

GEIS

MASTGear

Metal-Clad Switchgear

GEIS Electrical Protection

Safer Smarter Greener



About GEIS

GEIS was established in 2019 following the spin-off of several businesses and assets that ABB had acquired from GE on July 1, 2018, including 3 manufacturing centers, Warehousing & Trading business at FTZ, China Technology Center.

- Components: Full range of circuit breakers up to 40.5kV: Medium voltage vacuum circuit breakers, LV circuit breakers: ACB, MCCB, MCB, RCD, RCBO: Control components.
- Equipment: MV switchgear (Air insulation and Gas Insulation Technology), LV switchgear, switchboard.
- Medium voltage distribution transformer.
- Medium voltage ATS system (Paralleling Switchgear).

After the separation, all the above product lines were rebranded as AEG for selected markets and GEIS for global markets. Moreover, GEIS has expanded its technological portfolio to include medium-voltage controls such as VFDs and soft starters, as well as ATS systems and EV chargers.



Quality is Built-in

Where Technology Meets Manufacturing Excellence for Customers

- Since 2000, we have been specializing in localizing world-class products and manufacturing technologies, developing strong expertise and a highly capable team.
- Vertical integrated Shanghai Manufacturing Center brought key manufacturing processes into a 75,000 m² facility, enabling high-quality, high-efficiency production and fostering innovation. A dedicated R&D team committed to developing products that meet global standards and serve diverse applications.
- Global expansion: GEIS's first Thailand facility makes it easier to serve customers worldwide.



GEIS deliver complete range of products for the evolving electrification needs:



SecoVac VCB



M-PACT Plus ACB



Elfa Series MCB/RCBO



SolidDrive MV VFD



SecoGear MV Switchgear



RMU Gas Insulated Switchgear



WaveCast Transformer



MLS LV Switchgear



MASTGear Metal-Clad Switchgear

Catalogue



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Product Description

Overview

MASTGear (MAST) Metal-Clad Switchgear is designed and manufactured with advanced technology and has been fully tested to IEEE standards. MAST Metal-Clad Switchgear is rated for applications 5-15kV, 50/60Hz, 1200A - 2000A and up to 40kA short circuit rating, MAST equipped with **SecoVac** embedded pole vacuum circuit breakers. SecoVac uses recycle material with its patent technology. Its **GAL** spring charge mechanism has 60,000 mechanical operation life, tested at XIHARI lab.

MAST Metal-Clad Switchgear is available in 2-high construction, indoor NEMA 1 enclosure.

MASTGear Features

- Fully compartmentalized construction, grounded metal barriers between breaker, bus, cable, and control compartments.
- Two-high breaker stacking provides flexibility configuration, reduced floor space, easy for expansion.
- Comprehensive and reliable interlocking system
- Automatic shutter system
- Drawable design (circuit breakers, VT/CPT, fuses, etc.,) for easy maintenance



MASTGear Metal-Clad Switchgear complies with the following standards and specification for factory assembled switchgear

- IEEE C37.20.2: Standard for metal-clad switchgear
- IEEE C37.04: Rating structure for AC high-voltage circuit breakers
- IEEE C37.06: Standard for AC high-voltage circuit breakers rated on a symmetrical current basis
- IEEE C37.09: Standard test procedure for AC high-voltage circuit breakers with rated maximum voltage above 1000 V
- IEEE C37.010: Application guide for AC high-voltage circuit breakers rated on a symmetrical current basis
- IEEE C37.012: Application guide for capacitance current switching for AC high-voltage circuit breakers
- IEEE C37.11: Standard requirements for electrical control for high-voltage circuit breakers rated on a symmetrical current basis
- IEEE C37.100.1: Standard of common requirements for high voltage power switchgear rated above 1000



Product Description

Design for Safety

Standard Interlocking Systems

- The circuit breaker can only be moved from test to connect position and vice versa when the circuit breaker is in the Open position.
- The secondary disconnect plug can only be inserted or removed when the circuit breaker is in the test position.
- The circuit breaker cannot be closed when it is in between the connected, test or disconnect positions.
- When the circuit breaker is moved from the connect position, the metal shutters will close automatically.
- Defeat door interlock in case of maintenance needs, with breaker in connected position
- Discharges all spring energy before removing the breaker from the cell, at a minimum.



Automatic Shutters

MASTGear Metal-Clad Switchgear is equipped with grounded metal shutters in front of the primary bushings. The shutters are automatically operated by the circuit breaker movement. When the circuit breaker is racked out to the test or disconnect positions, the shutters automatically close to isolate the fixed primary contacts.

Optional Safety Measures

- **Shutter Interlock:** Prevents manual activation of the shutters, which will be only activated by the apparatus truck.
- **VCB Key Interlock:** Up to two locks are available for the VCB condition. Either one or both of the two locks can be configured, providing multiple possible combinations for the condition of the key, trapped or released, when the VCB is in test position.
- **Emergency Stop Pushbutton:** a mechanical trip of the circuit breaker with the door closed. It is typically used to open the breaker in case of loss of auxiliary voltage.

Design for Reliability

Mechanical operation

Mechanical endurance tests are performed on MASTGear switchgear across all operating components, including the circuit breaker racking system, safety shutters, and interlocking mechanisms, to ensure overall system integrity and long-term reliability of the circuit breaker.

Industry experience in the electrotechnical sector shows that mechanical failures are among the most common causes of installation faults, making mechanical robustness a critical design requirement.

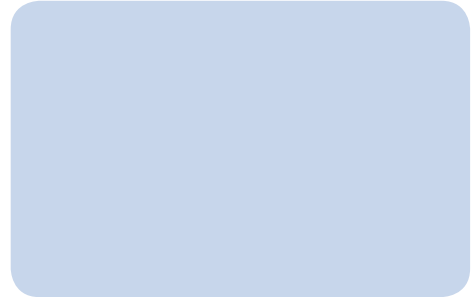
The SecoVac VB2 Plus vacuum circuit breaker has been independently type tested per IEEE standard. It is equipped with the GAL spring-charging mechanism, featuring a design life of up to 90,000 operations. In addition, the SecoVac VB2 Plus with GAL mechanism has been type tested at XIHARI for 60,000 mechanical operations on a 1250 A, 31.5 kA-rated VCB, demonstrating exceptional.

Product Description

Applications

Utilities and power plants

Network substation of Utility Grid
Balanced of Plant in Power Generation
Generator Switchgear



Industry

Oil and Gas
Mining
Pulp and Paper
Cement
Textiles
Automotive Metallurgy



Transport

Airports
Ports Railways
Underground transport



Services

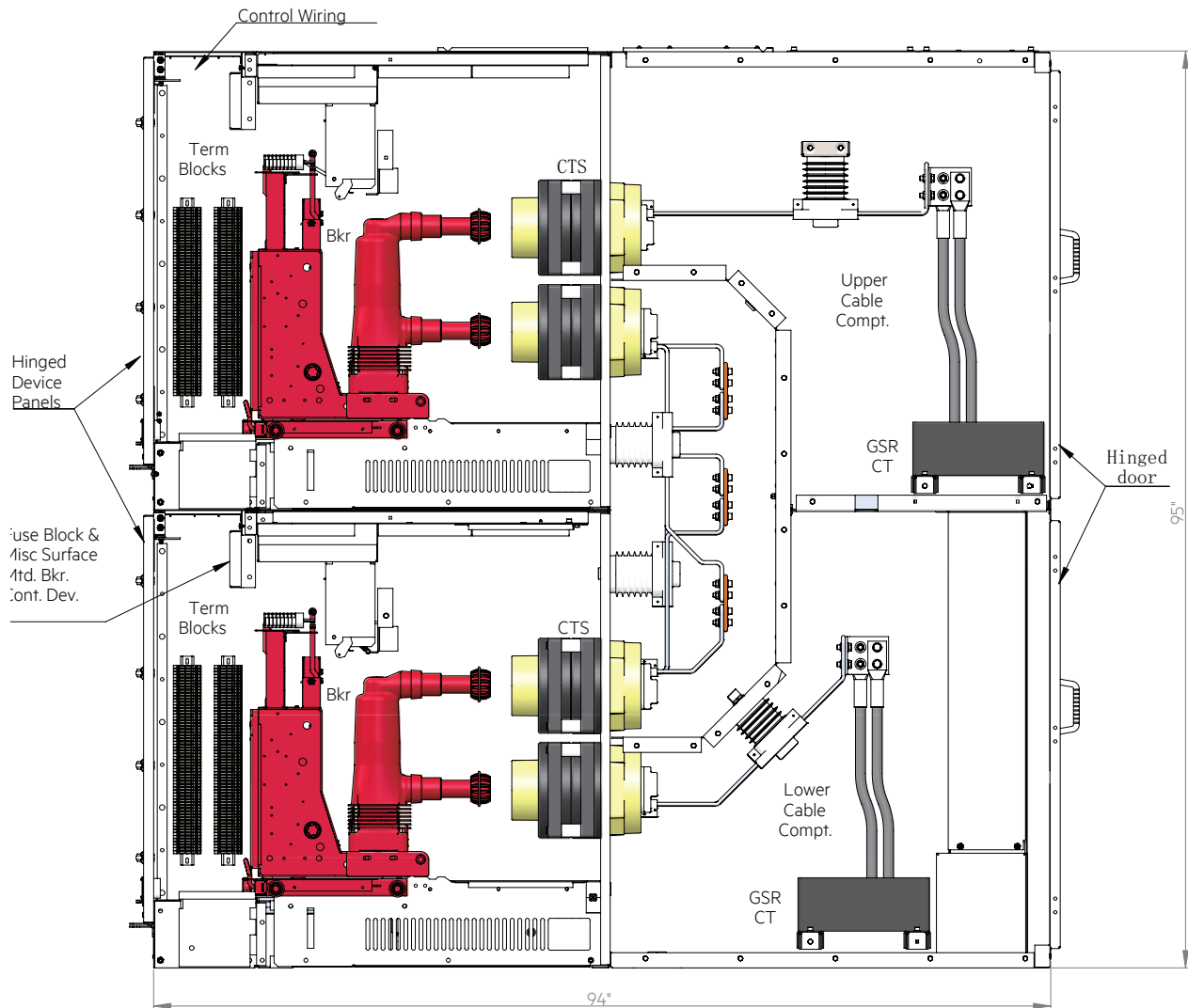
Supermarkets
Shopping malls
Hospitals
CBD
Data Center



Product Introduction

Structure

Non-IAC type typical layout



Product Introduction

Structure Feature

1. The primary disconnecting multiple finger assemblies (clusters) are spring loaded and mounted on the circuit breaker with cluster pliers. They engage and disengage the primary conductors at the back of the VCB cell when the breaker is racked in/out the connected and disconnected positions.
2. The racking mechanism incorporates "SAFETY" close prevention feature - The Circuit breaker can not be inserted or withdrawn when breaker is in closed position.
3. Safety shutters are provided which shield the line and load stabs when the breaker is in disconnected or test positions inside the compartment. The shutters can be padlocked.
4. Safety device for shutters (fail-safe) - mechanical device which, in the absence of the VCB, prevents a person from opening the shutters manually.
5. The racking mechanism and locks are located at the bottom of the undercarriage and are accessible from front through the door cut out enabling the breaker to be disconnected from the mains supply without opening the door and access to the live parts.
6. Compartment is provided with a rejection mechanism which consists of two parts, one mounted on the moving portion of the circuit breaker and the other part on the undercarriage which enables only the properly rated circuit breaker to be inserted into the matching undercarriage.
7. The Secondary disconnect blocks (control wiring plug and sockets) are located on the front bottom position for automatic connection at test position and connected position.
8. Mechanical position indicator can check breaker position inside of compartment with door closed.
9. The withdrawable breaker truck is grounded on bottom side. Undercarriage grounding includes an interface to the breaker earthing in service and disconnected position of the breaker in the breaker truck.
10. Both the associated relay compartment/ circuit breaker front doors are hinged. Door lock with padlock option.
11. Breaker cell primary mounted CTs (window type), at least 4 per phase.
12. Truck Operated Contact (5NO/NC) for VCB to be mounted in Cell for indicate VCB at connected position.

Product Introduction

Technical Data

Item		Unit	Specification
Rated maximum voltage		kV	15
Rated maximum continuous current		A	1200/2000
Rated frequency		Hz	50/60
Rated power freq with-stand voltage (1 min)	Phase to phase and to	kV	36
	Between isolating		36
Rated lightning impulse withstand voltage	Phase to phase and to	kV	95
	Between isolating		95
Rated short time withstand current		kA	31.5/40
Rated duration time for short-circuit		s	2
Rated peak value withstand current		kA	82/104
IP degree			Indoor NEMA 1
External dimensions (Width x Depth x Height)			36*94*95 (inch) 914*2387*2413 (mm)

Operating conditions

The normal service conditions for indoor switchgear per IEEE standards

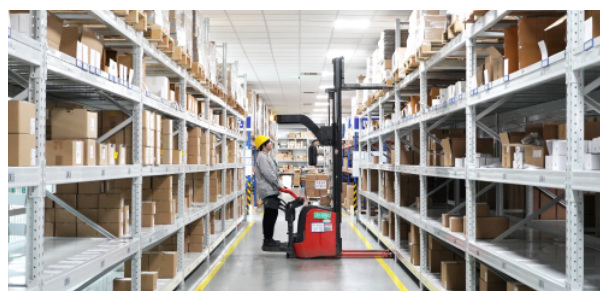
- Ambient temperature
 - Maximum Ambient: 104°F (40°C)
 - Minimum Ambient: -22°F (-30°C)
- Altitude: Maximum: 6600ft (2000m) a.s.l.

- Humidity
 - Maximum average value measured within 24 hours
 - Relative humidity: ≤ 95%
 - Maximum average value measured within 1 month
 - Relative humidity: ≤ 90%

Storage conditions

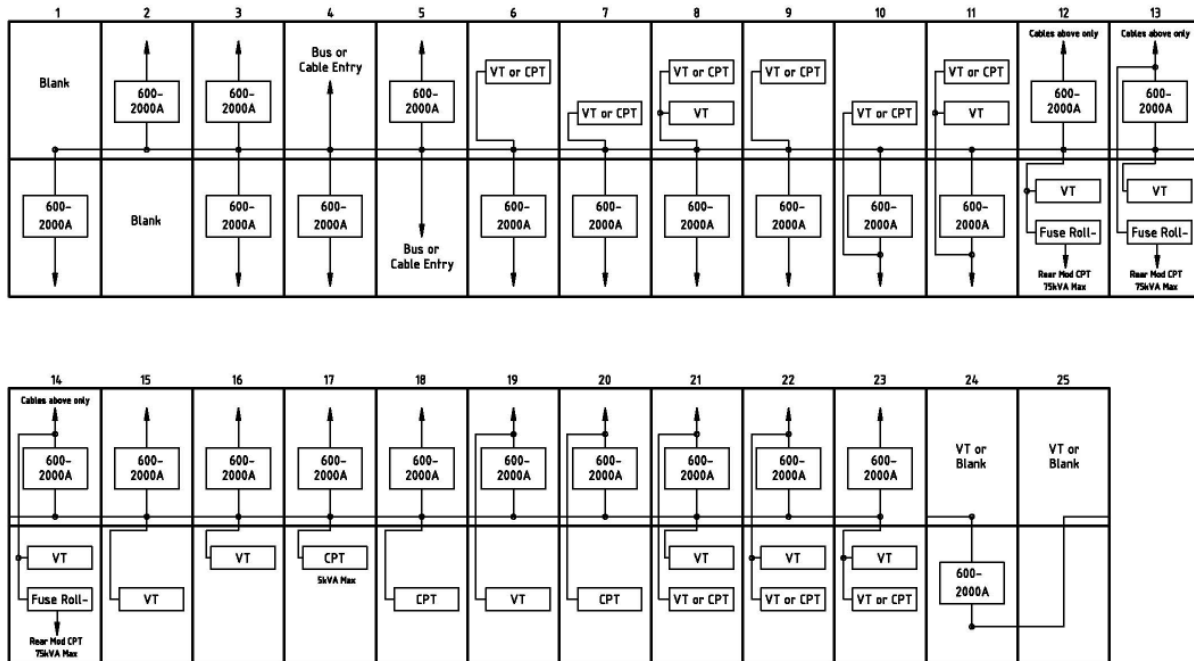
If the switchgear is to be stored for a prolonged period, it is advised that it should be stored in its original package in a dry place away from direct sunlight and rainwater in order to safeguard the quality of its functional units.

The maximum ambient temperature should not be higher than 40°C, the minimum ambient temperature should be no lower than -40°C, and the daily average temperature should be no higher than 35°C.



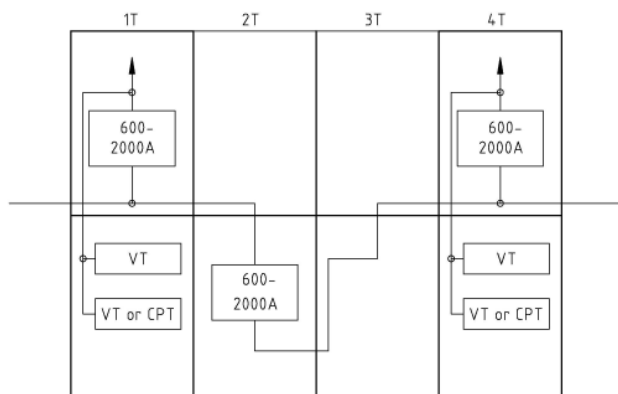
Product Introduction

Available Configurations



- Top or bottom cable entry.
- Maximum CPT size is 15kVA.
- Standard cable termination with 2-750MCM per phase. Adapters can be added to increase to 4 per phase.

Typical Main-Tie-Main Combination

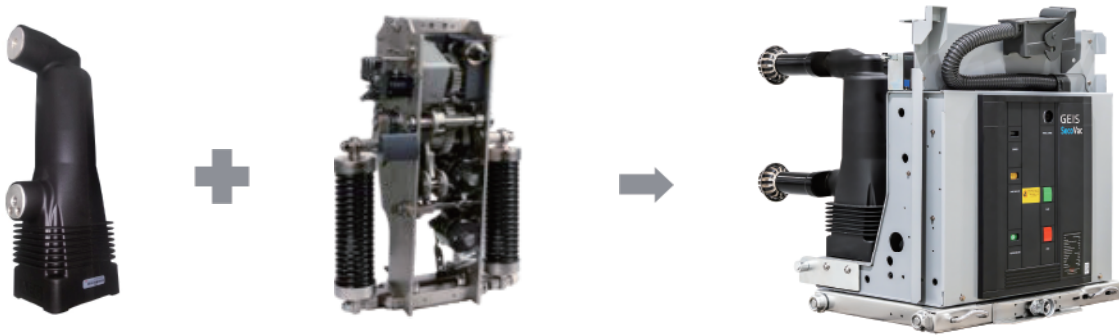


Note

- Main Breaker and VT/CPT combinations can be changed as shown in the basic stacking arrangements above.
- The Tie Breaker and Aux tie compartments can be swapped so the breaker and aux tie are in the upper compartments.

Switchgear Components

SecoVac VB2 Plus 15kV- embedded pole vacuum circuit breaker



Modules of SecoVac VB2 Plus Breaker

Overview

The SecoVac VB2 Plus-15 is designed, tested, and certified in accordance with IEEE C37.04, IEEE C37.06, IEEE C37.09, and IEEE C37.20.2, covering requirements for rated continuous current, short-circuit performance, dielectric withstand, capacitive switching, and endurance. It is ideally suited for feeder, transformer, and bus protection in utility and industrial power systems.

The SecoVac VB2 Plus family incorporates GEIS-patented ASP embedded pole technology, manufactured using advanced materials and a highly controlled, sophisticated production process.

Equipped with the proven GAL spring-charging operating mechanism, VB2 Plus-15 offering a design life of up to 90,000 mechanical operations.

SecoVac VB2 Plus has full line IEC series, covering 12kV, 15kV, 17.5kV, 24kV, 27kV, 40.5kV, short circuit breaker capability ranging from 25kA, 31.5kA, 40kA, 50kA.

Applications

Up to 15kV, 3000A and 40kA, VB2 Plus-15 is widely applied to industrial, utility, petrochemical, mining, commercial building.

- Network protection.
- Transformer, motor and bus protection.
- Harsh environment-high humidity, high and low temperature, up to 2000 meter altitude.
- VB2 Plus-15 comes with withdrawable and fixed type construction. Suitable for IEEE metal clad and metal enclosed switchgear.

Switchgear Components

VCB Features



Vacuum Interrupter

The vacuum interrupter is designed and manufactured to effectively extinguish the arc within a sealed ceramic vacuum chamber. The specially engineered contact material minimizes chopping current to a very low level without affecting system performance. Its clean, maintenance-free operation and high reliability make the VCB an ideal choice for medium-voltage circuit breaker applications.

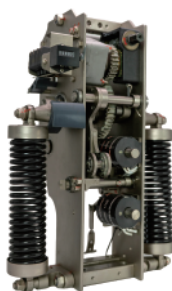


ASP Embedded Pole

The ASP embedded pole design delivers enhanced performance in harsh operating environments, including high-altitude installations. By reducing internal electrical and mechanical stresses, the ASP pole structure improves dielectric strength and contributes to the long-term reliability of the circuit breaker.

Each ASP embedded pole is individually manufactured and rigorously tested, including partial discharge testing, prior to installation in the circuit breaker.

The ASP embedded pole is fully recyclable, providing an environmentally responsible solution aligned with modern sustainability requirements.



GAL Mechanism

The SecoVac VB2 Plus-15 vacuum circuit breaker has been independently type tested in accordance with applicable IEEE standards, ensuring compliance with ANSI/IEEE performance and reliability requirements. It is equipped with the proven GAL spring-charging operating mechanism, offering a design life of up to 90,000 mechanical operations.

In addition, the SecoVac VB2+ has successfully completed 60,000 mechanical endurance operations during type testing at XIHARI, based on a 1250 A, 31.5 kA rated VCB, demonstrating exceptional mechanical robustness and long-term reliability.

GAL mechanism is 100% inhouse made, modular design, heavy stainless steel structure, suitable for voltage range up to 40.5kV, 50kA short circuit breaker breaking capability.

Switchgear Components

Technical Data

Number	Rated parameters		Unit	Parameter value	
1	Rated maximum voltage (Ur)		kV	15	
2	Rated insulation levels	Rated power-frequency withstand voltage 1min (Ud)	kV	Common value/Across the isolating distance: 36/40	
		Rated lightning impulse withstand voltage (Up)		Common value/Across the isolating distance: 95/105	
3	Rated power frequency (fr)		Hz	50/60	
4	Rated continuous current (Ir)		A	1200	1200/2000/3000
5	Rated short-time withstand current (Ik)		kA	31.5	40
6	Rated peak withstand current (Ik)		kA	82	104
7	Rated duration of short-circuit (tk)		s	2	
8	Rated short-circuit breaking current (Isc)		kA	31.5	40
9	Rated short-circuit making current		kA	82	104
10	Rated supply voltage of closing and opening devices and of auxiliary and control circuit (Ua)		V	DC: 250	
11	Rated operating sequence			O-0.3s-CO-180s-CO	
12	Transient recovery voltage		kV	25.7	
13	DC component			≤ 52%	
14	Double earth fault breaking current		kA	27.4	34.8
15	Rated cable-charging capacitor breaking current (CC)		A	25	
16	Rated capacitor bank breaking current (BC)		A	630	
17	Rated back-to-back capacitor bank breaking current		A	400	
18	Rated back-to-back capacitor bank transient peak inrush making current (Ibb)		kA	20	
19	Mechanical endurance		times	M2	
20	Electrical endurance			E2	
21	The class according to capacitive current switching capability		V	C2	

SecoVac main circuit resistor

Item	Unit	Value	
Rated current	A	1200	2000
Resistor	μΩ	45	40

Coil parameters

Rate Voltage (V)	Resistance Value (Ω)	Rated Current (A)	Maximum Power (W)
DC 48	6	8	384
DC 125	50	2.5	312.5
DC 250	170	1.5	375
AC 120	50	2.5	312.5
AC 240	170	1.5	375

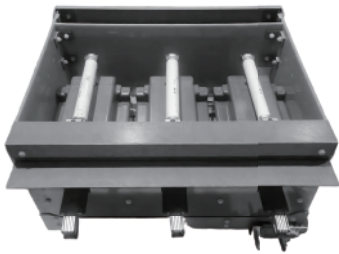
Charging Motor Characteristics

Rate Voltage (V)	Normal Operation Voltage Range (%)	Charging Time at Rated Voltage (s)	Input Power (W)
DC 48	85-110	≤10	100
DC 125	85-110	≤10	100
DC 250	85-110	≤10	100
AC 120	85-110	≤10	100
AC 240	85-110	≤10	100

Switchgear Components

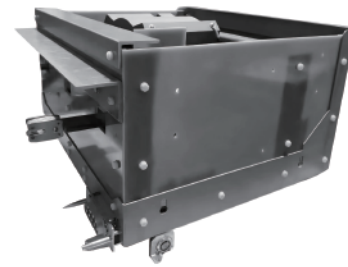
Drawout -PT/Fuse Truck

- 5kV to 15kV applications the voltage transformers may be connected as required by the user.
- One VT with 2 fuses connected line-to-line
- One VT with 1 fuse connected line-to-neutral
- Two VT's with 3 fuses connected line-to-line
- Three VT's with 3 fuses connected line-to-neutral, provisions for neutral loading resistor, either primary or secondary, for Ferro resonance issues



Drawout -CPT Truck

One single phase 15kVA or smaller CPT with primary fuses roll out. A secondary disconnect is mechanically interlocked so that it must be open before roll-out can be withdrawn. When a larger CPT is required it is fixed mounted and the power fuses only are mounted in the drawout trays assembly.



Lift Truck



Lift Truck is provided for handling a breaker or roll-out during installation

into a compartment, or during removal for inspection or maintenance.

Lifts for both indoor and outdoor equipment have interlocks on the lifting forks to lock the breaker in place during transporting

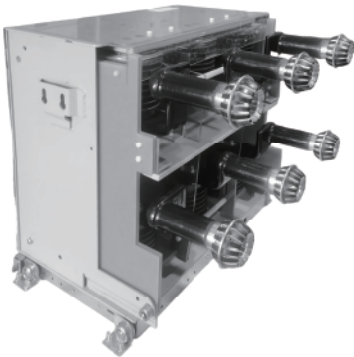
Cable Termination

By default Cable entry is located at the bottom of the cable compartment of the switch cabinet. Remove its seal plate to allow the cable into the cable compartment of top entry is also available request.

Switchgear Components

Ground and Test Device

The SecoVac Ground and Test (G&T) device is an auxiliary removable device for use when installing and maintaining MAST Metal-clad Switchgear. The device provides a convenient manual means of grounding a system to safeguard personnel who may be working on the equipment. It also serves to solidly ground the equipment to permit various tests. Exposed terminals can also be used for applying a high-potential test, measuring insulation resistance to ground, and phasing out cables.



- IEEE Ground and Test devices, This G&T truck rack in/out with cell door open.
- Standard: IEEE Std C37.20.6 IEEE Standard for 4.76 kV to 15 kV Rated Grounding and Testing Devices Used in Enclosures

Rated voltage (kV)	15
Power frequency withstand voltage (kV/1min)	36
Lightning impulse withstand voltage (kVp)	95
Short time withstand current (kA) 2 s	31.5/40
Momentary current test (kAp)	82/104

- Dimension

Rating	Phase distance	Distance between upper and lower arm	Lower arm to base	
1200A 31.5kA	254mm	317.5mm	280mm	
1200A/2000A 40kA	254mm	317.5mm	295mm	

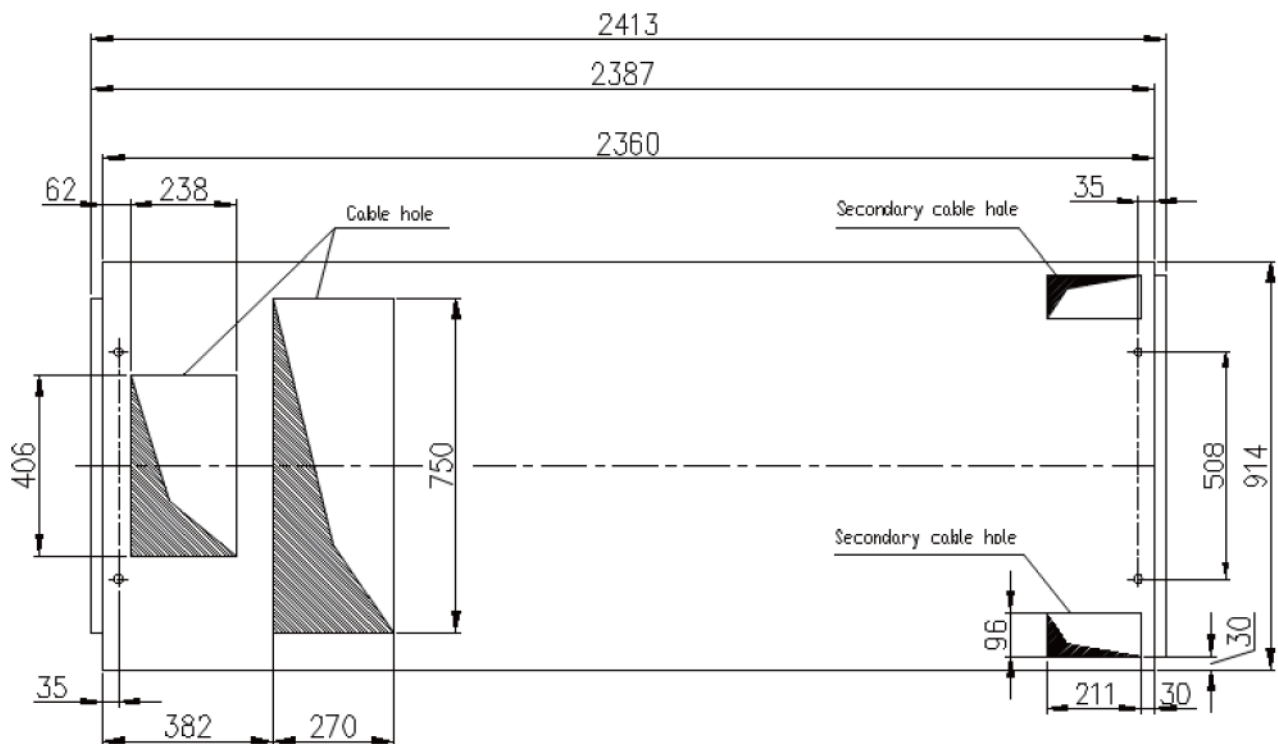
Installation Instructions

Field assembly of the switchgear shall be carried out only by properly trained personnel under the guidance and supervision of qualified staff to ensure correct installation sequence and acceptable workmanship quality. If such personnel are not available, installation may be performed by qualified contracted professionals under the supervision of the designated person-in-charge.

Once field installation has commenced, the installation of each switchgear section shall be completed without interruption. The installation site shall be provided with adequate lighting and a reliable power supply, and the area shall be secured and lockable. The switchgear shall be kept dry at all times and appropriate ventilation shall be provided.

Prior to installation, the basic structural framework and the indoor floor of the transformer station shall be inspected and accepted to ensure compliance with installation requirements.

Switchgear inbound/outbound cables access cutout



GEIS

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