



Advance and Advance 27

Non-arc-resistant MV ANSI switchgear

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Agenda

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- Ratings, dimensions & qualifications
- MV ANSI circuit breakers for Advance and Advance 27
- Design features
- Auxiliary compartments
- Enclosures
- Accessories
- Key options
- Key differentiators and values



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Ratings, dimensions, and qualifications

Metal-clad non-arc-resistant switchgear

Voltage ratings:	Advance = 5, 8.25 and 15 kV; Advance 27 = 27 kV
Continuous current ratings:	5-15 kV - 1200, 2000, 3000 A, (4000 AFAC*); 27 kV – 1200/2000 A
Interruption ratings:	5-15 kV - 25, 31.5, 40, 50 and 63 kA; 27 kV – 16, 25 kA
Enclosure type:	Category B
Enclosure dimensions:	36”w x 95”h x 85/92”d (27kV is 92”d only)
Outdoor enclosure:	Outdoor non-walk-in; single row walk-in or PDC
Certifications:	Advance = C37.20.2-1993; UL; CSA**; Advance 27 = C37.20.2-1993; UL
Rear 10” or 20” extensions (bolt on) available. Front 10” extension (bolt on) is available	
Seismic qualified to:	UBC-1997, IBC-2012, CBC-2013, ASCE 7-10 SDS = 2.0 g, SS = 3.0 g, Ip = 1.5 for z/h = 1 IEEE 693-2005 “Inherently Acceptable”

* 4000 A is forced air cooled rating

**CSA available for 5/15 kV only

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MV ANSI circuit breakers

Key features and values

- All breakers have integrated racking trucks
- Roll-on-floor options are available to allow breakers in lower compartments to be rolled directly into the frame without the use of ramps or lift trucks
- ADVAC breakers require the least amount of maintenance of all spring-charged mechanism breakers on the market today
 - SmartCoil quick change technology included with ADVAC Model 4 breakers
- AMVAC breakers require the least amount of maintenance of all breakers on the market
- AMVAC comes standard with a 5-year warranty



ADVAC® Model 4



AMVAC™ Model 4



ADVAC® Classic

Breaker	Voltage Class (kV)	Continuous Current (A)	Short circuit withstand (kA)	Close and Latch (kA, peak)	BIL (kV, peak)	Low Frequency Withstand (kV)
ADVAC M4	5, 8.25, 15	1200, 2000, 3000	25, 31.5, 40, 50	65, 82, 104, 130	60, 95	19, 36
AMVAC M4	5, 15, 27*	1200, 2000, 3000	25, 31.5, 40, 50	65, 82, 104, 130	60, 95, 125*	19, 36, 60*
ADVAC Classic	5, 15	1200, 2000, 3000	63	164	60, 95	19, 36

*AMVAC 27 ratings = 1200 and 2000 A, 25 kA maximum, Breaker is UL certified to 28.5 kV
ADVAC breaker not available for Advance 27

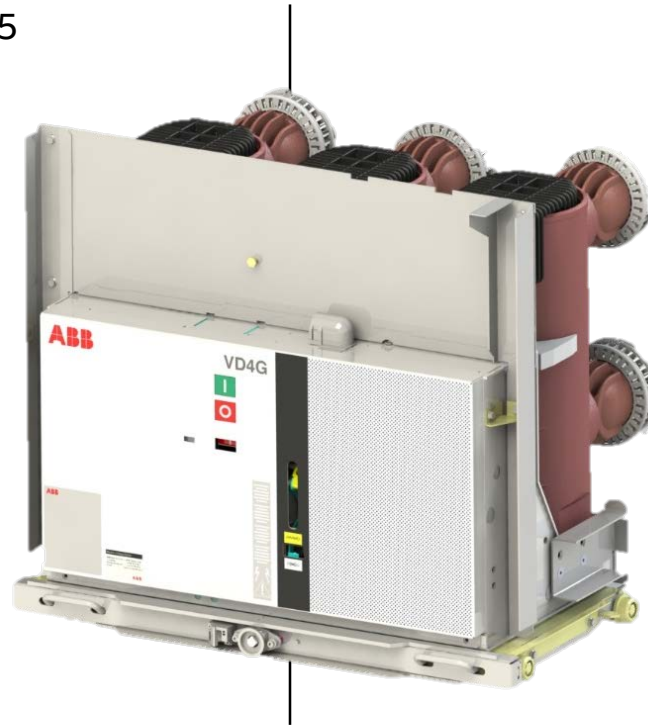
Advance

Generator circuit breakers

Generator circuit breakers

Tested to new combined IEC/IEEE 62271-37-013: 2015 standards

- 50 kA GFF/50 kA SFF – Advance/SafeGear
 - Non-UL version released Q4-2017
 - UL version to be released when 50/63 GCB is completed
- 25 kA GFF/40 kA SFF – Advance/SafeGear
 - UL version released Q4-2017
- 50 kA GFF/63 kA SFF – for use in SafeGear HD platform only. **Currently in development**



Customer values

- Tested to the latest global combined standards
- Enables compact and full protection and connection of small power generators
- Best footprint for generator applications
- Tested for out-of-phase switching and dc-components up to 130% - better than competitors
- Can be used with the ABB SmartRack® electric racking system

GFF – Generator Fed Fault

SFF – System Fed Fault

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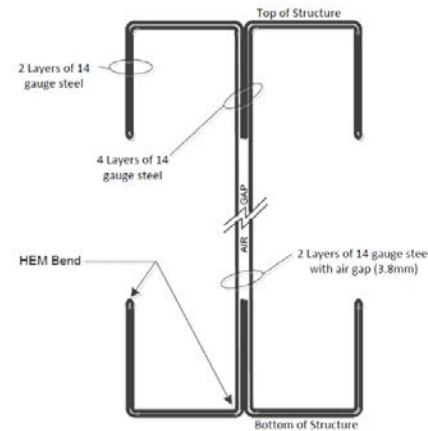
Design features

Galvanized steel construction



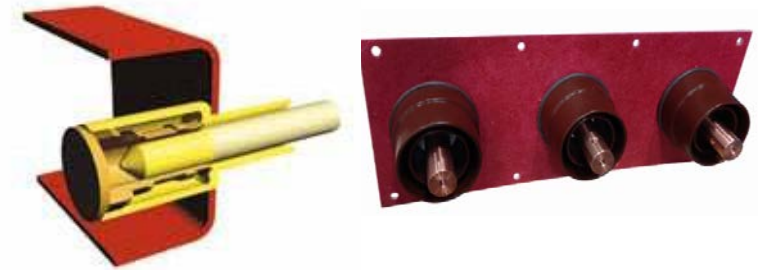
- High reflectivity increases visibility in compartments
- Corrosive resistant-suitable for use in unusual environment conditions
- Modular construction provides isolated LV compartments for increased personnel safety

Hem bending



- Superior strength and rigidity
- Reduced sharp edges for increased safety
- Reduces arc propagation between compartments
- Forms a self-supporting structure

Delrin technology



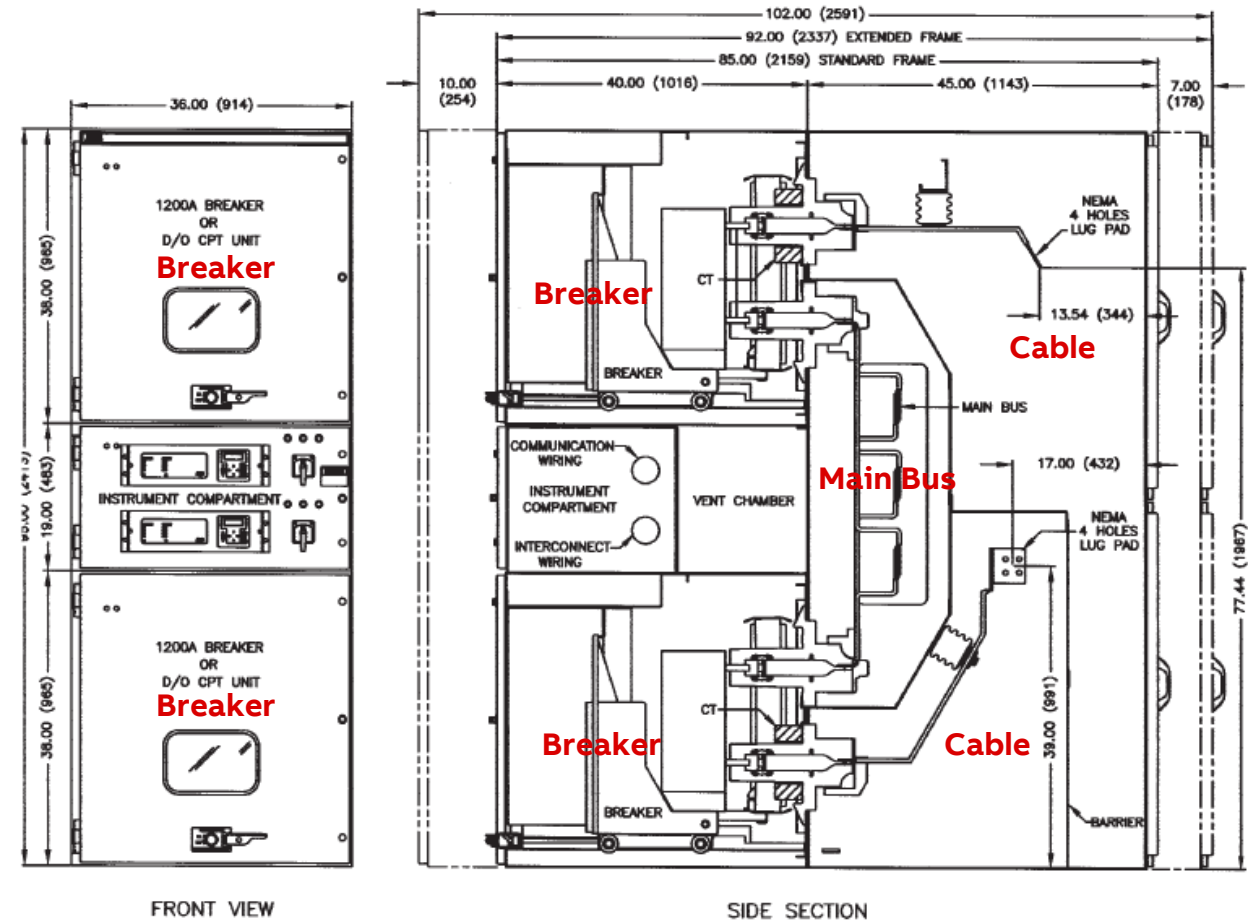
- PT, CPT, and CPT fuse primary connections use Delrin tipped primary contacts
- Increased personnel safety by eliminating arcing during racking
- Negates the need for shutters in auxiliary device compartments

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Design features

Compartments

- Breaker – top or bottom, one-high or two-high (stacked)
- Instrument – LV compartment – isolated from HV
- Auxiliary compartments
- Main Bus Compartment
- Cable compartment
- Vent chamber (used for cooling in Advance)
- 10-inch front extension can be added – allows relays and instruments to be located on breaker doors
- Modular design offers great flexibility in design configurations, increased personnel safety and robust structural integrity.



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Design features

Breaker compartments

- Automatic primary and secondary disconnects
- Shutters to cover primary contacts
 - Advance standard: grounded metal, Lexan available. Advance 27 standard: Lexan
- Breaker position indicator
- Large viewing window on breaker door for quick, easy breaker position verification
- Dead front design when breaker is installed
- Breaker to door interlock available
- Closed door racking for personnel safety
- Current transformers located on bushings
- SmartRack remote racking system available – keeps operators away from switchgear



Customer values

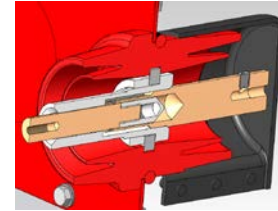
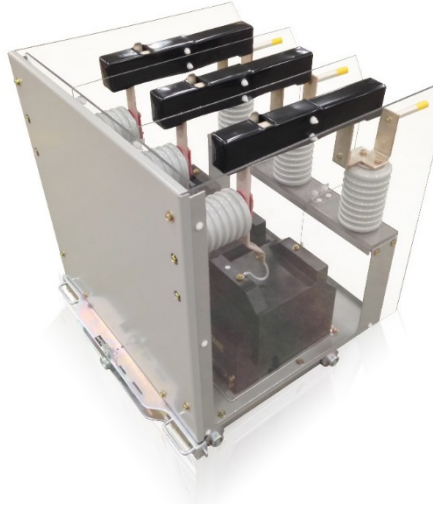
- Closed-door racking provides a higher degree of operator safety than typical open door racking
 - SmartRack remote racking available – improves operator safety
- Automatic primary and secondary contacts for increased reliability
- Large viewing windows and position indicators – safely determine the breaker position within the frame
- Automatic shutters for ensuring all primary parts are not exposed

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Auxiliary compartments

PT, CPT, and CPT fuse compartments

- Closed door racking
- Delrin snuffer contact technology
- PTs – Wye-Wye, Open Delta, Broken Delta
- CPT – 5, 10 or 15 kVA, single-phase w/integral fuse
- Standard secondary breaker mechanically interlocked with CPT truck
 - CPT Fuse – Single- or three-phase applications
 - For remote or rear mounted CPT
 - 5/15 kVA up to **112.5** kVA 3-ph, **50** kVA 1-ph
 - 27 kV up to 45 kVA 3-ph, 50 kVA 1-ph



Customer values

- Closed-door racking provides a higher degree of operator safety than typical open door racking
- Delrin snuffer contact technology increases product reliability and operator safety
- CPT rollout compartments provide increased flexibility and compactness of design

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Tools and accessories

Tools and accessories

- Breaker operation accessories:
 - Racking crank and lifting yoke
 - Test jumper – connects between compartment and externally located breaker
 - Test cabinet – allows testing in adjacent room
- SmartRack remote racking system
 - Electrically racks the breakers in and out of the compartment – keeps personnel away from frame
- Hydraulic foot operated lift truck
- Manual and electrically operated Ground & Test devices (up to 50 kA)
 - Safely ground primaries when performing maintenance



Customer values

- G&T devices provide means to safely test and ground the primary circuits for maintenance personnel
- SmartRack provides personnel safety by allowing operators to rack breakers in and out while being safely away from the switchgear
- Lift trucks provide safety to operators while moving, installing and removing breakers from the cell
- Tools and accessories provide the means to easily operate and maintain the circuit breakers used in switchgear

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Key options

Ultra Fast Earthing Switch (UFES)

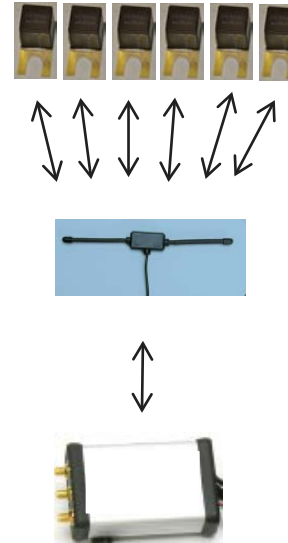
- Incident energy level reduction device
- Clears arc faults by grounding system
- ≤ 4 ms to extinguish arc fault
- Can work as stand alone or in conjunction with REA arc detection system
- Increases personnel safety by reducing the incident energy level
- Prevents switchgear damage – increased reliability



Asset health monitoring

Two options available:

- **Wired version**
 - Temp only
- **Wireless version**
 - Temp, humidity, PD
- HMI for front of switchgear available
- Improves personnel safety as IR ports not needed
- Increases reliability by detecting potential issues before they create a fault



REA arc detection system

High speed arc detection < 2.5 ms

- Light detection via fiber optic
- Light or light and current can trip
- Multi-shot use
- Can be coordinated with other protective devices such as the UFES
- Clears arc fault in 53-85 ms via breaker

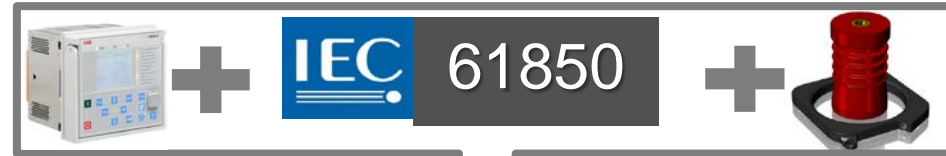


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Key options

Digital switchgear solutions

- **IEC61850 w/GOOSE messaging & process bus**
 - Voltage & current sensors
 - Low energy analog input relays
- **Safety**
 - No open secondary CT issue
 - Low output voltages (mV)
- **Simple** - up to 80% less wiring
- **Reliable**
 - No CT saturation
 - No Ferro resonance
- **P&C flexibility** – Last minute load changes are no problem



Fault current protection

FC protector and IsLimiter

- Solves problems of short circuit values exceeding equipment ratings
- IsLimiter easily coordinated with P&C systems
- Construction savings
 - Cables, raceway, replacing switchgear



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Key options - enclosures

Enclosure types

- Indoor construction as defined by ANSI C37.20.2
- Outdoor enclosures available:
 - Outdoor non-walk-in (ODNWI)
 - Outdoor single-row walk-in (ODSRWI) (aka sheltered aisle)
 - Power Distribution Center (PDC) (aka E-House)
- ODNWI – designed and tested per ANSI C37.20.2
 - Similar to NEMA 3R
 - Designed and manufactured by ABB
- ODSRWI – designed & manufactured by Switchgear Power Systems (SPS)
 - NEMA 3R construction
- PDC's by 3rd party suppliers



Customer value

- Enclosures designed and tested to ANSI standards ensures highest quality and reliability
- ODNWI enclosures are a low cost option for unmanned sites
- ODSRWI enclosures provide aisle space for operating and maintaining equipment out of the weather elements

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Key options - utility metering cabinets

Advance/Advance 27 – UMC features and ratings

- Voltage ratings of 5, 8.25 and 15 kV
- Fault current ratings of 25, 31.5, 40 & 50 kA
- Continuous current ratings of 1200/2000/3000 A
- Certified to ANSI 37.20.2
- Typical dimensions: 36-60”w x 95”h x 85/92”d
- Padlockable and sealable PT, metering and CT compartments
- Available in hot or cold sequence configurations
- Top or bottom entry with bus duct or cables
- Custom designs can be made for just about any utility

UMC customer value

- Flexibility in design to meet most all utility requirements
- Can be integrated into the switchgear line-up, or set as stand alone
- Flexible cable entry options that can accommodate large or multiple cables or bus duct
- Pre-engineered and approved designs for: EUSERC 400 std, Idaho Power, NV Energy, PG&E, Portland Gen.Elec, Power Utility Districts, Puget Sound Energy, Sempra Energy
- ABB can obtain UMC design approval directly with the utility

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Key differentiators and values

Differentiator

- Separate low voltage compartment for instrumentation mounting
- Use of hem bending and galvanized steel
- Modular building block design
- 85-inch depth for all 5 and 15 kV applications, 36-inch width and 92-inch depth at 27 kV(competitors average 95 inches deep)
- Optional active arc-mitigating devices such as UFES and REA
- SmartRack remote racking system for all breakers and auxiliary compartments
- ADVAC and AMVAC breakers offer the lowest maintenance in the industry

Value

- Instrumentation and controls are mounted away from MV presence – personnel safety
- Robust construction with natural corrosion resistance - reliability
- Field changes or repair times greatly reduced – reliability and flexibility
- Space savings means dollars saved in PDC or e-house applications – reduced cost of ownership
- Active arc-mitigation can result in reduced incident energy level – offers increased personnel safety
- Remote racking means increased operator safety
- Less maintenance = less cost and increased personnel safety

Advance with AMVAC or ADVAC offers the safest, most reliable MV ANSI non-arc-resistant switchgear available

ABB