

At Federal Pacific, Combining Metering, Switchgear, and Fusing in an Economical and Compact Pad-Mounted Unit is a “Walk in the Park”



Figure 1. Air-insulated 15.5kV 6-compartment dead-front pad-mounted switchgear unit provides a compact, multi-functional, front-end metering installation for this overhead to underground conversion project, replacing an obsolete and unsightly overhead metering installation. The coating system on the switchgear unit provides long-term environmental protection, while the dark-green color allows the pad-mounted switchgear to blend unobtrusively into the state park setting. This type of pad-mounted metering is ideal for any application where primary metering of bulk power is required, such as at factories, commercial centers, business parks, and, in this application, recreational areas.

As part of a program to upgrade the infrastructure and electrical systems in a northeastern U. S. state park, Federal Pacific was selected to supply several switchgear units for an overhead-to-underground electrical facility conversion, including the dead-front pad-mounted metering switchgear unit featured in this bulletin.

This air-insulated dead-front metering switchgear unit is being used to replace an overhead metering and service entrance disconnect installation, originally spanning two poles, with one compact pad-mounted unit. This dead-front pad-mounted design minimizes the exposure of operating personnel to energized parts, while allowing operation and maintenance at ground level. At the same

time, reliability is increased by minimizing the exposure of energized parts to vegetation, animals, storm damage, and other environmental factors encountered in pole-mounted applications.

The use of an air-insulated design is an environmentally-friendly alternative to liquid-filled or SF₆ gas insulated designs, eliminating the need to inspect and maintain the dielectric medium, as well as avoiding the record-keeping and/or regulatory issues associated with releases of dielectric liquids or SF₆ into the environment.

The dead-front design eliminates the exposed medium-voltage connections typically encountered in overhead installations and in live-front pad-mounted switchgear designs. Dead-front pad-mounted installations greatly

reduce exposure of components energized at medium voltage to insects, animals, and vegetation. By reducing these exposures, positive impacts on switchgear and system reliability can be achieved, resulting in increased customer satisfaction.

The Federal Pacific dead-front pad-mounted metering design features a welded steel enclosure that meets the enclosure integrity, security requirements, and coating systems performance criteria requirements of IEEE C57.12.28. In addition to the standard pad-mount green (Munsell notation 7GY3 3.29/1.6) specified in the standard, other colors are optionally available by customer request.

600-ampere bushings and 200-ampere bushing wells manufactured by Federal Pacific's sister company, Line Power, are provided in the cable compartments. Line Power also manufactures the insulators used on switches, fuse mountings and for bus supports in the medium voltage compartment. These terminating and support components are composed of cycloaliphatic materials, and the bushings and bushing wells meet the requirements of the IEEE-386 standard for separable connectors.

In addition, every bushing, bushing well, and insulator is X-rayed to make certain that no internal voids or other defects exist to absolutely confirm the dielectric integrity of the components. Furthermore, every unit of Federal Pacific pad-mounted switchgear is both resistance tested and high potential tested, confirming dielectric performance of the completed pad-mounted switchgear assembly.

Stainless steel ground pads are located in compartments 1, 3, 4, and 6, at the four corners of the overall metering switchgear, and include attached copper ground rods conveniently located in the front of each of the cable termination compartments.

The customer-supplied metering potential transformers (PTs) and current transformers (CTs) will be mounted within the medium-voltage chamber, protected from the environment. Removable steel panels are provided in Compartment 2 and Compartment 5 for easy access to the PTs and CTs for installation, inspection and any maintenance which may be required. An additional access panel is provided in Compartment 6.

CIRCUIT DIAGRAM

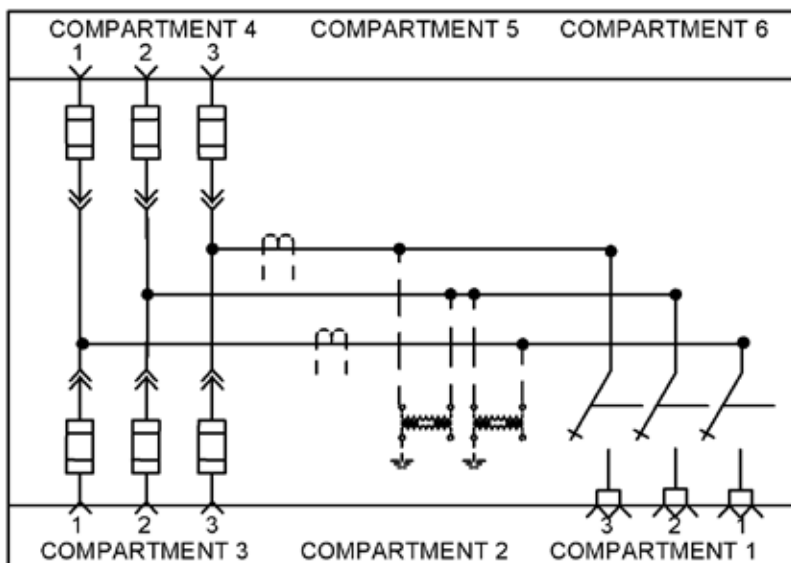


Figure 2. One-line schematic diagram showing the overall layout of the 600-ampere Auto-jet[®] Load-Interrupter Switch, PTs, CTs, and two three-phase fuse positions in the switchgear.



Figure 3. Incoming switch termination compartment, featuring a wide mar-resistant polycarbonate viewing window, allows direct view of switch blade position. Clearly visible open/closed labels and supplemental switch position indicator help to orient and identify blade position. In addition to the standard 600-ampere bushings, customer requested optional 200-ampere bushing wells (one in parallel with each bushing) to provide convenient locations for grounding or installing surge arresters.



Figure 4. View of the stainless-steel switch-operating handle pocket. The bracket shown over the hex switch-operating shaft is an example of the “-K2” option, which allows the switch to be locked into the open or closed position when the bracket is padlocked across the switch-operating shaft. To the right of the switch-operating shaft is an example of the “-K3” key interlock option, which prevents opening of the fuse termination compartment doors unless the loadbreak switch is in the open position.



Figure 5. The access panel of Compartment 6 is shown removed, providing views of, and access to, the internal bus and the incoming 600-ampere loadbreak switch in the medium voltage compartment.



Figure 6. The access panel of Compartment 5 is shown removed, providing access to the metering bay. In this case, the customer has elected to provide and install their own PTs and CTs, therefore, the metering PTs and CTs are not shown in this illustration.



Figure 7. This is a close-up view of the interior of Compartment 5 through the panel opening. The steel support plates visible in the bus at the bottom of the switchgear metering unit are temporary bus supports which will be removed and replaced by the bar-type CTs, to be installed by the customer.



Figure 8. View of load fuse-termination compartment. Fuse panels hinge at bottom, providing full isolation at both sides of the fuse assembly when in open position, while allowing ground and drain wires to be maintained, and insulating protective caps remain installed, during the fuse panel operation sequence. Dual viewing window in each hinged fuse panel allow viewing of the blown-fuse indicator target and fuse size information. The keyed portion of the fuse-termination compartment interlock is on the door, while the fixed portion of the interlock is at the top of the compartment door opening, as shown.

