

2018



EXTERNAL TRAINING

SafeGear®

MV ANSI arc-resistant switchgear



SafeGear

MV ANSI arc-resistant switchgear

Highlights

- 50 kA metal-clad arc-resistant air insulated switchgear
 - Type 2B, 0.5s (30-cycle); Type 2BC, 10-cycle
- Tested to IEEE C37.20.2-1993 and C37.20.7-2007
- Quoted and built in Lake Mary, Florida, and San Luis Potosi, Mexico
- UL and CSA listed
- Seismic certified to IBC Region D with Ip1.5
- ADVAC spring-charged breakers
- AMVAC magnetically actuated breakers
- ADVAC G40/50 generator circuit breakers
- SwitchgearMD™ asset health monitoring
- SmartRack® remote electric racking system
- Also available as SafeGear® Digital



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Ratings, dimensions, certifications and qualifications

Metal-clad non-arc-resistant switchgear

Rated voltage:	5, 8.25 and 15 kV
Rated continuous current:	1200, 2000, 3000 A, 4000 A FAC*
Interruption ratings (Sym.):	25, 31.5, 40 and 50 kA**
Arc-res accessibility type:	2B, 2C or 2BC
Arc-res duration:	0.5s (2B) or 10 cycle (2BC)
Enclosure dimensions:	36" w x 95" h x 85/92" d Rear 10 or 20" bolt on extensions available
Enclosure type:	Category B
Outdoor enclosure options:	Single row walk-in (sheltered aisle) or PDC (eHouse)
Certifications:	C37.20.2-1993; C37.20.7-2007; UL; CSA
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
**63 kA interrupting rating available in SafeGear HD

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MV ANSI circuit breakers

Key features and values

- All breakers have integrated racking 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
- Remote electric racking via the SmartRack system
- Integral racking expected in late 2018



ADVAC® Model 4



AMVAC™ Model 4

Breaker	Voltage Class (kV)	Continuous Current (A)	Interrupt (kA)	Close and Latch (kA, peak)	BIL (kV, peak)	Power 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	1200, 2000, 3000	25, 31.5, 40, 50	65, 82, 104, 130	60, 95	19, 36

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Generator circuit breakers

Generator circuit breakers

Tested to new dual logo IEEE/IEC 62271-37-013 standard

- 50 kA GFF/50 kA SFF – Advance/SafeGear
 - UL or non-UL versions available
- 25 kA GFF/40 kA SFF – Advance/SafeGear
 - UL or non-UL versions available
- 50 kA GFF/63 kA SFF – for use in SafeGear HD platform only. **Currently in development**



Customer value

- 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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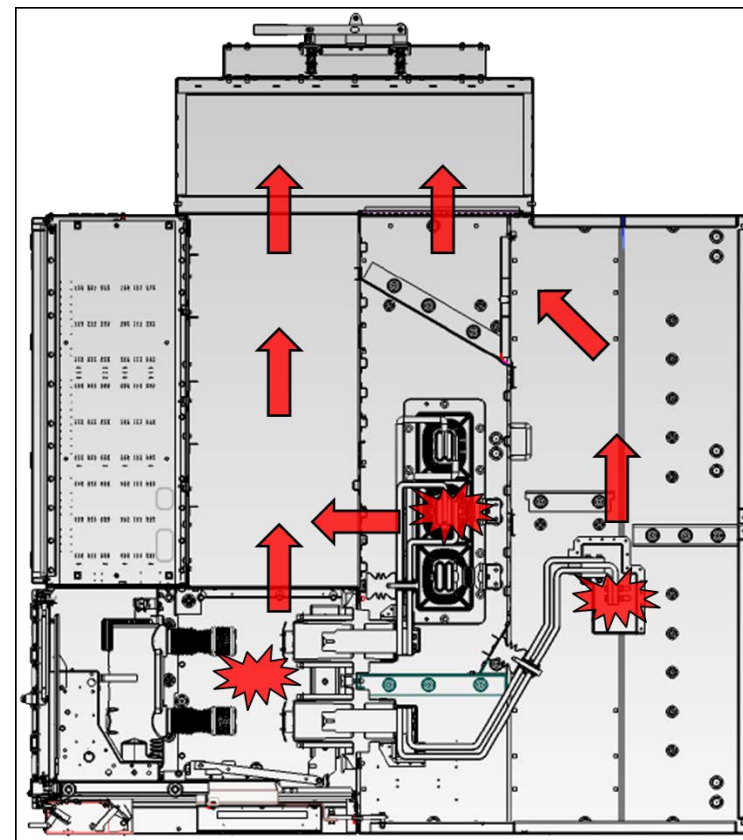
Arc-resistant switchgear

Basic features

- Modular, bolted frame design
- Flap/vent system to relieve pressure
- Patented arc chamber
- Gases are safely expelled out the roof and through the plenum
- Two-high breaker configuration
- Separate, isolated low voltage compartment
- Compatible with the ABB SmartRack® remote racking system
- Direct coupling with ABB MCC2.5 (front aligned)
- Arc-resistant transition sections for GE LimitAmp and Rockwell Automation ArcShield MV MCC available

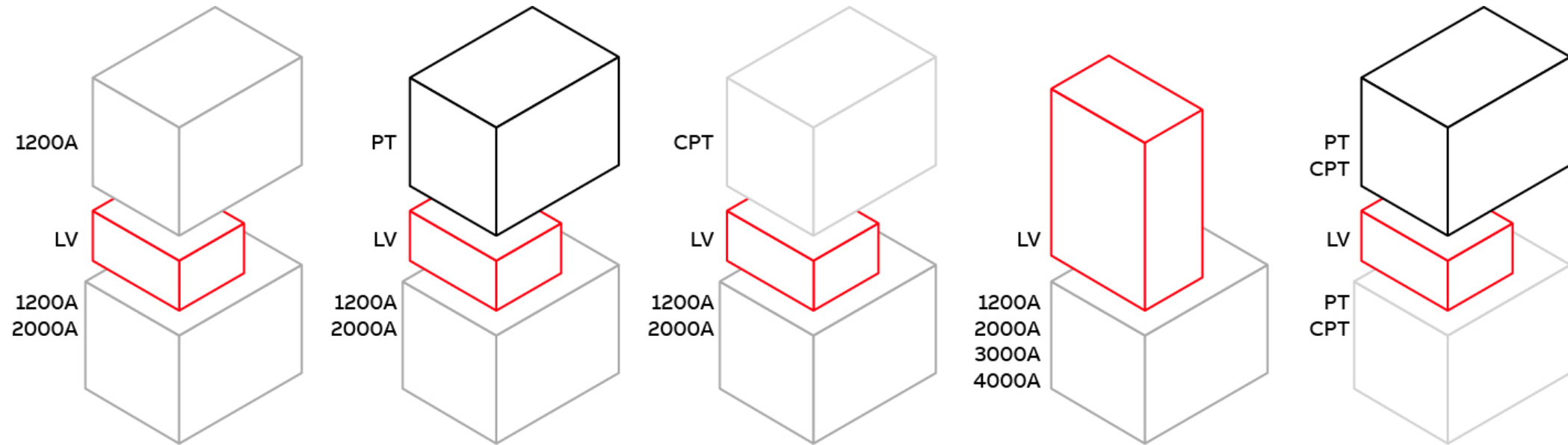
Additional safety features

- Type 2B accessibility for protecting personnel when accessing LV compartment
- Closed-door rackable breakers, PT/CPT/fuse compartments
- Snuffer contact design – PT's/CPT/fuse



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Modular design



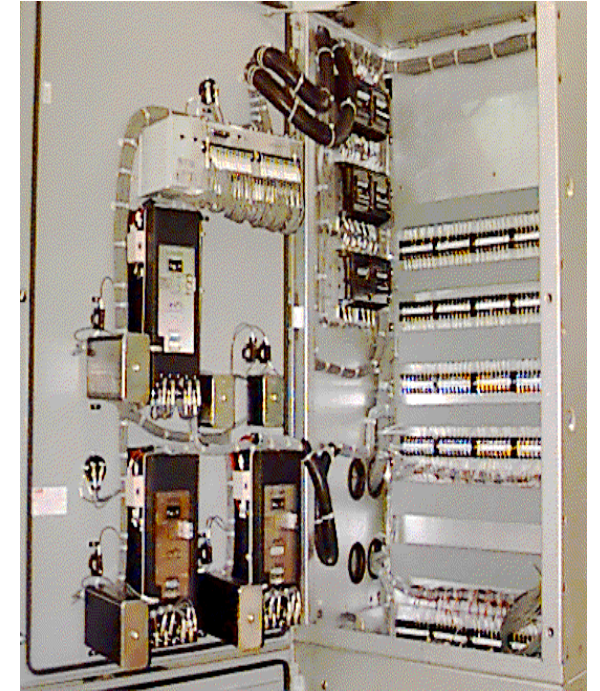
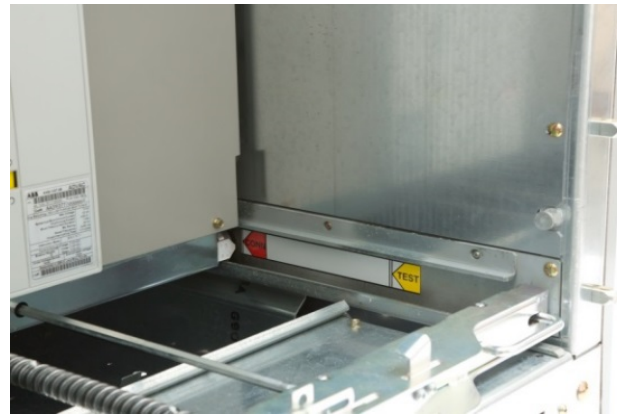
- Bolted construction enables faster replacement and modification in the field
- Allows for easy replacements, repairs, and specialized configurations

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Modular design

Breaker and instrument compartments

- Grounded metal shutters
- Breaker position indicators visible from front of switchgear with breaker door closed
- Automatic engaging secondary disconnect
- Isolated terminal blocks
- Instrument compartments are isolated from high voltage compartments
 - Available in 19", 38", 57" heights

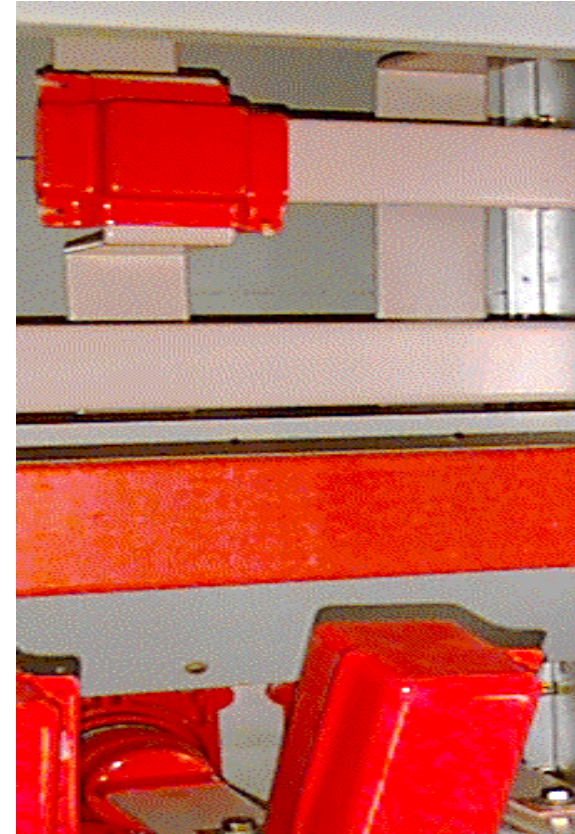


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Modular design

Bus and cable compartments

- Copper bars
- Epoxy coated bus insulation
 - No sleeve/heat shrink insulation
- Molded vinyl boots with reusable plastic hardware
 - Cable lug boots available
- Epoxy stand off insulators
- Rear hinged/bolted doors available for all ratings
 - Split design or full height option



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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 75 kVA 3-ph, 50 kVA 1-ph



- Built-in rail extensions facilitate fuse replacement
- 19" high up to 50 kA when located in top of frame
- 19" high for all locations with ratings of ≤ 31.5 kA
- For 40/50 kA, PT's located below LV compartments must be 38" high

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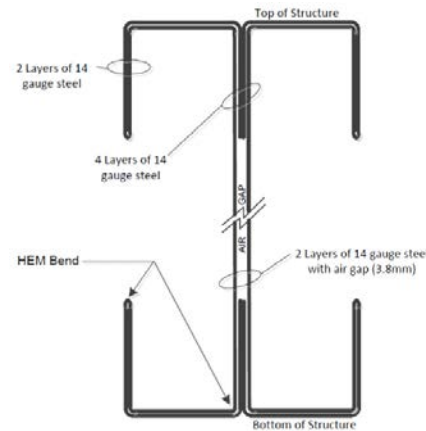
Design features

Galvanized steel construction



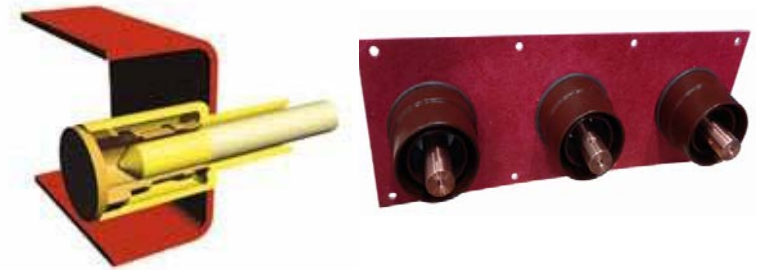
- High reflectivity increases visibility in compartments
- Corrosive-resistant; suitable for use in unusual environmental conditions
- Modular construction provides isolated LV compartments for increased personnel safety

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
- Increases personnel safety by eliminating arcing during racking
 - Negates the need for shutters in auxiliary device compartments

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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 external remote racking system
 - Operator can safely stand 50-75 ft away from breaker frame.
- Hydraulic foot operated lift truck
- Manually and electrically operated ground & test devices are available, including specialized versions such as PEPCO and ConEd client
 - Safely ground primaries when performing maintenance



Customer value

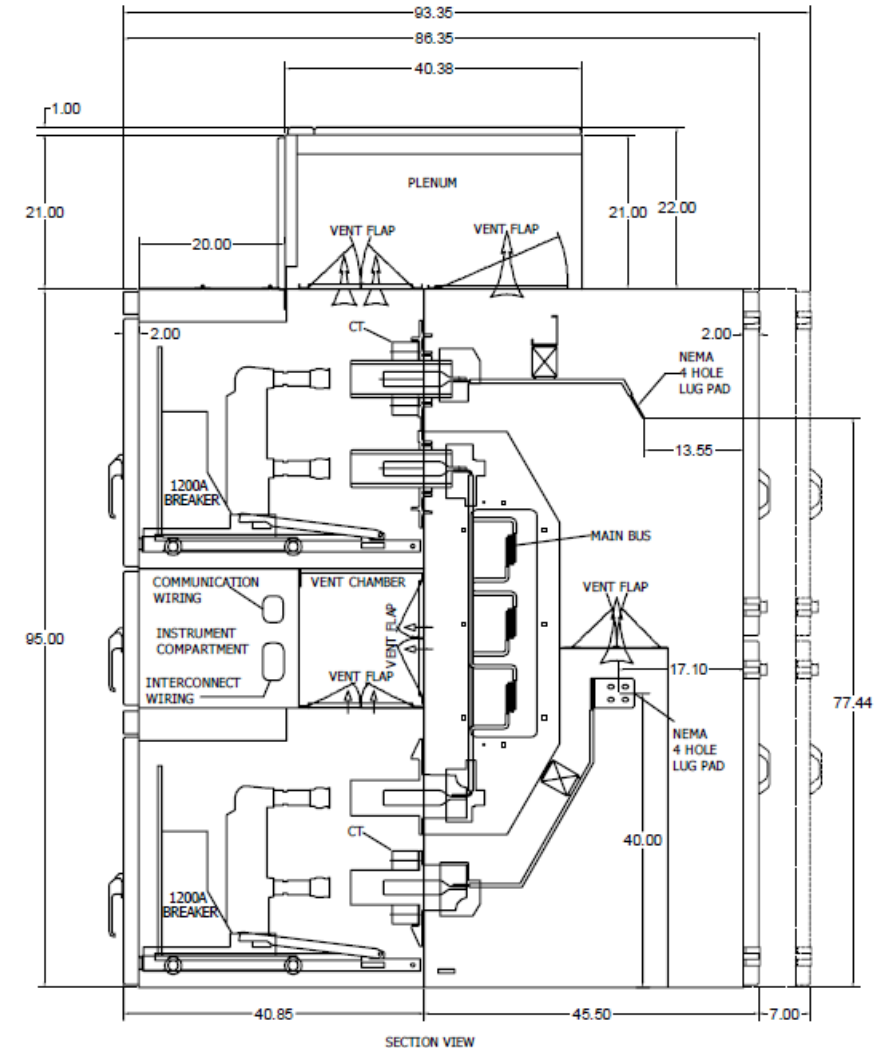
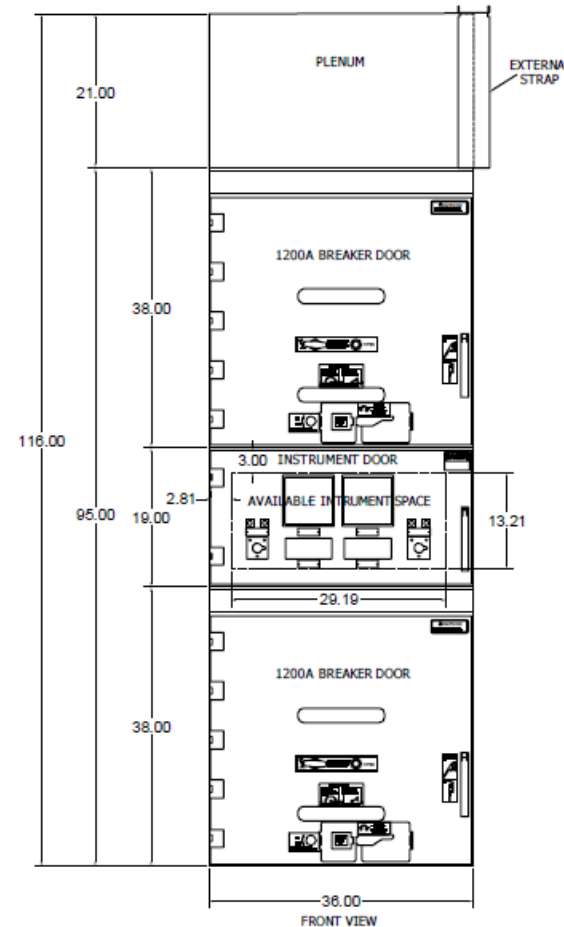
- G&T devices provide means to safely test and ground the primary circuits for maintenance personnel
- SmartRack provides personnel safety by allowing operators to rack breakers in and out while being safely away from the switchgear
- Lift trucks provide safety to operators while moving, installing and 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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1200 A switchgear

Dimensions and configuration requirements

- 36" wide x 95"h (less plenum)
- Overall height w/plenum 121"
- 1200-3000 A depths = 85 or 92"
- 19"h x 36"w instrument compartment (two-high configurations)
 - 38"h x 36"w and 57"h x 36"w instrument compartments (for single stack breakers only)
- Breaker, CPT Fuse and CPT drawout compartments 38"h x 36"w
- PT compartments 19" or 38" (ratings dependent)
- 1200 A switchgear does not require ventilation
- 1200 A breaker can be located in top, bottom or both top and bottom locations

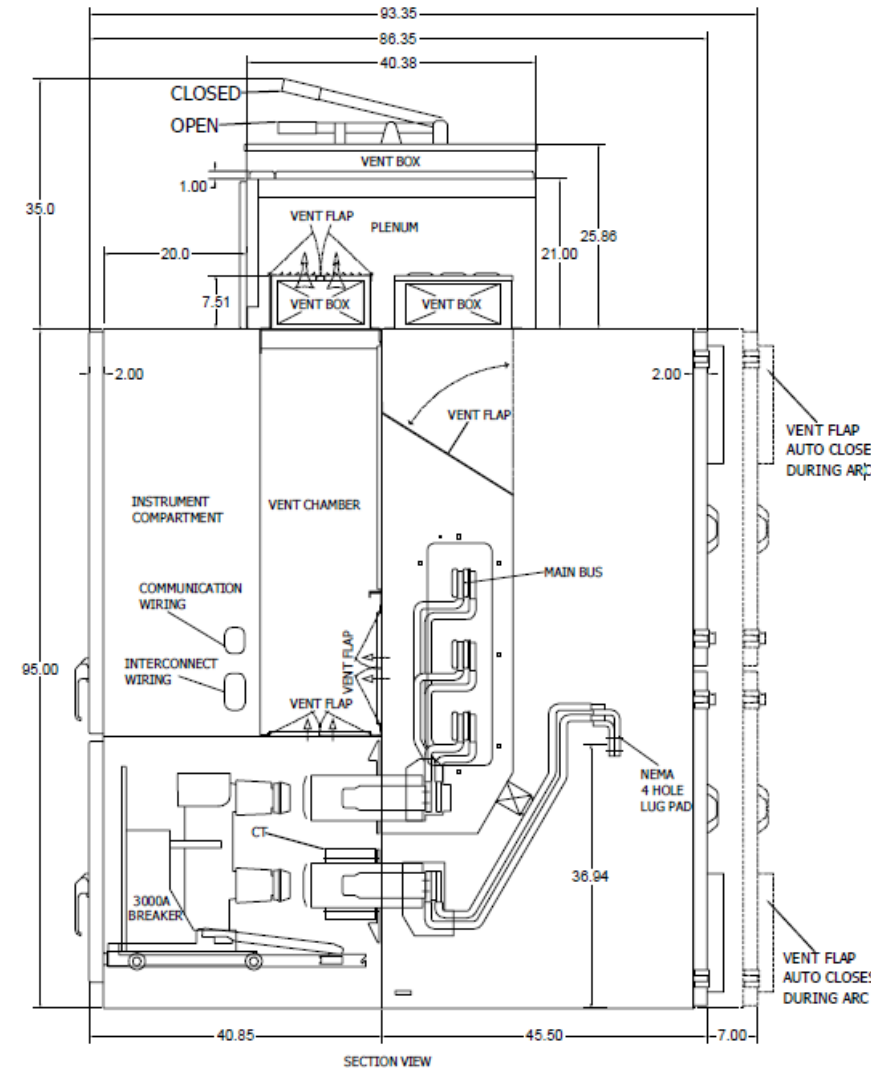
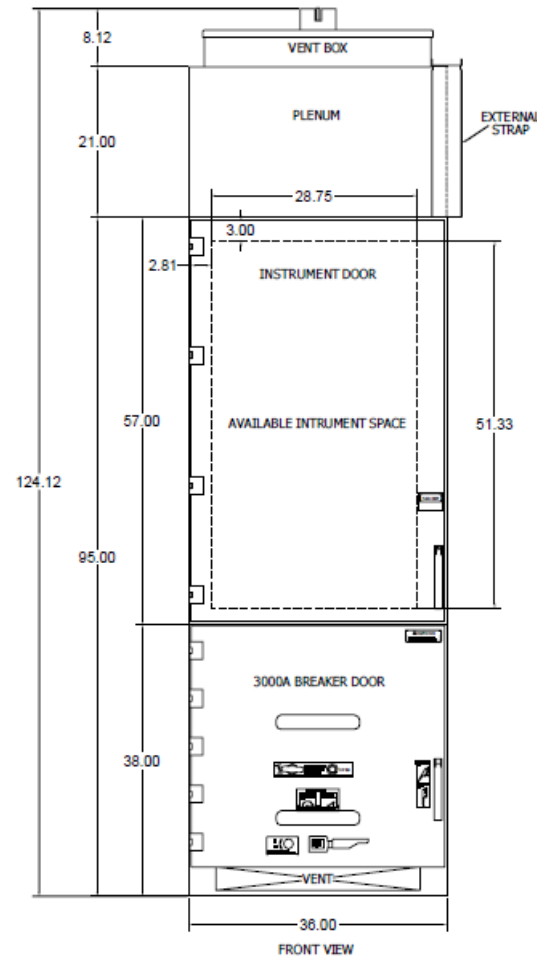


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3000 A switchgear

Dimensions and configuration requirements

- 36" wide x 95"h (less plenum)
- Overall height w/plenum 130"
- 3000 A depths
 - 85 or 92" (10-cycle)
 - 86.5 or 93.5" (0.5 sec)
- 38"h x 36"w and 57"h x 36"w instrument space
- Breaker located in bottom compartment only
- No PT compartments with 3000 A breaker frames
- 3000 A switchgear requires ventilation at bottom of breaker door in front, and at roof line on top for all 2000 A frames
- 3000 A located in bottom compartment. Contact factory for other locations



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Key options

Ultra Fast Earthing Switch (UFES)

- Incident energy level reduction device
- Clears arc faults by grounding system
- ≤ 4.5 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 and humidity
- **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 lead to 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

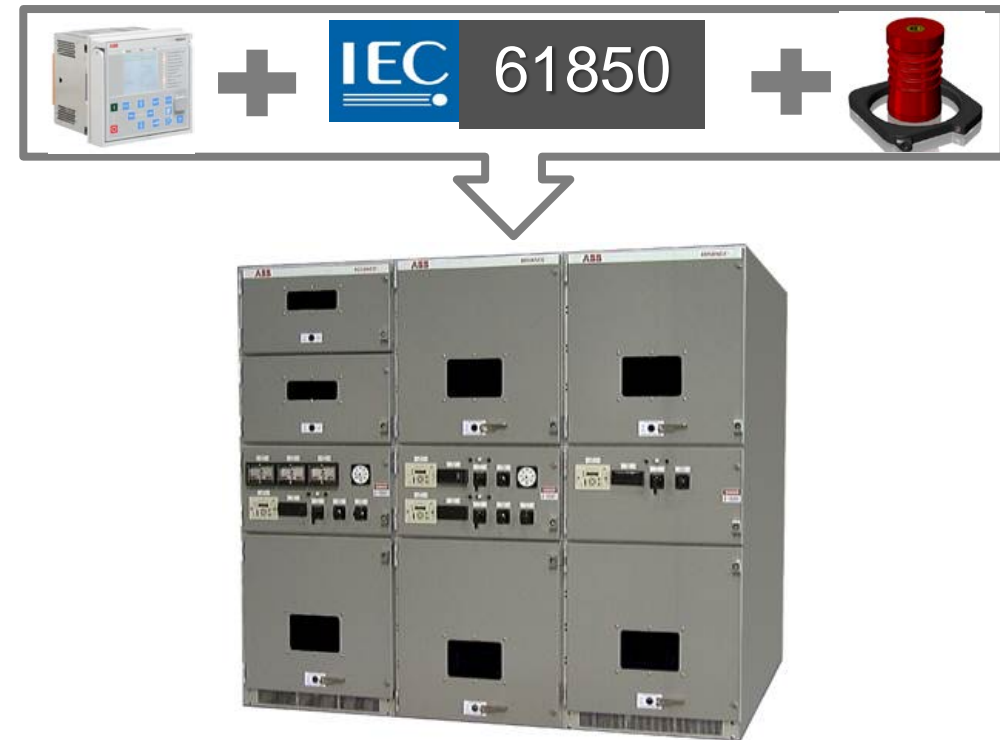


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Key options

Digital switchgear solutions

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



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Key options - enclosures

Enclosure types

- Indoor construction as defined by ANSI C37.20.2
- Outdoor enclosures available:
 - Outdoor single-row walk-in (ODSRWI) (aka sheltered aisle)
 - Power Distribution Center (PDC) (aka E-House)
- 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
- ODSRWI enclosures provide aisle space for operating and maintaining equipment out of the weather elements

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Key options - utility metering cabinets

SafeGear – 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: 95”h x 85/92”d x 36”w
- 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 many utility companies

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
- Arc-resistant protection for personnel safety.

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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
- 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 eHouse 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

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

ABB