

Compact Primary, Secondary, Single & Double Ended, Permanent & Portable Skid Mounted Unit Substations



MTL-Series Unit Substations & Transformers Solutions Brochure

www.apt-power.com 433 N. 36th Street Lafayette, IN 47905 (765) 446-2343

SAFE SMART SERVICEABLE SWITCHGEAR & ENGINEERED POWER SYSTEM SOLUTIONS



ALN: 573 Rev. 04



General Features



Figure 1: Permanent Skid-Mounted MTL-Series with Low & Medium Voltage Switchgear and Transformer



Figure 3: MTL-Series Unit Substation with Rear Access



Figure 2: Permanent Skid-Mounted MTL-Series Unit Substation with Front Access Top View



Figure 4: MTL-Series Unit Substation with Substation Transformer

Versatile Substations with Numerous Configurations

- Built to IEEE Std C37.121-2012: IEEE Guide for Switchgear—Unit Substation— Requirements
- Frequency:
 - o 60Hz or 50Hz
- Silver plated copper bus
- Listed low voltage bus ampacity up to 4000A
 - Unlisted options built to UL standards available upon request for main buses larger than 4000A
- Busbar connections with NEMA standard hole pattern
- Bus Access & Cable Entry
 - Front or Rear Access for either top or bottom cable entry
- Low Voltage Power or Insulated Case Circuit Breakers
 - o See page 9 for more information

- Molded Case Circuit Breakers
 - See page 9 for more information
- Installation Location & Enclosure
 - NEMA 1 for Indoor Installation
 - NEMA 3R for outdoor installation
 - Manufactured from Carbon Steel, Aluminum or Stainless Steel (304 or 316)
 - o Powder coated ANSI 61 Gray
 - o NEMA 1 Lockable T-handles
 - Internal Climate Control (requires 120VAC)
 - Anti-condensation Heater w/Thermostat
 - NEMA 3R Stainless steel hardware & pad lockable handle
 - o Optional Power System Mimic Bus



Medium Voltage Mains



Figure 5: MTL-Series Medium/Low Voltage Secondary Unit Substation Portable Skid-Mount Switchgear



Figure 8: Permanent Skid-Mounted MTL-Series with Circuit Breaker



Figure 6: Medium Voltage Switchgear with Loadbreak Bushings



Figure 7: MTL-Series with Metal-Enclosed Drawout Vacuum Circuit Breaker



Figure 9: Medium Voltage Metal-Enclosed Bus Stabs



Figure 10: Metal-Enclosed Unfused Air Insulated Switch with Roll Out Vacuum Circuit Breaker

Medium Voltage Main Circuit Protection Sections

⊙ Medium Voltage:

∘ 2.4kV – 38kV, 3Ø

- Medium Voltage Main Protection Disconnect Sections Options:
 - IEEE Std C37.20.2 Metal-clad Drawout Vacuum Circuit Breaker
 - IEEE Std C37.20.3 Metalenclosed Fused Air Insulated Loadbreak Interrupter Switch (LIS)
 - Metal-enclosed Drawout
 Vacuum Circuit Breaker

- Metal-enclosed Unfused Air Insulated Switch with Fixed or Roll Out Vacuum Circuit Breaker
- IEEE 386 Loadbreak or Deadbreak Bushings with Optional Grounding
- IEEE Std C37.23 Metalenclosed Bus Stabs with NEMA Standard 2-hole pattern directly to the transformer or incoming line pull section

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Power Transformers



Figure 11: Permanent Skid-Mounted MTL-Series with Dry-Type Transformer



Figure 12: Portable Skid-Mounted Cast-Coil Transformer



Figure 13: Low Voltage Cogeneration Switchgear with Skid-Mounted Oil-Filled Transformer

Medium Voltage to Low Voltage Power Transformer

- ⊙ Up to 4MVA Transformers
 - o Dry-Type
 - o Cast-Coil
 - o Oil-Filled
- Built to all applicable IEEE C57.12.34
- High Voltage Side:
 - o Aluminum windings
 - 2.4kV 34,500 V Delta or Wye Connected
 - o BIL up to 200 kV
 - Tap changer: ± 2, 2.5%
 - o Live front
 - o Radial feed
 - o Optional Bushing wells
- Low Voltage Side:
 - o Aluminum windings
 - o Single Low Voltage Winding
 - 208V 120 V Delta or Grounded Wye Connected
 - o BIL up to 10 kV

- Epoxy 2 piece-bushings with 4-holes blade
- Cooling class: ONAN
- Pad Mount, Step Down
- Ratings:
 - o 500kVA 4,000 kVA
 - o Frequency: 60 Hz
 - o Impedance: 5.75% ± 7.5%
 - o Temperature rise: 65°C
- Options:
 - o Dead front
 - o Loop feed
- ⊙ Enclosure
 - o Indoor NEMA 1 or Outdoor NEMA 3R
 - o Mild steel tank & cabinet
 - Powder paint system; Color: ANSI 70 or Green Munsell 7GY 3.29/1.5
 - Weights: 7000 17500 lbs

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Low Voltage Mains & Feeders



Figure 14: Low Voltage Switchgear Showing Molded Case Circuit Breakers, and Lights & Control Switch



Figure 15: Low Voltage Switchgear Showing Insulated Case Circuit Breakers & Feeders

Large & Small Branch Circuit Protection Sections

- Low Voltage:
 - o 208V − 690V, 3Ø
- ANSI/UL 891 Listed & Labeled Low Voltage Main Protection and Feeder Sections Options:
 - UL 489 Insulated Case & Molded Case Circuit Breakers
 - Built to IEEE Std C37.20.1 with UL 1066 Listed Low Voltage Power Circuit Breakers
- Interrupting Rating:
 - o 18kA 200kA @ 480Vac
- Circuit breaker position Aux Contacts ("a" and "b")
- Your Choice of Circuit Breakers:
 - Low Voltage Power Circuit Breakers (LVPCBs)/ Insulated Case Circuit Breakers (ICCBs):

- Available from 100A up to 6000A
- LVPCBs UL[®] 1066 Listed
- ICCBs UL[®] 489 Listed
- See page 9 for table of available circuit breaker frame ratings
- Electrically or Manually Operated
- 100% Rated
- Fixed Mounted or Drawout
- Electronic Trip Units LI, LSI, LSIG
- o Molded Case Circuit Breakers:
 - UL[®] 489 Listed
 - Available up to 3000A
 - Manually Operated
 - Electrically Operated with Motor Operator Add-on
 - Standard or 100% Rated
 - Fixed Mounted
 - Thermal Magnetic or Electronic Trip Units – LI, LSI, LSIG

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Automatic Source Transfer



Figure 16: Skid-Mounted MTL-Series Unit Substation with Double Ended Substations for Automatic Transfer

Automatic Transfer for Double Ended Substations

- Add secondary paths to provide power to your feeders via a double ended substation
 - Enables the ability to feed loads from two different utility or generator sources automatically
- Automatic standby with Open Transition return operation:
 - Time delayed control sensor detects if a utility outage has occurred
 - When timer expires, the generator set is automatically started and brought up to speed and voltage
 - Utility circuit breaker opens and generator circuit breaker closes (after adjustable time delay) so that generator supplies power to the site load
 - When a healthy utility is connected for a set time delay, the generator breaker opens, and the utility breaker closes and Normal power is restored

- Automatic standby with Closed Transition return operation:
 - Time delayed control sensor detects if a utility outage has occurred
 - When timer expires, the generator set is automatically started and brought up to speed and voltage
 - Utility circuit breaker opens and generator circuit breaker closes (after adjustable time delay) so that generator supplies power to the site load
- When a healthy utility is connected for a set time delay and the generator is synchronized with the utility, the generator circuit breaker shall open within 100ms and Normal power is restored
- Call APT for Automatic standby with (Soft loading/Unloading) operation or Sustained Utility Paralleling operation

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Backup Portable Substations



Figure 17: GLQC Switchgear Exterior View

Figure 18: GLQC Switchgear Interior View

Integrated Generator / Load Bank Quick Connection

- Add the ability to connect temporary power to your substation to provide power to your feeders via integrated Generator Quick Connection
- 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
 - o 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
- Loadbank connection only applications
 - Easily connects a temporary loadbank to a facility's permanent generator(s)
 - o 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 for permanent generator load testing

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Motor Starting, Protection, & Control



Figure 19: MotorGo-Series Motor Starter Panel



Figure 20: PwrMotorL-Series 460V Motor Control Center Switchgear VFD Softstart Contactor Exterior



Figure 21: PwrMotorL-Series 460V Motor Control Center Switchgear VFD Softstart Contactor Interior

Motor VFDs, Soft Starts, Contactors Sections

- Add Motor Starting Capability to your Secondary Unit Substation
- Single Phase and Three Phase (115V – 575V) motor controls
- 0.5HP 400HP drives in a single standard section
- Over 400HP through 800HP drives can be housed in larger custom sized sections
- Hand-Off-Auto control switches and activity indicating lights gives users the ability to control motors from the control panel

- Terminal blocks as needed for customer field connections
- Able to house:
 - Variable Frequency Drives
 - Motor Soft Starters
 - o Manual Starters
 - Motor Controller Contactors
 - Overload Relays
 - Full Voltage Non-Reversing Starters
 - Full Voltage Reversing Starters
- Air Flow cutouts ensure proper cooling for the number of devices



Circuit Breaker Ratings

Breaker	Frame Rating (A)	Interrupting Rating (kA)			
Туре		240V	480V	600V	Sensor Plug (A)
Drawout	800	65	65	50	100, 250, 400, 600, 800
		100	100	85	
		200	150	100	
		200	150	100	
	1200	65	65	50	600, 800, 1000, 1200
		100	100	85	
		200	150	100	
		200	150	100	
	1600	65	65	50	800, 1000, 1200, 1600
		100	100	85	
		200	150	100	
		200	150	100	
	2000	65	65	50	1000, 1200, 1600, 2000
		100	100	85	
		200	150	100	
		200	150	100	
	2500	100	100	85	1200, 1600, 2000, 2500
		200	150	100	
	3000	100	100	85	1600, 2000, 2500, 3000
		200	150	100	
	4000	100	100	85	2000, 2500, 3000, 4000
		200	150	100	
	5000	100	100	85	2500, 3000, 4000, 5000
		200	150	100	
	6000	100	100	85	3000, 4000, 5000, 6000
		200	150	100	
Fixed	800	65	65	50	100, 250, 400, 600, 800
		100	100	85	
	1200	65	65	50	600, 800, 1000, 1200
		100	100	85	
	1600	65	65	50	800, 1000, 1200, 1600
		100	100	85	
	2000	65	65	50	1000, 1200, 1600, 2000
		100	100	85	
	2500	100	100	85	1200, 1600, 2000, 2500
	3000	100	100	85	1600, 2000, 2500, 3000
	4000	100	100	85	2000, 2500, 3000, 4000
	5000	100	100	85	2500, 3000, 4000, 5000
	6000	100	100	85	3000, 4000, 5000, 6000

Table 1: Available Circuit Breaker Ratings

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Typical GG Applications

Generator Only Configurations



Figure 22: Generator Paralleling with Temporary Loadbank Quick Connection, Gen Bus Tie & Distribution Feeders



Figure 23: Generator Paralleling with Gen Bus Tie & Distribution Feeders





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Typical UU Applications

Utility Source Only Configurations



Figure 25: Two Utility Sources Main-Tie-Main with Feeders on Both Ends of the Tie









Figure 28: Single Utility with Distribution Feeders

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Typical UG Applications

Utility & Generator Configurations



Figure 29: Generator Paralleling with Temporary Generator & Load Bank Quick Connection, Gen Bus Tie, Normal Utility & Distribution Feeders



Figure 30: Generator Paralleling with Temporary Generator & Load Bank Quick Connection, Gen Bus Tie, Normal Utility & Distribution Feeders







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.apt-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.