

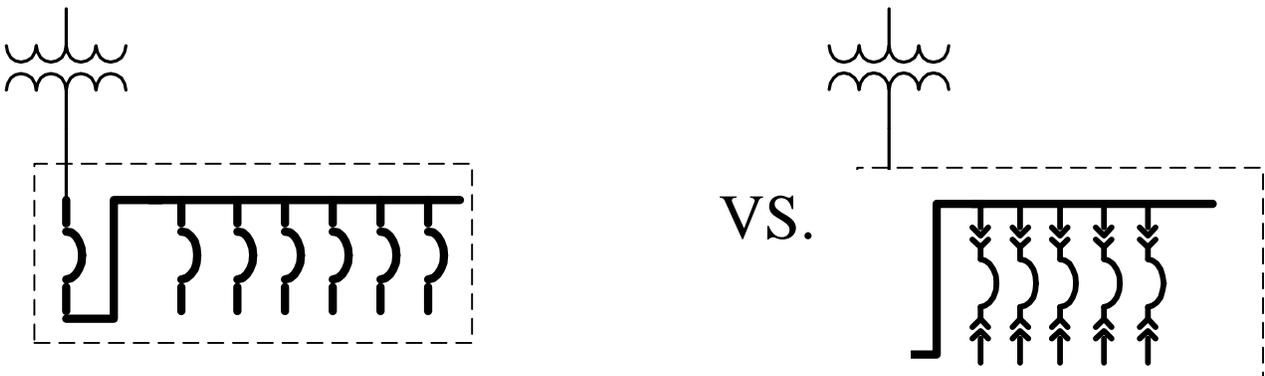
Design For SAFETY

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This is part 2 of an ongoing series intended to give tips and suggestions to the electrical design engineers for designing electrical distribution systems with safety for the end user as the primary concern. Concern for worker safety continues to increase, and there are numerous items that can be specified and designs that can be implemented that will increase a worker's safety.

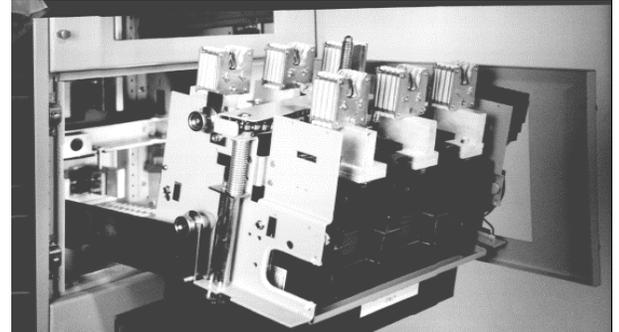
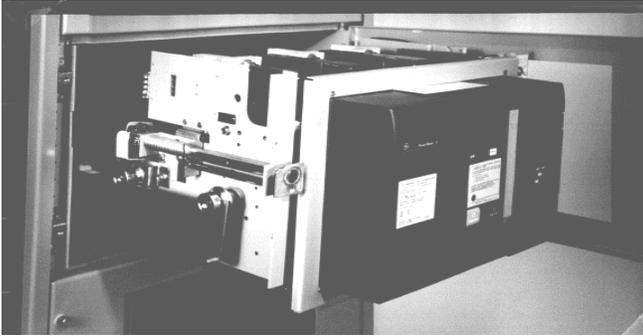
Draw-out vs. Fixed Mounted Breakers

This article is aimed toward electrical distribution systems, which utilize services with overcurrent devices rated greater than 1200A. To enhance a workers safety, the designer must consider devices that remove the technician from hazardous conditions. Typically, any device over 1200A is individually mounted vs. the group mounted or panel mounted devices. Many of these projects utilize switchboards with an individually mounted main device and possibly some feeders, which are individually mounted. On many projects, these devices are fixed mounted or otherwise bolted in place. In most cases, these breakers are available in draw-out construction.



There are many advantages to draw-out construction. Ease of removal for replacement, service or testing is the key feature. However, there are other advantages. If multiple breakers of the same frame size are present on a project, then devices can be easily moved from one location to another in case of an emergency. Inspection of the breaker for routine

maintenance is simplified with draw-out breakers vs. bolted devices. Continuity of service is always desired and a draw-out device allows the technician to safely remove the breaker for maintenance.



Lock-out and tag-out is a routine practice for most maintenance procedures. Most fixed mounted breakers are provided with a device for the technician to attach their lock-out device. However, with draw-out devices, additional safeguards can be implemented with the lock-out procedure. The breaker can be withdrawn from the cubicle and locked in the disconnected position to provide a positive open circuit. The breaker can also be removed from the cubicle and the draw-out rails locked to prevent insertion of a breaker.



Draw-out breakers are standard for low-voltage switchgear construction. Switchboards are also available with all draw-out insulated case breakers with features similar to what is available in switchgear. The specifier also has the option to provide the end customer with draw-out breakers for the larger frame sizes for even the simplest switchboard.

When specifying draw-out devices, the designer must take into consideration that the switchboard will typically be 5 to 10 inches deeper than the same board with fixed mounted devices. The actual cost percentage to add the draw-out devices will vary with the size and the total number of devices within a switchboard. For a simple switchboard with a 3000A main, a 1600A feeder and a variety of smaller feeder breakers, a meter and TVSS, the cost adder would be about 10% of the price of the switchboard. A misconception exists that all switchboards with draw-out devices must have rear access. While this is true for low-voltage switchgear and high-end class 3 switchboards similar to GE's PowerBreak® Switchboards, front connections can be attained with the simplest switchboards such as GE Spectra switchboards when only a single device is in the section.

Another item for the specifier to consider when specifying low-voltage switchgear, which has draw-out devices as standard, is a remote racking mechanism. A remote racking mechanism is an electric motor, which is attached to the breaker face and is provided with a cord connected to the control station. The operator then stands as far as 30 feet away instead of directly in front of the switchgear. This will typically take the technician out of the arc flash zone in front of the gear while performing a critical live bus racking operation.



In conclusion, while group-mounted molded case devices are standard for typical switchboards for amperages 1200A and below, individually mounted devices are available for insulated case frames for amperages 800A and larger. The draw-out devices provide the end user with ease of maintenance and allow a technician to perform critical maintenance operations and positive circuit disconnect that is not available with a fixed mounted bolted in device. Additional safety features such as remote racking can also be specified when switchgear designs are implemented.