Trayer SWITCHGEAR

Grid Smart. Grid Tough.

PNP

for Spot Networks

- Self-Contained Automatic Network Protection
- 5kV, 15kV, and 25kV Ratings
- Padmount and Submersible Configurations
- Drop-in Replacement to Upgrade Automatic Transfer Switches
- Welded 304 Stainless Steel, Storm-Hardened Designs
- SEL Grid Protection Relay controls

Trayer Engineering's Primary Network Protector (PNP) for Spot Networks is designed to assure cost-effective and reliable service to critical and sensitive loads requiring uninterruptable power delivery. Under normal operating conditions, the spot network is simultaneously supplied by two independent feeders. This creates a very "stiff" power source that significantly reduces levels of voltage sag, voltage flicker and other power quality concerns. Should a fault be detected on either of the feeds, a vacuum fault interrupter (VFI) isolates the load from the fault while seamlessly providing uninterrupted power to the load. When the fault condition is cleared, the unit automatically reverts to its dual-feed operation.

Trayer PNP Switchgear are fully self-contained units available in padmount or submersible designs. The units are similar in configuration to conventional automatic transfer switchgear (ATS). What distinguishes the PNP from a conventional ATS is the use of vacuum fault interrupters instead of conventional load break switches and the use of grid-protection relaying. However, the Trayer PNP can also be field-programmed to operate as a conventional ATS.

Trayer Engineering is the recognized leader in tailoring equipment to the specific demands of customers. Trayer switchgear products are distinguished by their rugged, fully sealed and welded 304 stainless steel construction built for decades of trouble-free operation. These units also feature the latest in advanced electronic controls.

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Spot Network Protection

Power companies rely on networked systems to provide uninterrupted power delivery to critical loads. Spot networks are used to assure continuous power where interruptions must be avoided. Examples include: sports venue illumination where HID lighting restrike time can cause extended delays; or, critical loads in hospitals and data centers where false starts of generator sets are expensive and disruptive, and critical urban loads.

Networked systems rely on relay protection to interrupt faults and reconfigure the system so that power to the critical load is not interrupted. Directional overcurrent relaying is used for "spot network" locations utilizing dual feeders.

The Trayer PNP combines high-performance VFI switchgear with integrated controls to create a completely self-contained, automatic network protection system that is ideal for primary spot networks. The PNP is compatible with standard feeder configurations and does not require any special system wiring, relaying or external communications. In fact, the PNP can be used as a drop-in replacement to upgrade from existing automatic transfer switchgear. An ATS doesn't begin a transfer operation until an outage occurs, guaranteeing a temporary power interruption. With the PNP, the critical load is never without power.

PNP Operation

The connections to the PNP are similar to a standard ATS that is connected to two sources so that the load can be fed from either source. An ATS uses vacuum switches and electronic controls to change to the alternate source when a fault occurs on the primary feeder. In a PNP, the vacuum switches are replaced with vacuum fault interrupters and the two sources are tied together so that the load is normally fed from both sources simultaneously. The operation of the PNP is as follows:

Figure 1 illustrates a typical spot network configuration. Two primary substations feed the PNP. These two sources are tied together (networked) within the unit via two VFIs that are normally closed. The load is now shared by the two primary substations, A and B.

In Figure 2, feeder B experiences a fault. The PNP control senses the fault in both magnitude and the change in current direction (due to the contribution of fault current from feeder A). The unit's control then opens VFI B to prevent feeder A from feeding the fault and thus isolating the fault from the PNP. The substation B circuit breaker also opens, isolating the faulted feeder section. The critical load remains continuously supplied from feeder A and does not experience an outage.

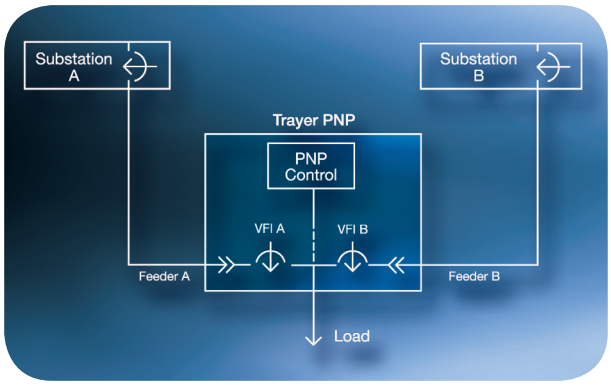

Figure 1: Standard Operating Configuration

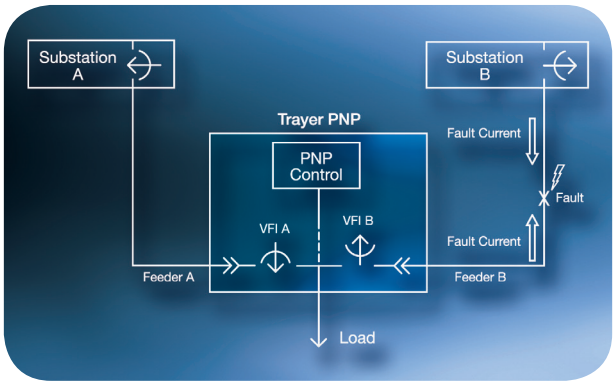

Figure 2: Fault Condition

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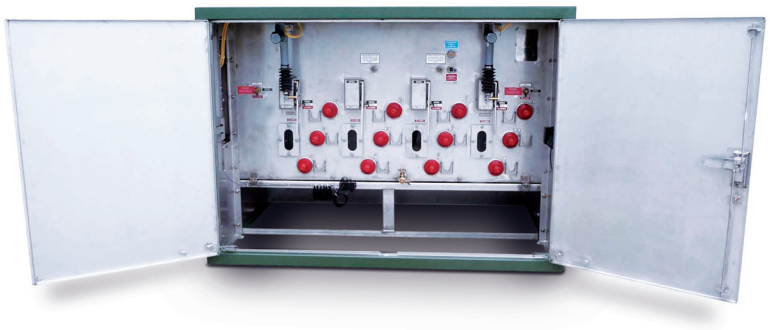
Padmount and Submersible Switchgear

Trayer has been manufacturing switchgear for over 50 years. Trayer designs are built with 304 stainless steel, eliminating corrosion.

Padmount designs are available as either a single side access or a double side access unit.



Trayer Padmount Features

- Single or double-sided designs available
- Single-sided design:
  - allows full operation from one side
  - allows operation next to a wall or a fence
- Compact designs reduce space required to operate equipment
- Ideally suited as retrofit equipment for existing switchgear
- Lower profile design options available
- Built with SEL relays for auto transfer and over current protection
- Versatile design allows customers to select the RTU of choice for SCADA applications

Trayer Submersible Features

- Trayer submersible switchgear, stand, and motorized operators can be disassembled and passed through manhole openings and reconstructed inside the vault
- Trayer offers a choice of motorized operators, either linear actuators or rugged Motopaks for submersible applications
- Multiple stand options allow for top or side facing bushings
- Hot dipped galvanized or 304 stainless steel stands are available
- Round or rectangular footprints available

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The Trayer Way

With 50 years of industry experience in medium voltage switching and fault interruption, Trayer has a sterling reputation for designing and building the toughest and smartest switchgear on the market. Trayer is a pioneer in vacuum breaker technology and continues to lead the industry with designs that meet the demands for highly reliable electrical grids. Plus, Trayer gear is noted for safety and ease-of-operation by linemen. That's why Trayer switchgear is specified by utilities around the globe. By combining excellent engineering with high quality manufacturing, backed up with a solid commitment to customer service, you can depend on Trayer Switchgear to perform for decade after decade.

Engineering Expertise. Using state-of-the-art CAD and software tools, Trayer engineers can design and model switchgear designs for plug-and-play replacement of industry standard configurations.

Quality and Craftsmanship. Trayer's advanced U.S. manufacturing facility utilizes the latest in fabrication and manufacturing technology. We take pride in the skill of our craftsmen who are experts in electrical, welding, electrical testing, and associated disciplines.

Customer Support. From the initial specification of switchgear through delivery, Trayer sales engineers will assist you through all stages of your switchgear project. From our extensive library of designs we can customize switchgear rapidly to your specific application.

Trayer PNP for Spot Networks Operating Ratings

EACH SOURCE BREAKER (VFI)	5/15 kV	25 kV
BIL Across Open Contacts (kV)	95	125
BIL Phase-to-Phase (kV)	95	125
BIL Phase-to-Ground (Bushing Dependent) (kV)	95	125
Continuous Current (Bushing Dependent) (Amps)	200/600	200/600
Interrupting Capacity (Symmetrical Amps)	12,500	12,500

PNP Fault Current Guidelines

Fault current rating must be considered when specifying a PNP.
The PNP tap protection shall be capable of interrupting the available tap fault current, calculated as:

Source 1 available fault current + Source 2 available fault current = Tap available fault current.

Refer to the following tables:

VFI Tap(s)	5kV	15kV	25kV
Maximum available Tap fault current	12.5kA RMS	12.5kA RMS	12.5kA RMS

Specify Current Limiting fuses for Tap protection if available Tap fault current exceeds 12.5kA RMS:

CL fuse Tap(s)	5kV	15kV	25kV
Maximum available Tap fault current	25kA RMS	25kA RMS	25kA RMS

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