



Electric Utilities May Hold A Key To Purchases of Metal-Enclosed Switchgear!



Figure 1. A 4-bay, 25kV, outdoor lineup of Federal Pacific Metal-Enclosed Switchgear provides primary power with utility metering to two connected lateral load-feeder circuits. See one-line diagram on page 5.

Federal Pacific's penetration of the electrical equipment market at electric-power utilities has been, for the most part, limited to pad-mounted switchgear, primary-metering equipment, fused sectionalizers (FTDFs) and capacitor banks. Recent orders have proven that substantial business can be derived for many other requirements that develop at electric utilities or where the utility has control over, in particular, metering requirements. It is well known that Federal Pacific Metal-Enclosed Switchgear is often purchased for use at commercial and industrial facilities. In some cases, the metal-enclosed switchgear may include a bay for the electric-utility revenue metering transformers.

When there is a utility metering section, the utility nearly always requires approval of the design and layout of that bay and may also maintain access control of the incoming line section as well. To expedite the approval process and to keep lead times as short as possible, pre-approval of the metering bay by the utility is almost always necessary. Gaining such approval is important because Federal Pacific is automatically added to an approved supplier list. Thus, contractors, consultants and engineering firms will involve us in projects as they occur.

In some cases, the metal-enclosed switchgear is purchased by the electric power utility it may be used to provide switching and protection for loads within a substation. The economics of this type installation for the utility are significant:

- (1) The arrangement is less expensive than circuit breakers;
- (2) The configuration takes up less space within the substation than the equivalent circuit-breaker lineup;
- (3) The equipment requires less adjustment and maintenance than circuit breakers;
- (4) The construction allows easier access and viewing of internal components than would circuit breakers; and
- (5) Remote operation of manual switches is possible by using the Federal Pacific PROM (Portable Remote Operating Mechanism) to minimize exposure to arc-flash hazards.

In some instances, the metal-enclosed switchgear is purchased by the electric power consumer; the utility has approval and control of the revenue metering section; and also has responsibility for operating and maintaining the equipment. In the ultimate case, the utility purchases, maintains and controls the switchgear.

This newsletter features a Metal-Enclosed Switchgear assembly that includes a metering section and an incoming line section that are controlled by the serving utility. As many account visits are often made to electric utilities, it is certainly worthwhile to determine the potential need for metal-enclosed switchgear and exploit those opportunities. First, these are not normally frequent requirements and timing is often a key factor. So, the first response may often be, "No, we do not purchase metal-enclosed switchgear." Therefore, it is often necessary to subtly keep reminding engineering (distribution, transmission and substation departments), planning and purchasing personnel of our capabilities to build air-insulated metal-enclosed switchgear through 38kV if such a need should ever develop. Then, when a requirement does emerge, Federal Pacific will be recalled as a viable supplier of that product.

A second requirement often encountered with utility purchased metal-enclosed switchgear is the metering bay. Metering requirements in switchgear may often be an important consideration because it is like the cash register for the utility. In some cases, it may become desirable to get a pre-approved utility design for the metering bay and this will expedite future orders. It may also have positive impact on sales to the commercial and industrial sector, where the revenue metering section is almost always controlled by the serving utility and will generally require separate approval.

As the effort to promote Custom Solutions gains momentum, metal-enclosed switchgear may form part of that requirement too. Make sure in all customer visits to promote metal-enclosed switchgear and seek to identify opportunities or, as a minimum, to educate customers about our capabilities in this product segment. Scatter enough seeds and continue to provide the follow-up to nurture the effort so that the metal-enclosed switchgear sales will grow.

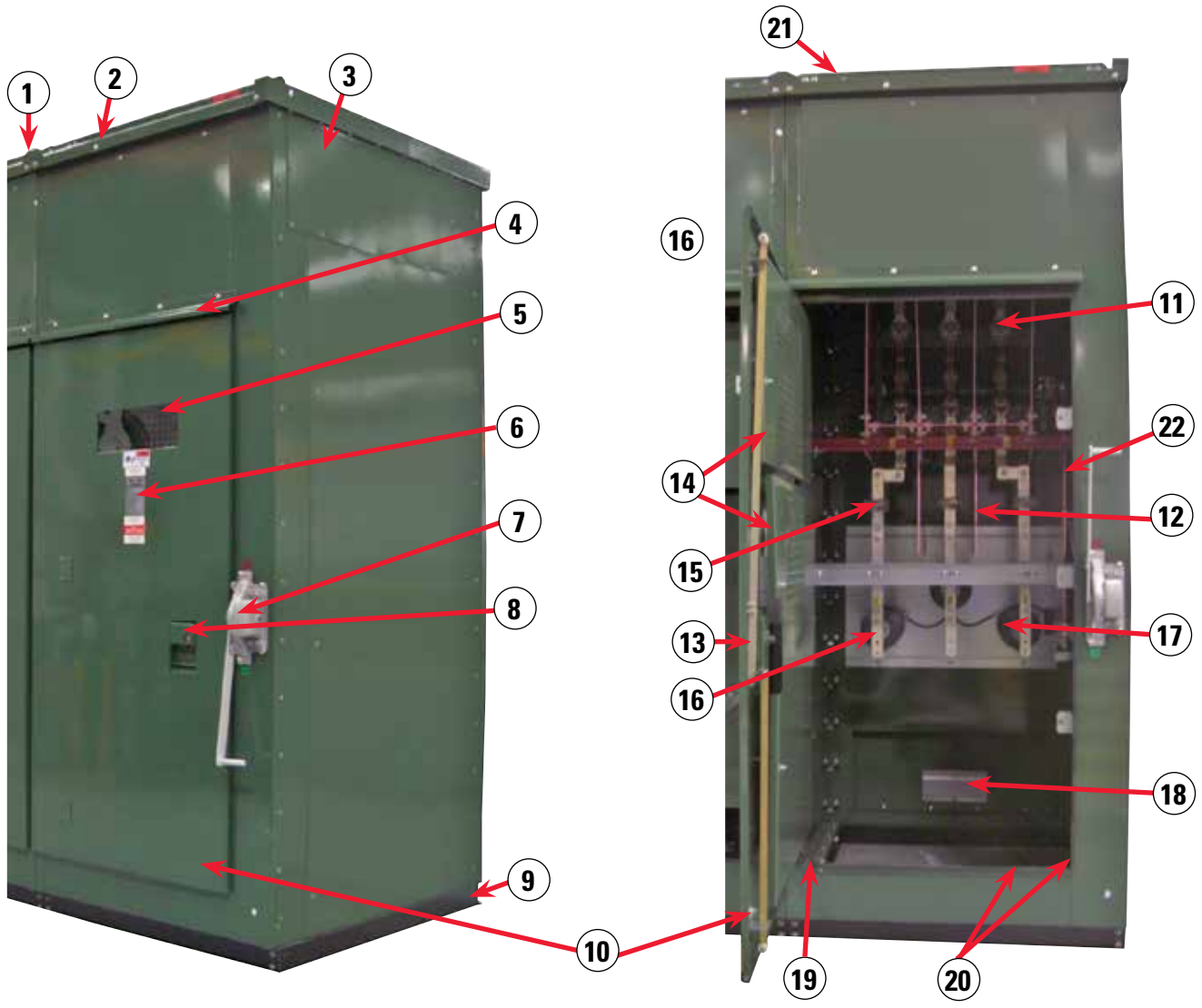


Figure 2. Incoming line bay features Federal Pacific's Auto-jet® II Load-Interrupter Switch, which utilizes a puffer-type interrupter with its unsurpassed load-switching capability and three-time duty-cycle fault closing ratings. The serving utility maintains access control to the incoming line bay (which does not include a mechanical door interlock) and the metering bay.

Features in Incoming Bay:

- 1. Roof caps cover all openings between bays
- 2. Outdoor roof has deep bends to overlap enclosure
- 3. Removable cover plate at each end for future bus extension
- 4. Rain shield prevents moisture from falling directly on top edge of door and door-opening flange
- 5. Clear polycarbonate window allows inspection of interior without opening the door
- 6. Nameplate and external hazard alerting signs and labels
- 7. Heavy cast-aluminum manual handle has provisions for key interlocks and can be padlocked open or closed
- 8. Optional flush, padlockable stainless-steel door handle with pentahead security bolt and overhang to shield the padlock shackle
- 9. Optional heavy coal-tar coating on channel base provides additional protection from any moisture accumulating on the pad at the bottom of the enclosure; for moisture abatement in outdoor units a thermostat controls the heater (not visible) in each bay
- 10. Sturdy doors of 11-gauge steel with formed edges for added rigidity
- 11. Federal Pacific Auto-jet® II features a puffer-type interrupter that directs air into the arc, at increased pressure, to aid in cooling and extinguishing the arc. Puffer-type interrupters do not depend on consumable materials that erode away to generate gases necessary for circuit interruption and utilize only air so there are no hazardous gases, such as SF6, to contaminate the environment or require any special handling
- 12. Red GPO3 NEMA-Grade fiberglass provides insulation and isolation between phases and to ground

Features in Incoming Bay - continued:

13. Door is secured by three-point door latches; multiple sets of stainless-steel hinges and hinge pins ensure smooth operation
14. Separate perforated screens over switch section and termination section
15. Ground studs on incoming bus sections
16. 600-amp silver-flashed copper main bus and ground bus throughout unit
17. 18kV Intermediate Class surge arresters on incoming lines
18. Louvers with backing covers and stainless-steel screens
19. Manual wind brace automatically sets door stop position
20. Gasket around complete door opening on outdoor bays
21. Lifting brackets span full width of each bay at front and back
22. Mechanical door interlock to prevent access to interior of incoming line bay has not been included at the request of the serving utility, which maintains access control to the incoming and metering bays.

Metering Section



Figure 3. Open door view of metering bay showing (at left) a hinged protective screen at top section over current transformers and a hinged- panel with a plywood section for meters and controls to be installed by the utility. The perforated screen allows viewing the CTs without opening the screen. With the screen open (in photo at right), the revenue metering, outdoor-style, current transformers are completely visible for closer inspection.



Figure 4. Close up view of compartment containing current transformers shows (1) bus interconnections (2), grounding provisions on each CT terminal, and (3) interconnecting ground cable that runs to compartment ground pad. CT secondary wiring is isolated in conduit and connects to a terminal block with shorting pins, which is located on the side wall of the enclosure. CTs were provided by the customer and installed and wired by Federal Pacific.

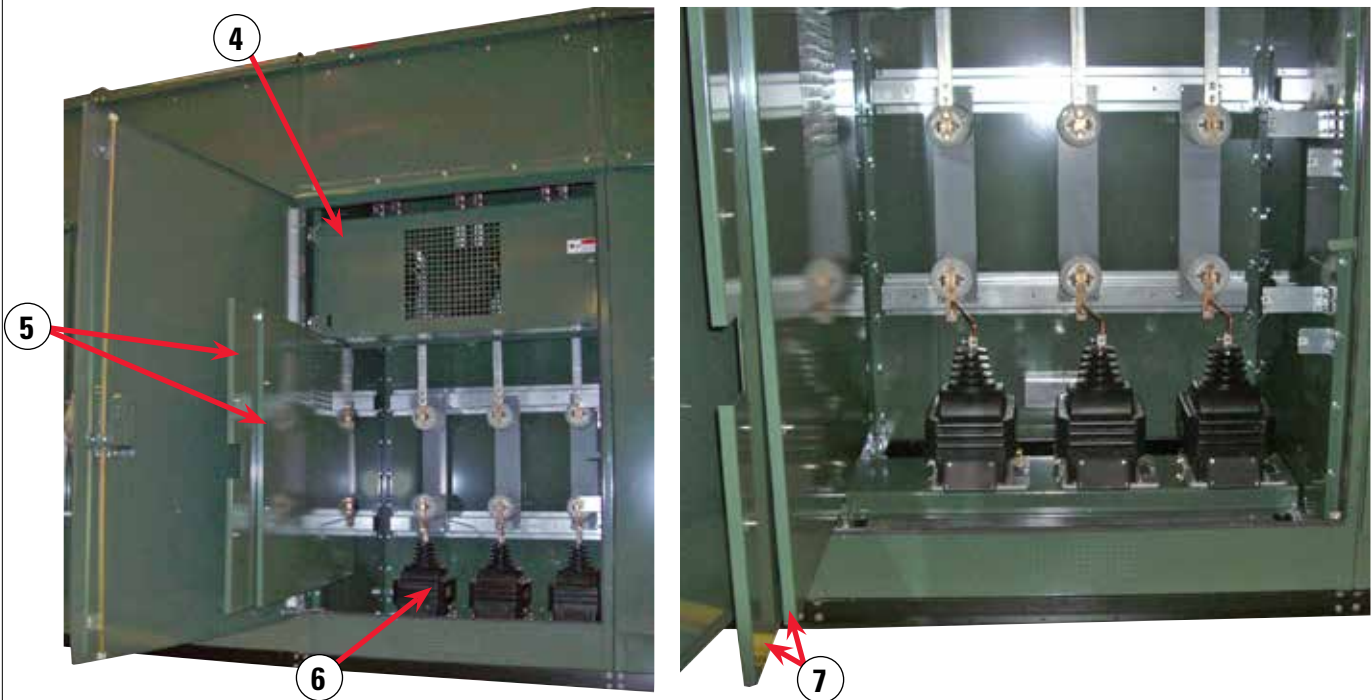


Figure 5. Open door view at left shows the metering compartment with the (4) screen closed over the current transformers and (5) the hinged barrier and screen open to expose (6) the fused voltage transformers. Note also that there is a separate hinged screen behind the hinged meter panel. This allows access to the meters while still maintaining a bolted barrier to the high-voltage section and there are perforations in the inner barrier to allow viewing the VTs without opening the screen. The view at right provides a closer view of the fused voltage transformers and shows (7) the edges of the two covering barriers. Secondary connections from the VTs are isolated in metal sheathing and are also wired to a terminal block on the left side wall of the enclosure (not visible). VTs were provided by the customer and installed and wired by Federal Pacific.

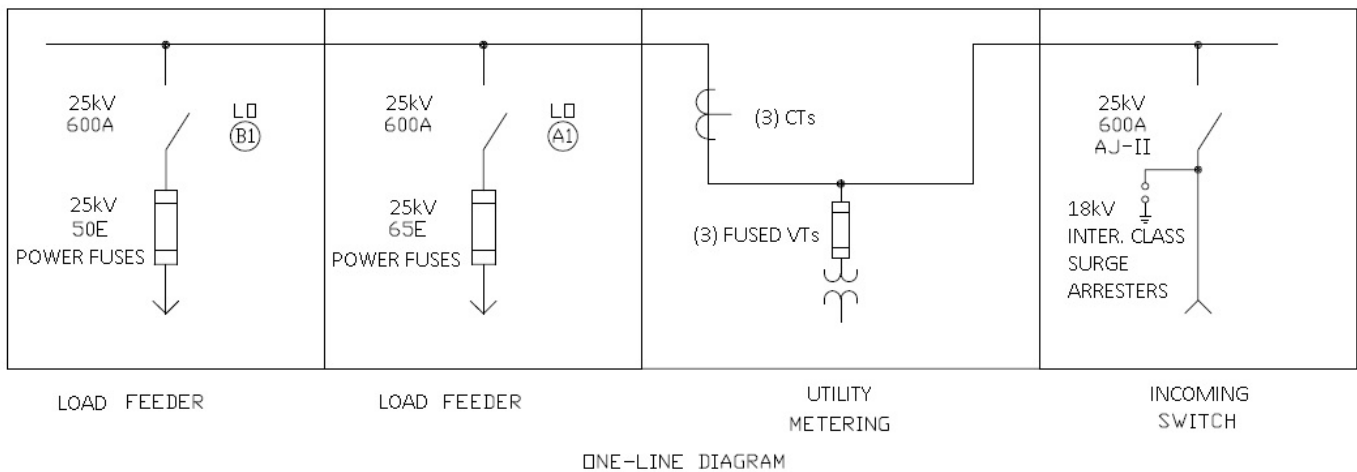
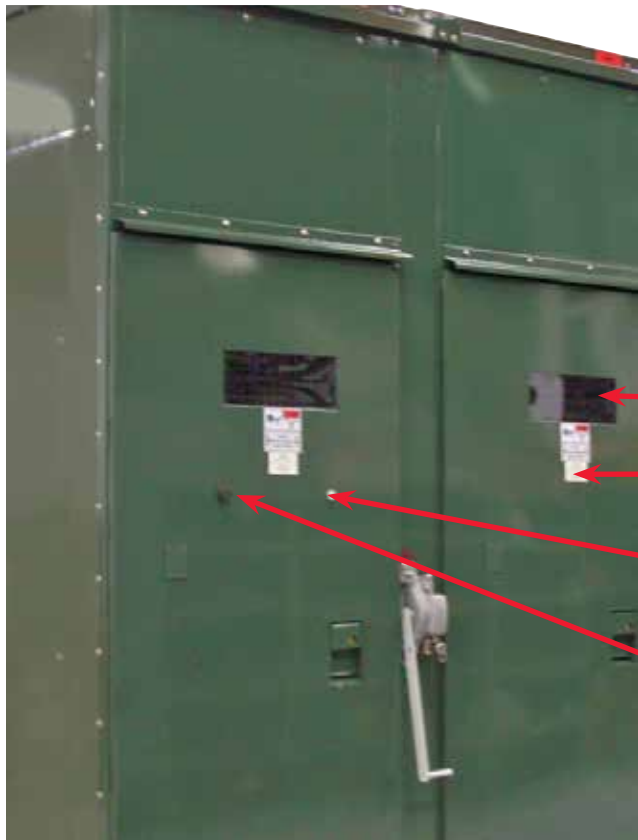


Figure 6. The one-line diagram of the 4-Bay Lineup of 25kV Outdoor Federal Pacific Metal-Enclosed Switchgear is illustrated above. Interlocks on the Load-Feeder Switches are (a) coordinated with downstream equipment requiring the switches to be open before access is gained to the downstream equipment and (b) coordination with a back-up power source in the event the metering transformers need to be isolated.



Features in Feeder Bays

1. Clear polycarbonate windows with interior perforated screens allow viewing of switch position without opening the door
2. Exterior hazard alerting signs on doors:
 Danger High-Voltage Inside Bay
 Fuses May Be Energized in Any Position
 Feeder Load-Break Switch and Fuses
3. Lamp illuminates on push-to-test of pushbutton
4. Pushbutton operates adjacent indicator lamp – allows testing the heater circuit to verify that it is energized. Power to the heater circuit is supplied from an external control-power source

Figure 7. The two feeder bays are pictured above. The end bay includes a pushbutton and indicator light to allow patrol of the switchgear to verify that the heater circuit is operational.

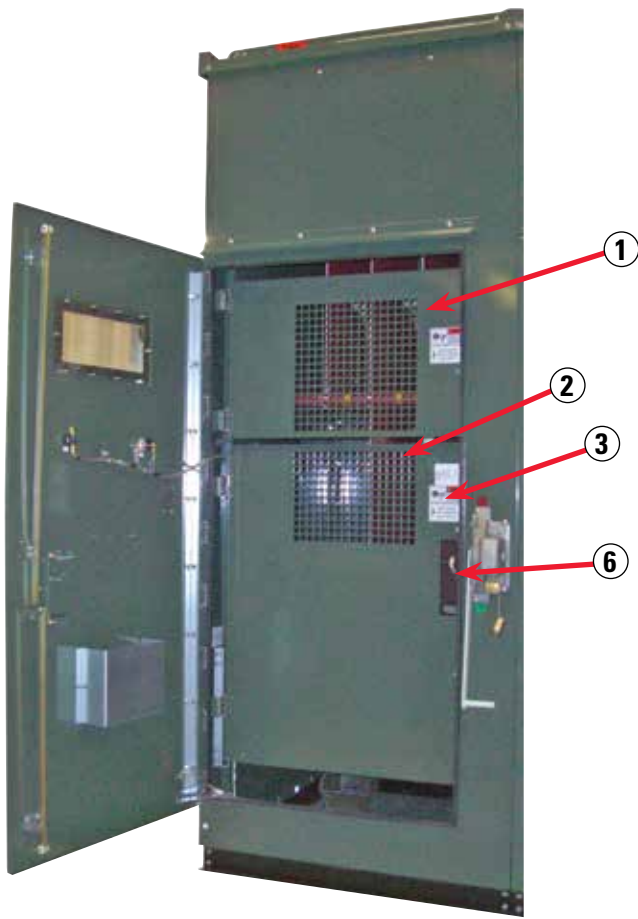


Figure 8. Feeder bays include a split-screen arrangement that allows access to fuses while blocking access to bus at top of bay that may be energized.

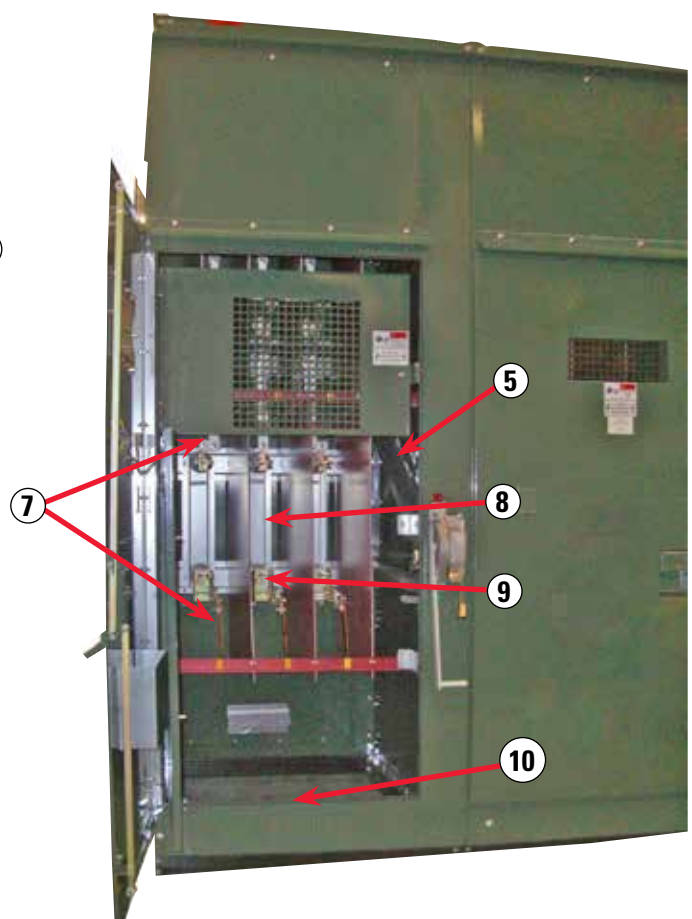


Figure 9. Mechanical interlock on feeder bays prevent access to interior until switch is open. With switch open and bottom screen open, access to fuses (not installed) is readily achieved using appropriate fuse-handling tools.

Features in Feeder Bays

1. Separate perforated screen at top of door opening in feeder bays blocks exposure to energized bus at top of enclosure when switch is open
2. Separate perforated screen at bottom of door opening in feeder bays hinges open to allow access to fuses independent of top screen over switch section
3. Hazard alerting danger label on interior screens
4. Barriers between switch poles provide isolation between phases and to enclosure
5. High-strength chain coupled operating handle to the switch operating shaft and includes a turnbuckle that is tightened and secured in position at the factory so no future maintenance or adjustment is required
6. Mechanical interlock on doors of feeder bays prevent access to the interior until the switch is open
7. Ground rods on both sides of fuses plus on the enclosure ground bus (not shown) allow installation of grounding cables to support maintenance requirements to test for voltage and ground before performing any work inside the bay
8. Barriers between fuse phases provide isolation between phase and to enclosure
9. Disconnect style fuse mounting (fuses not installed) allow easy opening and removal of fuses with appropriate fuse handling tools
10. Continuous silver-flashed copper ground bus throughout the switchgear assembly (not visible)
11. Key interlock on switch operating handle locks switch open — allows coordination with downstream devices

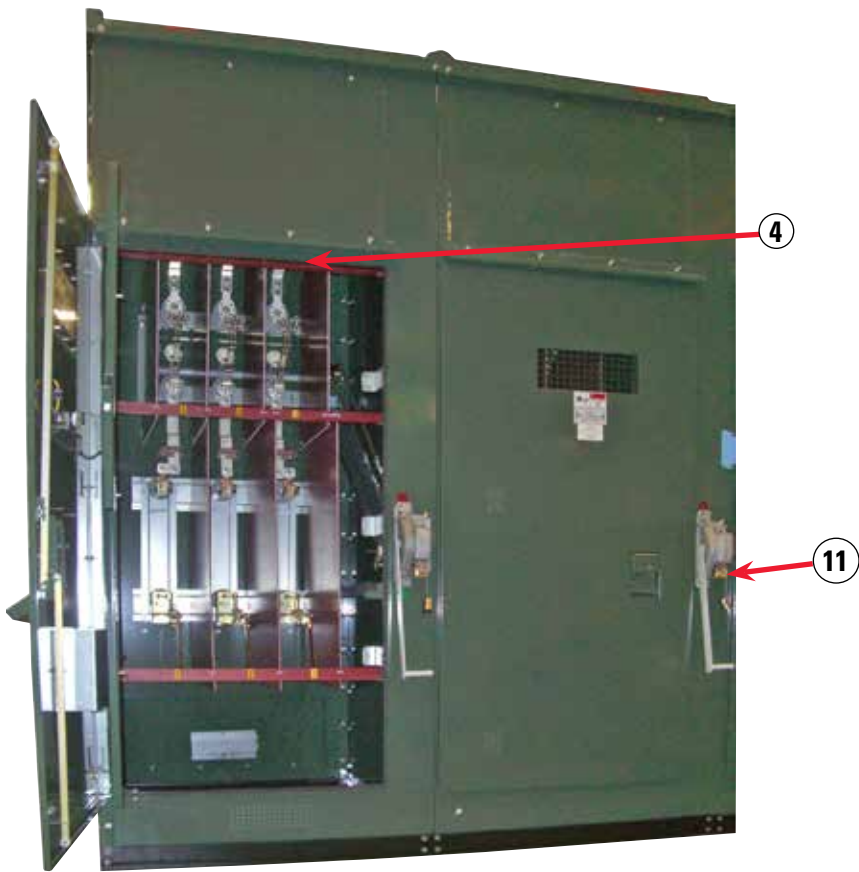


Figure 10. Key interlock on operating handle of each feeder switch allows switch to be interlocked open. The key is then removable and can be taken to coordinate access with a downstream device, preventing access to or operation of the downstream device until the upstream switch is open.

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