



EAT•N

Cutler-Hammer

**Generator Quick-Connect
Double-Throw Safety Switch**

Product Focus



Backup Power Solutions for Commercial Facilities



The Power is Out!

Blackouts. Hurricanes. Thunderstorms. Snow. Ice storms. Floods. High winds. Whether they are caused by a utility power interruption or weather disasters, power outages are frequent occurrences throughout the country. If you are responsible for maintaining commercial facilities, power reliability is likely to be a real concern. Whether you want to maintain uptime, or are worried about losing perishable inventory, chances are the thought of power reliability has crossed your mind recently — maybe even causing you a few sleepless nights.

Making the decision to provide backup power capability to your facilities is the first step, and has probably raised many questions: *Do you need standby systems that automatically start when there is an outage, or will you use portable units? What size generator is suitable for your needs? How do you safely connect a portable generator to the store's electrical system? If you have decided to use portable units, will you own the generators, or rent them as needed?* These are just a few of the questions that need to be answered in order to meet your unique power needs.

If the decision has been made to use portable generators rather than investing in permanently installed standby units, this product guide will assist you in the critical step of preparing your facilities to be able to quickly connect the generators once they arrive at the site.

Like the utility power lines that enter the facility, the portable generator will need a point of connection. The time to think about how that connection will be made is now — before the power is out. Also, a plan needs to be in place that considers your customers' and employees' safety, yet allows for a quick connection of the generator to your facility to get the facility powered up with a minimal amount of downtime.

Installing a Cutler-Hammer® Quick-Connect Double-Throw Switch as your utility service disconnecting means up front provides both a quick means of generator connection, and a safe way to transfer power from a normal power source to the backup power source.

Step 1 — Determine the requirements for Main Service Disconnect

A facility will generally have one utility service disconnect. This

disconnect may be inside or outside, but it will be the first device after the utility meter. Cutler-Hammer Double-Throw Switches are available up to 800 amperes. If the service for your facility is larger than 800 amperes, another solution from Eaton is required. Generally, a fusible device is preferred — first to provide overcurrent protection, and second because fusible devices have a higher fault current rating than non-fused switches.

Step 2 — Determine the generator size in kilowatts (kW) that will meet your requirements

While some facility managers may desire to run the entire operation under generator power, it is not a requirement to do so. You may choose to run only a critical portion of your facility during a power outage. The important component in the decision is whether you want to keep the whole facility operating as it would with utility-supplied power. The chart on page 3 is an analysis of the output current of various sizes of generators at different voltages. If the desire is to run the entire facility, the generator required is the one that provides a current rating equal to the ampacity of your Main Service Disconnect at the facility's utilization voltage. For example, a 600 ampere 208 volt three-phase building would best be served by using a 175 kW generator.

Step 3 — Determine whether the backup generators will be owned or rented

If the units will be rented, it will be helpful to make contact with a generator rental company to see what form of agreement is required to guarantee the delivery of the generator to the facility in a timely manner. The rental company will help



MAXIMUM GENERATOR CURRENT OUTPUT AND SWITCH SIZING CHART

kW	Three-Phase (80% Power Factor)			480 Volt			Single-Phase (Unity Power Factor)		
	208 Volt			480 Volt			240 Volt		
	Amps	Fusible	Non-Fusible ²	Amps	Fusible	Non-Fusible ²	Amps	Fusible	Non-Fusible ²
5	17	30	30	8	30	30	21	30	30
7.5	26	60	30	11	30	30	31	60	60
10	35	60	60	15	30	30	42	60	60
12	42	60	60	18	30	30	50	100	60
15	52	100	60	23	30	30	63	100	100
20	69	100	100	30	60	30	83	200	100
25	87	200	100	38	60	60	104	200	200
30	104	200	200	45	60	60	125	200	200
40	139	200	200	60	100	60	167	400	200
50	173	400	200	75	100	100	208	400	400
60	208	400	400	90	200	100	250	400	400
75	260	400	400	113	200	200	313	400	400
80	278	400	400	120	200	200	333	600	400
100	347	600	400	150	200	200	417	600	600
125	434	600	600	188	400	200	521	800	600
150	520	800	600	226	400	400	625	800	800
175	607	800	800	263	400	400	729	x ¹	800
200	694	x ¹	800	301	400	400	-	-	-
250	x ¹	x ¹	x ¹	376	600	400	-	-	-
300	x ¹	x ¹	x ¹	451	600	600	-	-	-
350	x ¹	x ¹	x ¹	526	800	600	-	-	-
400	x ¹	x ¹	x ¹	601	800	800	-	-	-
500	x ¹	x ¹	x ¹	752	x ¹	800	-	-	-

- ¹ x indicates an ampacity that exceeds the capability of the Quick-Connect Double-Throw Switches. If your facility falls outside the scope of the Quick-Connect Switch capacity, talk with an Eaton representative about other options available.
- ² Non-fusible devices are rated at 10 kAIC maximum unless protected by an upstream fuse.

determine the right size generator to meet the needed requirements, and may make a site visit to analyze the location and any potential connection issues.

One point of discussion should be which party will provide the cables to connect the generator to the facility. If the rental company is going to provide the wires to connect, it is important to determine what type of quick-connect device they can provide to plug into the facility's electrical system.

Cutler-Hammer Quick-Connect Double-Throw Switches are available with Cam-Lok®, Posi-Lok® and pin-and-sleeve devices from various manufacturers including Crouse-Hinds®, Appleton®, Meltric, Russellstoll® and others. Since these devices are not generally interchangeable, it is important that the plug and receptacle are compatible.

If the generators will be purchased, Eaton can help guide you through the decision of selecting the appropriate connector for your needs.

Step 4 — Configure a Quick-Connect Double-Throw Switch

Call the Flex Center at Eaton's Cleveland, Tennessee manufacturing plant for assistance in designing a suitable switch for the application. A double-throw switch is a manual device that consists of two interlocked switches that cannot be "ON" at the same time. The switches are vertically oriented with the upper switch being the "NORMAL" switch, and the lower switch being the "BACKUP POWER" switch.

For Quick-Connect Double-Throw Switches, Flex Center technicians connect wires from the line side of the "BACKUP POWER" switch to a power inlet receptacle. This allows a generator to be plugged into the switch via a receptacle rather than opening the switch, and hard wiring cables directly to the lugs. The receptacle can be a pin-and-sleeve device that connects all wires simultaneously, or it can be an individual receptacle such as a Cam-Lok or Posi-Lok that connects each wire individually. There are benefits and drawbacks to using each of these devices.

Pin-and-sleeve devices ensure that all cables are connected since they are inserted simultaneously. However, since all of the cables are bundled together, the weight of the connection cable can become unwieldy at higher amperages. The Meltric pin-and-sleeve device has the added benefit of being able to be connected and disconnected while energized. This is a safety feature in the event that the receptacle is inserted or removed without opening the switch and/or turning off the generator.

The Cam-Lok and Posi-Lok devices are single-pole connectors that connect each wire separately. The result is that the

multiple phase, neutral and ground wires are unbundled and connected individually which breaks the connecting cables into more manageable weights. This allows for longer runs from the generator, and is also ideal for higher ampacities (400 amperes and higher).

The difference between the Cam-Lok and Posi-Lok devices is that Posi-Lok panels require the wires to be connected in proper electrical sequence. Specifically, the ground wire must be connected prior to connecting the neutral wire, and the neutral wire must be connected prior to the phase A conductor and so on. Likewise, the wires must be disconnected in proper reverse order. This added level of safety ensures proper grounding connection of the system, which can prevent electrical shock. With both of these devices, however, the system can be energized without having all conductors connected — risking potential damage to equipment, and therefore should be connected only by trained electrical professionals.

The Flex Center staff will guide you through this process, and will assist in configuring the required Quick-Connect Switch. You will be asked for the ampacity of the switch, the voltage system employed at the facility, as well as the type of generator connection that is desired. The Flex Center staff has over 120 years of design, manufacturing and industry experience, and has been providing customer switching device solutions since 1988. Call the Flex Center today at 1-888-329-9272.



1. 800 Ampere Double-Throw

With Posi-Lok panels to Quick-Connect a 150 kW generator.

2. 60 Ampere Quick-Connect Double-Throw

With interlocked pin-and-sleeve receptacle.

3. and 4. Cutler-Hammer Quick-Connect Double-Throw

Switches streamline installation for a neat, clean appearance.

5. Posi-Lok Panels

This detail shows one ground receptacle open — note that a plug would need to be installed to open the next door.





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