



ADVANCED POWER
TECHNOLOGIES

Service Entrance Generator Quick Connection Transfer Switchboard



FS2-T Generator/Loadbank Quick Connection Solutions Brochure

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



ALN: 522 Rev. 02

Standard Construction



Figure 1: Carbon Steel NEMA 3R Enclosure



Figure 2: 2500A GQC Switchboard with Temporary Generator Circuit Breaker Interior

800A-4000A SE Generator Quick Connection Switchboard

- UL Listed, Service Entrance Equipment (SE)
- Saves floor space & installation cost by replacing the need for an external manual or automatic transfer switch
- System Ratings:
 - Voltage: 208V-480V (3Ø, 4W)
 - Current: 800A-4000A
 - Interrupting Rating: 65, 100 kAIC
- Temporary Generator & Utility Protection
 - Insulated Case Circuit Breakers
 - Fixed mount
 - Electronic trip unit with adjustable Long Time, Short Time, Instantaneous settings
 - 100% rated
 - Breaker Position Aux Contacts ("a" & "b")
- Silver-plated copper phase bus bar for permanent connection to the facility
- APT Mechanical Lugs for incoming utility, permanent facility-side, & alternate generator connections
- Alternative bus bar connections with NEMA standard hole pattern and mechanical lugs for use in the event a mobile genset is used that does not have cables with 'Cam-lok' E1016 compatible plugs
- Easy and spacious access to color coded, generator (male) & loadbank (female) E1016 cam-lok type receptacles with covers
 - A phase – Brown
 - B phase – Orange
 - C phase – Yellow
 - Neutral – White
 - Ground – Green
- Standard Enclosure:
 - Filtered ventilation louvers
 - Pad-lockable hinged main access door
 - Pad-lockable integral lower flip door (allows the main door to be closed with the mobile generator/loadbank cables connected)
 - Powder coated ANSI 61 Gray
 - NEMA 3R for outdoor applications
 - Utility & Permanent Connections: (Side/Rear/Bottom Exit)
 - Temporary Connections: (Lower Flip Door Entry)
 - Internal Climate Control to include (2) Space Heaters with a Thermostat - Requires customer supplied 120VAC, 10A circuit

Switchboard Features & Options

Fully Customizable



Figure 3:
Top left: Cam-lok Cover
Top right: Male Cam-lok Receptacle
Bottom Middle: Captive Key Provision

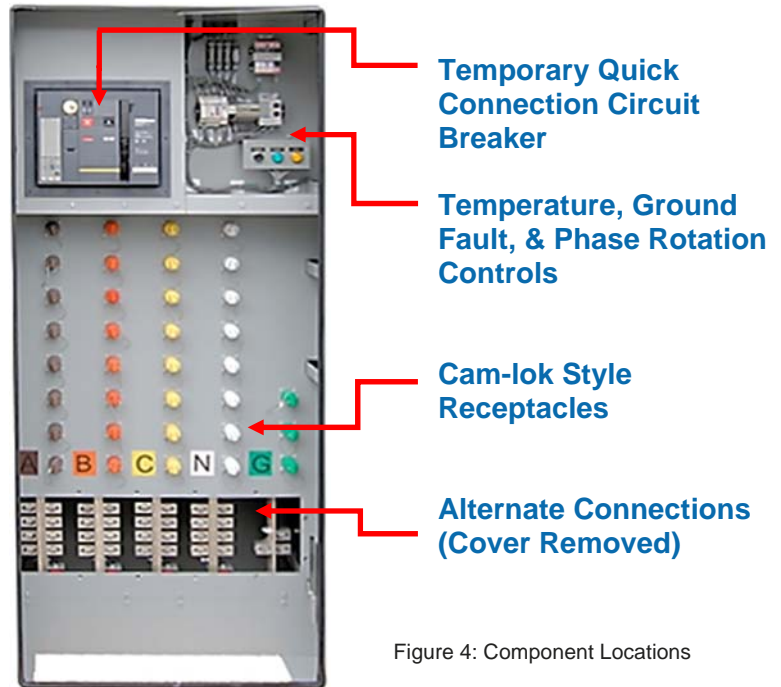


Figure 4: Component Locations

SE Interlocking, Monitoring, and Options

- Service Entrance Ground Fault Monitoring:
 - Trips the circuit breaker on ground fault
- Open Transition Manual Transfer Interlocking:
 - NEC 700.3 compliant key interlocking to prevent inadvertent paralleling of the temporary generator source with normal source(s)
- Available Automatic Load Transfer means for use in Permanent Generator applications:
 - Open Transition Automatic Transfer
 - Closed Transition (100ms) Automatic Transfer
- Phase Rotation Monitoring:
 - Provides visual assurance that mobile generator set phase rotation matches that of the facility
 - Configured to prevent circuit breaker from being closed if phase rotation is incorrect
 - Instructions to easily fix incorrect phase rotation are on a label inside each panel
- NEC 700.3 compliant temporary generator source connected indication
- Shunt Trip:
 - 120VAC for tripping circuit breaker if phase rotation is incorrect or on ground fault sensing
- Enclosure options:
 - NEMA 1 for indoor installation
 - NEMA 3R for outdoor installation:
 - Type 304 Stainless Steel
 - Type 5052 Aluminum
 - Enclosure Climate Control:
 - Anti-condensation Heater w/ Thermostat & Humidistat
- Other Options
 - No Neutral Bus or Cam-loks
 - 100% Ground
 - Surge Protection Device (SPD)
 - Generator Remote Start/Stop Terminal Blocks
 - Generator Block Heater Receptacle
 - 480VAC or 240VAC Twist-lock Receptacle
 - 120VAC Battery Charger/Convenience Receptacle
 - Load Dump Receptacle/Terminal
 - Extra Large Enclosure for Conduit Entry/Exit
 - Custom Color
 - Convenience Light
 - SCADA Connection Interface

Key Interlocking Configurations



Figure 5: 3000A Manual Transfer Switchboard



Figure 6: 3000A Breaker over Breaker Service Entrance Utility & GQC



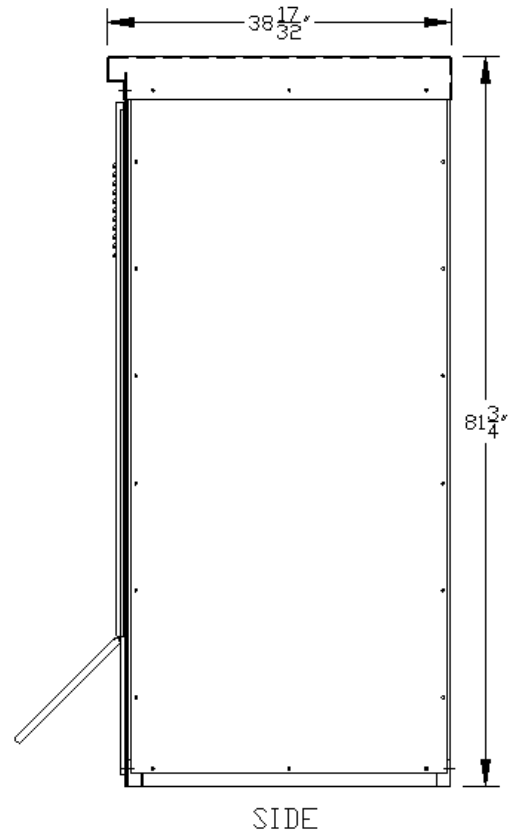
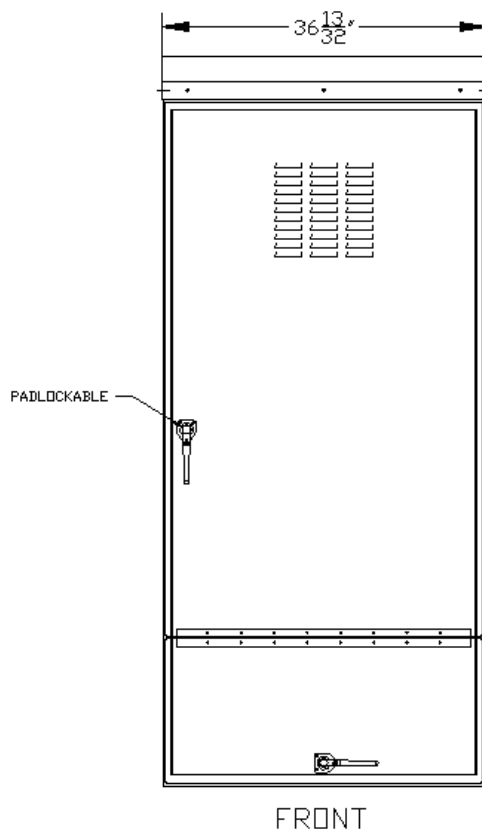
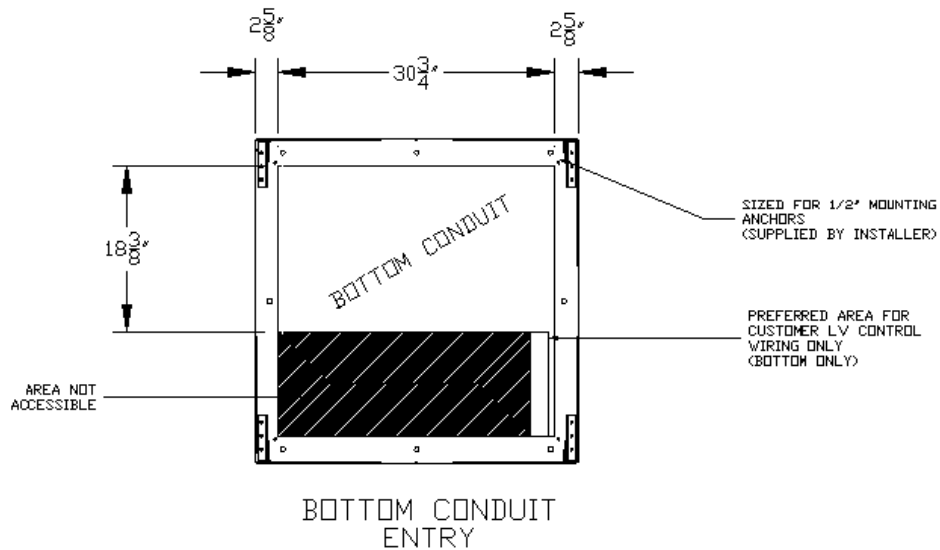
Figure 7: Service Entrance Utility Circuit Breaker w/ Captive Key Interlock

Utility, Mobile Generator Only, Permanent Generator/Loadbank Applications

- 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 permanent 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
- Loadbank connection only applications
 - Easily connects a temporary loadbank 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 & Loadbank 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 loadbank
- Alternatively, cam-lok gender changeover adapters are available to convert Generator Quick Connection into Loadbank Quick Connection*

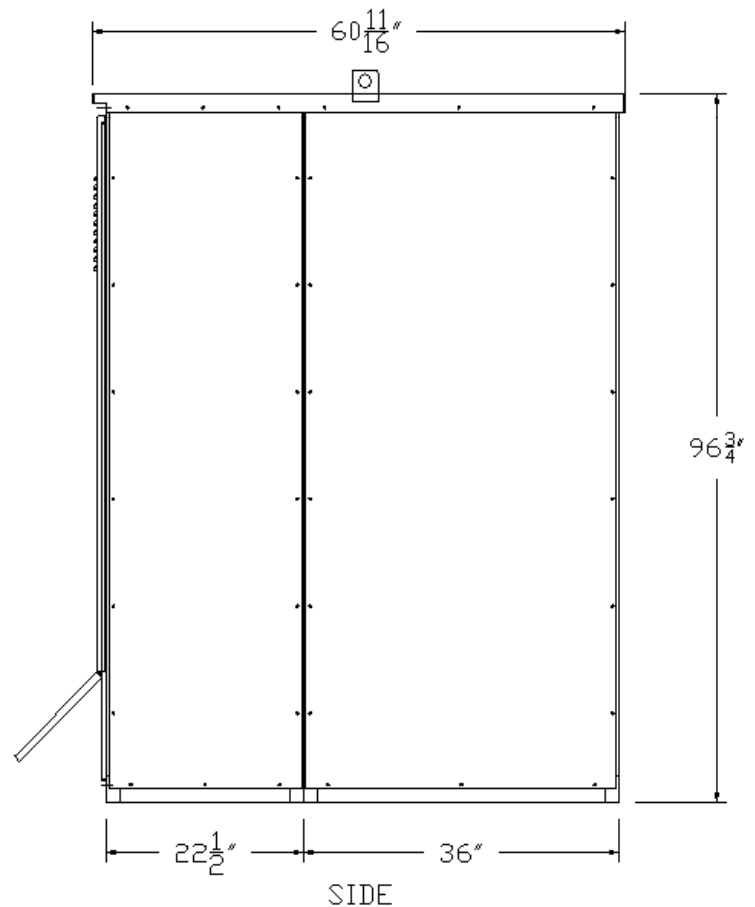
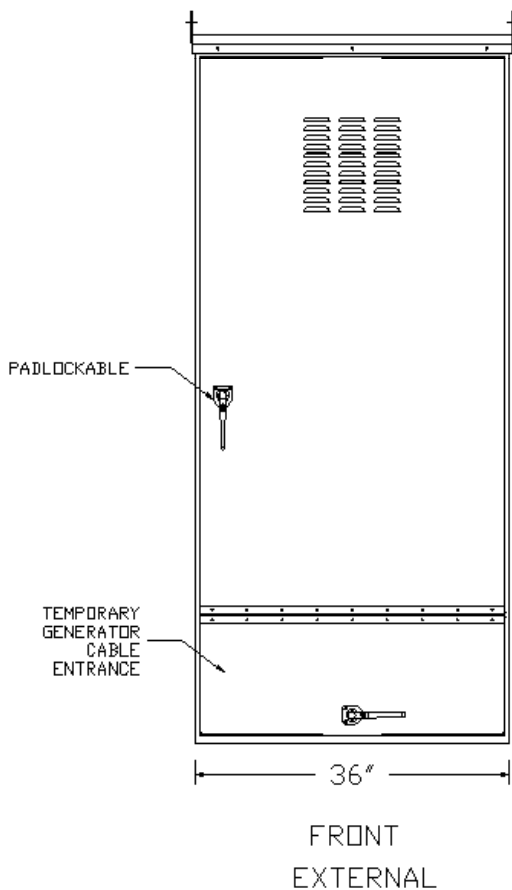
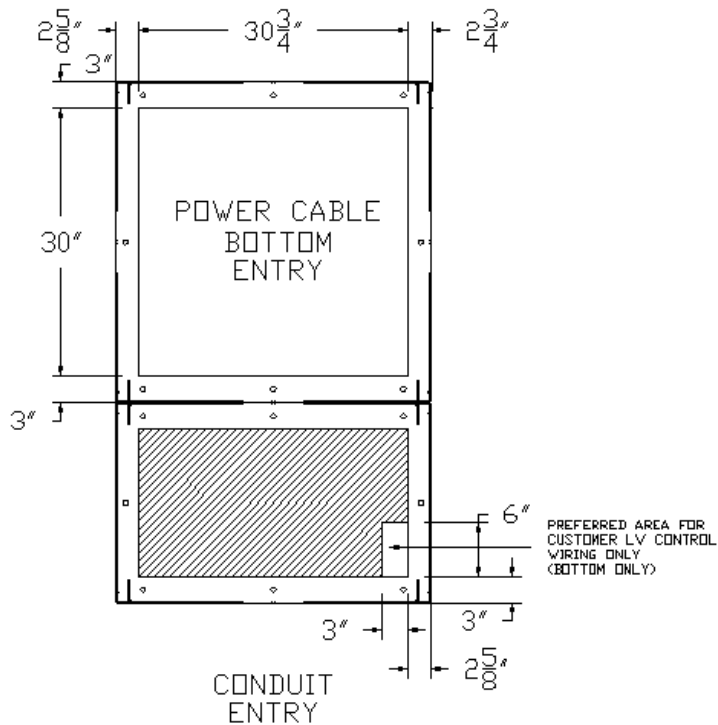
*Subject to implemented options

SE GQC Switchboard Drawing 1

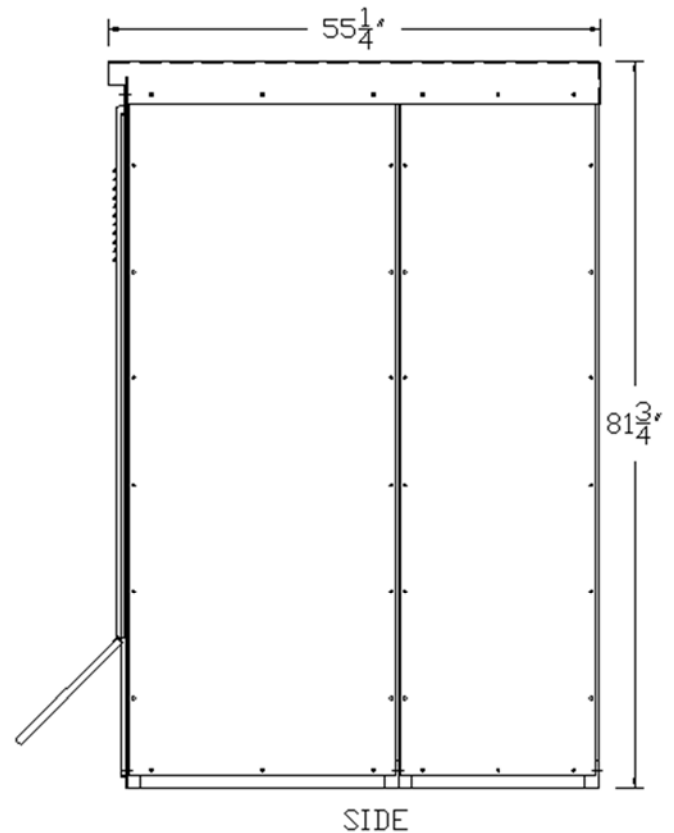
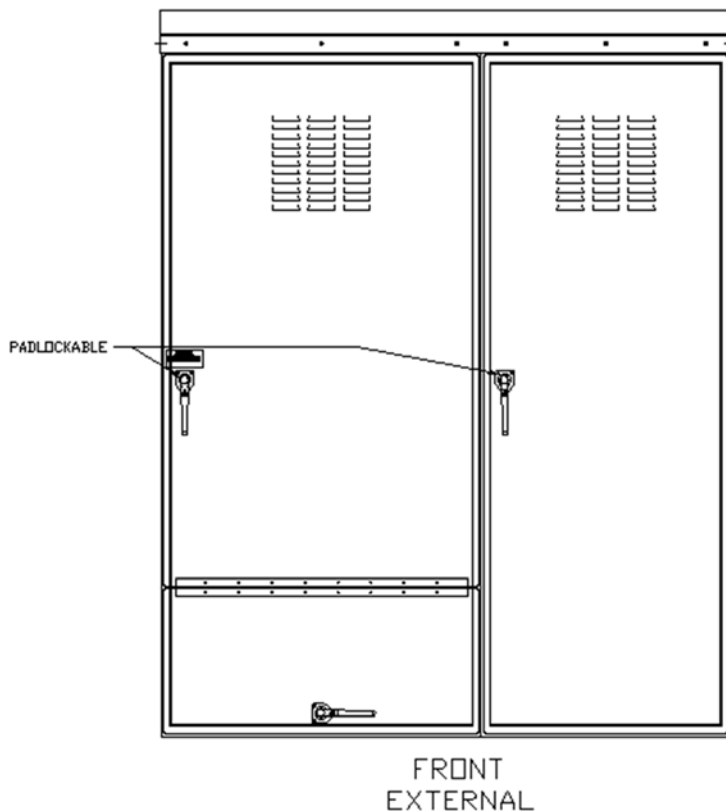
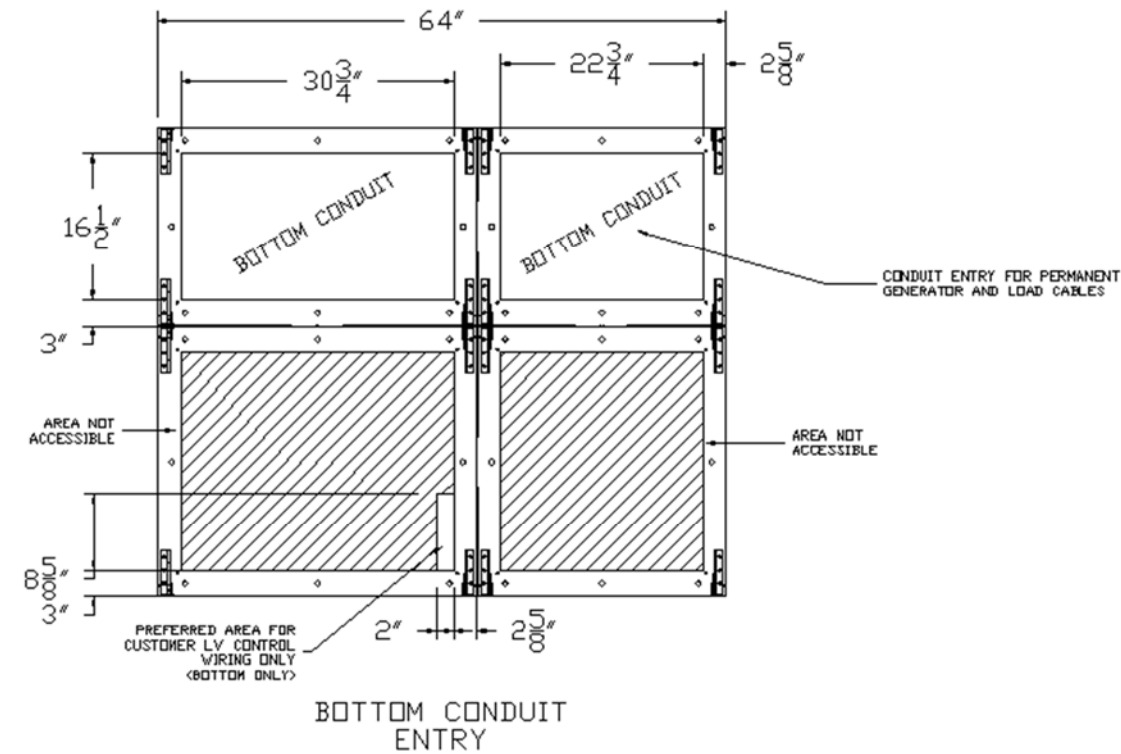


EXTERNAL

SE GQC Switchboard Drawing 2



SE GQC Switchboard Drawing 3



APT Product Part Number Builder

Table 1: Standard Product Configuration Budgeting Prices

Base Part Number	Approx. Generator Rating @ 480V (kW@0.8pf, kVA)	Current Rating With Service Entrance Circuit Breaker	Maximum # of Cables Per Phase and Neutral		Base Budget Price (One Circuit Breaker) (USD \$)
			Cam-locks/Phase (Temporary Generator Side)	Mechanical Lugs Available/Phase (Permanent Facility-Side)	
	250kW, 333kVA	400A	1	2	Call APT for Inquiry
APN1623	500kW, 667kVA	800A	2	4	\$23,625.00
APN1624	750kW, 1000kVA	1200A	3	6	\$24,637.50
APN1625	1000kW, 1333kVA	1600A	4	8	\$25,875.00
APN1626	1250kW, 1667kVA	2000A	5	10	\$26,737.50
APN1627	1500kW, 2000kVA	2500A	7	14	\$32,212.50
APN1628	2000kW, 2500kVA	3000A	8	16	\$36,187.50
APN1629	2500kW, 3000kVA	4000A	10	20	\$56,225.00
	3000kW, 4000kVA	5000A	13	26	Call APT for Inquiry

Base Size

Option Number

BPN	A	EM	ET	CB	CC	KK	MO	OO
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Example: **APN1623** **G** **CS** **3R** **1** **1** **1** **1** **3-5-6-1a**

Your P/N:

Base Part Number
(APN1623) - 800A
(APN1624) - 1200A
(APN1625) - 1600A
(APN1626) - 2000A
(APN1627) - 2500A
(APN1628) - 3000A
(APN1629) - 4000A

Application
(G) - Generator Only
(L) - Loadbank Only
(GL) - Generator & Loadbank
(SE) - Service Entrance
(TL) - Termination Lugs Only (No Cam-locks)

Enclosure Metal
(CS) - Carbon Steel
(AL) - Aluminum
(SS) - Stainless Steel

Enclosure Type
(3R) - NEMA 3R
(01) - NEMA 1

of Circuit Breakers*
(1) - One CB
(2) - Two CBs
(0) - None

Climate Control
(1) - Heater w/Thermostat
(2) - Heater w/Thermostat & Humidistat
(0) - None

Kirk Key Interlocking
(1) - One Integrated Lock, One Ship Loose Lock
(2) - Two Integrated Locks (Manual Transfer)
(0) - None

Monitoring
(3) - Phase Rotation & Ground Fault
(2) - Ground Fault Only
(1) - Phase Rotation Only

Other Options*
(1) - No Neutral Bus or Cam-locks
(2) - 100% Ground
(3) - Surge Protection Device (SPD)
(4) - Generator Remote Start/Stop Terminal Blocks
(5) - Generator Block Heater Receptacle
(6) - 480VAC or 240VAC Twist-lock Receptacle
(7) - 120VAC Battery Charger/Convenience Receptacle
(8) - Load Dump Receptacle/Terminal
(9) - Extra Large Enclosure for Conduit Entry/Exit
(1a) - Custom Color
(2a) - Convenience Light
(3a) - SCADA Connection Interface
(4a) - Alternate Portable Generator Lug Connections
(0) - None

*Customer to provide description of the features desired

Typical Applications for GQC & LQC

Generator Only Configurations

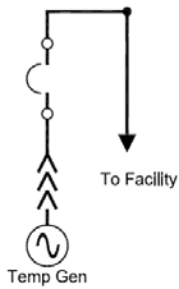


Figure 8: Single Circuit Breaker Option

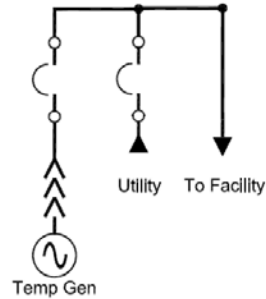


Figure 9: Dual Circuit Breaker Option with Utility & Gen Breaker

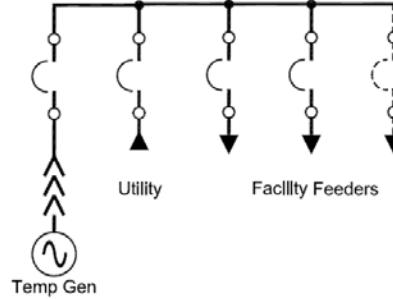


Figure 10: Multiple Circuit Breakers Option

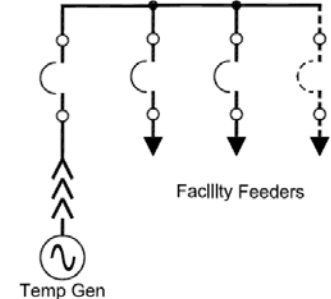


Figure 11: Feeder Circuit Breakers Option

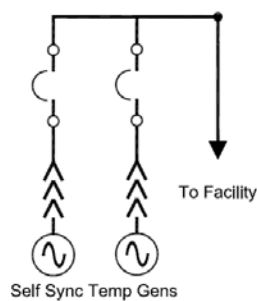


Figure 12: Two Self Sync Temp Gensets into two sets of Cam-locks

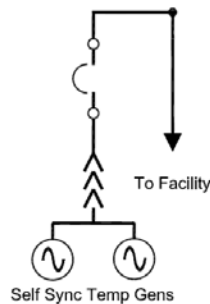


Figure 13: Two Self Sync Temp Gensets into one set of Cam-locks

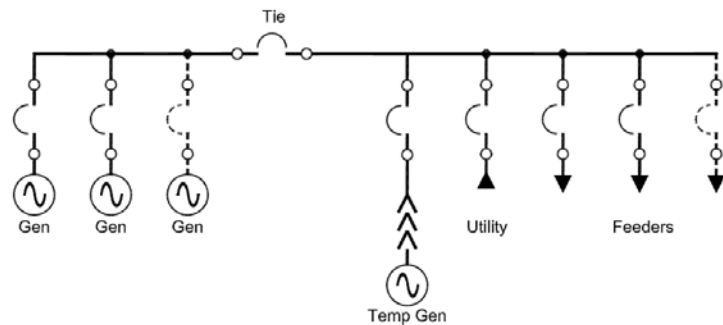


Figure 14: GQC integrated into Low Voltage Switchgear

Loadbank Only Configurations

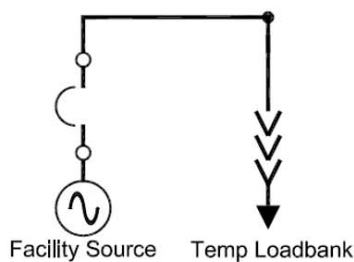


Figure 15: LQC Single Circuit Breaker Option

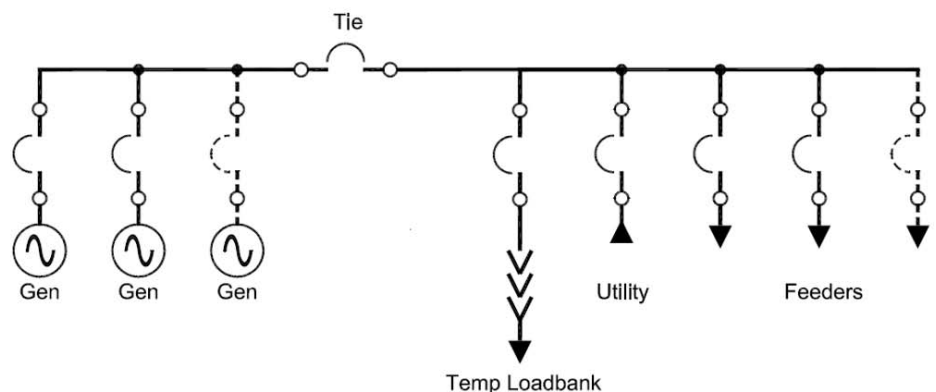


Figure 16: LQC integrated into Low Voltage Switchgear for annual Genset Testing

Typical Applications for GLQC

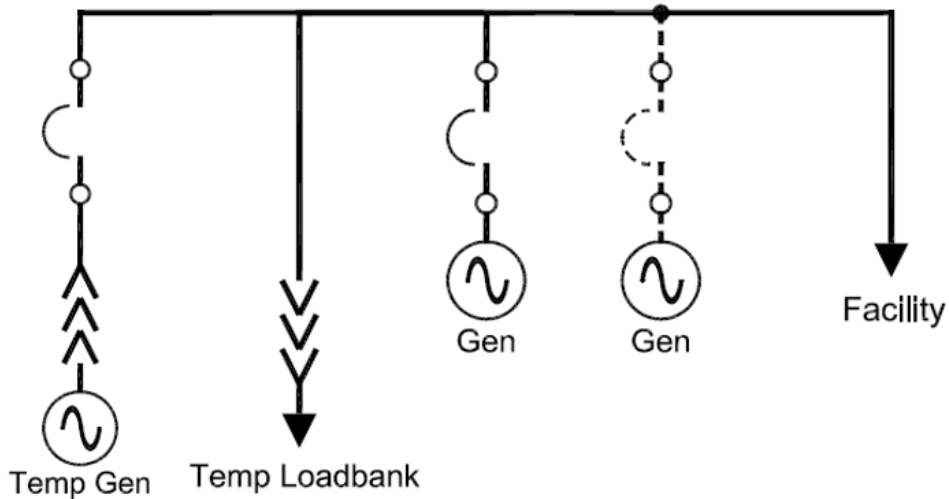


Figure 17: Generator & Loadbank Quick Connection Switchboard with Temporary Generator Circuit Breaker Only

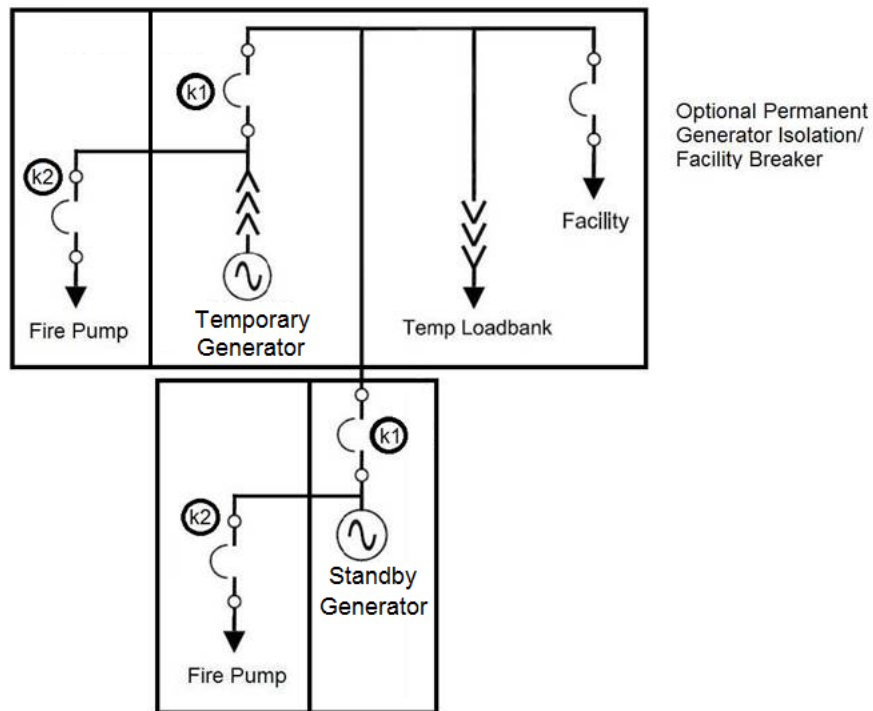


Figure 18: Generator & Loadbank Quick Connection Switchboard with NEC 695 Fire Pump & Generator Circuit Breakers with Permanent Generator Connection & Loadbank Quick Connection

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 in order 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.