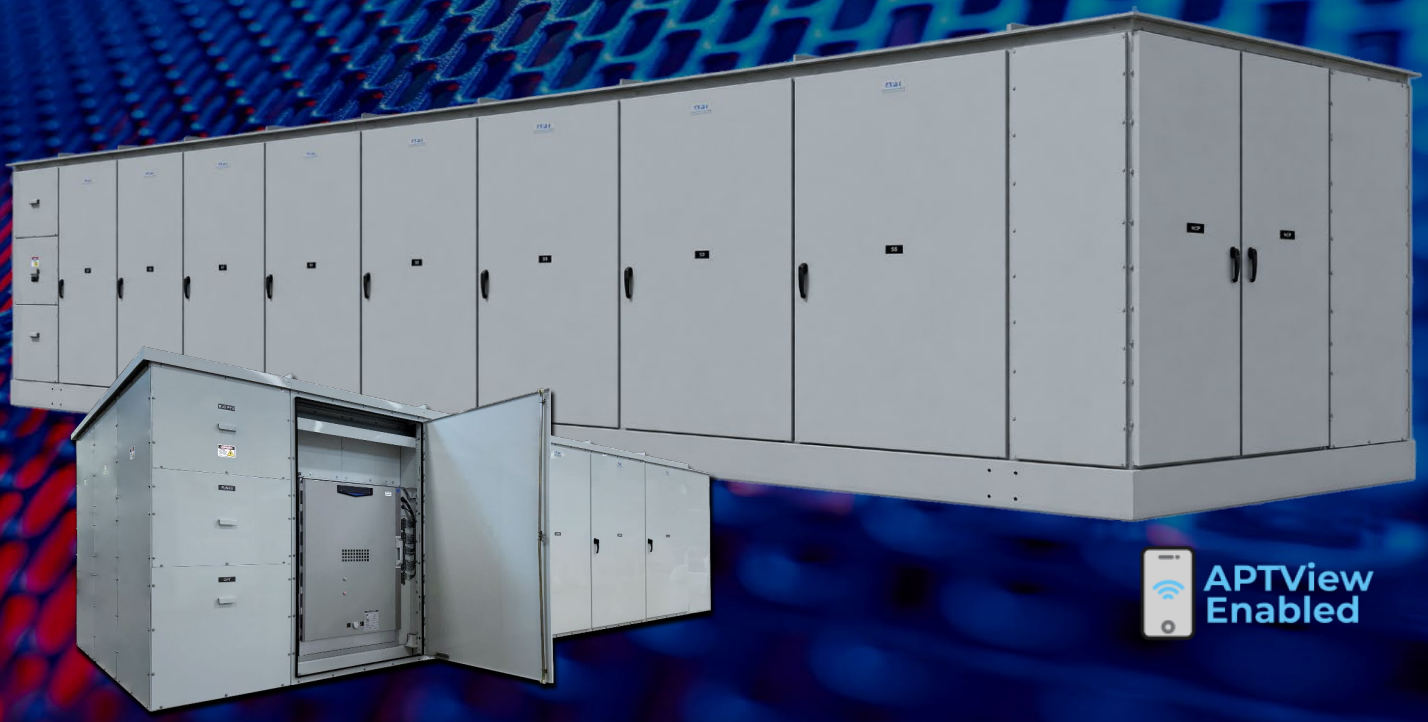
ADVANCED POWER TECHNOLOGIES

NEMA 1 • Outdoor 3R

# 38kV Class Metal Enclosed Vacuum Circuit Breaker Switchgear



APTView Enabled

## MEC38-Series
## Beyond Traditional Medium Voltage Switchgear

### Solutions Brochure


www.apt-power.com

1501 Veterans Memorial Pkwy E
Lafayette, IN 47905

(765) 446-2343


Volume Production

Advanced Engineered Solutions

MADE IN THE USA

Rev. 01

# Switchgear Construction



**Bus Potential Transformers (PTs)**
Bus voltage sensing for metering, protective relaying, and system monitoring.

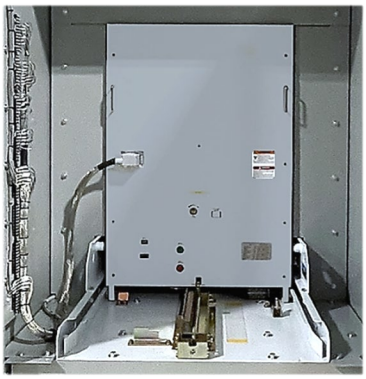
**Lightning Arresters**
Protect equipment from lightning and switching surges by limiting transient overvoltage's.

**Control Power Transformer (CPT)**
Supplies AC power for switchgear controls and battery charging systems.

**Vacuum Circuit Breakers**
Provide circuit switching and rapid fault interruption to protect connected equipment.

**Control & Protective Relaying Compartment**
Houses control and protective relays for system monitoring, fault detection, and breaker operation.

**Base**
ASTM A36 structural steel members continually welded and engineered for lifting and placing the skid with equipment installed.



**Vacuum Circuit Breakers**





**Control & Protective Relaying Compartment**



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# APTNextGen Architecture & Ratings

## APT's Flexible Next-Generation Medium Voltage Switchgear Platform Architecture Replaces Traditional Metal-Clad



Figure 1*

## Metal Enclosed Withdrawable Vacuum Circuit Breaker Switchgear for Tomorrow's Critical Infrastructure

### Flexibility of Design

**Installation Environment:** Suitable for Outdoor or Indoor installation.

**Vacuum Circuit Breakers:** Available in both fixed (optional) and withdrawable (standard) configurations, providing fast fault interruption, high reliability, and low maintenance requirements

**Load Interrupter Switches:** Provide reliable switching with visible isolation, with fault protection supplied by upstream devices or integrated fuse protection

**Optimized Section Dimensions:** Section dimensions optimized to accommodate the voltage class and equipment configuration to maintain required air insulation clearances and dielectric performance.

| Specification | Ratings & Options |
|---|---|
| System Voltages | 34.5 kV, 35 kV |
| Interrupting Capacity | 40 kA |
| Main Bus Ampacity | 600 – 4000* A |
| Bus Insulation Options | Standard: Bare<br>Optional: Insulated |
| Operation Modes | Manual, Automatic Open Transition, Automatic Closed Transition, Delayed Transition, Soft Transition |
| Transfer/Control Configurations | Utility-to-Generator, Utility-to-Utility, Generator-to-Generator, 3-Way |
| Circuit Disconnect Types | Withdrawable Vacuum Circuit Breaker (standard), Fixed Mount Vacuum Circuit Breaker, Air Insulated Load Break Switch |
| Reference Standards | ANSI/IEEE: C37.20.3, C37.09, C37.54 |

### Flexible & Durable Enclosure Options

Standard Indoor: NEMA 1
Weatherproof Outdoor: NEMA 3R Non-Walk-In (stainless hardware, pad-lockable doors)
APT PwrSkid: Outdoor Non-Walk-In Skid-Mounted

**Walk-in Solutions:**
APT PwrContainer: Compact Containerized Outdoor Walk-In Enclosure
APT PwrHouse: Outdoor Walk-In Enclosure

**Material & Finish Options:**
Carbon Steel, Aluminum, Stainless Steel (304 & 316)
Powder-coated ANSI 61 Gray or the color of your choice!



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Switchgear Sections and Features

## Simple To Service Modular Compartmentalized Switchgear

Our modular switchgear design is meticulously engineered for serviceability, reliability, and simplified integration, compliant with IEEE/ANSI, and component UL standards. Each specialized section is optimized and compartmentalizable to meet your exact application requirements.



Figure 3*

## Incoming Main & Utility Intertie Feed Sections

- **Rated Voltage:** 34.5 kV, 35 kV, up to 38kV, ensuring compatibility and safety with your utility grid.
- **Circuit Breakers:** Vacuum circuit breakers (VCBs) with withdrawable capability, simplifying maintenance and providing visible disconnect for operational safety.
- **Precision Instrumentation:** Integrated current transformers (CTs) and voltage transformers (PTs) configured for precise metering, monitoring, and protection.
- **Safety & Reliability:** Engineered with robust mechanical interlocks and clearly defined operational positions for maximum safety.

## Incoming Generator Sections

- **Enhanced Paralleling Capabilities:** State-of-the-art synchronizing equipment for seamless integration and paralleling of generators.
- **Flexible Breaker Configurations:** Fully withdrawable VCBs rated for continuous operation and quick maintenance.
- **Advanced Protection:** Comprehensive relay and protective systems safeguard generator integrity and ensure fault tolerance.
- **Maintenance Ease:** Optimized compartment design provides easy access to critical components, minimizing downtime.

# Switchgear Sections and Features

## Utility Bus Isolation Tie, Multi-Gen Bus Tie, Main-Tie-Main Sections

## Distribution Feeder Sections

- **Robust Source Transfer:** Designed for dependable automatic or manual transfer between multiple power sources without service interruption.
- **Seamless Controls:** Equipped with intelligent transfer controllers capable of automatic and fast switching between the power sources.
- **Digital Integration:** Advanced digital relaying and metering enhance system monitoring and fault identification, improving uptime.
- **Maximum Flexibility:** Designed to accommodate various operational and expansion scenarios seamlessly.
- **Flexible Power Distribution:** Optimized layout to ensure efficient and secure distribution to downstream loads.
- **Comprehensive Protection:** Integrated CTs and PTs, meticulously engineered for accuracy and reliability in protection schemes and power management.
- **Expandability:** Future-ready provisions included, facilitating easy upgrades or expansions as your needs evolve.
- **High Short-Circuit Withstand:** Engineered internal bus bars with exceptional thermal and mechanical stress resilience.

## Easy Integration & Planning

- Detailed dimensional layouts, clear equipment labeling, and precise technical drawings provided, ensures a straightforward submittal approval process, with revisions as required to ensure compliance with the project intent.
- Choose reliable delivery, flexibility, and performance — choose APT Switchgear solutions for your critical power infrastructure.



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Withdrawable Vacuum Circuit Breakers



Figure 6*

## Operational Simplicity for Frequently Maintained Systems

- **Withdrawable Removable Vacuum Circuit Breakers:** Provides visible disconnect of primary circuit to ensure safe maintenance and service on downstream load equipment.
- **Manual Charging Handle:** Allows for manual operation when control power source is not present.
- **Test Position:** Allows for testing of every aspect of the circuit breaker manual and electrical operation (trip, charge, close, position contacts, etc.) while circuit breaker's primary terminals are fully disconnected and circuit breaker is separated by safe distance from the switchgear cell.

## Safety Mechanisms for Mission-Critical Applications

- **Mechanical Interlocks:** Prevent withdrawal or insertion of the circuit breaker when main contacts are not open, ensuring operator safety.
- **Intermediate Position Lockout**: Breaker cannot be electrically or mechanically closed unless it is in fully connected or fully disconnected (in Disconnected or Test position), preventing unsafe operations.
- **Automatic Shutters:** Automatically cover primary connections when the circuit breaker is in Disconnected or Test position, or removed from the cell, reducing operator's exposure to live parts.

# Vacuum Circuit Breakers (VCB)

## Ratings and Features

| | |
|---|---|
| System Voltages | 34.5 kV, 35 kV |
| Maximum Voltages, kV | 38 |
| Power Frequency Withstand (1 minute), kV | 80 |
| BIL, kV | 150 |
| Continuous Current – Circuit Breakers, A | 600, 800, 900, 1200, 2000, 3000** |
| Interrupting Capacity – symmetrical, kA | 40 |
| Short time withstand, 2 seconds, kA | 40 |
| Mechanical endurance, operations | 10,000 (class M2 per IEEE C37.04 C37.06) |
| Interrupting Time | 3 cycles |
| Opening Time | Less than 40ms |

** Requires increased switchgear depth

- **High-Speed Operation:** Fault clearing in under 3 cycles with performance matching or exceeding industry-leading breakers, optimized for simplicity.
- **Rated Operation Sequences:**
  - O-0.3s-CO-3min-CO
- **Mechanisms and Interlocks:** Manufactured from stainless steel and other metals ensure reliable operation and ease of repairs.
- **Switchgear Insulation:** No reliance on custom moldings or extrusions. Industry standard readily available insulation type and shapes used in construction.

### Additional VCB Cell Features

- **Shutters:** When the breaker is removed, the shutters automatically close, separating the compartment from energized components
- **Grounded Metal Compartments:** All live parts are enclosed in grounded metal compartments; the breaker frame remains grounded during levering and in the connected position, enhancing safety.
- **Front Accessible Breaker Secondaries:** Front accessible circuit breaker secondary connectors and harness provides visual assurance of secure secondary connections and easy access for maintenance and inspection.



Figure 7*

# Vacuum Interrupters & Cable Connections

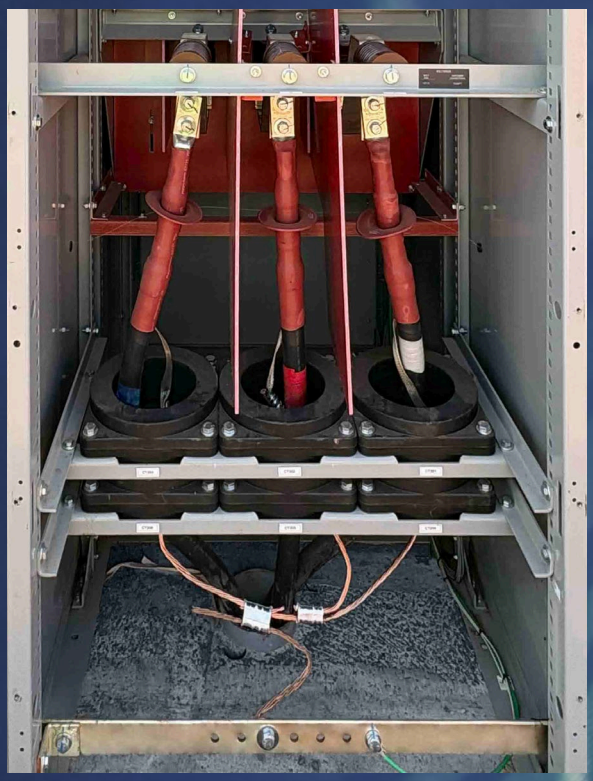


Figure 9*

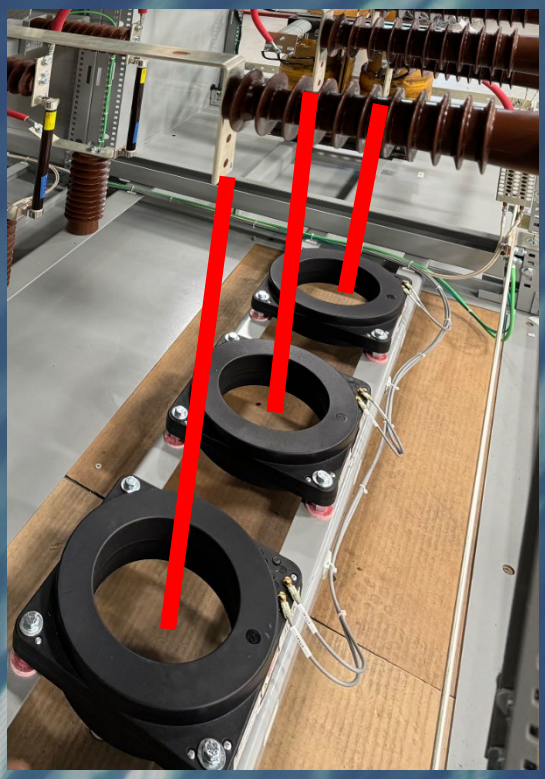


Figure 10*

## Reliable Interruption & Long-Life Contacts

- **Hermetically Sealed Vacuum Interrupters:** Ensure extinguishing of the arc and protect contacts from contamination, extending the lifespan of the breaker.
- **Copper-Chromium Vacuum Interrupter Contacts:** Provide superior dielectric withstand, very low contact resistance and low contact wear, ensuring reliable operation.
- **Low Arc Energy During Interruption:** Vacuum switching technology confines the arc within a sealed interrupter chamber, reducing energy dissipation.

## CT Installation Access & Available Schemes

- Shielded Power Cables Pass Through the Current Transformers installed on feeder cables or bus conductors to provide real-time current measurement for protection relays, metering, and system monitoring.
- Flexible Protection Architectures: CT inputs allow protection schemes to trip associated breaker or upstream main breaker/protective device when abnormal conditions are detected on downstream VCB or LIS circuits.

# Innovative Main Bus



Figure 12*

## 600A – 4000A Main Bus

- **Bracing Capacity:** Designed for systems ranging up to 38kV, with symmetrical short-circuit withstand capacities including 25kA, 31.5kA, 40 kA and up to 50* kA and beyond, ensuring robust performance under fault conditions.
- **Performance:** These ratings offer flexibility and reliable performance, accommodating power systems with various available fault currents.
- **Ease of Accessibility:** via Front, Rear and Top depending on switchgear configuration.

## Silver-Plated Copper Bus

- **Nominal Bus Current Ratings Available in:** 600A - 4000A @ 38kV max.
- **Rated short-circuit withstand time:** 2 Seconds
- **Superior Conductivity:** Silver plating improves surface conductivity and ensures minimum contact resistance versus alternatives.
- **Low Heat Generation:** Lower resistance in silver-plated conductors can lead to reduced heat generation under high current loads.



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Phase Barriers/Bus Segregation/Insulation



Figure 13*

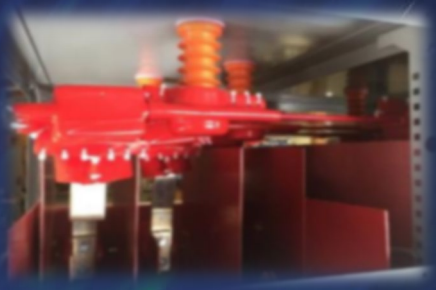


Figure 14*

## Phase Barriers and Bus Segregation*

- Insulating Barriers between phases eliminate the need for the taping of the cable connections simplifying and reducing the cost of installation. This also allows for easy visual, mechanical and electrical inspection of cable connections, simplifying the switchgear maintenance for the life of the installation.
- Insulating or grounded barriers are provided to separate main bus from the line and load connections, providing degree of protection for main bus from the faults in cable terminations as well as providing degree of protection for the qualified personnel working in the cable connection area while the main bus is energized.

## Bus Insulating Covering Options*

- Switchgear buses are generally designed to meet the dielectric withstand requirements of 80 kV for one minute and BIL of 150 kV with “uninsulated bus” and therefore not be dependent on any insulating bus coverings.
- Optional heat shrinkable or fluidized bed epoxy type coverings are available to supplement the dielectric strength and provide degree of protection in case of accidental contact by small animals or persons. In this case bolted connections are covered with removable insulating boots.



Figure 15*



Figure 16*



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Instrument Transformers – PTs, CTs



Figure 17*

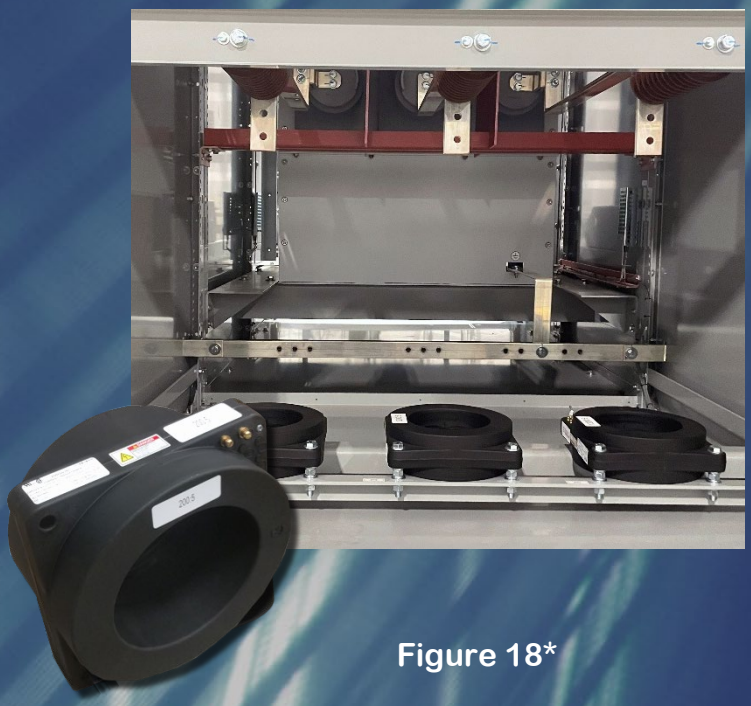


Figure 18*

## Precision Voltage Transformers (VTs/PTs)

- **Configurable Voltage Sensing:** Fused Potential Transformers connected in WYE/WYE Fixed or Drawer mounted, enabling precise voltage sensing tailored to specific application needs and system requirements.
- **Reliable and Accurate:** Accuracy Class 0.3WXMYZ ensures accurate voltage measurements critical for protection, metering, and system monitoring.
- **Available on:**
  - Utility Sections for Line Side Incoming Main/Utility Sensing
  - Generator Sections for Line Side Incoming Generator Sensing
  - Single or Multiple Main Bus Sensing
  - Distribution Feeder Sensing

## Advanced Current Transformers (CTs)

- **Diverse Application Support:**
  - Ratios: 50:5 - 4000:5
  - Relay Class: C10 – C400
  - ANSI Metering Class: 4.8B0.1 – 0.15B1.8 and beyond
- **Precision Metering Options:** Available in standard accuracy or high-precision, revenue-grade metering accuracy to support critical measurement and billing applications.
- **Mounting Over Shielded Power Cables:** allows for maintenance and replacement of the load side current transformers (with the corresponding feeder circuit breaker in Test/Disconnected Position) while the main bus remains energized, significantly improving the continuity of service.



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Protective Relaying Functions














Figure 19*



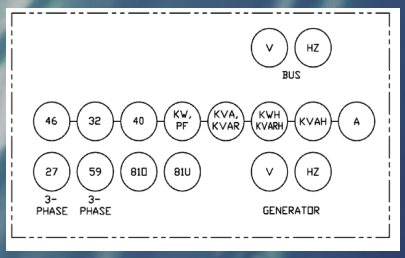




Figure 20*

## Digital Multifunction Relays

APT uses industry-leading relay brands such as SEL, GE Multilin, Basler, Beckwith, ABB, Eaton, Siemens and more for overcurrent, voltage, frequency, differential, distance, directional power and ground fault protection in the following applications:

- Utility Intertie
- Paralleling Protection
- Advanced Generator Protection
- Tie Protection
- Transformer Protection
- Feeder Protection
- Various Differential Protection Schemes

All devices are factory-labeled and documented in submittals with wiring diagrams.

## Common Relaying functions

- **50/51** – Inst./Time Overcurrent
- **50N/51N** – Inst./Time Ground Overcurrent
- **27/59** – Under/Overvoltage
- **59N** – Ground Overvoltage
- **81U/81O** – Under/Overfrequency
- **25** – Synch Check
- **32** – Reverse Power
- **40** – Loss of Excitation
- **60** – Current Balance
- **67** – Directional Overcurrent
- **86** – (LO) Lock-Out Relay (Knob Grip)
- **87** – Differential Protective Relay
- **87B** – Bus Differential
- **87G** – Generator Differential
- **And More!**

# Lockout Relays & Test Switches



Figure 21*

## Optional Test Switches & Test Plugs

- Provide a safe, simple, fast, and reliable method to isolate, test, and service installed equipment without disturbing the power system.
- Permits convenient isolation of relays, meters, and instrument transformers (PTs & CTs).
- Allows for quick and easy multi-circuit testing by conventional test methods.
- **Test Plug:** Enables easier measurement, calibration, verification and maintenance of relays, meters, PTs, & CTs.
- Conveniently connects external instruments to the same currents and voltages being applied to the panel relays and meters by the PTs, & CTs, without interrupting or short-circuiting the circuit.

## Lockout 86 Function

- **Fail-Safe Design:** Designed to remain in the lockout condition until manually or electrically reset, ensuring full inspection before re-energization.
- **Knob-Grip Manual Reset:** Heavy-duty mechanical lockout relay with a manual reset knob. Activates on critical protection trips to disable automatic reclosing.
- **Visible Mechanical Target:** Red "TRIPPED" indicator shows at-a-glance breaker lockout condition.



Figure 22*

# Power Sensing & Revenue Grade Metering




Figure 23*




Figure 24*

## High Accuracy Power Quality Metering

| METERING | | | |
|---|---|---|---|
| Parameters | Accuracy | Resolution | Range |
| Voltage | 0.5% | 0.1V | 20V 1000kV~ |
| Current | 0.5% | 0.001A | 0~50000A |
| Current Demand | 0.5% | 0.001A | 0~50000A |
| Power | 0.5% | 1W | -9999MW 9999MW~ |
| Reactive Power | 0.5% | 1Var | -9999Mvar 9999Mvar~ |
| Apparent Power | 0.5% | 1VA | 0~9999MVA |
| Power Demand | 0.5% | 1W | -9999MW 9999MW~ |
| Reactive Power Demand | 0.5% | 1Var | -9999Mvar 9999Mvar~ |
| Apparent Power Demand | 0.5% | 1VA | 0~9999MVA |
| Power Factor | 0.5% | 0,001 | -1.0~1.0 |
| Frequency | 0.2% | 0.01Hz | 45.00~65.00Hz |
| Energy | 0.5% | 0.1kWh | 0~99999999.9kWh |
| Reactive Energy | 0.5% | 0.1kvarh | 0~99999999.9kvarh |
| Apparent Energy | 0.5% | 0,1 V ah | 0~99999999.9kVAh |
| Harmonics | 1.0% | 0,01% | |
| Meter Running Time | | 0.1hrs | 0~999999999.9hrs |
| Load Running Time | | 0.1hrs | 0~999999999.9hrs |

- Optional Revenue Grade
  - Active Energy Accuracy according to ANSI C12.20: Class 0.2s
- Optional Data Logging
- Optional Time of Use
- Optional Waveform Capture & Event Logging
- Optional Harmonic Resolution to the 63rd

## Standard Advanced Metering Functions

- Voltage: $V_A$, $V_B$, $V_C$, $V_{AB}$, $V_{BC}$, $V_{CA}$
- Current: $I_A$, $I_B$, $I_C$, $I_N$
- Power: $P_A$, $P_B$, $P_C$, $P_{sum}$
- Reactive Power: $Q_A$, $Q_B$, $Q_C$, $Q_{sum}$
- Apparent Power: $S_A$, $S_B$, $S_C$, $S_{sum}$
- Frequency: F
- Power Factor: $PF_A$, $PF_B$, $PF_C$, PF
- Energy: $Ep_{import}$, $Ep_{export}$
- Reactive Energy: $Eq_{import}$, $Eq_{export}$
- Apparent Energy: Es
- Demand: $Dmd_{IA}$, $Dmd_{IB}$, $Dmd_{IC}$, $Dmd_P$, $Dmd_Q$, $Dmd_S$
- Power Quality
- Voltage Harmonics: 2nd - 31st and THD
- Current Harmonics: 2nd - 31st and THD
- Voltage Unbalance Factor: $U_{unbl}$
- Current Unbalance Factor: $I_{unbl}$
- Max/Min Statistics
- Meter Running Time and Load Running Time
- Pulse Output option
- RS485, industry standard Modbus RTU protocol
- Alarm Parameters
- Active Energy Accuracy according to ANSI C12.20: Class 0.5s



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Utility & Generator Control/Paralleling



Figure 26*



Figure 27*



Figure 25*

## Connect, Protect, Control

Utility Integration & Load Management

- Utility Intertie (UI)
- Utility Paralleling (UP)
  - Peak Shaving (PS)
  - Import/Export Control (IE)



Figure 28*



Figure 29*



Figure 30*

## Seamless Power Continuity

Generator Paralleling & Redundancy

- ACM 5150 Paralleling Controller (PG1)
- N+1 Redundant Backup Transfer (N1)

# Automatic & Manual Transfer Controls



Figure 31*

## Switch Smarter, Power Safer

Automatic Transfer Systems

- Open Transition (OT2)
- Closed Transition (CT1)
- Soft loading & Unloading (SL1)
- Automatic Return to Normal (AR) – Standard
- Operator-Supervised Return (NA) – Optional



Figure 32*

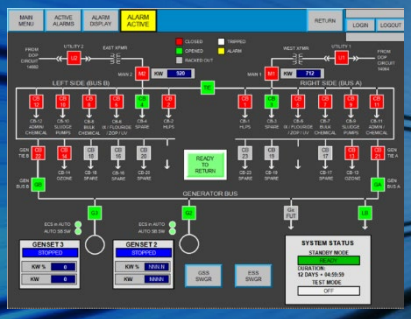


Figure 33*

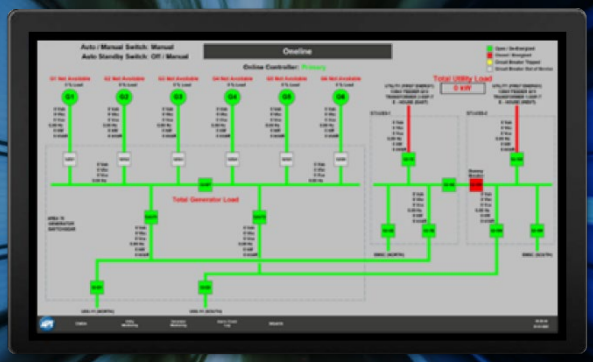


Figure 34*

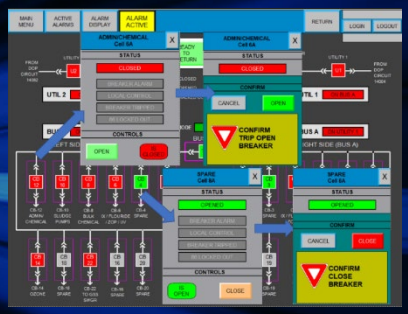


Figure 35*



Figure 36*

## Safe Maintenance, Minimized Downtime

Maintenance & Bypass Isolation

- Main-Tie-Main Operation (MTM)
- Automatic Bypass (ATO-BI)
- Manual Bypass/Isolation (BI)
- Manual Transfer (MT) w/Captive Key Interlocking
- Solenoid Key Release Bypass (SK)

# Advanced SCADA Controls - APTView

## Demand Control, Simplified

Advanced Load Management

- Load Shed Prioritization (LSC)
- Load Add Control (LAC)
- Load Demand Optimization (LDC)



Figure 37*



Figure 38*

## Advanced Master Control

20” minimum Touchscreen Display
Microgrid & Island Mode Capabilities

- Black Start for Turbines
- Island Mode Control (IM)
- Microgrid Integration (MG)

APT VIEW ENABLED

APT View ENABLED

APTView Enabled

## Control From Anywhere, Anytime

SCADA & Remote Management

- APTView Remote SCADA (AV)
- External BAS Integration (BSI)




Figure 39*



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Master Control Panel (MCP)

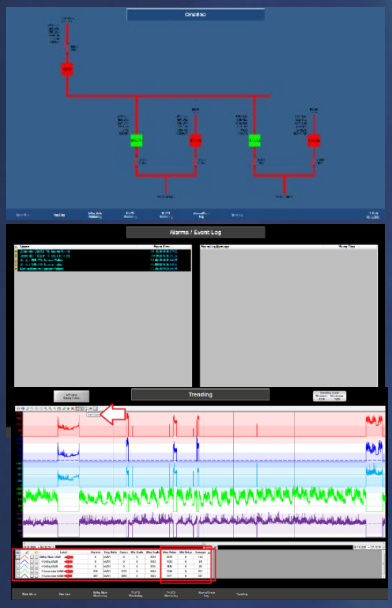


Figure 40*



Figure 41*





Figure 42*

## Master Control Panel Benefits

- Provides for the central point of control and monitoring of an entire system and interfaces with control systems at other locations.
- Configurable for control of incoming/outgoing utilities, tie breakers, generation sources, and load feeders for the ultimate in control flexibility.
- Customizable for any system/requirements.
- Provides events logging and automatic responses to changing conditions.
- Integrates the various pieces defined in other documents and makes them a system.
- Allows for full operational control and monitoring while keeping the operator outside of the arc-flash zone.
- Uninterruptable Power Supply keeps unit powered during unplanned outages

## APT Intelligent Master Control Features and Parameters

- Monitoring of generator, utility and load electrical data:
  - Line to line voltages: Vab, Vbc, Vca
  - Source frequency: Hz
  - Phase currents: Ia, Ib, Ic
  - 3Ø power: kW, PF, kVAR, kVA
  - 3Ø energy: kWh import, kWh export, kVARh import, kVARh export
- Bus electrical data:
  - Line to line voltages: Vab, Vbc, Vca
  - Bus Frequency: Hz
- System Status Information (alarm and events log):
  - Source and Feeder circuit breakers position
  - Circuit breaker control switch in Trip position
  - Protective relaying trip
  - Battery charger alarms



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# DC Control Power – Batteries & Chargers

## Comprehensive Switchgear Station Battery Systems

Whether you have an existing switchgear station battery system or are looking to purchase one, APT offers flexible battery solutions across multiple chemistries and voltages (24VDC, 48VDC, and 125VDC), tailored to your project's specific requirements and preferences.
Our standard 24 VDC battery system solutions deliver exceptional reliability, minimal maintenance, and robust performance, complemented by advanced integrated battery chargers designed specifically for our medium voltage (2.4kV–38kV, 3Ø) switchgear applications.

## APT 24 VDC Switchgear Battery System Features

- **Maintenance-Free Operation:** Fully sealed, eliminating routine electrolyte checks.
- **Reliable High-Current Delivery:** Stable and dependable current for breaker trip/close and protective relay functions.
- **Compact Design:** Optimized for installations where space is limited.
- **High Efficiency & Fast Recharge:** Quick recovery to full capacity following discharge events.
- Standard Voltage: **24 VDC**

## Optional Enhanced Features (Available Upon Request)

- **Extended Lifecycle:** Long-lasting performance with minimal degradation.
- **Advanced Battery Management System (BMS):** Real-time diagnostics, automated balancing, and continuous health monitoring & alarm status.
- **Ultra-Compact & Lightweight Construction:** Further reduced space requirements and ease of installation.
- **Enhanced Cycle Life & Longevity:** Superior long-term performance for demanding applications.
- Optional: **48 VDC, 125 VDC** upon request.




Figure 43*



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# Specialty 48VDC & 125VDC Systems

## Nickel-Cadmium (NiCd) Rugged Reliability

- **Extreme Temperature Tolerance:** Excellent performance from -40°C to +50°C, ideal for harsh outdoor installations.
- **Long Service Life:** Robust construction delivers 15–25+ years of dependable service.
- **High Discharge Resilience:** Exceptional performance during deep discharge cycles and rapid recovery capability.
- **Maintenance Considerations:** Moderate routine maintenance (periodic electrolyte replenishment) balanced by exceptional reliability and lifecycle cost-effectiveness.
- **Advanced features supplied as required**



Figure 44*

## Flooded Lead Acid (FLA) Proven Performance

- **Reliable, Proven Technology:** Long-established battery type delivering predictable performance and dependable service over 15–20 years.
- **High Current Capability:** Handles high instantaneous currents for breaker operations effectively.
- **Routine Maintenance:** Requires periodic electrolyte checks, watering, and maintenance, suitable for installations with structured maintenance resources.

## Lead Selenium (PbSe) Premium Longevity

- **Extended Lifecycle:** Proven 15–20+ years of service life with excellent cycling capability.
- **Reduced Maintenance:** Low-maintenance vented battery type, fewer watering intervals than standard flooded cells.
- **Enhanced Thermal Stability:** Reliable in demanding environments with temperature fluctuations.
- **High-Rate Discharge:** Strong, stable current output ideal for breaker tripping and high load demands.

# Switchgear Surge Arresters

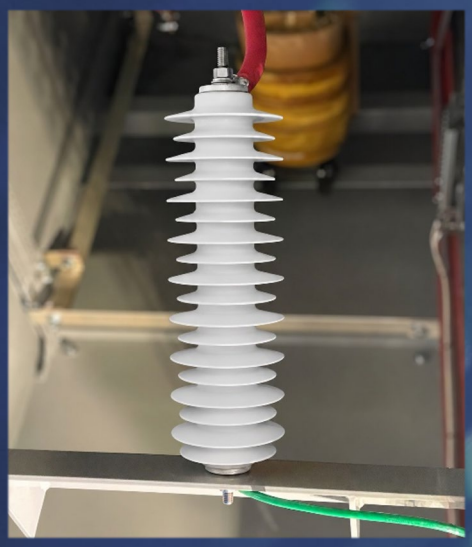


Figure 45*



Figure 46*

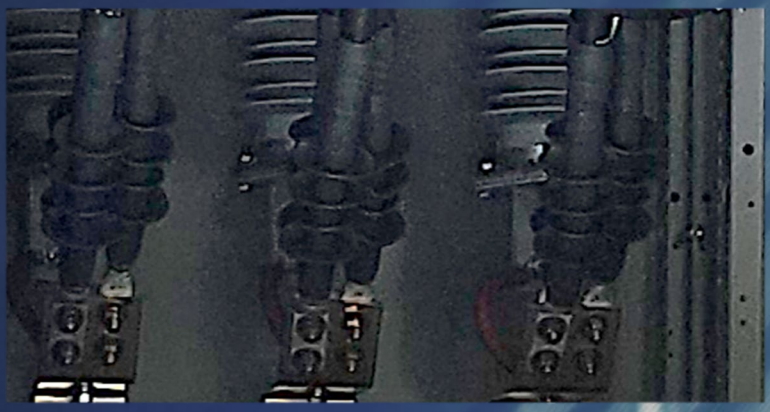


Figure 47*

## Integrated Protection for Medium Voltage Switchgear

**APT switchgear integrates high-performance metal oxide surge arresters to protect 38 kV systems from transient overvoltages caused by lightning strikes and switching surges. These arresters safeguard critical components; such as breakers, buses, and transformers as well as loads by limiting voltage to safer levels during surge events.**

## Available Arresters Characteristics & Classes

- **Metal-Oxide Varistor (MOV) Design: Gapless design ensures fast, consistent clamping without triggering delays.**
- **Polymer Encapsulated Housing: UV- and weather-resistant for long-term performance.**
- **Maintenance-Free: No required service or inspections over arrester life.**
- **Placement Options: Configurable for incoming lines, main bus taps, and feeder sections depending on system exposure and equipment sensitivity.**

| Class | Use Case | Key Performance Features |
|---|---|---|
| **Distribution Class** | General duty protection for power systems | • Available in light, normal, and heavy duty<br>• Compact size<br>• Ideal for transformer and feeder protection |
| **Intermediate Class** | Enhanced protection for moderate surge environments | • Better clamping performance than distribution<br>• Higher energy handling<br>• Rugged, compact design for switchgear integration |
| **Station Class** | Highest-performance arrester for critical assets | • Best voltage protection<br>• Highest energy and fault current withstand<br>• Preferred for rotating machinery protection |



*Due to ongoing product improvements, actual delivered products may differ from the images shown.
*Optional equipment features are frequently illustrated.
*Availability of options varies by product series.

# About Advanced Power Technologies







Advanced Power Technologies (APT) is a leading innovator in engineered low and medium voltage power systems, delivering customized solutions worldwide. From our strategically central headquarters in Lafayette, Indiana, we design and manufacture precision-crafted switchgear, switchboards, and electrical infrastructure systems.

**Decades of Expertise, Customized Solutions**

Our skilled engineering team brings extensive experience across industries such as utilities, data centers, healthcare, agriculture, education, and commercial manufacturing. Leveraging cutting-edge switchgear technologies, we specialize in:

- 208V-800VAC Switchgear & Switchboards
- 2.4kV-38kV Custom Metal Enclosed/Clad Style Switchgear
- Generator Enclosure Package Integrated Equipment
- Utility and Generator Paralleling, Transfer, Peak Shaving & Distribution Switchgear
- Automatic & Manual Load Transfer Switchgear
- Outdoor Walk-In Electrical Houses (E-Houses) & Skid-Mounted Switchgear
- Containerized Switchgear & Battery Energy Storage Systems (BESS)
- Generator/Load Bank Quick Connection Switchgear, Switchboards, & Tap Boxes
- Microgrids, Master Control Panels, SCADA Systems
- Low & High Resistance Grounding Systems
- Bypass/Isolation & Power Distribution Circuit Breaker Switchboards
- Photovoltaic (PV) Solar Power Collection & Renewable Energy Storage Systems
- Motor Control Centers & Motor Control Switchgear
- High Efficiency Combined Heat and Power (CHP, Co-generation) Switchgear & Control Systems
- Industrial Control Panels

**Precision Manufacturing & Innovation**

APT proudly offers complete in-house, Made-in-USA manufacturing with precision metal fabrication capabilities, ensuring unparalleled quality, rapid turnaround, and tailored solutions that meet your exact specifications. As an OEM partner with industry leaders like Siemens, Square D, ABB, LG, and Eaton/Cutler Hammer, we integrate superior components into every system.

**Flexible, Efficient, Scalable Solutions**

APT provides highly flexible solutions with efficient production processes and scalable manufacturing capacities, tailored specifically to meet the demands of high-volume customers. Our capabilities position us ideally to serve large-scale operations including oil and gas producers, large data centers, extensive solar portfolios, and projects specified by leading engineers and facility managers.

**Compact, Efficient, Reliable**

APT excels at optimizing facility footprints and reducing installation costs through innovative, space-efficient designs. Each project benefits from our collaborative approach, open communication, and relentless commitment to customer success.

Discover more at www.apt-power.com, and let APT engineer the perfect power solution for your facility.