2.54)	30.00 (762)	30.00 (762)	30.00 (762)		38.00 (965)	B	D	F	B	D	F			Top or Bottom	
1200	•	•	•								B	D	F	B	D	F				Yes ⑦

400–1200A HCP Switch Main

Maximum Ampere Rating	Applies To Switchboard			Dimensions in Inches (mm) — Height	Unit Space ⑧		Width	Depth Available — Letters Refer To Chart Below						Conduit Area		Main Location	Service Entrance Label
								D1			D2						
	SB1	SB2	SB3	H1	H3 ⑤	H4 ⑤	W	SB1	SB2	SB3	SB1	SB2	SB3	K	L		
400	•	•	•	90.00 (2286)	46.25 (1175)	46.25 (1175)	38.00 ⑨ (965)	A	C	E	B	D	F	2.50 (64)	3.00 (76)	Top or Bottom	Yes ⑩
600	•	•	•					A	C	E	B	D	F				
800	•	•	•					A	C	E	B	D	F				
1200	•	•	•					A	C	E	B	D	F				

Depth Reference Chart			
A	20 inches (508 mm)	D	28, 38 (711, 965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)

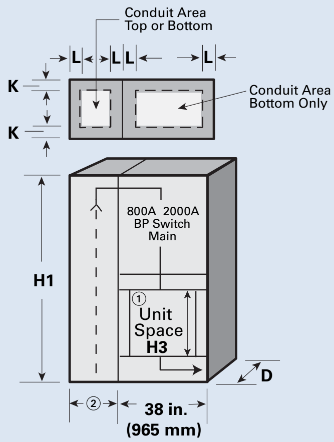
① Load cables must exit bottom when top fed and top when bottom fed.
② Refer to page 25 for dimensions.
③ 15 inch (381 mm) pull box when alternate 750Kcmil lugs are used.
④ Not available with load thru bus.
⑤ See page 27 for dimensional information of panel mounted main and branch devices.
⑥ 38 inch (965 mm) wide standard, 32 inch (813 mm) wide and 46 inch (1168mm) wide available as an option.
⑦ Service entrance label available at 240V only.
⑧ Unit Space dimensions shown are reduced by 10 inches (254mm) when ground fault is required.
⑨ 46 inch (1168mm) wide available as an option.
⑩ 1200A HCP switches rated 480V requires ground fault protection.

Combination Sections

Combination 800A – 2000A Bolted Pressure Switch Main Disconnect and Distribution Sections

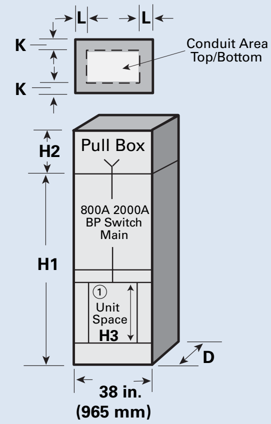
Main Bolted Pressure Switch

800 through 2000A Bolted Pressure Switch



Bottom Entrance

800 through 2000A Bolted Pressure Switch



Top Entrance

800–2000A Bolted Pressure Switch Main, with or without Ground Fault ③

Maximum Ampere Rating	Applies To Switchboard			Dimensions in Inches (mm): Height				Depth: Letter Refers To Chart Below: D			Conduit Area		Main Location	Service Entrance Label
	SB1	SB2	SB3	H1	Top Pull Box — H2: 500 kcmil Lugs	Top Pull Box — H2: 750 kcmil Lugs	Unit Space H3 ④	SB1	SB2	SB3	K	L		
800	•	•	•	90.00 (2286)	10 (254)	20 (508)	30 (762)	B	D	F	2.50 (64)	3.00 (76)	Top	Yes
1200	•	•	•					B	D	F				Yes ⑤
1600	•	•	•					B	D	F				
2000	•	•	•					B	D	F				

① Load cables must exit bottom.
② Refer to page 25 for dimensions.
③ Service entrance available at 240V only.
④ See page 27 for dimensional information of panel mounted branch devices.
⑤ On bolted pressure switch rated 1000A or greater without ground fault, service entrance label available for 240V only.

Depth Reference Chart			
A	20 inches (508 mm)	D	28, 38 (711, 965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)

Auxiliary Entrance Sections

400A – 6000A Bussed and Non-Bussed Auxiliary Cable Pull Sections

Non-Bussed Pull Section

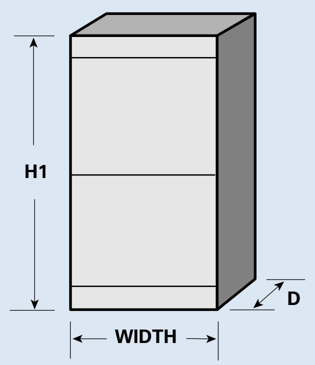
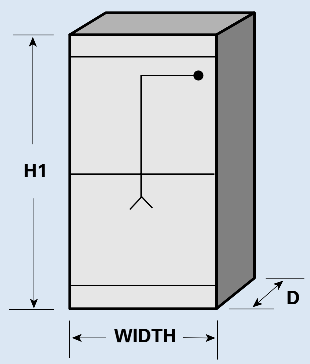


Figure 1

Bussed Pull Section



Invert for Top Feed
Figure 2

Bussed Pull Section with Utility Compartment

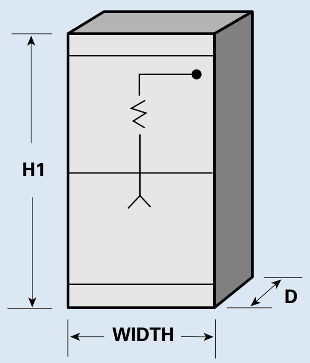


Figure 3

2500 through 4000A EUSERC Utility Pull Section ⑨

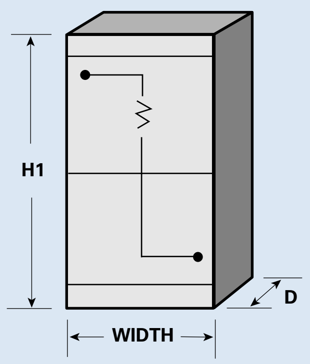


Figure 4

Pull Sections — Non-Bussed, Bussed, Including Customer Metering, Standard Utilities and EUSERC Utilities

Amp. Rtg.	Standard Pull Section Dimensions in Inches (mm)								EUSERC Pull Section Dimensions in Inches (mm)						
	Hgt.	Width				Depth Available			Hgt.	Width			Depth Available		
		Non-Bussed (Fig.1)		Bussed		Letters Refer To Chart Above D				Bussed (Fig. 2)	Bussed with Utility (Fig. 3 or Fig. 4) or Customer Metering (Fig. 2)		Letter Refers to Chart Above D		
	H	Std. ①	Opt. ①	Std. with Customer Metering① (Fig. 2)	With Utility Metering ① (Fig. 3)	SB1②	SB2	SB3	H	Std.	Std.	Opt.	SB1②	SB2	SB3
400		14 (356)	20 (508)			A,B	C	E					A,B	C	E
600		20 (508)	32 (813)	20 (508)		A,B	C	E		32 (813)	32 ③ (813)	38 (965)	A,B	C	E
800						A,B	C	E					A,B	C	E
1000						A,B	C	E		38 (965)	38 (965)	—	A,B	C	E
1200	90 (2286)	32 (813)	38 (965)		38 (965) or 46 (1168)	A,B	C	E				—	A,B	D	B,H
1600						A,B	C	E	90 (2286)	40 (1016)	40 (1016)	—	B	D	B,H
2000						A,B	C	E				—	B	D	B,H
2500				32 (813)		—	G ④	H ④		48 (1219)	⑥ ⑦	—	—	G	H
3000		38 (965)	46 (1168)			—	G ④	H ④				—	—	G	H
4000						—	G	H		52 ⑤ (1321)	52 ⑧ (1321)		—	G	H
5000		46 (1168)	52 (1321)	46 (1168)	46 (1168)	—	—	H		—	—	—	—	—	—
6000						—	—	H							

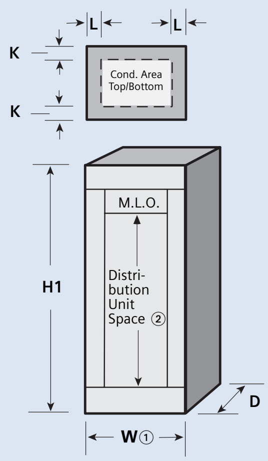
① Top or bottom feed.
② Pull sections without utility meters can be 28 inch (711m) deep minimum.
③ 38 inch (965mm) available in outdoor applications.
④ Determined by specific utility used.
⑤ 58 inch (1473mm) available for San Diego Gas and Electric.
⑥ With Customer Metering 48 inch (1219mm) wide.
⑦ 2500A and greater EUSERC utilities cannot be placed in an incoming EUSERC pull section. An additional section is required in addition to the standard EUSERC bussed pull section. The width of the 2500A or 3000A EUSERC Utility Section is 38 inch (965mm) wide.
⑧ 4000A EUSERC utilities cannot be placed in an incoming EUSERC pull section. An additional section is required in addition to the standard EUSERC bussed pull section. The width of the 4000A EUSERC Utility Section is 52 inch (1321mm) wide.
⑨ A Bussed Pull Section from Figure 2 is required when a EUSERC 2500-4000A utility is required.

Depth Reference Chart					
A	20 inches (508 mm)	D	28, 38 inches (711, 965 mm)	G	38 inches (965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	H	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)				

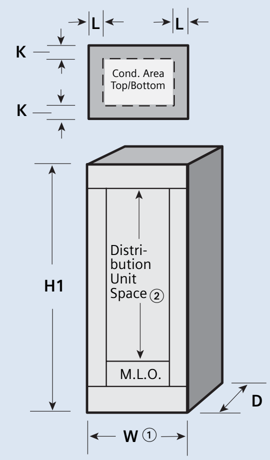
Distribution Sections

400A – 2000A Main Lug Only Distribution Sections ⑥

Top Feed



Bottom Feed



Main Lug Only Unit Space

Maximum Ampere Rating	Section Configuration	Service Equipment ③ ④	AIC Rating	Dimensions in Inches (mm) – Height – H1	Height – Distribution Unit Space ② – Connector Type – Standard 500 kcmil	Alternate 750 kcmil ⑤	Crimp 600 kcmil Max. ⑤	Width – W ①	Depth Available, Letter Refers To Chart Below – D – SB1	SB2	SB3	Conduit Area – K	L
400	Single without Through-Bus	Yes	200,000	90.00 (2286)	62.50 (1588)	60.00 (1524)	55.00 (1397)	32 or 38 (813 or 965)	A, B	C	E	2.50 (64)	3.00 (76)
600	Single without Through-Bus	Yes			60.00 (1524)	56.25 (1429)	55.00 (1397)		A, B	C	E		
800	Single without Through-Bus	Yes			58.75 (1492)	52.50 (1334)	53.75 (1365)		A, B	C	E		
	Multi With Through-Bus	Yes	42,000		51.25 (1302)	45.00 (1143)	46.25 (1175)		B	C	E		
			100,000		45.00 (1143)	38.75 (984)	45.00 (1143)	38 (965)					
1200	Single without Through-Bus	Yes	200,000		57.50 (1461)	50.00 (1270)	53.75 (1365)	32 or 38 (813 or 965)	A, B	C	E		
	Multi With Through-Bus	Yes	42,000		50.00 (1270)	42.50 (1080)	46.25 (1175)		B	C	E		
			100,000		45.00 (1143)	38.75 (984)	45.00 (1143)	38 (965)					
1600	Single without Through-Bus	Yes	200,000						A, B	C	E		
	Multi With Through-Bus	Yes	42,000						B	C	E		
			100,000										
2000	Single without Through-Bus	Yes	200,000						A, B	C	E		
	Multi With Through-Bus	Yes	42,000						B	C	E		
			100,000										

① 46 inch (1168m) wide available as an option.
② See page 27 for dimensional information of panel mounted branch devices.
③ A maximum of 6 service disconnects are allowed when switchboard is used as the service entrance equipment.
④ Service disconnects 1000A or higher on solidly grounded Wye systems of more than 150V to ground require ground fault protection. Ground fault uses 10 inches of unit space. See NEC 230.95 for additional details. This applies to branch devices 1000A or larger on non-service equipment unless a ground fault protection is provided upstream at the service. See NEC 240.13 for further information.
⑤ For connector sizes greater than shown, a bussed pull section is required. See page 25 for bussed pull section requirements.

Depth Reference Chart	
A	13.75 inches (349 mm)
B	20 inches (508 mm)
C	20, 28, 38 inches (508, 711, 965 mm)
E	20, 28, 38, 48, 58 inches (508, 711, 965 1219, 1473 mm)

Distribution Sections

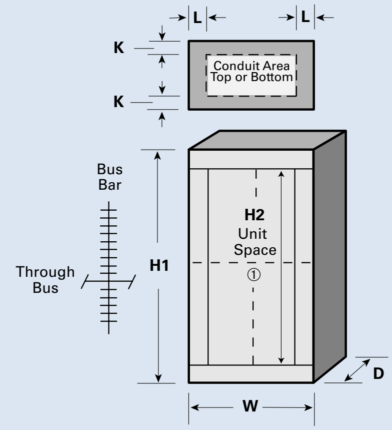
Panel Mount Branch Device Mounting Requirements

Through-Bus Fed Distribution Section Dimensions

Maximum Riser Amperage	With Maximum Through-Bus Amperage	As Applies to Switchboard			Dimensions in Inches (mm)							
					Height		Width	Depth Available: Letters Refer To Chart Below D			Conduit Area	
		SB1	SB2	SB3	H1	Unit Space H2 ①	W	SB1	SB2	SB3	K	L
2000	2000	•	•	•	90.0 (2286)	65.0 (1651)	32.0 (813) or 38.0 (965) ②	A	C	E	2.5 (64)	3.0 (76)
	2500 & 3000	—	•	•				—	C	E		
	4000	—	•	•				—	C	E		
3000	4000	—	•	•		62.5 (1588)	38.0 (965) or 46.0 (1168)	—	C	E		

Depth Reference Chart					
A	20 inches (508 mm)	D	28, 38 inches (711, 965 mm)	G	38 inches (965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219, 1473 mm)	H	38, 48, 58 inches (965, 1219, 1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)				

Through-Bus Fed Distribution Sections



① See below for unit space of disconnect devices.
② 46 inch (1168 mm) wide optional.
③ 46 inch (1168 mm) section width required when standard load connectors are greater than 600 kcmil or when compression lugs are required.
④ 100% rated panel mounted branch devices are limited to a maximum of 2 devices per distribution section. Additional 80% rated devices are allowed when two 100% rated devices are installed into one section, when additional space is available.
⑤ The 2.5 inch (64mm) high unit is suitable for NEC Class H, K1, and K5 fuses only. Class R rejection type fuse holders are not available.
⑥ Unit rated 600V, factory configured to accept 250V class H, K or R fuses. Field convertible to accept Class J fuses.
⑦ Factory configure to accept Class J fuses only.

Panel Mounted Unit Space Requirements — Molded Case Circuit Breakers

Max. Amp. Rating	Device Type	Device Applies To Switchboard			Total Poles Available			Dimensions in Inches (mm)		
								Height: Unit Space		Width
		SB1	SB2	SB3	1P	2P	3P	Twin Mounted	Single Mounted	Enclosure Minimum W
Branch Breakers										
100	BL, BLH, HBL, BQD ED2, ED4, HHED6	•	•	•	6	2	2	3.75 (95)	—	32.00 (813)
125	ED2, ED4, ED6, HED4, HHED6	•	•	•	—	2	2			
	ED2, ED4, ED6, HED4, HHED6, With Accessories	•	•	•		2	2	6.25 (159)		
	CED6	•	•	•		2	2	3.75 (95)		
	CED6 With Accessories	•	•	•		2	2	6.25 (159)		
225	QJ2, QJH2, QJ2-H	•	•	•		2	2	5.00 (127)		
250	FXD6, FD6, HFD6, HFXD6, HHFD6, HHFXD6	•	•	•		2	2	5.00 (127)		
	CFD6			•		—	1	—	5.00 (127)	32.00 (813)
400	JXD2, JXD6, JD6, HJD6, HJXD6, HHJD6, HHJXD6	•	•	•		1	1	—	8.75 (222)	32.00 (813)
						2	2	8.75 (222)	—	38.00 (965)
	SJD6, SHJD6		•	•		—	1	—	8.75 (222)	32.00 (813)
	CJD6			•		1				
	SCJD6			•		—				
600	LXD6, LD6, HLD6, HLXD6, HHLD6, HHLXD6	•	•	•		1				
	SLD6, SHLD6		•	•		—				
	CLD6			•		1				
	SCLD6			•		—				
800 ③ ④	LMD6, LMXD6, HLMD6, HLMXD6	•	•	•		1				
	MXD6, MD6, HMD6, HMXD6	•	•	•					10.00 (254)	38.00 (965) ③
	SMD6, SHMD6		•	•		—				
	CMD6			•						
1200 ③ ④	NXD6, ND6, HND6, HNXD6	•	•	•		1				
	SND6, SHND6		•	•		—				
	CND6, SCND6			•						

Panel Mounted Unit Space Requirements — Switches

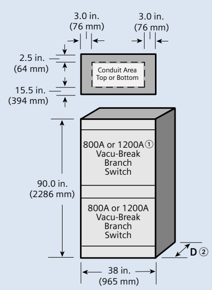
Max. Amp. Rating	Switch Type	Device Applies To Switchboard			Dimensions in Inches (mm)				
					Unit Space Mounting Height				Width
					240V		600V		
		SB1	SB2	SB3	Twin	Single	Twin	Single	Enclosure Minimum W
30-30	Vacu-Break	•	•	•	2.50 (64)⑤	—	—	—	32.00 (813)
30-30		•	•	•	5.00 (127)		7.50 (191)		
30-60		•	•	•					
60-60		•	•	•					
60-100		•	•	•	7.50 (191)				
100-100		•	•	•					
200-200		•	•	•	10.00 (254)⑥		10.00 (254)⑦		38.00 (965)
100		•	•	•	—	7.50 (191)	—	7.50 (191)	32.00 (813)
200		•	•	•		10.00 (254)	—	10.00 (254)	
400		•	•	•		15.00 (381)	—	15.00 (381)	38.00 (965)
600		•	•	•					
400-1200	HCP	•	•	•		16.25 (413)		16.25 (413)	

Distribution Sections

Individually Mounted 2-High and Combination Sections, Remote Main and EUSERC Large Tenant Main

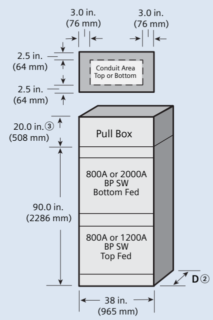
Individually Mounted Vacu-Break and Bolted Pressure Switch 2-High Sections and Combination Sections

Two High Vacu-Break Distribution Section 800A thru 1200A



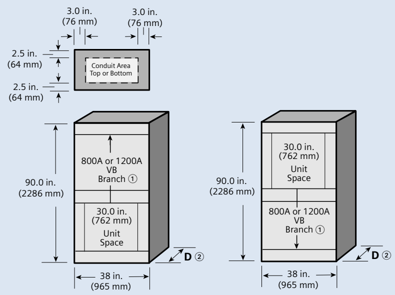
② D for Type SB2 = 28, 38 in. (711, 965 mm) D for Type SB3 = 28, 38, 48, 58 in. (711,965,1219, 1473 mm)

Two High Bolted Pressure Switch and Two High WL Breaker



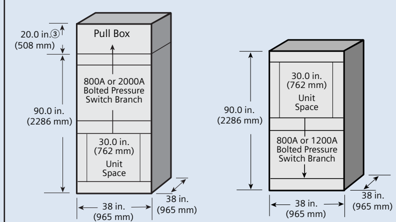
② Minimum depth for two high WL section is 28 in. and minimum depth for two high BPS is 38 in.

Combination 800A thru 1200A Vacu-Break Branch and Distribution Section (SB2 and SB3 only)



② D for Type SB2 = 28, 38 in. (711, 965 mm). D for Type SB3 = 28, 38, 48, 58 in. (711, 965, 1219, 1473 mm)

Bolted Pressure Switch Combination Section with Distribution (SB2 and SB3 only)

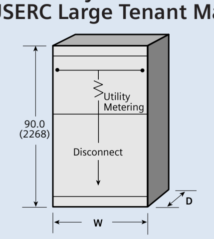


Large Tenant Mains and Remote Mains

Large Tenant Main sections are designed for use in the western United States with EUSERC Utility metering compartments when the tenant loading is greater than 200 ampere. At 200A and below, the SMM commercial metering switchboard section is available.

Remote Main sections are designed for non EUSERC utility metering compartment requirements for tenant amperage requirements above 200 ampere. All utility metering compartments must meet specific utility compartment specifications. For metering compartments 200 amp and below, the MMS commercial metering switchboard section is available.

Standard Utility Remote Mains and EUSERC Large Tenant Mains



① 1000A and 1200A Vacu-Break devices are not available as service disconnects when the voltage is greater than 150V to ground.
③ Top mounted pull box reduced to 15 inches (381 mm) high when 500 kcmil or less load connectors are provided.
④ Cold sequence utilities are not available in SB1/2 applications.
⑤ All Weather proof sections require 38.0 inch (965 mm) wide.
⑥ For type SB3, drawout WL breakers are available as an option. Minimum depth is 38 inches (965 mm).
⑦ When EUSERC Utilities are required, minimum depth is 28.0 inches (711 mm).

Depth Reference Chart			
A	20 inches (508 mm)	D	28, 38 (711, 965 mm)
B	28 inches (711 mm)	E	20, 28, 38, 48, 58 inches (508, 711, 965, 1219,1473 mm)
C	20, 28, 38 inches (508, 711, 965 mm)	F	28, 38, 48, 58 inches (711, 965, 1219, 1473 mm)

Max. Amp Rating	Device Type	Device Applies To Switchboard SB1	SB2	SB3	Dimensions in Inches (mm) Width Std. ④ Utility	Width EUSERC	Depth SB1	SB2	SB3
Molded Case Circuit Breakers									
400	JXD2, JXD6, JD6, HJXD6, HJD6, HHJXD6, HHJD6	•	•	•			A	C	E
	SJD6, SHLD6	•	•	•			A	C	E
	CLD6, SCLD6		•	•			—	C	E
600	LXD6, LD6, HLXD6, HLD6, HHLXD6, HHLD6,	•	•	•			A	C	E
	SLD6. SHLD6	•	•	•			A	C	E
	CLD6, SCLD6		•	•			—	C	E
800	LMXD6, LMD6, HLMXD6, HLMD6, MXD6, MD6, HMD6	•	•	•		32 ⑤ (813)	A	C	E
	SMD6		•	•	38 (965)		—	C	E
	CMD6, SCMD6		•	•			—	C	E
1000	NXD6, ND6, HNXD6, HND6	•	•	•			B	D	F
	SND6		•	•			—	D	F
	CND6, SCHD6		•	•			—	D	F
1200	NXD6, ND6, HNXD6, HND6	•	•	•			B	D	F
	SND6		•	•			—	D	F
	CND6, SCND6		•	•			—	D	F
1600	PXD6, PD6, HPD6, HPXD6	•	•	•			B	D	F
	SPD6		•	•		38 (965)	—	D	F
	CPD6		•	•			—	D	F
2000	RXD6, RD6, HRD6, HRXD6	•	•	•			B	D	F
Insulated Case Circuit Breakers — Stationary Mounted ⑥									
800	Type WL Insulated Case Breaker		•	•	38 (965)	38 (965)	—	D	F
1200			•	•			—	D	F
1600			•	•			—	D	F
2000			•	•			—	D	F
Switches									
400	HCP	•	•	•	38 (965)		A	C	E
600		•	•	•			A	C	E
800		•	•	•			A	C	E
1200		•	•	•			A⑦	C⑦	E⑦
800	Vacu-Break	•	•	•	38 (965)		B	D	F
1000①		•	•	•		38 (965)	B	D	F
1200①		•	•	•			B	D	F
800	Bolted Pressure	•	•	•	38 (965)		B	D	F
1000		•	•	•			B	D	F
1200		•	•	•			B	D	F
1600		•	•	•			B	D	F
2000		•	•	•			B	D	F

Distribution Sections

Combination Motor Starter Applications

Application Note: ①
ETI instantaneous-trip circuit breakers are recommended for use in combination motor starters to provide selective short circuit protection for the motor branch circuit. The adjustable instantaneous-trip feature provides for a trip setting slightly above the peak motor inrush current. With this setting, no delay is introduced in opening the circuit when the fault occurs. Since these circuit breakers have no time-delay trip element, they must be used in conjunction with, and immediately ahead of, the motor-running over-current protective device. Check the voltage and interrupting rating of the circuit breaker to assure that they are adequate for the electrical system. ETI circuit breakers are UL recognized components and must be used if the switchboard section is also to be UL Listed.

ETI Circuit Breakers (Instantaneous Trip Only)
For Branch-Circuit Use with AC Full Voltage Motor Starters

Ampere Rating	Breaker Type	Maximum 3Ø Ratings			Mounting Height in Inches (mm)		
		220(208)V	240V	480V ②③	Twin	Single	Min. Section Width inches (mm)
3	ED ②	—	—	1	5 (127)	—	32 (813)
5		0.5	0.5	2	5 (127)	—	32 (813)
10		2	2	3	5 (127)	—	32 (813)
25		5	5	10	5 (127)	—	32 (813)
50		15	15	30	5 (127)	—	32 (813)
100		30	30	60	5 (127)	—	32 (813)
150	FD6 ③	40	40	75	5 (127)	—	32 (813)
225	FD6, CFD6	50	50	100	5 (127)	—	32 (813)

Vacu-Break Fusible Switches
For Branch Circuit Use with AC Combination Full Voltage Starters ④

Ampere Rating	Horsepower Ratings				Mounting Height in Inches (mm)				Min. Sec. Width
	240V AC		480V AC		240V AC		480V AC		
	With NEC Fuse	With Dual-Element Fuse	With NEC Fuse	With Dual-Element Fuse	Twin	Single	Twin	Single	
30-30	3	7.5	—	—	2.50⑤ (64)	—	—	—	32
30-30	3	7.5	5	10	5.00 (127)	—	7.50 (191)	—	32
30-60	3–7.5	7.5–15	5–15	25	5.00 (127)	—	7.50 (191)	—	32
60-60	7.5	15	15	25	5.00 (127)	—	7.50 (191)	—	32
60-100	7.5–15	15–30	15–25	25–50	7.50 (191)	—	7.50 (191)	—	32
100-100	15	30	25	50	7.50 (191)	—	7.50 (191)	—	32
100	—	—	25	50	—	—	—	7.50 (191)	32
200	25	50	50	100	—	10.00 (254)	—	10.00 (254)	32
200-200	—	50	—	100	10.00 (254)	—	10.00 (254)	—	32
400	50	100	100	—	—	15.00 (381)	—	15.00 (381)	38
600	75	100	—	—	—	15.00 (381)	—	15.00 (381)	38

① Available only in SB3 switchboard configurations.
② 100,000 kA at 480V with E-Frame and CFD6-Frame breakers.
③ 65,000 kA at 480V with F-Frame Breakers.
④ 100,000 kA at 480V with Class J or Class RK5 fuses.
⑤ The 2.50 inch (64 mm) high unit is suitable for NEC Class H and K5 fuses only. Class R rejection type fuse holders are not available.

Full Voltage
Non–Reversing Starters Class A20

NEMA Starter Size		Unit space Mtg. Ht. In. (mm)	Min. Encl. Width In. (mm)
Left	Right		
0	—	5 ⑥ (127)	32 (813)
0	0		
1	—	5 ⑥ (127)	32 (813)
1	0		
1	1		
2	—	10 (254)	32 (813)
2	0		
2	1		
2	2		
3	—	15 (381)	32 (813)
3	0		
3	1		
3	2		
3	3		
4	—	15 (381)	32 (813)

⑥ Increase to 7.50 inch (191mm) when pilot light or control transformer is required.

Maximum 3 Phase
Horsepower Rating

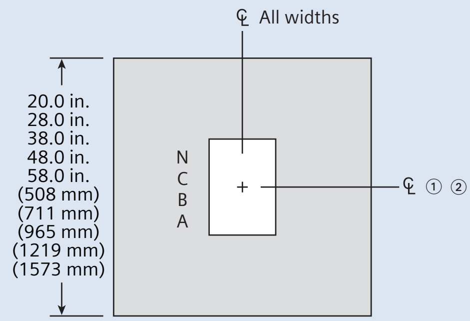
NEMA Starter Size	Voltage AC		
	220(208)V	240V	480V
0	3	3	5
1	7.5	7.5	10
2	10	15	25
3	25	30	50
4	40	50	100

Service Entrance Busway

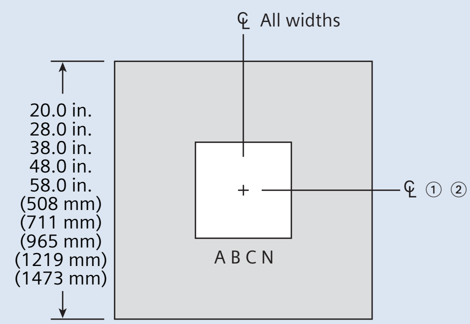
Siemens SENTRON Busway is ideal for service entrance use with Siemens Type SB3 switchboards. It is a low reactance power busway available with aluminum or copper bars in 3-phase, 3-wire, or 3-phase, 4-wire configuration, with or without ground bar.

Dimensions and Phase Sequence
The drawings at right show the phase sequence and the location of the centerline of the busway opening for each configuration, referenced to the switchboard front and side planes. Phasing shown conforms to NEMA standards and is preferred, unless alternate phasing is required by special customer terminations.

As an option, SENTRON busway standard entrance stubs can be shipped to the job site already factory connected to the gear, resulting in no labor installation costs associated with SENTRON busway connections to SB3 switchboards.



SB3 Switchboard Busway
Phasing Front to Rear
400 - 6000 Amperes



SB3 Switchboard Busway
Phasing Left to Right
400 - 6000 Amperes

① Centerline of duct is centered front to rear in cubicles 38 inches deep or less.
② Centerline of duct in 48 inch or 58 inch deep cubicles is located 19 inches from front of cubicle.

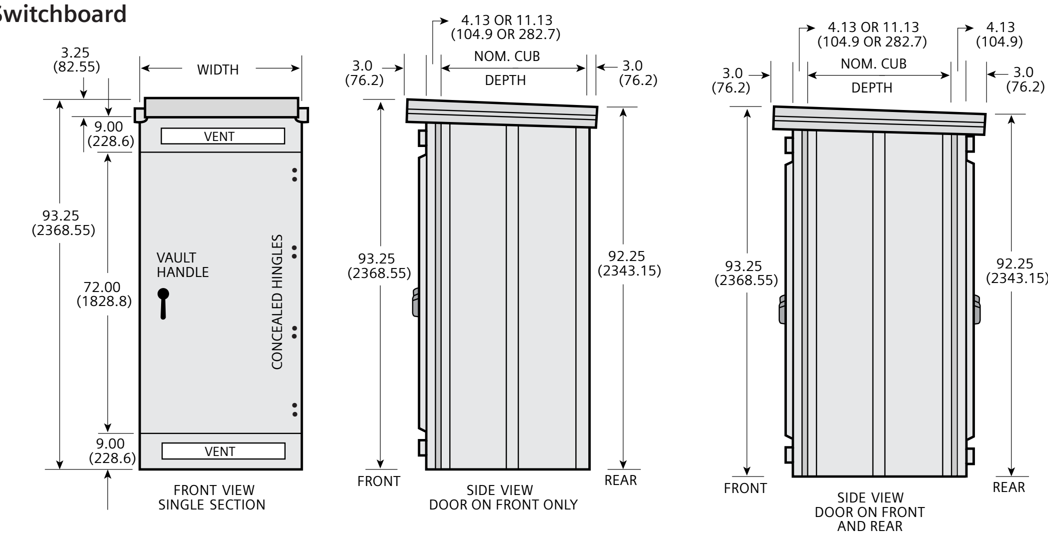
Device	Dimensions (in inches and mm)	
	Section Width	Section Depth
Molded Case Circuit Breaker and 400 thru 3200A maximum	38 (965)	20, 28 or 38 (508, 711 or 965)
Vacu-Break Service Section 800 and 1200A		
HCP Service Section 400 thru 1200A		28 or 38 (711 or 965)
BPS Service Section 800 thru 2000A		
BPS Service Section 2500 thru 4000A	46 (1168)	38, 48 or 58 (965, 1219 or 1473)
WL Insulated Case Breaker 400 thru 4000A	38 (965)	

Outdoor Enclosures

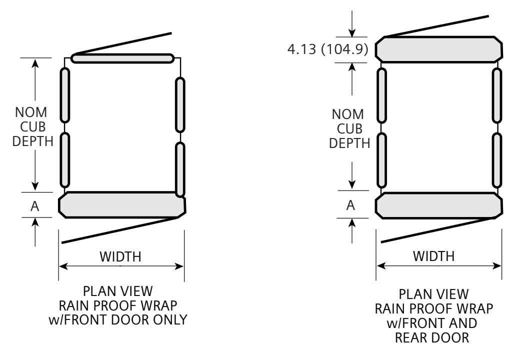
For Switchboard Sections

East Coast Switchboard

Slopped Roof



Rainproof Type 3R Enclosure
UL Listed in Accordance with UL891



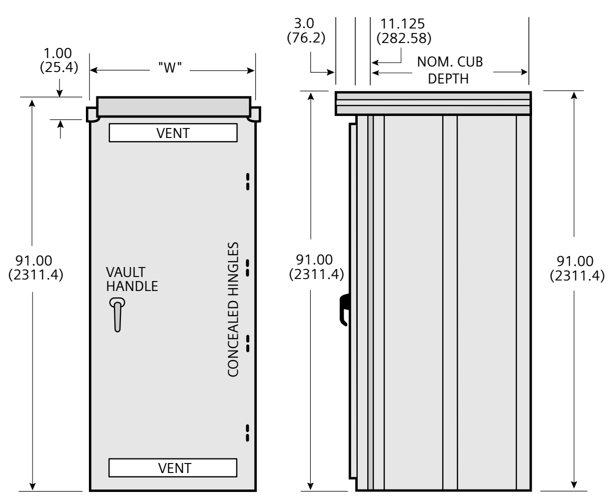
A
4.125” (104.78) ①
11.125” (282.58) ②

Nominal Cubicle Depth
20” (508)
28” (711.2)
38” (965.2)
48” (1219.2)
58” (1473.2)

Width
18” (457.2)
20” (508)
26” (660.4)
32” (812.8)
38” (965.2)
46” (1168.4)
52” (1320.8)

West Coast Switchboard

Flat Roof



Dimensions shown in inches and millimeters ( ).

① 4.125 inches (104.28 mm) is standard.
② 11.125 inches (282.58 mm) will be furnished with socket type watthour meter and other deep devices. Front access only for West Coast applications.

General Application Data

In the application of fusible switches and circuit breakers, consideration should be given to the following factors:

1. Circuit voltage
2. Circuit ampacity
3. Power source frequency
4. Operation conditions
5. Available fault current

Circuit Voltage
The system voltage should not exceed the listed voltage rating of the circuit breaker, fuse or switch.

Circuit Ampacity
The listed continuous current rating of the fuse or circuit breaker should not exceed the allowable ampacity of the conductors. Where the allowable ampacity of the conductors does not correspond to listed current ratings for fuses or circuit breakers, the next larger is permitted, providing it does not exceed the conductor ampacity by more than 25% (800A max — NEC 240.6). An exception to this rule is permitted for motor circuits where high inrush currents may persist for a short time.

Power Source Frequency
Circuit breakers and fusible switches are calibrated for use on direct current or 60 Hertz alternating current. For frequencies above 60 Hertz, some fuses, switches and circuit breakers must be derated. The derating varies with each type and size of protective device. The protective devices used for frequencies above 60 Hertz are not UL listed. Consult your nearest Siemens sales office for specific information.

Operating Conditions
Molded case circuit breakers and fuses are calibrated, without an enclosure as specified by the Underwriter's Laboratories, Inc. Per NEC 384, continuous leads should not exceed 80% of the breaker or fuse current rating for most breakers and most types of enclosures.

Conductors should be derated in accordance with the National Electrical Code, Table 310.15 for both ambient temperature and continuous loading. Correction factors to be applied to the allowable current-carrying capacities of conductors for application in temperatures above 30°C. Conductors which are loaded continuously should be derated to 80% of their allowable current-carrying capacity.

When the type of load is unusual, intermittent, or one which involved momentary peak currents such as motor loads, consideration should be given to the heating effect on the protective device and conductor over a period of time. The duty cycle of a motor which is started and stopped frequently may require a circuit breaker or fuses and conductor with a higher rating than an infrequently started motor.

Fault Current Available
The interrupting capacity of the circuit breaker or fused switch should be at least equal to the available short circuit current at the point of application. The short circuit current from some power sources, such as engine driven generators, is limited, and the prospective characteristics should be selected to clear such faults without delay.

Some systems require a study of protective device characteristics to assure proper protection and coordination for any possible value of fault current. Your nearest Siemens representative is available to assist in making coordination studies.

The data shown in the table on the next page is precalculated and based only on the power transformer impedance in percent and maximum short circuit kVA available from primary system. The data is of approximate values of maximum fault current available on secondary of transformer.

General Application Data

Transformer Rating 3 Phase kVA and Impedance % ①	Maximum Short Circuit kVA Available From Primary System	208 Volts, 3 Phase				240 Volts, 3 Phase				480 Volts, 3 Phase				600 Volts, 3 Phase			
		Rated Load Continuous Current, Amps	Short-Circuit Current RMS Symmetrical Amps			Rated Load Continuous Current, Amps	Short-Circuit Current RMS Symmetrical Amps			Rated Load Continuous Current, Amps	Short-Circuit Current RMS Symmetrical Amps			Rated Load Continuous Current, Amps	Short-Circuit Current RMS Symmetrical Amps		
			Transformer Alone	50% Motor Load ②	Combined		Transformer Alone	100% Motor Load ②	Combined		Transformer Alone	100% Motor Load ②	Combined		Transformer Alone	100% Motor Load ②	Combined
	50,000		14,900		16,600		12,900		15,800		6,400		7,800		5,200		6,400
	100,000		15,700		17,400		13,600		16,500		6,800		8,200		5,500		6,700
300	150,000	834	16,000	1,700	17,700	772	13,900	2,900	16,800	361	6,900	1,400	8,300	289	5,600	1,200	6,800
5%	250,000		16,300		18,000		14,100		17,000		7,000		8,400		5,600		6,800
	500,000		16,500		18,200		14,300		17,200		7,100		8,500		5,700		6,900
	Unlimited		16,700		18,400		14,400		17,300		7,200		8,600		5,800		7,000
	50,000		21,300		25,900		20,000		24,800		10,000		12,400		8,000		9,900
	100,000		25,200		28,000		21,900		26,700		10,900		13,300		8,700		10,600
500	150,000	1,388	26,000	2,800	28,800	1,203	22,500	4,800	27,300	601	11,300	2,400	13,700	481	9,000	1,900	10,900
5%	250,000		26,700		29,500		23,100		27,900		11,600		14,000		9,300		11,200
	500,000		27,200		30,000		23,600		28,400		11,800		14,200		9,400		13,000
	Unlimited		27,800		30,600		24,100		28,900		12,000		14,400		9,600		11,500
	50,000		28,700		32,900		24,900		32,100		12,400		16,000		10,000		12,900
	100,000		32,000		36,200		27,800		35,000		13,900		17,500		11,100		14,000
750	150,000	2,080	33,300	4,200	37,500	1,804	28,900	7,200	36,100	902	14,400	3,600	23,500	722	11,600	2,900	14,500
5.75%	250,000		34,400		38,600		29,800		37,000		14,900		18,000		11,900		14,800
	500,000		35,200		39,400		30,600		37,800		15,300		18,900		12,200		15,100
	Unlimited		36,200		40,400		31,400		38,600		15,700		19,300		12,600		15,500
	50,000		35,900		41,500		31,000		40,600		15,500		20,300		12,400		16,300
	100,000		41,200		46,800		35,600		45,200		17,800		22,600		14,300		18,200
1,000	150,000		43,300		48,900		37,500		47,100		18,700		23,500		15,000		18,900
5.75%	250,000	2,780	45,400	5,600	50,800	2,406	39,100	9,600	48,700	1,203	19,600	4,800	24,400	962	15,600	3,900	19,500
	500,000		46,700		52,300		40,400		50,000		20,200		25,000		16,200		20,100
	Unlimited		48,300		53,900		41,800		51,400		20,900		25,700		16,700		20,600
	50,000										12,030		16,830				
	100,000										13,350		18,150				
1,000	150,000									1,203	13,980	4,800	18,750				
8%	250,000										14,315		19,115				
	500,000										14,555		19,355				
	Unlimited										15,040		19,840				
	50,000						41,200		55,600		20,600		27,800		16,500		22,300
	100,000						49,800		64,200		24,900		32,100		20,000		25,800
1,500	150,000					3,609	53,500	14,400	57,900	1,804	26,700	7,200	33,900	1,444	21,400	5,800	27,200
5.75%	250,000						56,800		71,200		28,400		35,600		22,700		28,500
	500,000						59,600		74,000		29,800		37,000		23,900		29,700
	Unlimited						62,800		77,200		31,400		38,600		25,100		30,900
	50,000										24,700		34,300		19,700		27,500
	100,000										31,000		40,600		24,800		32,600
2,000	150,000									2,406	34,000	9,600	43,600	1,924	27,200	7,800	35,000
5.75%	250,000										36,700		46,300		29,400		37,200
	500,000										39,100		48,700		31,300		39,100
	Unlimited										48,100		51,400		33,500		41,300
	50,000										28,000		40,000		22,400		32,000
	100,000										36,500		48,500		29,200		38,800
2,500	150,000									3,008	40,500	12,000	52,500	2,405	32,400	9,600	42,000
5.75%	250,000										44,600		56,600		35,600		45,200
	500,000										48,100		60,100		38,500		48,100
	Unlimited										52,300		64,300		41,800		51,400

① Short circuit currents are calculated with typical impedance and kVA shown on this table.
② Short circuit contributions are calculated on the basis of motor characteristics that will produce four times normal circuit, 50% motor load contribution is assumed for 208 volt and 100% motor load contribution is assumed for 240 volt, 480 volt and 600 volt.

Pressure Wire Connectors

Pressure Wire Connectors

Breaker Type	Connector Applied to Amperage Range	Cables per Connector	Connector ① Wire Ranges Available
Normal Duty	**Thermal-Magnetic**		
BQH BLH HBL BQD	15–30	1	#14 - #6 AWG Cu
			#12 - #8 AWG Al
	35–50	1	#8 - #6 AWG Cu
			#8 - #4 AWG Al
	55–70	1	#8 - #4 AWG Cu
			#8 - #2 AWG Al
	80–100	1	#4 - #1/0 AWG Cu
			#2 - #1/0 AWG Al
BL	110–125	1	#2 - #1/0 AWG Cu
			#1/0 - #2/0 AWG Al
QJ2 QJH2 QJ2-H	60–225	1 pc.	#6 AWG - 250 kcmil Cu ②
			#6 AWG - 300 kcmil Cu
			#4 AWG - 300 kcmil Al
JXD2	200–400	1 pc.	#6 AWG - 300 kcmil Cu
			#4 AWG - 300 kcmil Al
Heavy/Extra Heavy Duty, Current-Limiting		**Thermal-Magnetic**	
ED2 ED4 ED6 HED4 HHED6 CED6	15–20	1 pc.	#14 - #10 AWG Cu
			#12 - #10 AWG Al
	25	1 pc.	#10 AWG Cu. or Al
	30–60 ③ 1 Pole, CED6	1 pc.	#10 - #4 Cu. or Al
	30–100	1 pc.	#10- #1/0 AWG Cu. or Al
	30–60 ③ 1 Pole, CED6	1 pc.	#4- #1/0 Cu. or Al
	110–125	1 pc.	#3/0 - 3 Cu
			#2/0- 1 Al
	30–125 2–3 Pole	1 pc.	#10 - #3/0 Cu. Only
FXD6/FD6 HFD6, CFD6 HHFD6	70–250	1 pc.	#6 AWG - 250 kcmil Cu
			#6 AWG - 350 kcmil Cu ②
			#4 AWG - 350 kcmil Al
JXD6/JD6 HJD6/HJXD6 HHJD6/HHJXD6 CJD6	200–400	1-2 pcs.	3/0 - 500 kcmil Cu
			4/0 - 500 kcmil Al
LXD6/LD6 HLD6/HLXD6 HHLD6 CLD6	250–600	1 pc.	3/0 – 600 kcmil Cu ②
			500 – 600 kcmil Cu ②
			500 – 750 kcmil Al ②
		1-2 pcs.	3/0 – 500 kcmil Cu ②
			4/0 – 500 kcmil Al
MXD6/MD6 NXD6/ND6 HND6/HNXD6 CMD6, CND6 LMD6, LMXD6 HLMXD6	500–600	1-2 pcs.	#1 AWG - 500 kcmil Cu or Al
	700–800	1-2 pcs.	600 – 750 kcmil Cu ②
			600 – 750 kcmil Al ②
		1-3 pcs.	#1 AWG- 350 kcmil ②
			#1/0 AWG-500 kcmil Cu or Al
	800–1200	1-3 pcs.	250 – 400 kcmil Cu ②
			500 – 750 kcmil Cu ②
			250 – 400 kcmil Al ②
			500 – 750 kcmil Al ②
		1-4 pcs.	250 – 500 kcmil Cu or Al
PXD6/PD6 HPD6/HPXD6 CPD6	1200–1600	1-5 pcs.	750 kcmil Al ②④
			300 – 600 kcmil Cu or Al
PXD6/PD6 HPD6/HPXD6 RXD6/RD6 HRD6/HRXD6	1600–2000	1-4 pcs.	300 – 600 kcmil Cu or Al ②
		1-6 pcs.	300 – 600 kcmil Cu or Al

Pressure Wire Connectors (cont'd)

Breaker Type	Connector Applied to Amperage Range	Cables per Connector	Connector ① Wire Ranges Available
Heavy / Extra Heavy Duty, Current-Limiting			**Solid-State Trip**
SJD6, SHJD6 SCJD6	200–400 ⑤	1-2 pcs.	3/0 - 500 kcmil Cu
			4/0 - 500 kcmil Al
SLD6, SHLD6 SCLD6	250–600 ⑤	1-2 pcs.	3/0 - 500 kcmil Cu
			4/0 - 500 kcmil Al
SMD6, SHMD6 SCMD6 SND6, SHND6 SCND6	500–600	1-2 pcs.	#1 AWG - 500 kcmil Cu or Al
	700–800	1-3 pcs.	#1/0 AWG - 500 kcmil Cu or Al
	800–1200	1-4 pcs.	250 – 500 kcmil Cu or Al
SPD6 / SHPD6	1200–1600	1-5 pcs.	300 – 600 kcmil Cu or Al
		1-4 pcs. ④	750 kcmil Cu or Al ②

Vacu-Break Fusible Switches (Branch Connectors)

Ampere Rating	Cables per Connector	Wire Range	Type
30 (2.5 in.) (64 mm)	1	#14 - #8 AWG	Cu
30	1	#14 - #4 AWG	Cu or Al
60	1	#14 - #4 AWG	Cu or Al
100	1	#1/0 AWG	Cu or Al
200	1	#6 AWG - 350 kcmil	Cu or Al
400	2	#4/0 AWG - 500 kcmil	Cu or Al
600	2	#4/0 AWG - 500 kcmil	Cu or Al
800	3	#4/0 AWG - 500 kcmil	Cu or Al
1200	4	#4/0 AWG - 500 kcmil	Cu or Al

HCP Fusible Switches (Branch Connectors)

Ampere Rating	Cables per Connector	Wire Range	Type
400 – 600	2	#1 AWG-500 kcmil	Cu or Al
400 – 600	2	#1 AWG-500 kcmil	Cu only
400 – 800	3	#1 AWG-500 kcmil	Cu or Al
400 – 800	3	#1 AWG-350 kcmil	Cu only
800 – 1200	4	#1 AWG-500 kcmil	Cu or Al
800 – 1200	3	#250-500 kcmil	Cu only

Fusible Bolted Pressure Switches ⑥ (Branch Connectors)

Ampere Rating	Cables per Connector	Wire Range	Type
800	2	#4/0 AWG - 750 kcmil	Cu or Al
1200	4	#4/0 AWG - 750 kcmil	Cu or Al
1600	6	#4/0 AWG - 750 kcmil	Cu or Al
2000	6	#4/0 AWG - 750 kcmil	Cu or Al

Starters and Contactors (Lug Data)

NEMA Size	Lugs per Pole	Wire Range	Type
00-1	1	#14 - #8 AWG	Cu Only
2	1	#14 - #4 AWG	Cu Only
3	1	#14 - #1/0 AWG	Cu/Al

① Terminals are UL listed for 60/75°C conductors. CSA listed for copper wire only.
② Optional — use only in cases allowed by local codes.
③ Use on load side only.
④ This connector is of aluminum construction, but rated for copper cable only.
⑤ 20A — Apply this connector when continuous current setting is adjusted for lower ampacities.
⑥ Not available with breaker or switch. Requires bussing to install.

Metering

Utility Metering
Requirements for power company metering and instrument transformer requirements vary with serving utility. Typically, utility company current transformers require a 30 inch (762 mm) high compartment in SB1, SB2 and SB3 construction. Switchboard sections that contain utility metering must meet the utility metering compartment specifications.

Customer Metering
A full complement of switchboard instruments with appropriate current transformers, potential transformers and selectors switches are available in all Siemens switchboards.

The meters and instrument switches are mounted on hinged panels with potential transformers and fuses mounted on an instrument pan located behind the door. Current transformers are mounted on the main bus or, at the load terminals of the branch device and normally do not require additional unit space.

Power Meters
The 9200, 9300, 9330, 9350, 9510 and 9610 power meters are provided as standard metering options for SB1, SB2 and SB3 switchboard configurations. All are microprocessor-based, three phase meters and offer a full range of features at an affordable price, providing highly accurate, reliable, transient surge and hipot-withstand capabilities. Measurements are true RMS, including harmonics.

All the power meters can be configured to operate in the Wye (Star), Delta, or single-phase system configurations. The display module has a high visibility crystal display (LCD). Using the power meters to replace analog metering simplifies wiring and reduces installation time. The savings combined with the increased functionality makes the power meters ideally suited for economical metering on three phase industrial and commercial switchboards.

Siemens power meters are intelligent field devices that easily communicate with the Siemens ACCESS systems utilizing the fully integrated Siemens WinPM™ software. All of the power meters have RS-485 communication capability to transmit valuable power systems measurements out onto the ACCESS network. The meter communication port lets you use the power meter as a stand-alone power monitoring station or as one element in a large energy-management network.

For additional technical information concerning the Siemens Power Meters, WinPM, or ACCESS compatible components, refer to the Siemens Website: www.sea.siemens.com/access/meter_application.html

9200 Power Meter

9610 Power Meter

Number of CT's and or PT's required for Typical Meters Applied on Selected System Voltages

					Watthour Meters													
		Ammeter	Voltometer		2 Element		2.5 Element		3 Element		Wattmeter		Varmeter		Power Factory Meter		Frequency Meter	Synchroscope
System	Volts	C/T	P/T	Scale	C/T	P/T	C/T	P/T	C/T	P/T	C/T	P/T	C/T	P/T	C/T	P/T	P/T	P/T
1Ø3W	120/240	2	—	0-300	2	—	—	—	—	—	2	—	2	—	1	—	—	—
3Ø3W	240	2	—	0-300	2	—	—	—	—	—	2	2	2	2	1	2	—	2
	480	2	2	0-600	2	2	—	—	—	—	2	2	2	2	1	2	1	2
3Ø4W	120/240	3	—	0-300	—	—	3	—	—	—	3	2	3	2	1	2	—	—
	120/208	3	—	0-300	—	—	3	—	3	—	3	—	3	—	1	2	—	—
	277/480	3	3	0-600	—	—	3	2	3	3	3	2	3	2	1	2	1	2

Interrupting Capacity Ratings

Of Disconnect Devices

Molded Case Circuit Breakers

Normal and Heavy Duty

Normal duty breakers are designed for commercial, industrial, institutional and other heavy duty applications. They are rated up to 600 volts ac; 500 volts dc. Heavy duty breakers have higher interrupting ratings than normal duty.

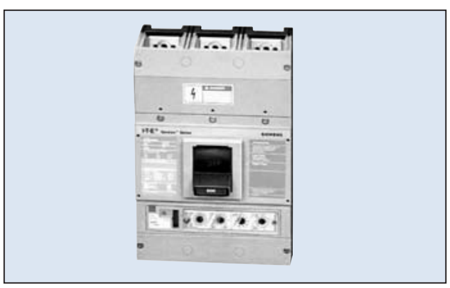
Type FD6, FXD6 Heavy Duty Thermal-Magnetic Breaker

Extra Heavy Duty

These are designed for heavy duty applications where the interrupting requirements exceed the ratings of heavy duty breakers. They are rated up to 600 volts ac and 500 volts dc.

Solid State Trip

Equipped with solid state tripping, and available in heavy duty and extra heavy duty interrupting ratings at 600V ac.



Type SHJD / SHLD Extra Heavy Duty Solid-State Trip

Current-Limiting

These breakers incorporate the exclusive Siemens blow-apart interruption principle and meet the NEC requirements for current-limiting breakers. Current-limiting circuit breakers can limit the let-through I^2t to a value less than the I^2t of one-half cycle wave of the symmetrical prospective current without any fusible elements when operating within their current-limiting range.

Maximum Ampere Rating	Available Amperage Range	Breaker Type	Maximum Interrupting Capacity				
			Symmetrical RMS Amperes VAC			In DC Amperes (VDC)	
			240V	480V	600V	250V ①	500V ①
Normal Duty — Thermal-Magnetic							
100	15-100	BQH	22,000	—	—	—	—
		BLH					
		BQD	—	14,000	—	—	—
125	15-125	BL	10,000	—	—	—	—
225	60-225	QJ2					
400	200-400	JXD2	65,000	—	—	30,000	—
Heavy Duty — Thermal-Magnetic							
100	15-100	ED2	10,000	—	—	5,000	—
125	15-125	ED4	65,000	18,000	—	30,000	—
		ED6		25,000	18,000		18,000
225	60-225	QJH2	22,000	—	—	—	—
250	70-250	FXD6/FD6	65,000	35,000	22,000	30,000	18,000
400	200-400	JXD6/JD6			25,000		25,000
600	250-600	LXD6/LD6					
800	500-800	LMXD6/LMD6/ MXD6/MD6		50,000			
1200	800-1200	NXD6/ND6					
1600	1200-1600	PXD6/PD6					
2000	1600-2000	RXD6/RD6					
Heavy Duty — Solid-State Trip							
400	200-400	SJD6	65,000	35,000	25,000	—	—
600	200-400	SLD6					
800	200-400	SMD6		50,000			
1200	800-1200	SND6					
1600	200-400	SPD6					
Extra Heavy Duty — Thermal-Magnetic ②							
100	15-100	HBL	65,000	—	—	—	—
125	15-125	HED4	100,000	42,000	—	30,000	—
	15-125	HHED6		65,000	25,000	—	—
	60-225	QJ2-H	42,000	—	—	—	—
250	70-250	HFD6	100,000	65,000	25,000	30,000	25,000
	70-250	HHFD6	200,000	100,000	25,000	—	—
400	200-400	HJD6/HJXD6	100,000	65,000	35,000	30,000	25,000
	200-400	HHJD6/HHJXD6	200,000	100,000	50,000	—	—
600	200-600	HLD6/HLXD6	100,000	65,000	35,000	30,000	35,000
	400-600	HHLD6/HHLXD6	200,000	100,000	50,000	—	—
800	500-800	HLMD6/HLMXD6	100,000	65,000	25,000	30,000	50,000
	500-800	HMD6/HMXD6			50,000		
1200	800-1200	HND6/HNXD6					
1600	1200-1600	HPD6/HPXD6					
2000	1600-2000	HRD6/HRXD6					
Extra Heavy Duty — Solid-State Trip							
400	40-400	SHJD6	100,000	65,000	35,000	—	—
600	60-600	SHLD6					
800	120-800	SHMD6			50,000		
1200	160-1200	SHND6					
1600	240-1600	SHPD6					
Current-Limiting — Thermal-Magnetic							
125	15-125	CED6	200,000	200,000	100,000	30,000	50,000
250	70-250	CFD6					
400	200-400	CJD6	150,000	150,000			
600	400-600	CLD6					
800	500-800	CMD6	100,000	100,000	65,000		
1200	800-1200	CND6					
1600	1200-1600	CPD6					
Current-Limiting — Solid-State Trip							
400	40-400	SCJD6	200,000	150,000	100,000	—	—
600	60-600	SCLD6					
800	120-800	SCMD6		100,000	65,000		
1200	160-1200	SCND6					

① All breakers are 2-pole for DC rating.
② Extra heavy duty breakers are inherently fungus-proof and do not require fungus treatment.

Interrupting Capacity Ratings

Of Disconnect Devices

Type WL Insulated Case Breakers ①

Maximum Ampere Rating	Breaker Type	Maximum Interrupting Capacity In Symmetrical RMS Amperes For Voltage AC		
		240V	480V	600V
800	S-Class	65,000	65,00	65,000
1200				
1600				
2000				
800	L-Class	100,000	100,000	85,000
1200				
1600				
2000				
2500				
3000				
4000				
5000				
4000	C-Class	150,000	150,000	100,000
5000				

Bolted Pressure Switches
All 600V AC Maximum 2 or 3 Poles ①

Ampere Rating	Fuse Rating (Amperes)	Fuse Interrupting Rating (Sym. RMS Amps)
400 ③	400	200,000
600 ③	600	
800	600, 700, 800	
1200	1000, 1200	
1600	1500. 1600	
2000	1800, 2000	
2500	2500	
3000	3000	
4000	3500, 4000	
5000 ④	5000	
6000 ④	6000	

① 100% rated device.
② 200,000A max. on 800A switch with "L" or "T" fuses and 1200A switch at 240V with "L" fuses.
③ 400 and 600 amp fuses on Bolted Pressure Switches shall be Class J type only.
④ 5000 and 6000A bolted pressure switch not UL listed.
⑤ For use on 240V maximum system.

Vacu-Break Fusible Switches

Maximum Ampere Rating	Fuse Class	Maximum Interrupting Capacity in Symmetrical RMS Amperes, 240 to 600V AC	Fuse Holder
30 to 600	H, K1, K5	10,000	NEC Standard
	RK1, RK5	200,000	Class R Rejection Type
	J	200,000	Rejection Type
800 1200	L	100,000 ②	—

HCP Fusible Switches

Ampere Rating	Fuse Class (Amperes)			Fuse Interrupting Rating (Sym. RMS Amps)
	J	T ⑤	L	
400	400	—	—	200,000
600	600	—	—	
800	—	600, 800,	601, 800	
1200	—	1000,1200	1000, 1200	

Modifications And Accessories

Transient Protection System

The SENTRON Transient Protection System truly is designed for the entire electrical system. From the service entrance equipment to lighting panelboards, Siemens has a system that will meet or exceed your specifications.

Installed at stages in your electrical system, the SENTRON TPS protects sensitive equipment closest to where it is needed. Industry-first retrofit kits complete one of the finest voltage transient protection systems on the market.

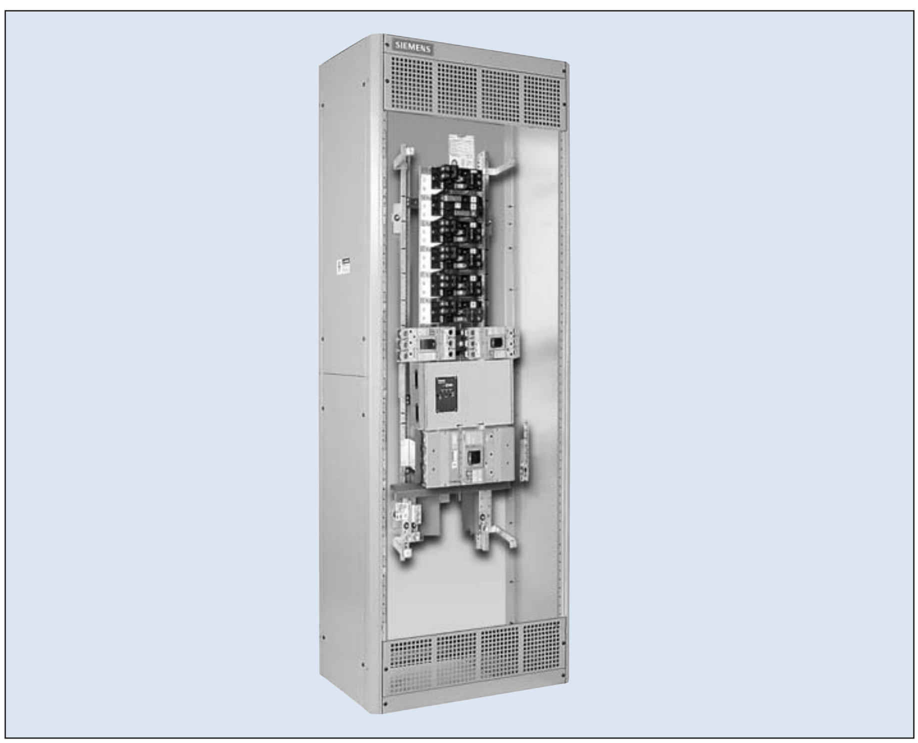
For TPS standards, Specifications and application information refer to www.sea.siemens.com/power/product/pdprodsp.html.

SENTRON TPS

Transient Protection System for Service Entrance Applications

SENTRON TPS

Transient Protection System for Distribution Applications



Ground Fault Protection

NEC Section 230.95 requires ground fault protection on all service disconnects rated 1000 amperes and larger in 600 volt class switchboards when fed by a solidly grounded Wye system of more than 150 volts to ground. Ground fault protection is required on 480 and 600 volt, 3-phase 3-wire, (i.e., no neutral bus), when the serving transformer is Wye connected.

There is an exception to this rule: Ground fault protection is not required on fire pumps or continuous industrial loads where a non-orderly shutdown would cause a hazard.

Health care facilities, such as hospitals require additional levels of ground fault protection. These requirements are described in NEC article 517.

Sections 215.10 and 240.13 of the NEC require ground fault protection on all 1000 ampere and larger devices, breakers, and switches, applied in a system as described above, unless there is ground fault protection upstream.

Many utilities use a grounded Wye secondary transformer and bring a connection from the grounded mid-point to the service section ground bar. When this is the case, ground fault protection is required.

For a 1000 ampere or larger 480 volt, 3-phase 3-wire service section, an inquiry should be made to determine if the utility is using a 3-wire delta secondary transformer. Should this be the case, no ground fault protection is required.

Ground Fault Relay

Ground Fault Testing

Warning: The following should be performed only by qualified personnel as defined in N.E.C. Article 100. The ground fault sensor (GFS), ground fault relay (GFR), must be installed as in Fig. 1.

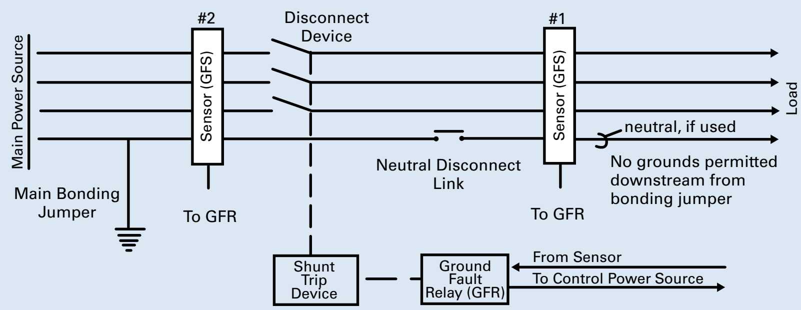


Fig. #1

GFS #1, is the standard location
GFS #2, alternate location for GFS

1. Disconnect Main Power Source.
2. Remove the neutral disconnect link. Make sure the neutral is grounded only by the main bonding jumper, which must be on the line side of the sensor.
3. Close all branch devices.
4. Using a "megger" type meter, measure the resistance of the load phase and neutral to ground. This is to ensure that no ground connections exist in the system. Resistance readings of (1) Megohm or greater are preferred.
5. Re-install the neutral disconnect link.
6. Open all branch devices.
7. Connect the main power source.
8. To Test The Entire System.
   a. Check for control power. (LED should be illuminated).
   b. Press the "push to test" switch on the relay.
   c. The trip indicator should go to the "tripped" position and the disconnect device should operate.
   d. Release the "push to test" switch and return the trip indicator to the "reset" position.
   e. Reset or "close" the disconnect device for normal operation of the switchboard.
9. This test meets the requirements of the National Electrical Code Section 230.95 (C).

Test Record

Date	By	Amp Setting	Time Setting	Notes

Some Things To Consider

When Applying SB1, SB2, and SB3 Switchboards
The electrical system is bound to have unique requirements that affect the design of the switchboard and the selection of the protective devices that go into it. However, some design aspects are common to all systems, and can be considered in more general terms.

Ampacity Should Anticipate Future Load Requirements
In addition to meeting the demands of pre-set loads, the switchboard should be sized to accommodate reasonable future load additions without major modifications. Expansion can usually be built into the switchboard easily. The main protective device frame size or continuous current rating, and the switchboard through-bus can be sized on the basis of anticipated future load demand. Trip units or fuses of lower ratings can be installed to meet preset load conditions and simply changed in the future as load increases, up to the maximum switchboard ratings.

Most protective devices are designed to operate continuously at 80% of their rating when installed in a switchboard. Bolted pressure switches, power circuit breakers, and some molded case breakers have been designed for operation at 100% of their current rating when housed in an adequately ventilated enclosure. However, since most protective devices are tested in a 40°C (104°F) ambient, derating may be necessary if the operating conditions normally exceed this temperature.

Selective Tripping
The switchboard and its protective devices must be capable of withstanding and interrupting the short circuit fault current that the electrical system can deliver to the switchboard's location in the system.

In a fully rated system, both the main and branch feeder protective devices must have adequate interrupting capacity for the available fault current, and the switchboard bus should be braced for the same maximum fault current. Without selective tripping coordination between the main and branch protective devices, both the main and branch device may trip under fault conditions.

The NEC permits the application of series rated devices in switchboards. Series rated devices are those which have been series tested to prove that a higher rated upstream device will protect a lower rated downstream device. In the selective system though, the main and branch devices are selected so that under fault condition, the branch device normally clears the fault while the main remains closed. Only in unusual events, such as a fault of the main switchboard bus or a failure of the branch device to operate, would the main device trip. Service continuity is maximized by the selective trip design.

Circuit Breaker Selectivity
Selectivity between main and branch circuit breakers can be achieved up to the instantaneous trip setting by building a short-time delay into the main breaker trip characteristics, or properly choosing and setting instantaneous trip characteristics to allow the branch breaker's instantaneous trip to clear the fault first. The short-time delay features are available on solid-state molded case circuit breakers, such as SENTRON™ Digital Circuit Breakers, and WL Insulated Case Breakers. With these breakers, a solid-state main breaker, and standard thermal-magnetic branch breakers can be combined to achieve an economical selective system.

Service Continuity Can Also Be Affected By Ground Fault Protection Design
Ground fault protection is required by the National Electrical Code, Section 230.95 for solidly grounded Wye electrical services of more than 150 volts to ground, but not exceeding 600 volts phase-to-phase on each service disconnecting device rated 1000 amps or more, to provide protection against low magnitude arcing ground faults. While the National Electrical Code stipulates only that ground fault protection be provided on the main disconnect device, the switchboard designer should consider service continuity when applying ground fault protection. Ground fault protection can be achieved using ground fault relays, or integral ground fault in solid-state trip circuit breakers.

Ground fault protection normally used on main disconnect devices have a pick-up trip from 200 to 1200 amperes, and operating times from six to thirty cycles.

For services in which continuity of service is critical, ground fault protection is recommended on both the main and branch feeder devices. For hospitals, the National Electric Code, Section 517.17 requires this ground fault relaying on both the main and feeder circuits. A time coordinated scheme between the main and branch devices will provide selective coordination to maintain continuity of service.

Enclosure Types
Type 1 enclosures are available for indoor applications and Type 3R for outdoor and wet locations.

NEC Section 110.26(F) requires switchboards to be located in dedicated rooms and spaces. Sections 408.7 and 408.8 require placement to reduce to a minimum the probability of communicating fire to adjacent combustible materials including the floor. Section 110.26 defines specific working clearances and exit doors to the switchboard area.

Factory Testing
Prior to shipment each switchboard is tested to UL 891, the dead front switchboard standard. A dielectric test is conducted at two times the switchboard voltage rating plus 1000 volts. External device ground fault systems are tested at 57% control voltage to ensure operation under severe ground faults.
Note: NEC Section 230.95 requires the ground fault system to also be field tested by the installer and a permanent record kept of this test using the field test instructions provided with the switchboard.

Phase Arrangement
When viewed from the front bus phasing per NEC Section, 408.3, is A-B-C from front to back, top to bottom, and left to right. There is no industry standard on the location of the neutral.

On a 4-wire delta system, the B phase has the higher voltage to ground except the C phase may have the higher voltage to ground when metering equipment is present. The bussing that has the higher voltage to ground will be marked with orange colored labels.

Overcurrent Devices Continuous Rating
Overcurrent devices are available with 80 and 100% continuous load ratings. The NEC defines a continuous load as maximum current for 3 hours or more.

Device Type	80% Rated	100% Rated
Molded Case Circuit Breakers	Yes	Yes
Fusible Switches VB & HCP	Yes	N/A
Bolted Pressure Switches	N/A	Yes
WL Insulated Case Circuit Breakers	N/A	Yes

Maintenance and Installation
Each switchboard is provided with maintenance and installation instructions at the time of shipment. Energized switchboards are hazardous when all enclosure covers are not in place. To reduce the risk of injury follow the instructions and switchboard instructional labels. NEC Section 110.3(B) requires these instructions be followed.

General Specifications

1. Scope
Furnish and install, as shown on the plans, a service and distribution switchboard as specified herein, for the system indicated below:

☐ 120/240V ☐ 1-phase ☐ 3-wire
☐ 208Y/120V ☐ 3-phase ☐ 4-wire
☐ 480Y/277V ☐ 3-phase ☐ 4-wire
☐ 480V
☐ ____________________V

Configuration
The switchboard enclosure shall be:

☐ NEMA 1 indoor construction
☐ NEMA 3R outdoor construction
☐ Non walk-in front accessible
☐ Non walk-in front & rear accessible

Switchboard shall be of the modular type construction with the required number of vertical sections bolted together to form one metal enclosed rigid switchboard. The sides, top and rear shall be covered with removable screw-on code gauge steel plates. Switchboard shall include all protective devices and equipment as listed on drawings with necessary interconnections, instrumentation and control wiring. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips.

Switchboard shall be constructed in accordance with the latest NEMA PB-2 and UL 891 standards.

2. Bus Requirements
The bus shall be ☐ tin-finished aluminum, ☐ silver-finished copper of sufficient size to limit the temperature rise to 65˚C, based on UL tests. The bus shall be braced for ☐ 50,000, ☐ 65,000, ☐ 75,000, ☐ 100,000, ☐ 200,000 amperes symmetrical and supported to withstand mechanical forces exerted during short circuit conditions when directly connected to a power source having the indicated available short circuit current. Provide a full capacity neutral where a neutral is indicated on the drawings.

The through bus on the end distribution section shall be extended and predrilled to allow the addition of future sections with standard splice plates.

Ground bus and lugs shall be furnished. The ground bus shall extend the entire length of the switchboard and shall be firmly secured to each vertical section.

3. Incoming Service
1. Underground Service:

To isolate incoming underground service conductors, an underground cable pull or auxiliary section shall be used. This section shall be of the ☐ nonbussed, ☐ bussed type and shall be sealable per local utility requirements. ☐ Screw-type mechanical lugs, ☐ compression lugs to terminate, ☐ aluminum, ☐ copper cable, shall be furnished as detailed on the plans.

2. Overhead Service:

A. Cable entry

☐ Screw-type mechanical lugs
☐ compression lugs to terminate
☐ aluminum ☐ copper cable
shall be furnished as detailed on the plans. Where necessary provide top cable pull box which shall be sealable per local utility requirements.

B. Busway Entry

Switchboard to be fed by Siemens SENTRON _____ ampere ☐ copper, ☐ aluminum busway, as detailed on plans, ☐ and other sections of this specification. The switchboard manufacturer shall be responsible for coordination, proper phasing and internal bussing to the incoming busway.

Service Section
The service section shall be designed for the system parameters indicated in article 1.0, shall have a ☐ _____ metering compartment per utility requirements, ☐ user metering as indicated in article _____, ☐ and shall have a main protective device indicated in article _____.

4. Distribution Sections
(Select one of Item #B)

B1. Switchboard Type Panel-Mounted, Front Accessible.
Switchboard shall be of Siemens SB1 type, or approved equal. Individual sections shall be front accessible, not less than 20” deep, and rear of all sections shall align. Incoming line termination, main device connection and all bolts used to join current-carrying parts shall be installed so as to permit servicing from the front only so that no rear access is required. The branch devices shall be front removable and panel mounted with line and load side connections front accessible.

B2. Switchboard Type Panel-Mounted Rear Accessible
Switchboard shall be of Siemens SB2 or SB3 type, or approved equal. Individual sections shall be front and rear accessible, not less than 38" deep, and both the front and rear of all sections shall align. The branch devices shall be front removable and panel mounted with line and load side connections front accessible. The bus and main device connections shall be rear accessible.

5. Main Protective Device
(Select one of Item #C)
The main protective device, to be installed in the main device section, shall be as indicated below:

C-1 Molded case circuit breaker shall be of the quick-make, quick-break, trip-free, (heavy duty) (extra heavy duty) (solid state) type. It shall be a _______ frame (2-pole) (3-pole) 600-volt breaker with a trip current rating of:

☐ 400A ☐ 1600A
☐ 600A ☐ 2000A
☐ 800A ☐ 2500A
☐ 1000A ☐ 3000A
☐ 1200A

of an interrupting capacity of not less than _______ amperes RMS symmetrical at the system voltage.

C-2 Fusible switch of the quick-make, quick-break type. It shall be a (2-pole) (3-pole) (240V) (600V) Vacu-Break unit with a continuous current rating of (400) (600) (800) (1200) amperes and with _______ ampere class _______ fuses, suitable for application on a system with _______ amperes symmetrical available fault current.

C-3 Fusible switch of the quick-make, quick-break type. It shall be a 3-pole (240V) (600V) HCP unit with a continuous current rating of (400) (600) (800) (1200) Ampere and with _________ Ampere Class________fuses, suitable for application on a system with _______amperes. Symmetrical available fault current. The following accessory features are to be included:

☐ Shunt Trip
☐ Ground Fault Relay
Other ______________________ (list)

General Specifications

C-4 Bolted pressure switch of the quick-make, quick-break type. It shall be a ☐ 2-pole, ☐ 3-pole, ☐ 240V, ☐ 480V unit with a continuous current rating of:

☐ 800A	☐ 2500A
☐ 1200A	☐ 3000A
☐ 1600A	☐ 4000A
☐ 2000A	

and with _______ ampere Class L fuses suitable for application on a system with ______ amperes symmetrical available fault current.

The following accessory features are to be included:

☐ Shunt Trip
☐ Ground fault relay
☐ Electrical operator
☐ Other _________________ (list)

C-5 Type Type WL Insulated Case Circuit Breaker with a ☐ stationary or ☐ drawout frame. Frame size to be _______ ampere, 3-pole, 600V with a trip current rating of:

☐ 800A	☐ 2500A
☐ 1200A	☐ 3000A
☐ 1600A	☐ 4000A
☐ 2000A	☐ 5000A

It shall be a ☐ manually, ☐ electrically operated breaker with a solid state trip device, stored energy type, trip free, an interrupting capacity of not less than _______ amperes RMS symmetrical at the line system voltage.

The following accessory features are to be included:

☐ Short time delay
☐ Integral ground fault trip
☐ Fault trip indicators
☐ Other _________________ (list)

6. Branch Protective Devices (Select one of Item #D)

All molded case circuit breakers, fusible switches, insulated case circuit breakers, bolted pressure switches, low voltage power circuit breakers, and/or motor starter units used as a protective device in a branch circuit will meet the requirements of the appropriate paragraph below.

D-1 Molded case circuit breakers shall be of quick-make, quick-break, trip-free ☐ thermal magnetic type, ☐ solid-state, with frame, trip and voltage ratings, either 2-pole or 3-pole, as indicated on the plans. All breakers shall have an interrupting capacity of not less than ______ amperes RMS symmetrical at the system voltage. All breakers shall be removable from the front of the switchboard without disturbing adjacent units. The switchboard shall have space or provisions for future units as shown on the plans.

D-2 Current limiting circuit breakers shall provide inverse time delay, instantaneous circuit protection, and also limit the let-through I^2t to a value less than I^2t of one-half cycle wave of the symmetrical prospective current without any fusible elements. Breakers shall have an interrupting capacity of not less than ______ amperes RMS symmetrical at the system voltage.

D-3 Fusible switches shall be quick-make, quick-break units utilizing the double-break principle of circuit rupturing to minimize arcing and pitting and shall conform to the ratings shown on the plans.

Each switch shall have an individual door over the front, equipped with a voidable interlock that prevents the door from being opened when the switch is in the ON position unless the interlock is purposely defeated by activation of the voiding mechanism. All switches shall have externally operated handles. Switches shall be equipped with ☐ NEC standard, ☐ Class R rejection type fuse holders, and Class ☐ H, ☐ K1, ☐ K5, ☐ RK1, ☐ RK5, ☐ J, ☐ T and ☐ L fuses of ampere rating and type as indicated on the plans suitable for application on system with ______ ampere symmetrical available fault current.

D-4 Each bolted pressure switch shall be the quick-make, quick-break type, equipped with Class L fuses suitable for application on a system with ______ amperes symmetrical available fault current. Ampere ratings to be as shown on the plans.

D-5 Each insulated case circuit breaker shall be a (drawout stationary) frame, stored energy type, trip free, (manually operated) (electrically operated) with solid- state trip device. Frame sizes and trip ratings to be as shown on the plans. All breakers to have an interrupting capacity of not less than _______ amperes symmetrical at the rated voltage.

D-6 **Motor Starters (SB3 Switchboards only)**

NEMA rated Siemens magnetic starters shall be furnished of the type and horsepower ratings as indicated on the plans. Thermal overload relays on starters shall be (non-compensated bimetallic type with selector for either auto or manual reset) (ambient temperature compensated bimetallic type with selector for either auto or manual resets). Three overload relays will be furnished on each starter. The overload heater elements will be sized from the actual motor nameplate data.

The following accessory features will be furnished on each starter:

☐ Individual control power transformers
☐ Pilot light(s)
☐ Auxiliary interlocks
☐ _______ NO _______ NC

Pushbuttons, selector switches and other pilot devices shall be furnished as indicated on the plans.

General Specifications

6. Branch Protective Devices (cont'd)

The disconnect device shall be mounted immediately above its associated starter, and the unit doors will be mechanically interlocked to prevent access without de-energizing the unit. (The interlocking means shall be voidable by qualified personnel.) The disconnecting devices will be:

☐ Circuit Breakers

Type ETI molded case circuit breakers will be furnished for combination starter.

☐ Fusible Switches

Type Vacu-Break fusible switch shall be furnished for combination starters. Switches will meet the requirements of Article D-3.

The disconnect shall be factory wired to the starter unit. Wiring to be:

☐ Class 1A

☐ Class 1B

7. Ground Fault Protection

A) General

Furnish and install in the service equipment and / or switchboard ground fault protection and indication equipment as specified herein and as shown on drawings in accordance with NEC #230-95.

All parts of the systems specified shall be UL Listed.

All new ground fault protection and indication equipment shall be factory installed, wired and tested by the switchboard manufacturer.

B) Ground Fault Relay

The ground fault relay shall be a line-powered, self-contained device and shall be designed to mount in the front panel of the equipment in which it is installed.

The ground fault relay shall be supplied with 120 Vac control power from a suitably rated control transformer whose primary is connected phase-to-phase. When control power is present, a "Control Power" indicator shall be lit on the relay panel.

The ground fault relay shall receive a signal from the sensor proportional to the magnitude of the fault current. Pick-up (trip) and time delay settings shall be incrementally adjustable 100 through 1200 amperes and 0.10 to 1 second, respectively in various ranges.

The ground fault relay shall be provided with an integral test panel with "push to test" and "shunt trip bypass" push-buttons for testing the system with or without tripping the protective device.

☐ Ground fault relays shall be zone interlocked.

8. Metering Equipment (When Required)

Provide a multi-function, high accuracy digital power metering instrumentation module equipped with a display. The power metering module shall provide simultaneous measurements for current, voltage, and power parameters. Power meter shall be Siemens type ☐ 9200 ☐ 9300 ☐ 9330 ☐ 9350 ☐ 9510 ☐ 9610 equipped with a communications port for connection to customer's energy-management network.

9. General

The complete switchboard shall be phosphatized and finished with light gray. ASA-61 paint.

Each switchboard section shall have a nameplate permanently affixed to it, listing the following information:

Name of manufacturer

System voltage

Ampacity Type

Manufacturer's shop order number and date

Each section of switchboard shall bear a UL listing mark, where qualified, and a short circuit rating label.

In addition, the front, side, rear and top of each switchboard section will have a DANGER label in accordance with NEMA Standard PB-2.

Notes

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