



ADVANCED POWER
TECHNOLOGIES

2.4kV-15kV Front Access Compact 26"W x 38.5"D Switchgear



FAC-Series 06 Metal Enclosed Switchgear Solutions Brochure

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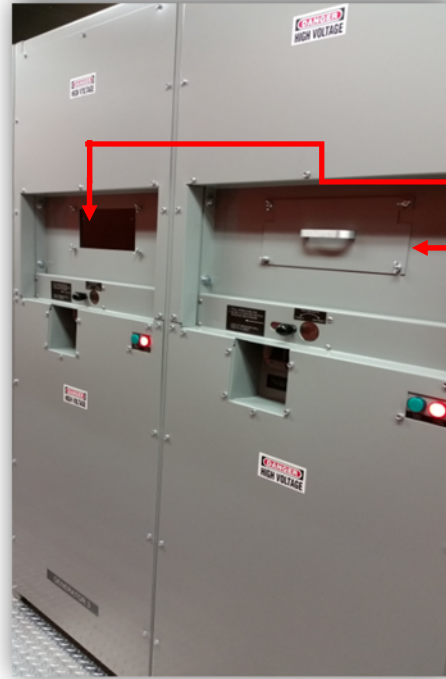
**SAFE SMART SERVICEABLE SWITCHGEAR &
ENGINEERED POWER SYSTEM SOLUTIONS**



ALN: 541 Rev. 01

Features and Benefits

The safest, most compact air insulated SF6-free Medium Voltage Switchgear on the market.



Lexan viewing Window for observing visual air disconnect switch position

Removable viewing window access metal panel provides additional arc flash safety

Circuit breaker position indicating lights

Figure 1: Carbon Steel NEMA 1 Enclosure

Switchgear Overview

Vacuum Interrupters & Visible Disconnect

- ⦿ Space saving Front Access Only design, can be placed against the back wall.
- ⦿ Smallest footprint 15kV air insulated switchgear on the market, each section is only 40" deep and 28" wide.
- ⦿ Increased operator safety:
 - Remote controllable design
 - Completely metal enclosed dead front
 - Provision for connection of field grounding cables
 - Removable metal panel for viewing blades position of the visible disconnect air insulated switch (through Lexan protected viewing window)
- ⦿ Complete front access to all the components, bus, and bolted joints.
- ⦿ Easy to maintain & environmentally friendly:
 - 100% air insulated, no SF6 gas used.
- ⦿ Modular, slide-out design of the major power switching components to minimize the down time, should component replacement or repair be needed.
- ⦿ Lower cost of installation: Insulating barriers provided between the phases, no need to tape or boot field cable terminations.
- ⦿ Fixed mounted vacuum circuit breakers, installed on rollers. Rollers are provided to simplify the field removal of the circuit breakers.
- ⦿ High-speed operation – complete fault clearing in less than 3 cycles.
- ⦿ Hermetically sealed vacuum interrupters protect contacts from corroding elements and contamination.
- ⦿ Inline visible air-disconnect switch, pad-lockable in open and/or closed position, to ensure personnel safety during power system service, maintenance, and repairs.

Switchboard Available Features



Figure 3: Dead Front Removed Exposing Main Bus Compartment with Cover Over Visual Disconnect Window

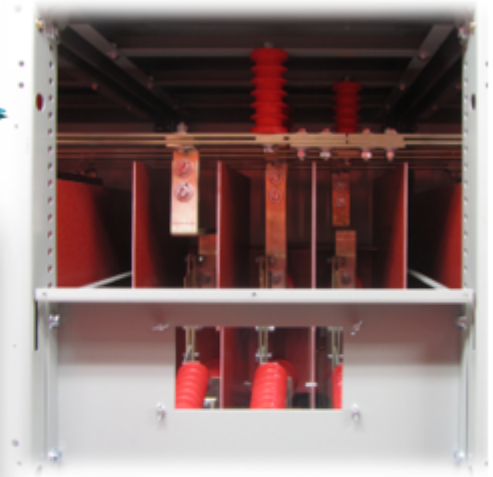


Figure 4: Main Bus with Visual Disconnect Window Removed



Figure 2: Single Front Access Section with Dead Fronts Attached

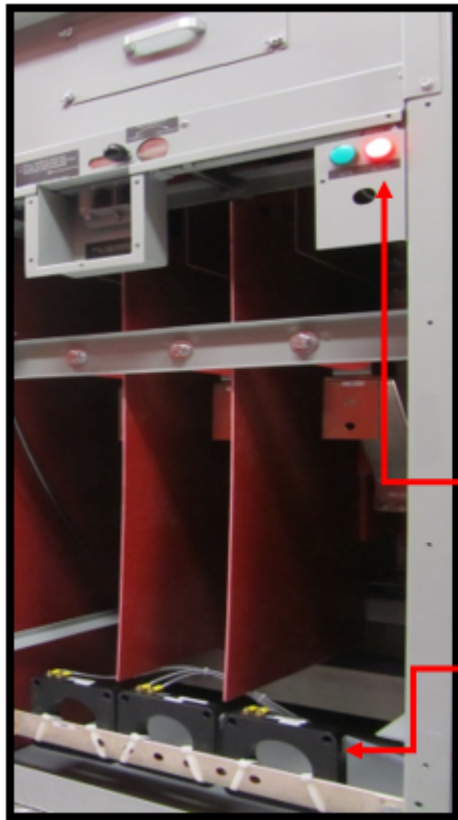


Figure 5: Cable Connection Compartment Dead Front Removed



Circuit breaker position indicating lights

CTs for installation over the cables

Cable Connections

Vacuum Interrupters



Figure 6: Inside cable connection compartment

Auxiliary Drawers



Auxiliary Drawers can accommodate Fuses, Control Power Transformers or Voltage Transformers. For operator safety these devices are automatically grounded during movement to disconnected position

Auxiliary Drawer Secondary
Contacts are of self-aligning design and can accommodate up to six independent circuits

GQC Switchboard Drawing

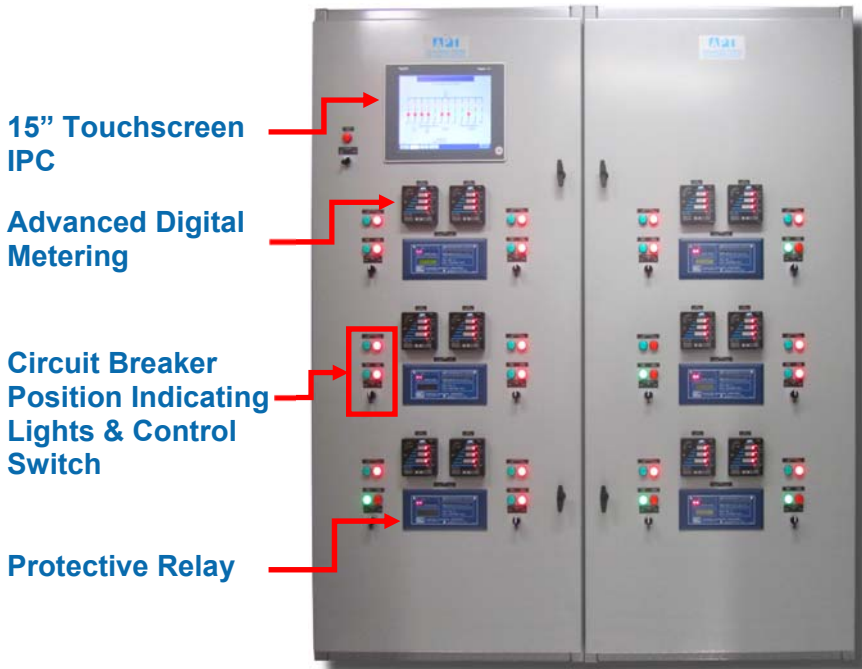


Figure 7: Isolated Local Operator Station

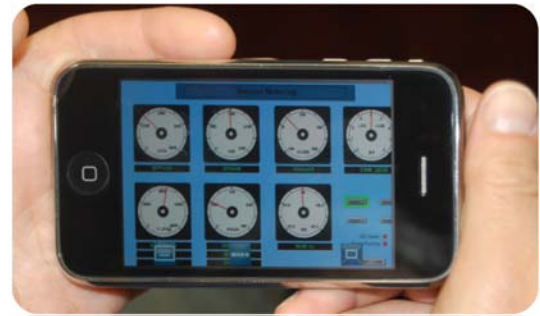


Figure 8: Secure Remote Access to Operator Station allows users to access the "Virtual Switchgear"

Isolated Remote Operator Control Station Includes:

- ⊙ Human Machine Interface (HMI):
 - Industrial Personal Computer (IPC)
 - 15" Color Touchscreen
 - Windows 7 operating system
 - Provides graphical interface
- ⊙ APT View Virtual Switchgear
 - Local & Remote SCADA Access
 - Graphical Displays
 - System One line diagram with color coded real time position of every circuit breakers
 - Detailed electrical information
 - Load transfer and Generator loading controls
 - Alarm annunciation
 - Storage of all the monitored data every minute with date and time stamp
 - Events log with date and time stamp
 - Remote Monitoring and remote-control software
 - Capability of remote system troubleshooting
- ⊙ Uninterruptable Power Supply keeps unit powered during unplanned outages
- ⊙ Each main, feeder, or generator circuit breaker electrical data:
 - Line to line voltages: V_{ab} , V_{bc} , V_{ca}
 - Generator frequency: Hz
 - Phase currents: I_a , I_b , I_c
 - 3 \emptyset power: kW, PF, kVAR, kVA
 - 3 \emptyset energy: kWh import, kWh export, kVARh import, kVARh export
 - Harmonics
- ⊙ Main bus electrical data:
 - Line to line voltages: V_{ab} , V_{bc} , V_{ca}
 - Bus Frequency: Hz
- ⊙ System Status Information (alarm and events log):
 - All circuit breakers and switches position
 - Circuit breaker control switch in Trip position
 - Every protective trip
- ⊙ SCADA Control
 - Opening and closing of every circuit breaker, generators Start/load, Stop/unload

Outdoor Walk-in Switchgear Modules

APT's outdoor walk-in pre-engineered switchgear modules allow for the rapid deployment of power worldwide



Figure 9: 40' ISO Container-Based Walk-in Switchgear Module



Figure 10: Front Access Switchgear, Isolated from Local and Remote Operator Control Stations gives unprecedented safety and security to Switchgear Operators in the sheltered isle



Figure 11: Inside of ISO Container based Switchgear Module with Ultra Compact Front Access (FA) Air Insulated Vacuum Circuit Breaker Switchgear



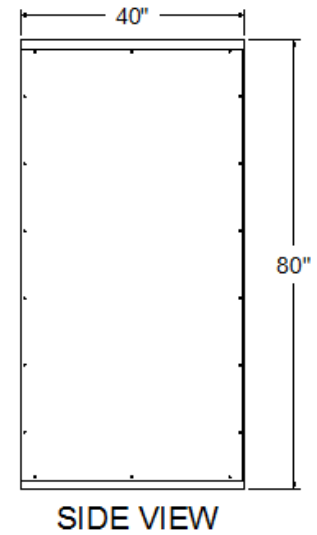
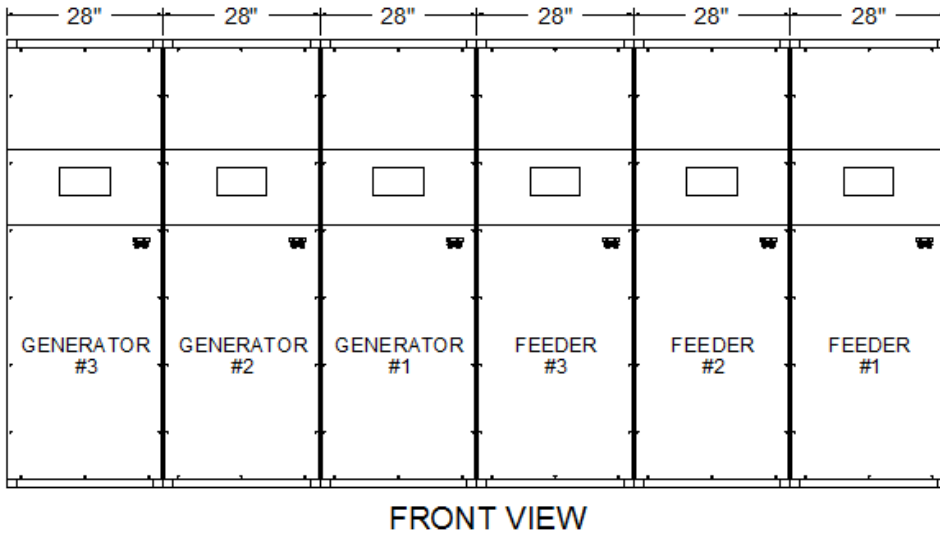
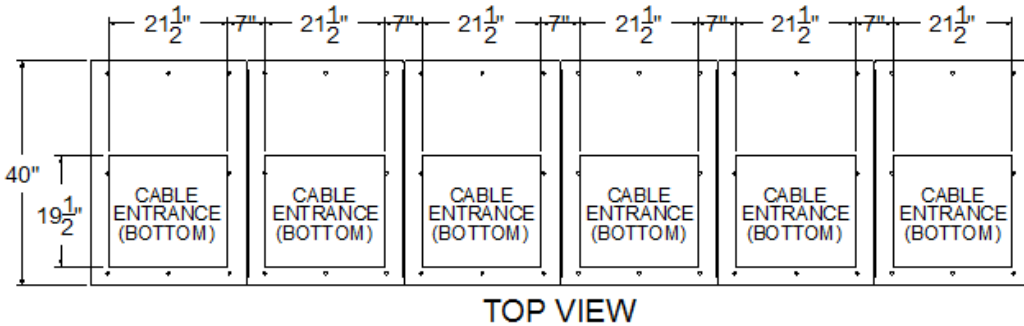
Figure 12: 40' ISO Container-Based Walk-in Switchgear Module

Circuit Breaker Ratings

Table 1: Available Circuit Breaker Ratings

MVA Rating (reference only)	Actual MVA @ Operating Voltage	Rated Continuous Current	Voltage		Dielectric Ratings		Short Circuit Current					Mechanical Endurance
			Max Rated Voltage	Range Factor	Power Frequency	Impulse 1.2 x 50µs	System Interrupting	Close and Latch Rating	Short-Time Current Rating	Short-Time Current Duration	Interrupting Time	No Load Mechanical Operations
			kV RMS	K	kV RMS	kV peak	kA RMS	kA peak	kA RMS	s	Cycles	
250	330	1200	4.76	1.0	19	60	40	104	40	2	3	10,000
250	330	2000	4.76	1.0	19	60	40	104	40	2	3	10,000
250	330	3000	4.76	1.0	19	60	40	104	40	2	3	5000
350	412	1200	4.76	1.0	19	60	50	130	50	2	3	5000
350	412	2000	4.76	1.0	19	60	50	130	50	2	3	5000
350	412	3000	4.76	1.0	19	60	50	130	50	2	3	5000
500	572	1200	8.25	1.0	36	60	40	104	40	2	3	10,000
500	572	2000	8.25	1.0	36	95	40	104	40	2	3	10,000
500	572	3000	8.25	1.0	36	95	40	104	40	2	3	5000
500	650	1200	15	1.0	36	95	25	65	25	2	3	10,000
500	650	2000	15	1.0	36	95	25	65	25	2	3	10,000
500	650	3000	15	1.0	36	95	25	65	25	2	3	5000
750	1039	1200	15	1.0	36	95	40	104	40	2	3	10,000
750	1039	2000	15	1.0	36	95	40	104	40	2	3	10,000
750	1039	3000	15	1.0	36	95	40	104	40	2	3	5000
1000	1299	1200	15	1.0	36	95	50	130	50	2	3	5000
1000	1299	2000	15	1.0	36	95	50	130	50	2	3	5000
1000	1299	3000	15	1.0	36	95	50	130	50	2	3	5000

Dimensions & Weight of 1200A Indoor Sections

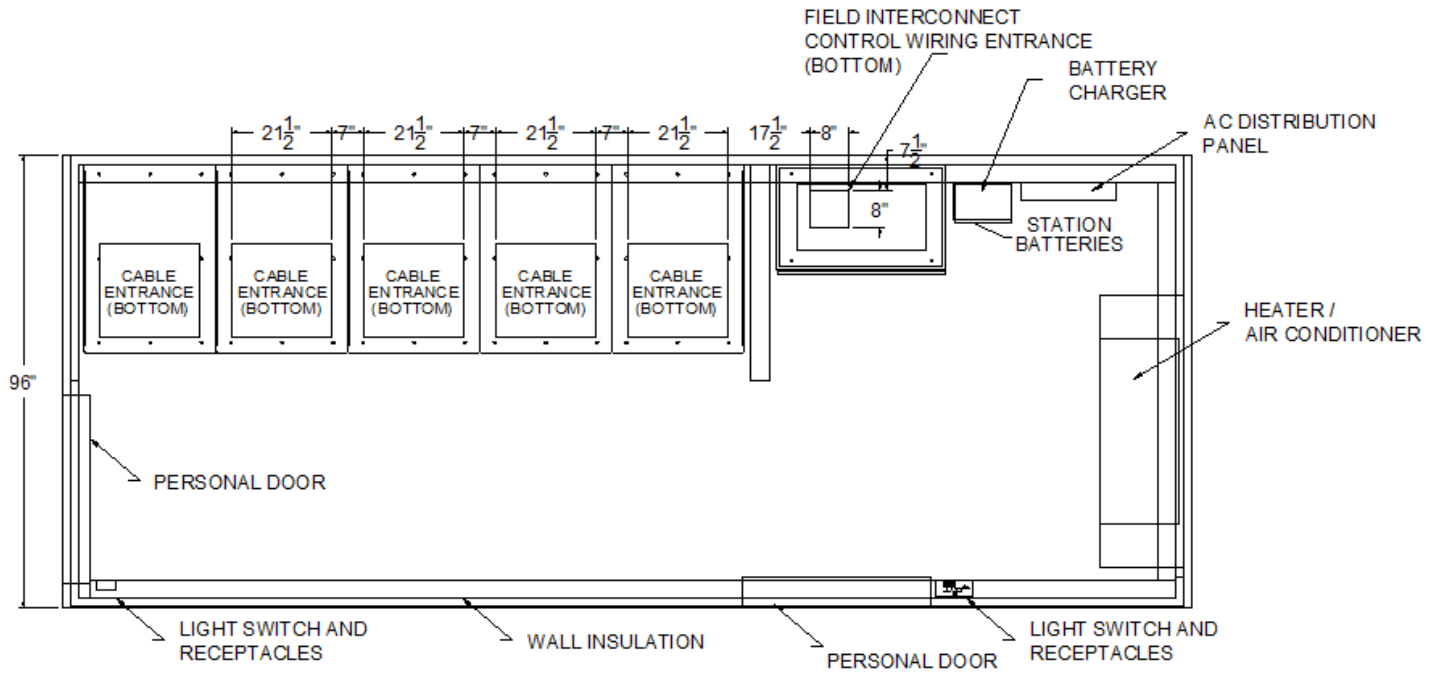


Single 1200 A section dimensions:

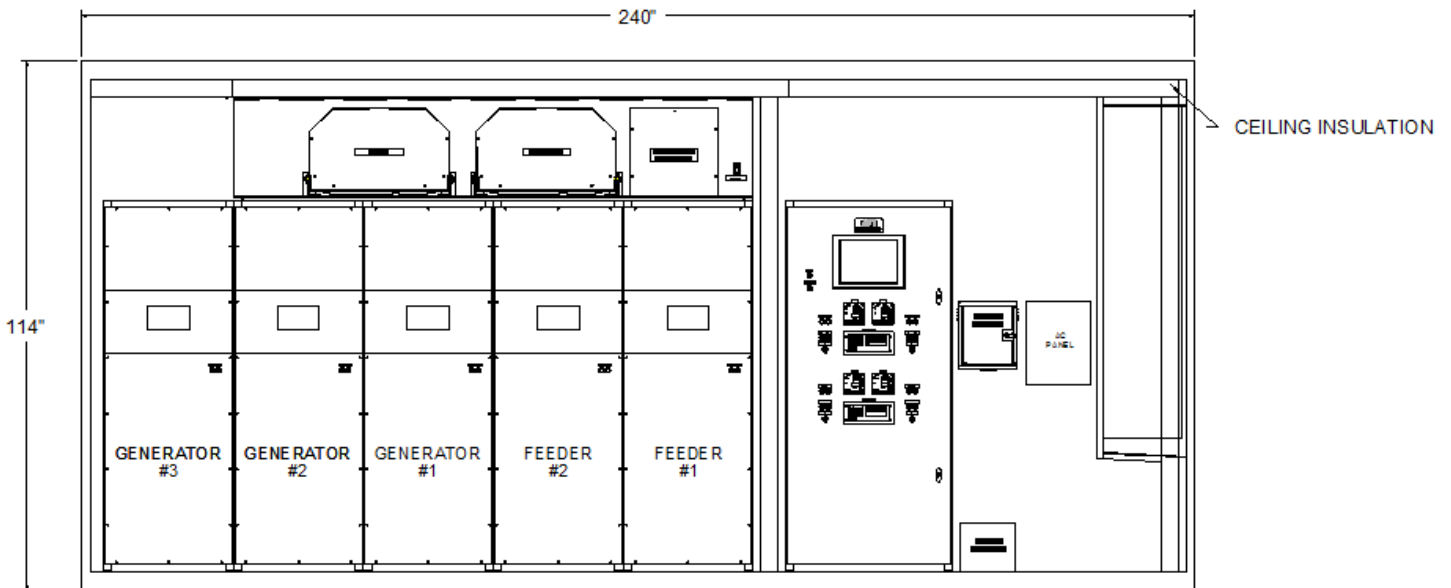
40" deep by 28" wide by 80" high

Table 2: Standard Section Weights	
Component	Weight Per
NEMA 1 Section (Less Breakers)	1800 lbs.
1200A Circuit Breaker	380 lbs.
2000A Circuit Breaker	410 lbs.

Typical Layout of 20' Outdoor Walk-in Switchgear Module

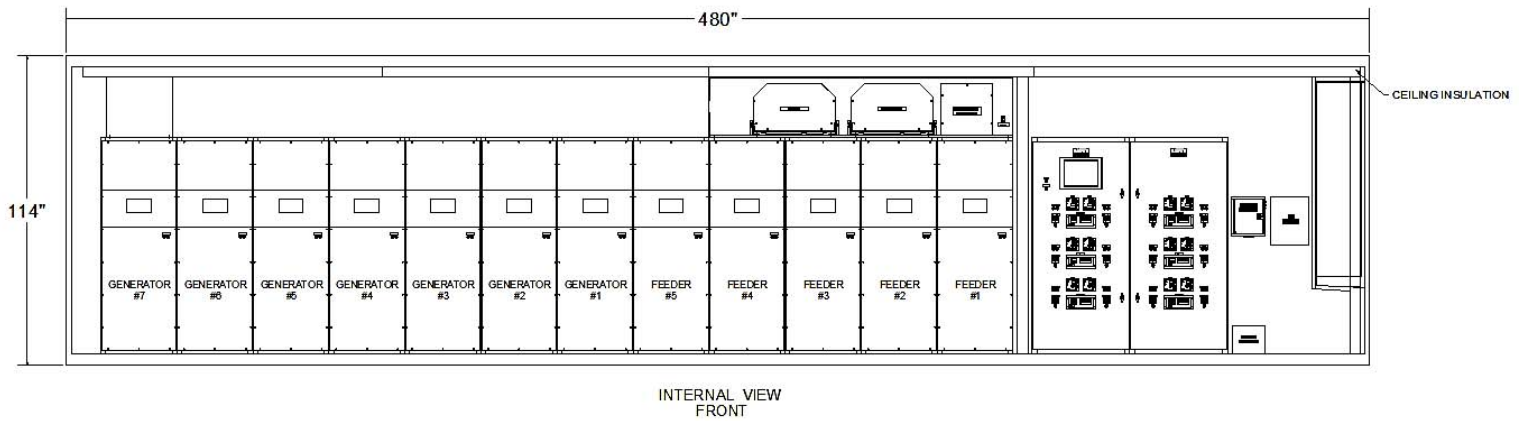
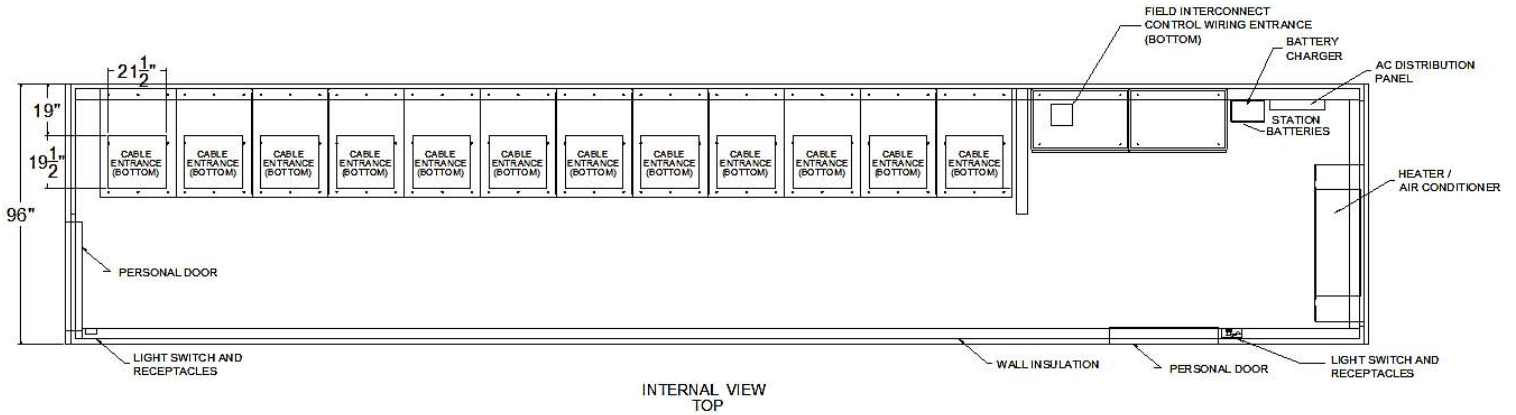


INTERNAL VIEW
TOP



INTERNAL VIEW
FRONT

Typical Layout of 40' Outdoor Walk-in Switchgear Module



Typical Layout of 40' Outdoor Walk-in Switchgear Module

Our traditional air insulated SF6-free Medium Voltage Switchgear utilizes drawout circuit breakers to provide visible disconnect. This gives the switchgear a larger, heavier, and more bulky foot print.

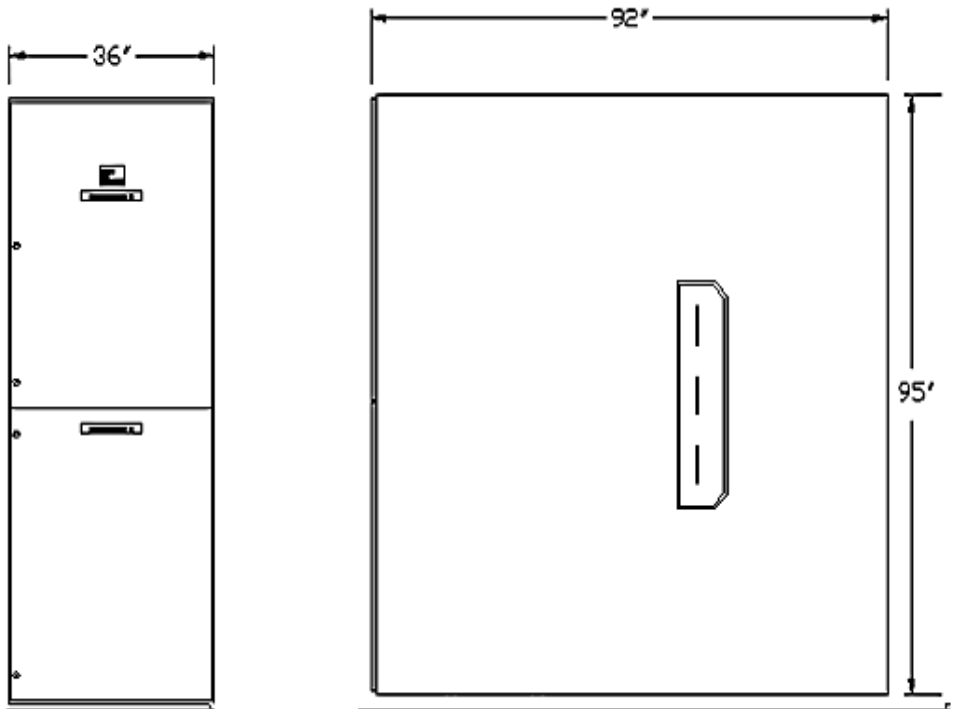


Figure 13: Traditional Switchgear Single Section Dimensions (rear access required)

Our Front Access Compact air insulated SF6-free Medium Voltage Switchgear utilizes state-of-the-art innovative switchgear design methods and technology and utilizes an air insulated isolation switch on the line side of the circuit breaker and a clear Lexan viewing window to provide visible disconnect.

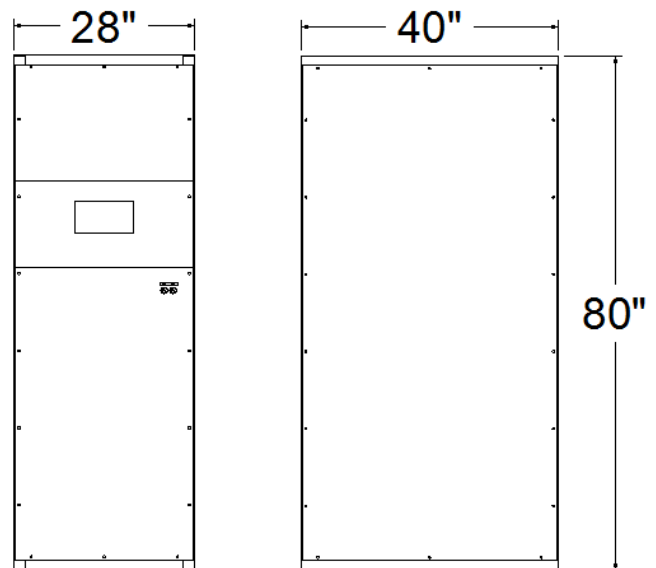


Figure 14: Ultra Compact Front Access Switchgear Single Section Dimensions (rear access is not required)



Advanced Power Technologies (APT) offers a unique combination of Power Systems products and services. Our uniqueness and strength is our ability to assist in all phases of the project. At the beginning stages of the project, we can assist the Owner and Engineers in evaluating the existing power system, calculate the available fault currents and advise on the optimal switchgear configuration and operation. Our engineers can explain pros and cons and assist in selecting solidly grounded, low impedance grounded or high impedance grounded systems, various protective relaying, power monitoring and automation schemes as well as perform all the calculations necessary to supply equipment for a functional and coordinated power system.

When our equipment is installed, we can provide and oversee a comprehensive system commissioning, testing and integration. We will continue ongoing support during the lifetime of the installation.



About APT



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.