



ADVANCED POWER
TECHNOLOGIES

208V-480V Generator Disconnect, Output Protection Switchboard



GenProtectL-Series Low Voltage Switchboard & Switchgear Solutions Brochure

www.appt-power.com
1501 Veterans Memorial Pkwy E
Lafayette, IN 47905
(765) 446-2343

**SAFE SMART SERVICEABLE SWITCHGEAR &
ENGINEERED POWER SYSTEM SOLUTIONS**



ALN: 530 Rev. 04

Generator Output Protection



Figure 1: 1.3MW, 480V, 2000A Generator Disconnect & Output Protection Molded Case Circuit Breaker NEMA 1 Enclosure with Window Kit



Figure 2: GenProtectL 2MW, 480V, 3000A Generator Output Protection w/ 1600A Feeder Sections NEMA 3R



Figure 3: 2MW, 480V, 2500A Generator Output Protection Insulated Case Circuit Breaker NEMA 1 Enclosure Floor Standing Panel Door Open Side View

Floor Standing Output & Distribution Protection

- ⊙ UL® 891 Labeled and Listed
- ⊙ Application Voltages:
 - 415V-480V, 600V, 208V (3Ø), 3-Wire/4-Wire
 - 120V/240V (2Ø)
- ⊙ Enclosure Standard Features:
 - Full Removable Front Sheet
 - Powder coated ANSI 61 Gray Standard
- ⊙ Enclosure Options:
 - Full Hinged Front Door
 - Full Hinged Rear Door
 - Customer Specified/Custom Colors
- ⊙ Cable Connections from Generator:
 - Optional ($\geq 1200A$) circuit breaker lug terminations
- ⊙ Your Choice of Circuit Breakers:
 - UL® 489 or UL® 1066 Listed
 - Interrupting Rating:
 - 18kA – 200kA @ 480V_{AC}
 - Molded Case Circuit Breakers:
 - Available up to 3000A
 - 80% or 100% Rated
 - Fixed Mounted, Drawout, or Plug-In
- Insulated Case Circuit Breakers:
 - Available from 800A up to 4000A+
 - 3-Pole (standard) & 4-Pole (available)
 - Manually Operated
 - Electrically Operated with Motor Operator Add-on
 - 100% Rated
 - Fixed or Drawout Mounted
- ⊙ Circuit Breaker Trip Unit Options:
 - Basic Electronic
 - LI – Adjustable long time, instantaneous trip settings
 - LSI – Adjustable long & short time, instantaneous trip settings
 - LSIg – Adjustable long & short time, instantaneous trip settings, with ground fault trip settings
 - LSIA – Ground Fault Indication – Bell Alarm, No Trip
 - Power & Energy Metering Trip Unit
- ⊙ Optional Neutral CT
- ⊙ Breaker position Aux Contacts (“a” and “b”)
- ⊙ Shunt Trip
- ⊙ Pad-lockable

Distribution Protection



Figure 7: 1 MW, 480V, 1600A Generator Disconnect & Output Protection Molded Case Circuit Breaker with Front Removable Sheets



Figure 8: Remote Generator Start/Stop & Setpoints Panels



Figure 9: 500kW, 480V, 800A Generator Disconnect & Output Protection Insulated Case Circuit Breaker with Hinged T-hinged Front Door

Protection Equipment Options

- ⊙ Installation Location & Enclosure
 - Carbon Steel NEMA 1 Floor Standing
 - Front Sheet(s): Screw Removable Panel
 - Front Door(s): T-latch Front Door with the circuit breaker face thru the door
 - Your choice of cable entrance/exit locations
- ⊙ 4 Wire Systems: Neutral Busbar
 - 200%, 100%, 50% Rated
- ⊙ 3 Wire Systems: No Neutral
- ⊙ Optional: Line Side Common Generator Power Distribution Bus for multiple main circuit breakers for a single generator
- ⊙ Kirk Key Interlocking available to prevent inadvertent paralleling of two sources
- ⊙ Glastic or Metal Isolation Barriers Between Circuit Breakers Available Upon Request
- ⊙ Optional remote panel includes start and E-stop for control of generator adjustable setpoint parameters with touchscreen HMI to be mounted in a convenient & easy to access location
- ⊙ Each enclosure is manufactured to order based on the dimensions available in the generator house that it will be mounted in
- ⊙ NEC 695 Compliant Fire Pump Connection
 - Segregation & isolation from generator output/distribution protection circuit breakers
 - Fire pump overcurrent protection connects directly to the generator
- ⊙ Control Power
 - 12/24VDC from Engine starting batteries
 - 120VAC Customer Supplied

Paralleled Generator Protection



Figure 4: APT GenProtectL-Series with Multiple Paralleled Generators and Main Bus



Figure 5: Three (3) 750kW, 480V, 1200A Paralleled Generator Disconnect & Output Protection Insulated Case Circuit Breaker Lineup with Front Removable Sheets



Figure 6: 500kW, 480V, 800A Paralleled Generators Disconnect & Output Protection Insulated Case Circuit Breakers and load take-off

Protection for Multiple Paralleled Generators with Optional Distribution

- ⦿ The most powerful, all in one solution to your paralleled generator power distribution needs
- ⦿ This variant of the GenProtectL-Series can be custom configured to accommodate connection of any number of permanent generators with on board paralleling controls
- ⦿ With the option to connect paralleled generators via mechanical main lugs only to one large circuit breaker, or the flexibility in customization to provide a manually operated circuit breaker based disconnect for each generator to a common bus, it makes this the best solution to providing safe, protected power distribution no matter the system protection requirements
- ⦿ Available in NEMA 1 for integration into a generator enclosure or NEMA 3R for centralized outdoor mounting
- ⦿ NEC 2017 requires a method of Energy Reduction Maintenance Mode which adds cost to the overall system for operator safety. This feature is optional when used in conjunction with appropriate engine generator controller settings no matter the circuit breaker size to provide superior protection at an affordable price
- ⦿ Designed to fully support all paralleled generator controllers including
 - CAT EMCP 4.4
 - Cummins Power Command
 - Deep Sea
 - Woodward
 - And more!

Temporary Generator or Load Bank Connection

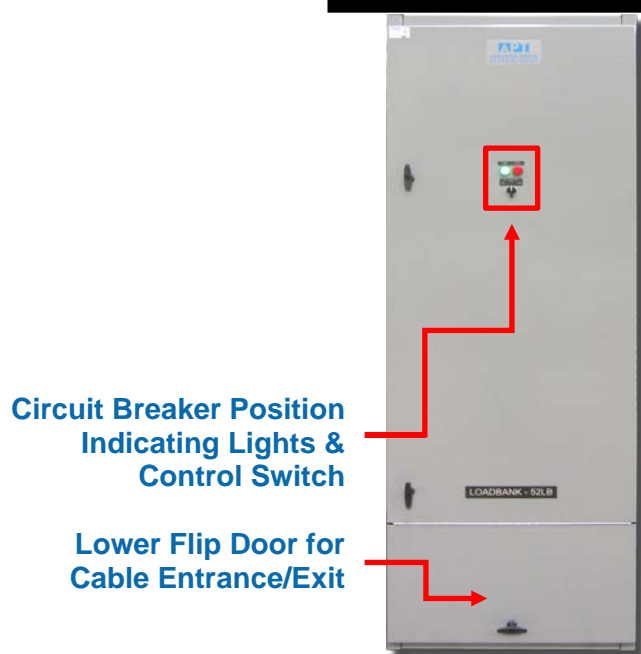


Figure 10: Quick Connect Section

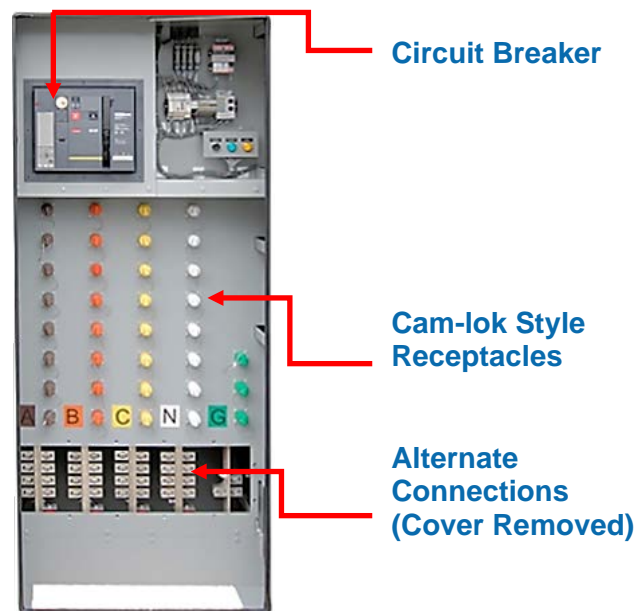


Figure 11: Inside GQC Section

Integrated Generator / Load Bank Quick Connection

- ⊙ Add the ability to connect load bank your gensets or add temporary power to your distribution system to provide power to your feeders via integrated Generator Quick Connection when permanent generator power is unavailable
- ⊙ Backup your ability to feed loads manually via temporary generator connection.
- ⊙ Per NEC 700.3, temporary generator connection applications require either mechanical or electrical interlocking of the power sources to safely prevent the inadvertent paralleling of the normal & emergency power sources:
 - Service Entrance Rated Manual Transfer Switchboard (two integrated keys)
 - Utility service entrance circuit breaker with mechanical key interlock
 - Temporary generator circuit breaker with mechanical key interlock
 - Temporary Generator Connection Only
 - External service main no temporary generator circuit breaker protection
 - One integrated mechanical key interlock, one ship loose with mechanical key interlock for installation on facility service main
- Multiple generators or feeders circuit breaker sections (multiple mechanical key interlocks, transfer block)
- ⊙ Operation sequence without the interlocking of sources is available for systems that achieve NEC 700.3 source interlocking externally
- ⊙ Load bank connection only applications
 - Easily connects a temporary load bank to a facility's permanent generator(s)
 - Utilizes female cam-lok type receptacles
 - Does not require the use of interlocking
 - Circuit breaker and monitoring options available
- ⊙ Integrated Generator & Load bank Quick Connection
 - Integrates male & female cam-loks into one unit for all your temporary connection needs in one location
 - Dual-purpose termination cabinet allows for safe and clean connection of a portable temporary generator or load bank for permanent generator load testing

Paralleled Generator Enclosure Drawing

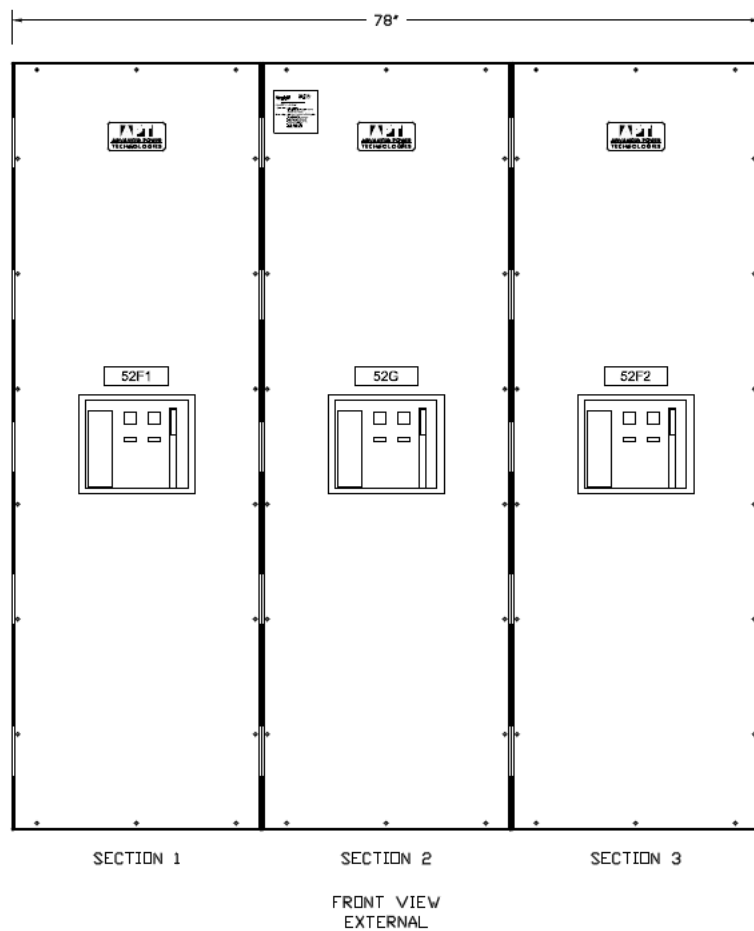
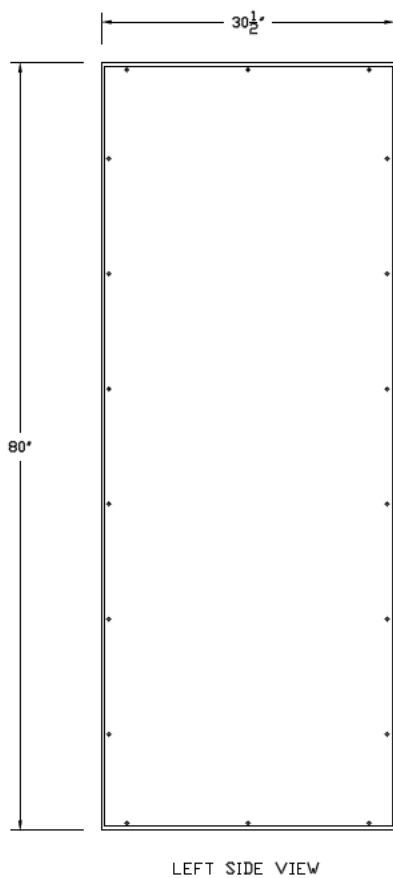
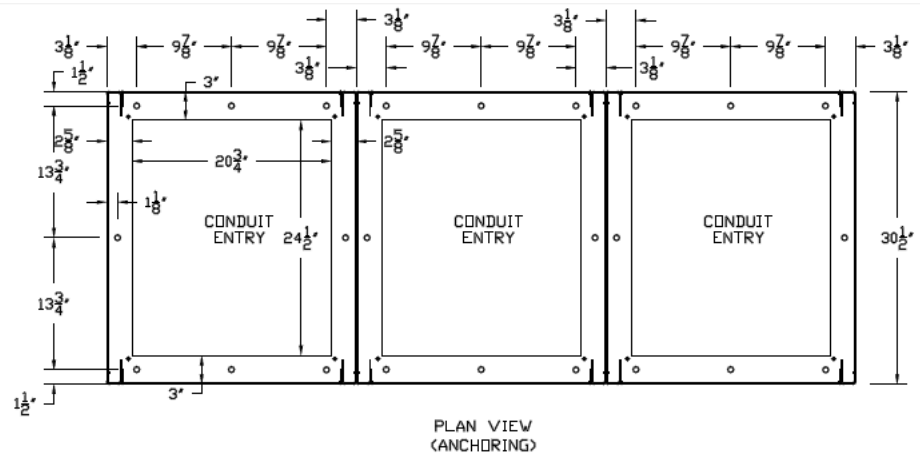


Figure 12: 800A – 3000A Three (3) Paralleled Generators Output Protection Breaker Standard Depth with Removable Sheets (1S)

Standard Depth Enclosure Drawing

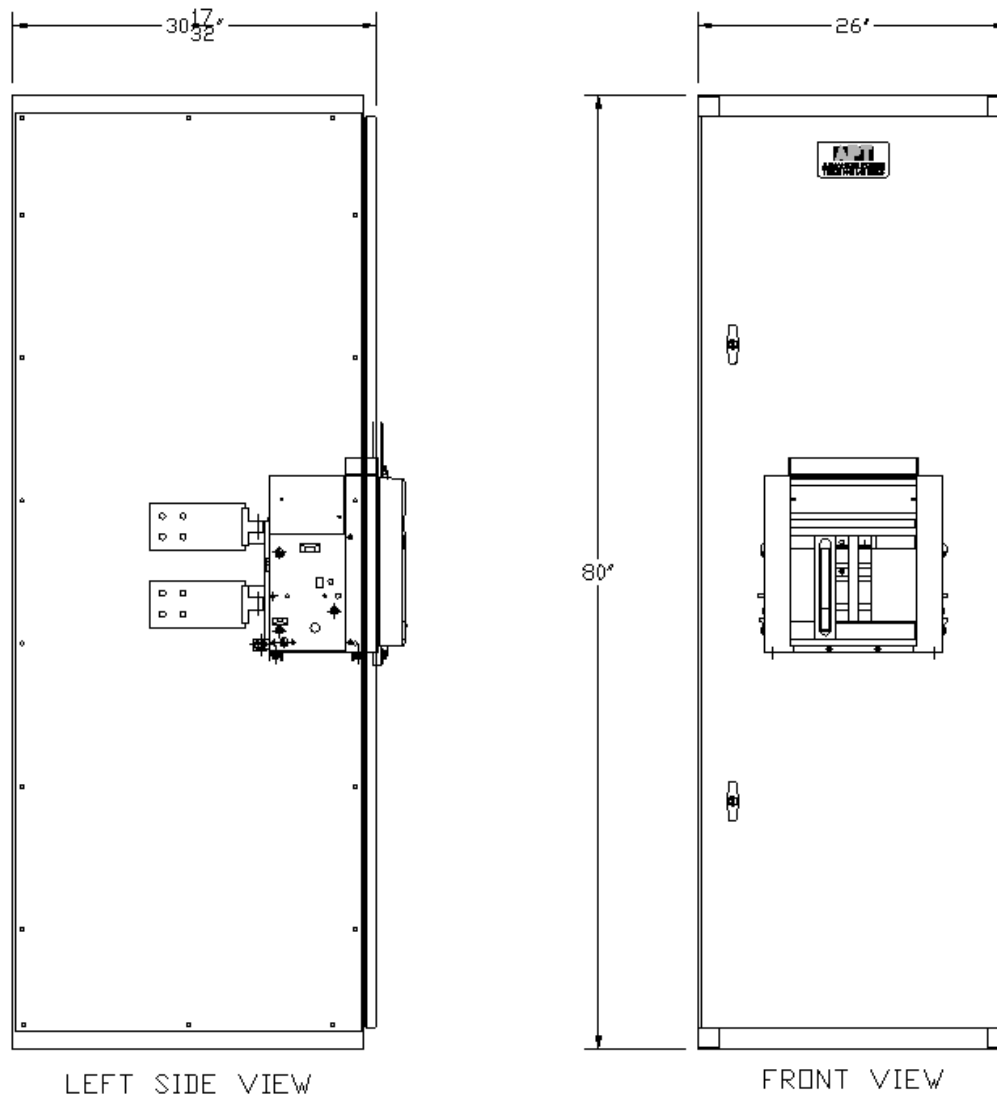


Figure 13: 800A – 3000A Generator Output Protection Breaker Standard Depth

Extra Depth Enclosure Drawing

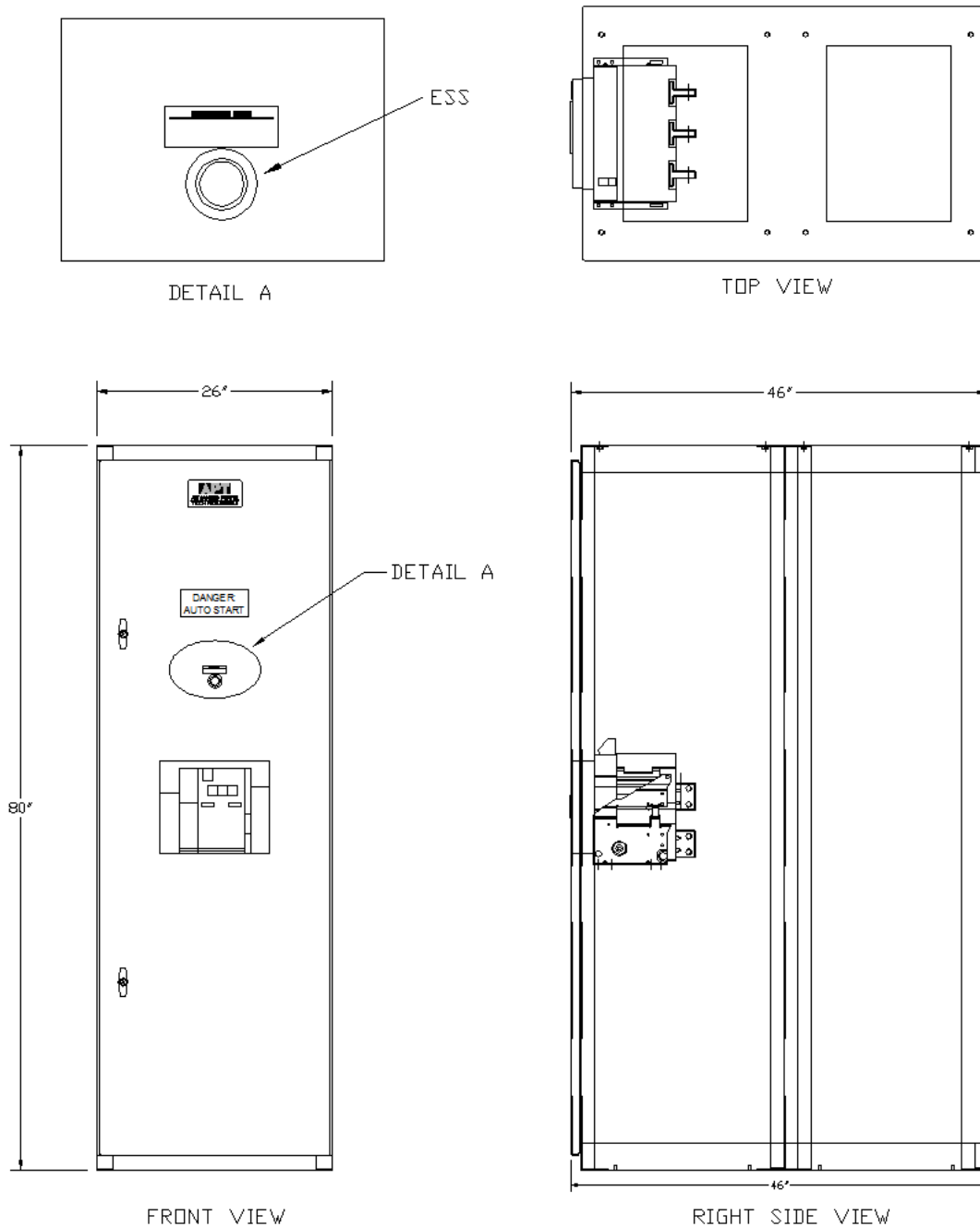
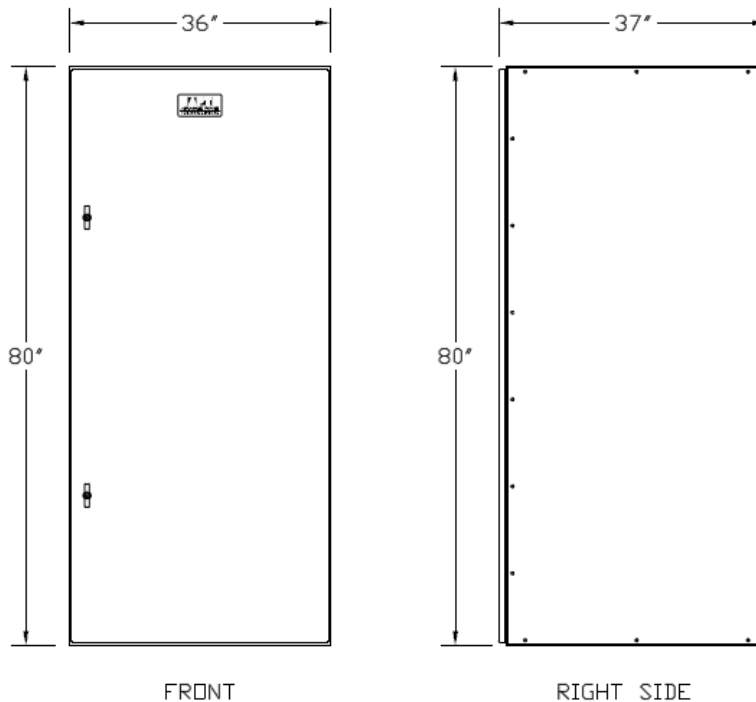
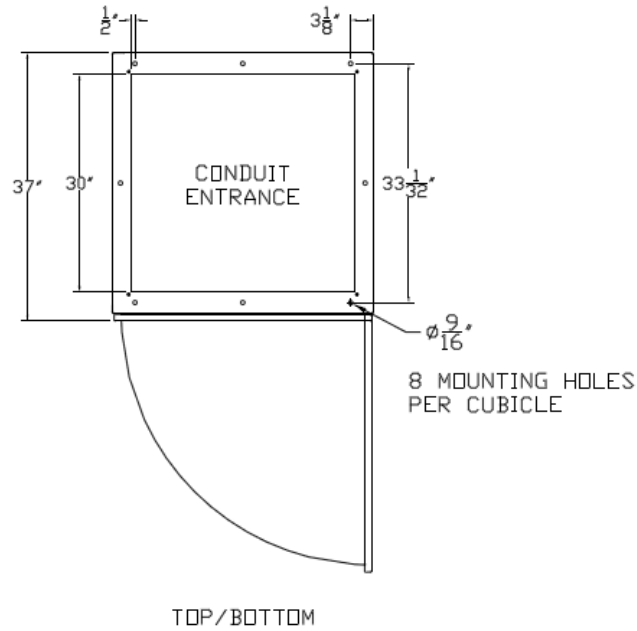


Figure 14: 800A – 3000A Generator Output Protection Breaker with Extra Depth Cabinet

> 3200A, 3-Pole Enclosure Drawing



EXTERNAL
VIEW
(1D) - NEMA 1 WITH FRONT DOOR

Figure 15: 4000A – 6000A One Generator Output Protection Breaker

> 3200A, 4-Pole Enclosure Drawings

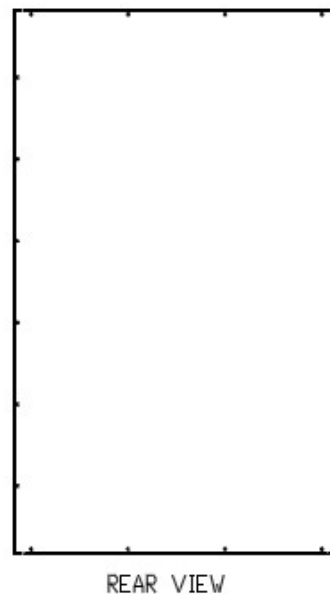
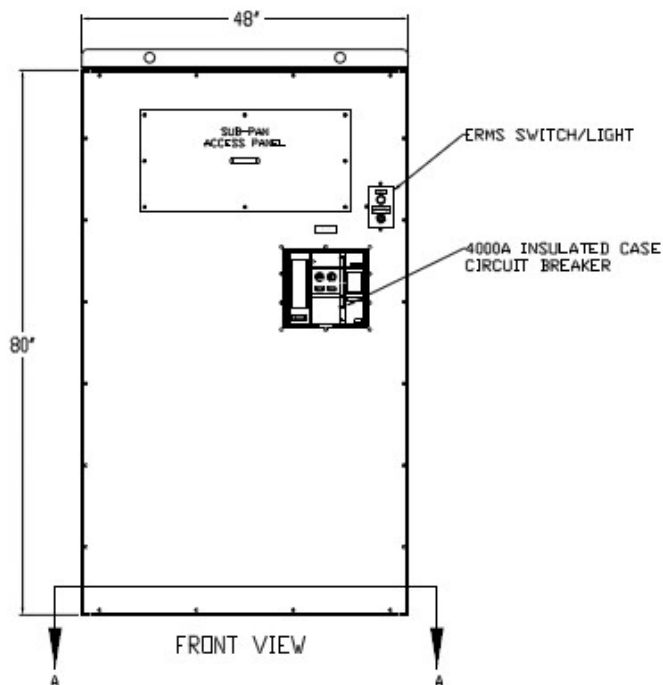
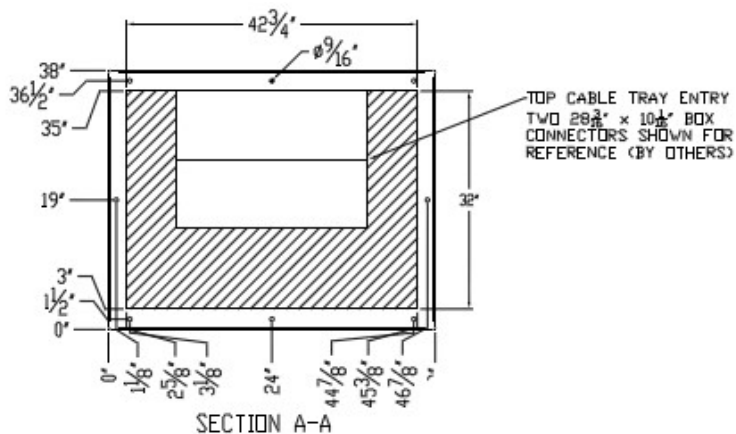


Figure 16: 4000A – 6000A Generator Output Protection Breaker w/ Top Entry & Bottom Exit

> 3200A, 4-Pole Enclosure Drawings

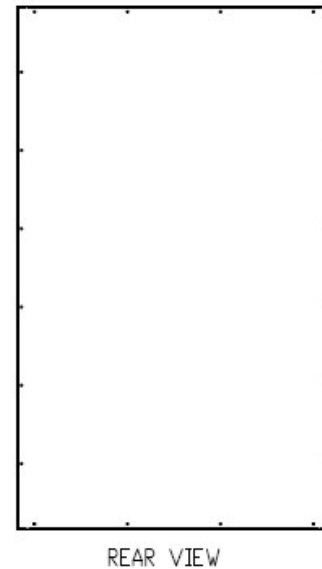
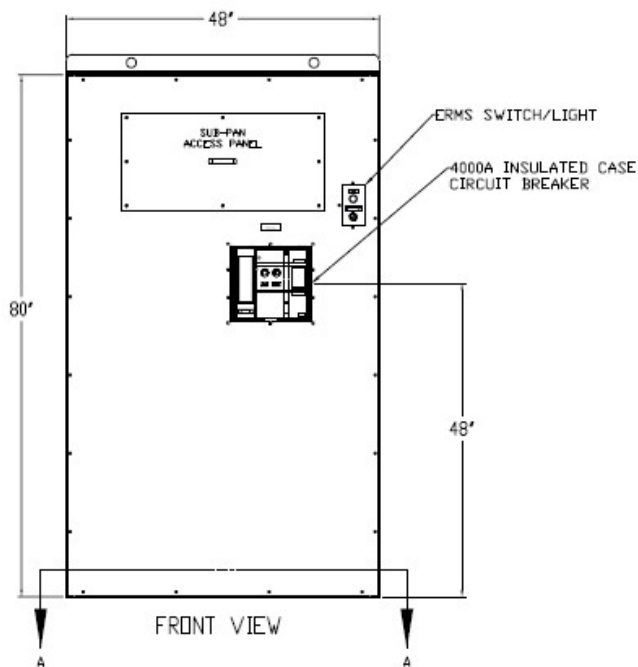
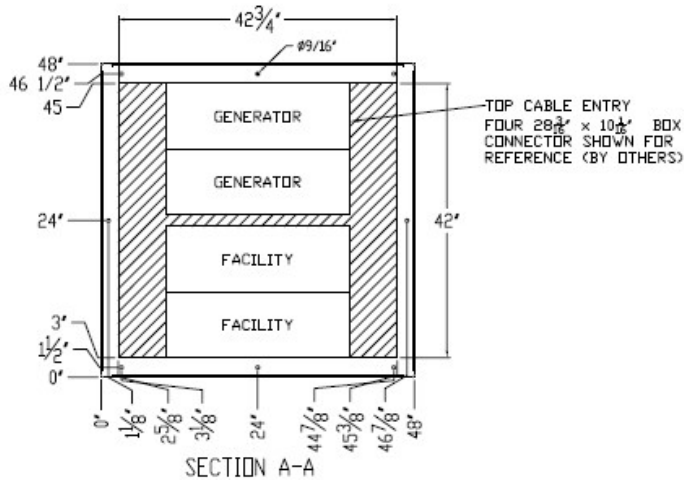


Figure 17: 4000A – 6000A Generator Output Protection Breaker w/ Top Entry & Top Exit (Extra Depth)

Typical GenProtectL Applications

Power Distribution Only



Figure 18: Single Generator Disconnect & Output Protection

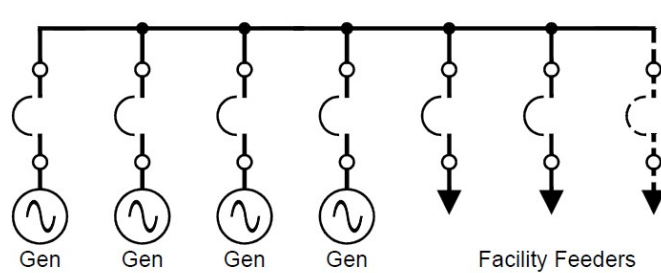


Figure 19: Multiple Paralleled Generator Disconnect & Output Distribution Protection

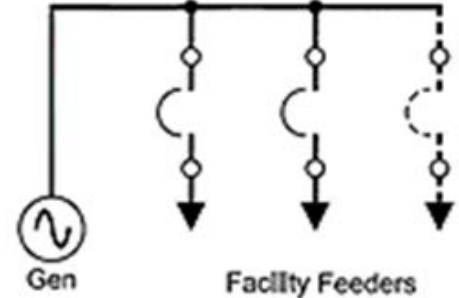


Figure 20: Single Generator Disconnect & Output Protection with Distribution Feeders

Power Distribution with Fire Pump Protection

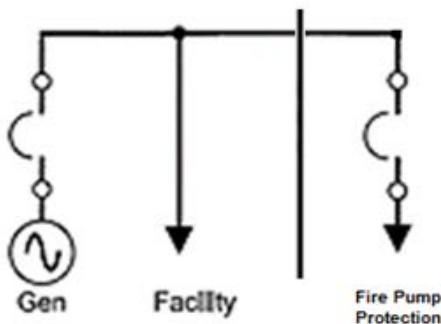


Figure 21: Single Generator Disconnect & Output Protection with Fire Pump Protection



Figure 22: Single Generator Disconnect/Output Protection with Distribution Feeders, & Fire Pump Protection

About Advanced Power Technologies



Advanced Power Technologies (APT) is on the cutting edge of the latest engineered power system smart technologies, as it relates to microgrid & storage management, renewable & conventional energy source deployment, demand peak shaving, and facility back-up and co-generation power systems. Located in the central United States and headquartered in Lafayette, Indiana with solutions development engineers around the country, APT provides domestic and international products and services to industry leading companies from around the world. APT engineers have decades of power system experience from working with some of the largest companies in industry. Over the last two decades, we have produced successful solutions for hundreds of large-scale electric power projects involving utility/generator paralleling, transfer, peak shaving, and distribution. We pride ourselves in providing electrical power systems that are engineered and custom built, utilizing state-of-the-art technologies to fit our customer's exact needs. The core of our business is low & medium voltage engineered power systems for a wide range of indoor & outdoor applications, such as:

- ⊙ Utility(ies) and Generator(s) Paralleling/Transfer/Peak Shaving/Distribution Switchgear
- ⊙ Microgrids, Microgrid Master Control Panels, SCADA systems
- ⊙ Containerized Battery Energy Storage Systems (BESS)
- ⊙ Photovoltaic (PV) Solar Power Collection/Distribution & Renewable Energy Storage Systems
- ⊙ Low & High Resistance Grounding Systems, Grounding Systems for Photovoltaic Effective Grounding
- ⊙ High Efficiency Combined Heat and Power Switchgear & Control Systems (CHP, Co-generation)
- ⊙ Outdoor Walk-In Electrical Houses (E-Houses) & Skid-Mounted Switchgear
- ⊙ Motor Control Centers & Motor Control Switchgear
- ⊙ Automatic & Manual Load Transfer Switchgear
- ⊙ Bypass/Isolation & Power Distribution Circuit Breaker Switchboards
- ⊙ Generator/Loadbank Quick Connection Switchgear, Switchboards, & Tap Boxes
- ⊙ Industrial Control Panels

Please see our product webpages on www.appt-power.com for product brochures and relevant information. Actual products may look different from images shown on the website and in brochures, based on actual specifications.

APT cares and understands that each power system is different. We will evaluate various solutions to develop the best solution for a site. APT focuses on our ability to a combine several traditional pieces of equipment/functionality into as little of a footprint possible. This saves on space, the cost of equipment, cost of installation, and accomplishes the most optimal/state-of-the-art design your facilities. APT's desires to foster and grow a culture of continued open communication with each customer. Let APT be your source to provide fully engineered power system equipment solutions for the full customer facility on time, on or under budget, and in the smallest footprint possible. We are always available to assist customers and engineers representing customers in the development of complex power solutions for all facility types.