GEIS

SecoGear 12kV-27kV

Medium Voltage 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

SecoGear 12kV-27kV Air Insulated Switchgear

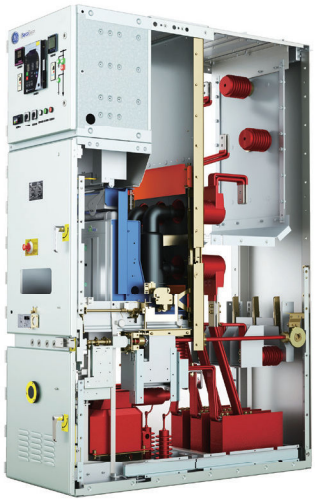
Catalogue

Product Description

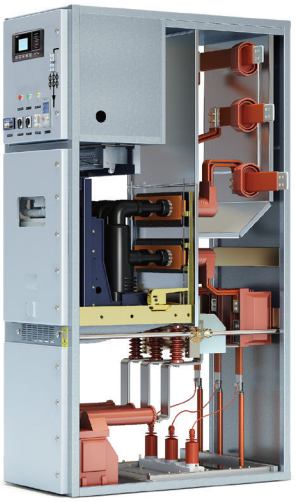
SecoGear Series Up to 27kV Switchgear

- Indoor metal-clad (According to IEC 62271-200, loss of service continuity category (LSC) 2B and partition class is PM-metallic partition) switchgear designed for the MV section of HV/MV and MV/MV substation
- Air insulated switchgear with a compact design
- Safe and Reliable switchgear for universal indoor applications
- Designed with full metallic segregation of its internal compartments
- Equipped with the latest design embedded pole SecoVac vacuum circuit breaker
- Cable compartments with ample space for ease of power cable connection
- Fully arc-proof unit up to 50kA for 1 second AFLR
- Tested in accordance with the IEC international standards
- Tested to UBC zone 4 IBC 2012 intensity 9 for Seismic
- Front panel features easy operation and low maintenance
- Complete interlocking system to prevent incorrect operation and to improve safety

Innovative in its design, SecoGear is compact air insulated switchgear and leads the industry in safety, reliability, performance and sustainability. Fully IEC certified at the KEMA, IPH and TUV test labs to IEC 62271-100 and IEC 62271-200, meeting the requirements of LSC2B. SecoGear Switchgear is suited to provide control and protection for cables, transformers, capacitors and motors used across many industries. SecoGear excels anywhere that medium voltage power has to be switched, controlled and protected.



SecoGear Front Access
Unit compartment



SecoGear
Unit compartment

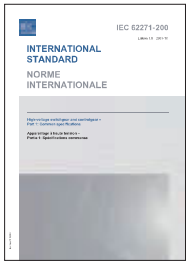
Apparatus compartment
Busbar compartment
Cable compartment
Low voltage compartment

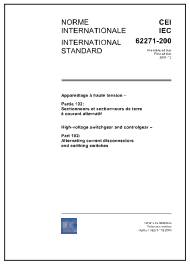
Product Description

Built to highest quality standards

SecoGear is designed and fully third-party type tested to the latest IEC 62271-200 standards. It is fully isolated by earthed metal partitions for all the major compartments. It is equipped with very latest series of IEC vacuum circuit breakers type SecoVac, which are fully third party type tested in accordance with IEC 62271-100. Using state of the art technology, and manufactured in accordance with the highest quality standards; our engineers have integrated core technologies. These technologies such as circuit breaker and mechanism design, vacuum arc control technology, insulation technolog and electrical field control and analysis combine to build a highly reliable and compact system. SecoGear benefits from best practices incorporated in our current medium voltage.

The typical rated voltage of SecoGear is 12/15/17.5/24/27kV and rated current ranges for SecoGear up to 17.5 is from 630A to 4000A (4000A force cooling), cooling), for SecoGear 24/27kV the rated current is up to 2500A. All SecoGear with a switching device is equipped with SecoVac vacuum circuit breaker or fuse contactor with corresponding specifications.





Fully type tested to latest IEC standards

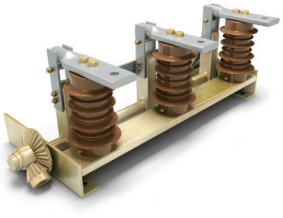
The switchgear is type tested to the latest IEC 62271-200 and has the third party certification to rove internal arc containment classfication of AFLR from 31.5kA for 1 second and up to 50kA for 1 second. This means protection against harm to personnel in the unlikely event of an internal arc in the cable compartment, vacuum circuit breaker compartment and the bus bar compartment in any direction: front, rear and sides of the switchgear.

Circuit breaker making and breaking capacity

The SecoVac vacuum circuit breaker is subjected to the rated current and short- circuit current breaking tests. Furthermore, it is also subjected to the opening and closing of capacitive and inductive loads, capacitor banks and/or cable lines.

Fused Contactor

Vacuum Contactors are designed and manufactured for frequent switchings, especially taking into account safety and quality assurance. They are suitable for switching and controlling squirrel cage and wound rotor motors, medium voltage resistive loads, and capacitors and transformers. The fuse provides protection against short-circuit currents. SecoVac fuse contactor rated current is 400A. HV fuse ratings are 224A for 12kV, 355A for 7.2kV rated voltage.



Earthing switch making capacity

The earth switch of the SecoGear switchgear can be closed under short- circuit up to 50kA. The eartth switch is interlocked to avoid being operated on circuits which are still live. However, should the switch be accidentally closed then safety of the operating personnel is assured by arc fault containment.

Mechanical operations

The mechanical endurance tests on all the operating parts ensure the reliability of the circuit breaker. General experience in the electro-technical sector shows that mechanical faults are one of the most common causes of a fault in on installation. The circuit breaker is tested by carrying out a high number of operations far in excess of those which are normally carried out whilst actually in service. Furthmor, the switchgear components are of a quality control program and samples are regularly taken from the production lines and subjected to total mechanical life tests to verify that the quality is identical to that of the components subjected to the type tests.

Full Front Access

SecoGear FA 17.5kV provides state of the art design principles to allow for complete operation and installation from the front of the swicthgear. It allows for back to wall installation thus optimising space within the switchroom. An optional base frame solution is available for up to 5 panels reducing installation work and commissioning time. SecoGear FA 17.5kV is 100% compatible with standard SecoGear 17.5kV panels.

Base Frame

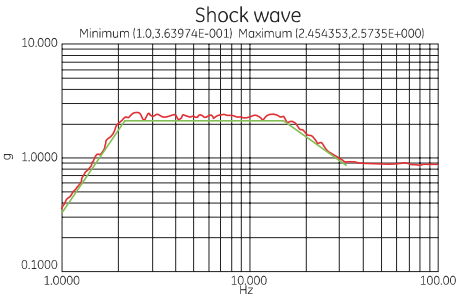
An optional 75mm height base frame can be provided with SecoGear. The base frame can be used on up to 5 panels to provide modular concept for the switchgear. Use of the base frame decreases field ork for mechanical and electrical assembly hence decreases the total commissioning time by up to 80%. Base frame usage is highly recommended for marine and E-Hous applications.

IP degree

The IP protection degree is the resistance offered by SecoGear against penetration of solid objects and liquids. This degree of resistance is indicated by the prefix IP followed by two characters IP 4X is for the enclosure and IP 2X for the partitions. The first number identifies the degree of protection against the entrance of solid objects, the second one is related to liquids. IP41, IP42, IP43 and IP44 are available by customer request.

High ambient temperatures

The service conditions for the electrical circuit breaker in marine installations are generally more severe than those in normal land applications. Temperatures are a main factor and for this reason the shipping register regulations require the switchgear to be able to operate at higher ambient temperatures of 40°C or higher.



Marine application Approvals

- American Bureau of Shipping (ABS) 17.5k SecoGear
- Russian Maritime Register of Shipping (RMRS) 12kV SecoGear 550
- Seimic Certification - UBC Zone 4
- Seimic Certification - IBC 2012

Inclination

The Inclination test proved that SecoGear can continue operating as intended, even when inclined at an angle up to 25 degrees on all four sides and with an ambient temperature of 50C, up to IP44. The exposure to these severe service conditions confirms the suitability of SecoGear to marine unstable Conditions.

Vibration

The operating conditions on marine platforms and shipping installation require the capability to work in enviranments affected by bibrations. SecoGear was exposed to a resonance search and endurance testing, which consists of a random vibration test according to IACS E10. Vibration Sweep Test

- From 2 to 13.2 Hz displacement 1.0 (peak value)
- From 13.2 to 100 Hz acceleration amplitude of 0.7 g

Vibration Endurance Tests 90 minutes

Product Description

Minimal costs during service due to:

- Robust maintenance-free design with minimum number of parts
- SecoVac VB2 Plus vacuum circuit breaker has a along life up to 30,000 operations without the need for active maintenance
- An advanced vacuum interrupter contact design prevents hot spots, creates less heat and minimizes electrode erosion to yield longer life
- Low end of life disposal costs due to:
  - Vacuum switching technology
  - Air insulation
  - Recycling or re-use of all materials possible
  - No special decommissioning procedures necessary

User interface friendly

- Cable connection and user interfaces for operation on the same side of the unit
- Up to 8 cables per phase with standard compression lug for ease of cable connection
- Secondary cable entry points on both sides of the low voltage compartment top plate
- Secondary cable wiring runs over the length of the switchgear to help with inter-unit wiring
- Secondary cable terminals positioned at a good reachable height within the low voltage compartment
- Clear and simple, straightforward operation, panels combined with an active LED mimic diagram
- Base frame for up to 5 panels decreases the eommissioning time and site works

Low lifetime cost

Low initial costs due to:

- Compact footprint
- Cable access from front or rear
- Cable entry from either top or bottom
- Bus Duct entry from top or bottom
- Easy-access cable compartment for ease of cable connection
- Integrated arc release system, there are arc skirt, arc duct and arc roof as optional solutions
- Back to wall configuration with front cable access

Applications

Utilities and power plants

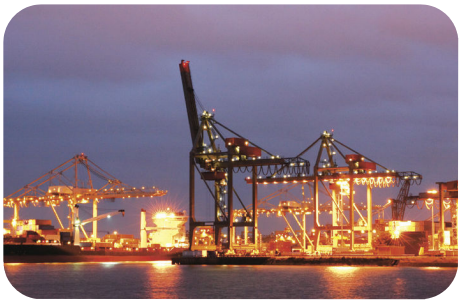
Power generation stations
Transformer stations
Switching stations
Main and auxiliary switchgear
E-House
Generator Circuit Breaker

Industry

Oil and Gas
Mining
Pulp and Paper
Cement
Textiles
Chemicals
Automotive
Petrochemical
Data Center
Metallurgy

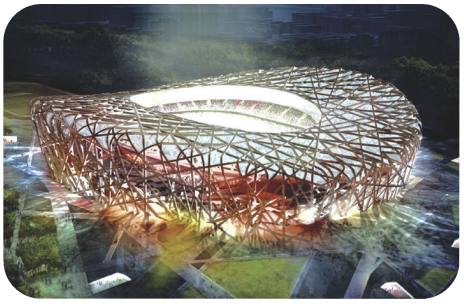
Transport

Airports
Ports Railways
Underground transport



Services

Supermarkets
Shopping malls
Hospitals
Large infrastructure and civil works

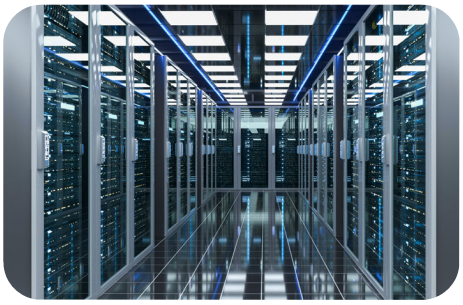


Marine

Drilling and Exploration
Merchant
Cruise
FPSO
Naval

Product Description

Applications



Applications

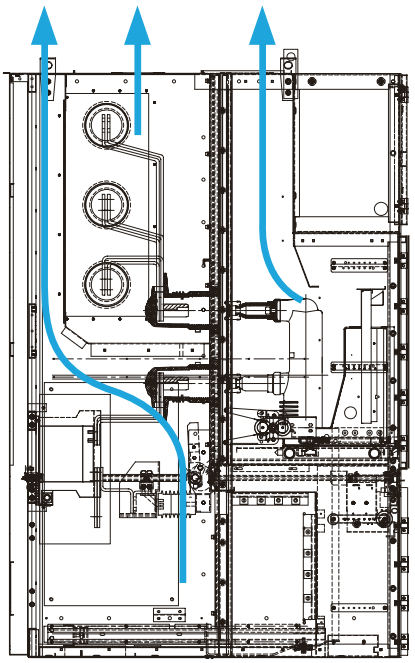
Safety

Internal Arc Containment

When developing modern medium voltage switchgear, personnel safety must take priority. This is why the SecoGear switchgear has been designed and tested to withstand an internal arc due to a short-circuit current of the same current level as the maximum shorttime withstand level.

The tests show that the metal housing of SecoGear switchgear provides an enhanced degree of protection for personnel near the switchgear in the case of an internal arcing fault.

SecoGear up to 17.5kV passes the 50kA/1s



Arc release Channel

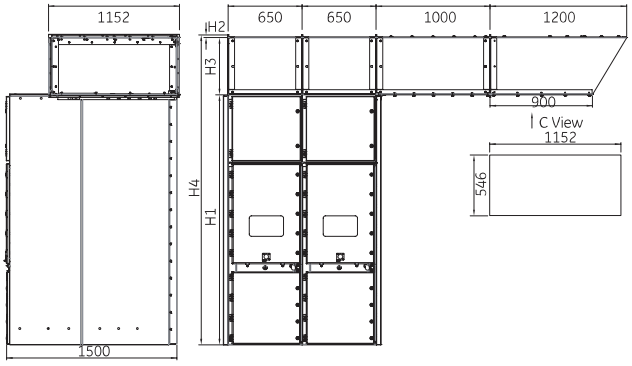
Arc Release System

The Arc Release System is the perfect solution for an E-house, marine and other restricted area, where do not allow hot particles and gases can not be vented within the switchroom. It guarantees safety for all personnel.

The top of each panel is fitted with two metal mesh panels. The pressure generated by arc fault causes these panels to open, allowing the gas and particles into the arc tunnel and are then evacuated to the outside of the room.

IAC test. SecoGear up to 27kV passes the 31.5kA/1s test.

- All high voltage primary compartment are provided with pressure relief flaps located on the topside of the switchgear
- Any overpressure inside the compartment caused by internal arcing will be released through the pressure relief flaps



Arc Release System

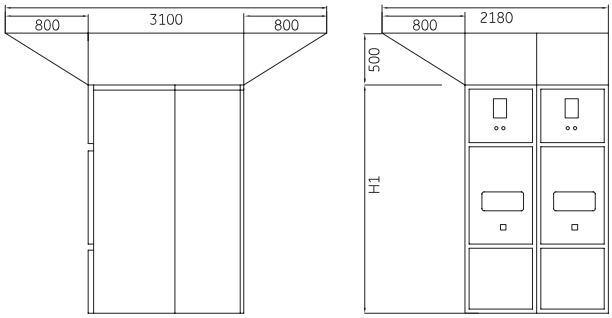
Switchgear with standard arc release system can be used where the room height is greater than 3000mm. At the location of the exhaust exits from the switchroom, personal access should be restricted.

For SecoGear FA 17.5kV, a reduced arc release system height is available with the tunnel having a height of 400mm, the the ceiling height being a minimum of 2700mm.

The switchgear units have been tested according to IEC 62271-200:2003 for the following Internal Arc Classiication. The SecoGear have pass type test IAC AFLR 50kA/1s for 17.5kV and for 27kV 31.5kA/1s with skirt as below.

	Arc Duct
H1	2200
H2	20
H3	400
H4	2620

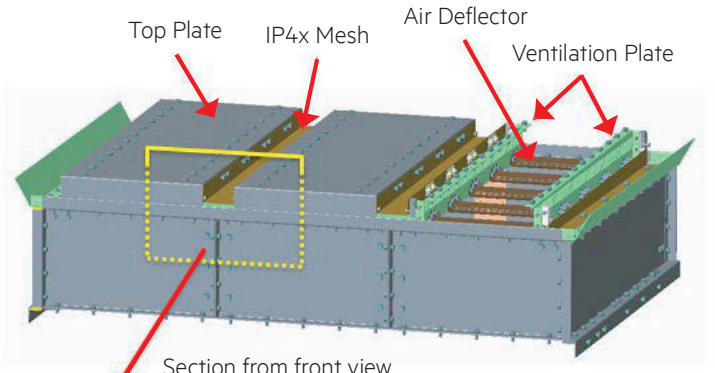
Product Description

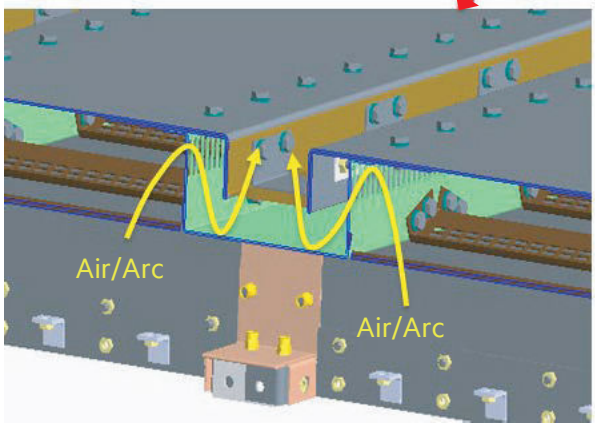


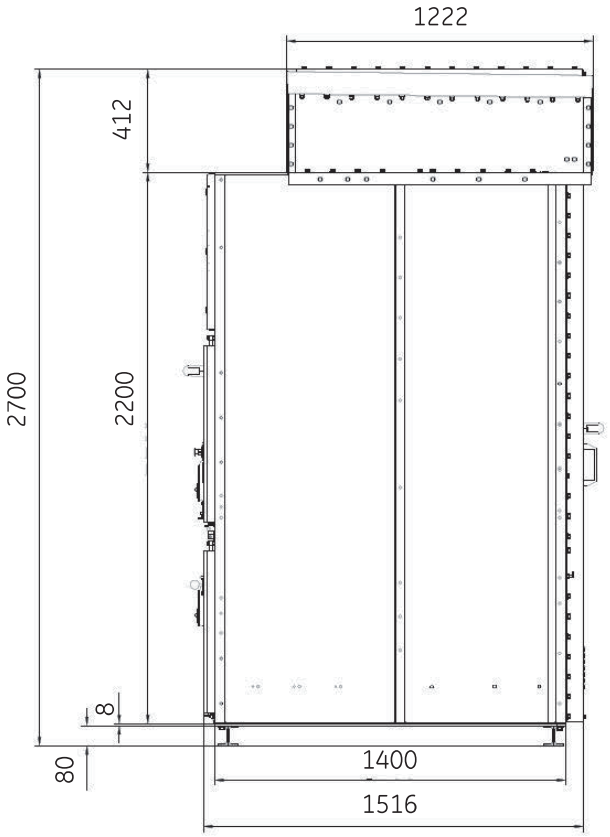
Arc skirt (optional)

Arc roof (optional)

For installations where installation of the arc duct or arc skirt could be physically or economically difficult GEIS can provide an alternative arc release system. The Arc Roof uses arc energy absorption technology to contain the arc and its by products in the roof mounted assembly. The Arc Roof is type tested for IAC ALFR 40kA/1sec according to IEC62271. The Arc Roof is standard for the Secogear 550 panels.





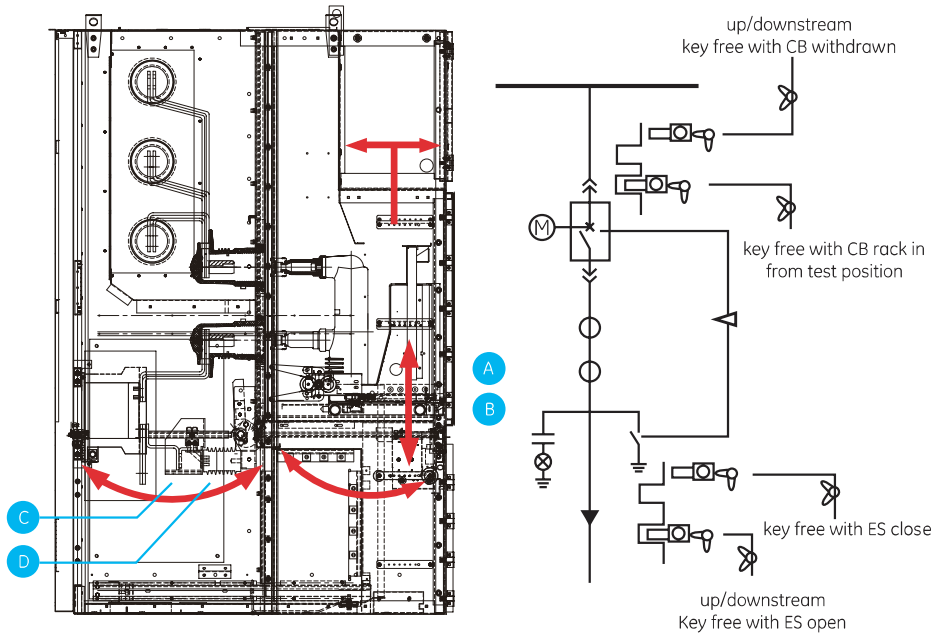


Interlock

Safety interlock systems guarantee the highest level of personnel safety preventing operator errors from occurring. SecoGear is designed with a number of interlocking systems to prevent mis-operation:

- The apparatus can only be moved fromtest to connected position and vice versa when apparatus is opened
- The earthing switch cannot be closed when the apparatus is in the connected position and in the traveling position between test and connected
- The cable compartment door can be opened only when the earthing switch is closed
- The earthing switch can be opened only when the cable compartment door is closed
- The secondary plug can be inserted or removed only when the apparatus is in the test position
- The apparatus can only be closedwhen the circuit breaker is positively located in the connected position
- When the apparatus is removed from connected position, the metal shutters will close automatically preventing access to live connections

Description of the interrock system	Key Condition
A Functional truck racking-out lock	Key will be free when the truck in the connected position
	Key will be trapped when the truck in the test position
B Functional truck racking-in lock	Key will be free when the truck in the test position
	Key will be trapped when the truck in the connected position
C Earthing switch closing lock	Key will be free when the earthing switch is open
	Key will be trapped when the earthing switch in closed position
D Earthing switch opening lock	Key will be free when the earthing switch closed
	Key will be trapped when the earthing switch in open position



Interlock

Safety

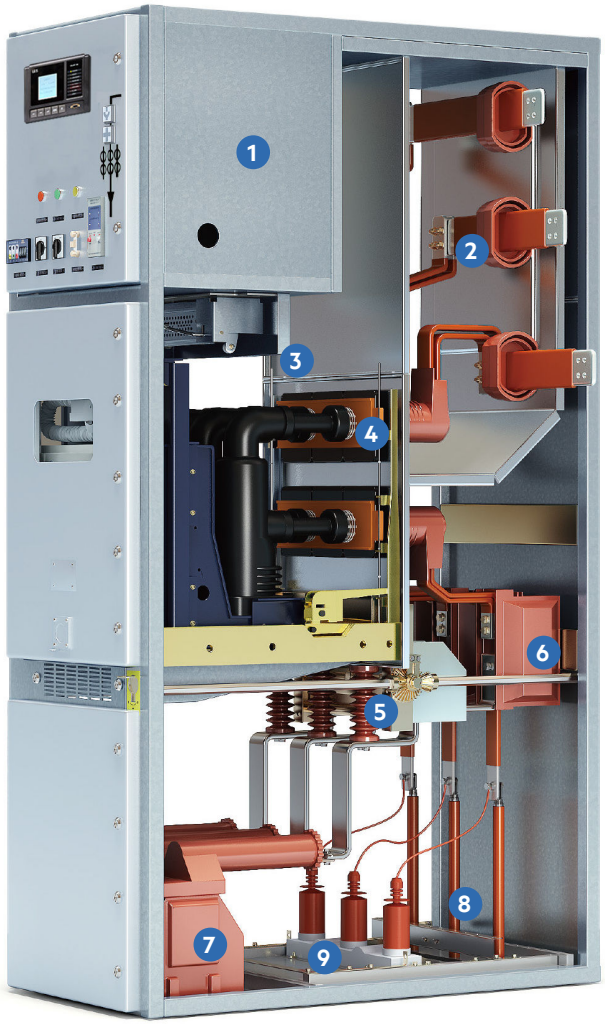
Product Description

Safety

SecoGear Interlocing

Category		Condition	Interlocking type	SecoGear 550/750		SecoGear 17.5kV		SecoGear FA 17.5kV		SecoGear 27kV	
				Standard	Optional	Standard	Optional	Standard	Optional	Standard	Optional
Apparatus Closing & Opening	**Apparatus could be closed only when:**										
	1	Apparatus in connected or test position and not in any intermediate position	Mechanical	√		√		√		√	
			Electrical		√		√		√		√
	Apparatus could be opened without conditions.										
	Padlocks allowance:										
	1	Access to Open Button	Padlock		√		√		√		√
	2	Access to Close Button	Padlock		√		√		√		√
	Apparatus cloud be Rack-Out from connected to test position only when:										
	1	Apparatus is open	Mechanical	√		√		√		√	
			Electrical		√		√		√		√
	2	Key-lock A for VCB rank in is turned captive	key		√				√		
Apparatus racking in/out locking from connected to test positions	**Apparatus could be Rack-In from test to connected position only when:**										
	1	Apparatus is open	Mechanical	√		√		√		√	
			Electrical		√		√		√		√
	2	Apparatus Control Plug is connected	Mechanical						√		
			Electrical				√		√		√
	3	Earthing Switch is open	Mechanical	√		√		√		√	
			Electrical		√		√		√		√
	4	Apparatus compartment door is closed	Mechanical		√		√		√		√
			Electrical		√		√		√		√
	5	Key-lock B for VCB rack in is turned captive	key		√		√		√		√
	Padlocks allowance										
	1	Access to insert crank lever	Padlock		√		√		√		√
Apparatus pulling in/ out locking from test to extracted positions	**Apparatus could be pulled-out from test position to service trolley only when:**										
	1	Service Trolley is attached to the Panel and locked to it	Mechanical						√		
			Electrical						√		
	2	Apparatus Control plug is disconnected	Mechanical						√		
			Electrical						√		
	Apparatus could be pulled-in from service trolley to test position only when:										
	1	Service Trolley is attached to the Panel and locked to it	Mechanical						√		
			Electrical						√		
Earthing Switch Closing & Opening	**Earthing switch could be closed only when:**										
	1	Apparatus in test position	Mechanical	√		√		√		√	
			Electrical		√		√		√		√
	2	Permisive blocking magnet is energized	Electrical		√		√		√		√
	3	Key-lock C for Earthing switch is turned captive	key		√		√		√		√
	Earthing switch could be open only when:										
	1	Cable compartment door closed	Mechanical	√		√		√		√	
			Electrical		√		√		√		√
	2	Rear cover is assembled	Mechanical	√		√		√		√	
	3	Key-lock D for Earthing switch is turned captive	key		√		√		√		√
	Padlocks allowance:										
	1	Access to insert operation lever	Padlock		√		√		√		√
Apparatus Compartment door Closing & Opening	**Apparatus compartment door could be opened only when:**										
	1	Apparatus in test position	Mechanical		√		√		√		√
			Electrical						√		
	2	Shutter Closed	Mechanical								
			Electrical						√		
Cable compartment door Closing & Opening	**Apparatus compartment door could be closed without conditions.**										
	Cable compartment door could be opened only when:										
	1	Earthing Switch is closed	Mechanical	√		√		√		√	
			Electrical						√		
	Cable compartment door could be closed without conditions.										
Shutters	**Shutters could be opened only when:**										
	1	Activated by Apparaturs Undercarriage	Mechanical						√		
			Electrical								
	Shutters could be closed without conditions.										
Control Plug	**Padlocks allowance:**										
	1	Padlock Opening or Closing	Padlock	√		√		√		√	
	Apparatus Control plug could be connected / disconnected only when:										
	1	Apparatus is in test position	Mechanical	√		√		√		√	
			Electrical								

Product Introduction



1. Low voltage compartment

The compartment is isolated with earthed metal partitions and has ample space for control and protection devices.

A fully isolated metal wire way is mounted at the top of each switchgear panel; this connects together to form a continuous low ous low voltage wire way that runs along the entire length of the switchgear.

2. Busbar compartment

Busbars are totally enclosed in their own earthed metal compartment which vents into the arc chamber. Fully insulated along their entire length, the busbars for up to 17.5kV SecoGear are type tested for ratings up to 4000A, 50kA for 3 seconds, up to 27kV SecoGear are type tested for rating up to 2500A, 31.5kA for 3 seconds. For 24/27kV SecoGear, the busbars are type tested for rating up to 2500A, 31.5kA for 3 seconds. Epoxy moldings separate switchgear sections.

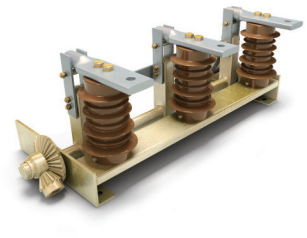
3. Apparatus compartment

Fully isolated by earthed metal partitions, with its own pressure relief channel into the arc chamber. The compartment provides all the safely interlocking mechanisms required for safe and reliable operation of the vacuum apparatus. Manual operation buttons allow for full operation of the vacuum apparatus from the front of the switchgear with the door fully closed. The apparatus is mechanically interlocked with the compartment door so that the door cannot be opened until the appparatus is switched off and racked out into the test position.

4. Automatic shutters

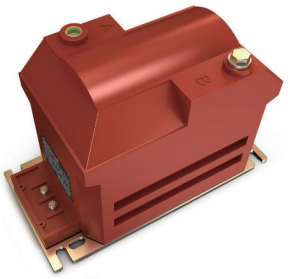
When the apparatus is in test position, the shutters automatically close to isolate the fixed contact from any live parts. Shutters can be individually and automatically operated for bus side and feeder side connection in close position.

Product Introduction



5. Earth switch

The earthing switch can be operated from the front of the switchgear. It is mechanically interlocked with the apparatus truck so that the earthing switch can only be operated when the apparatus is open in test position as well. The switch is also mechanically interlocked with the cable compartment for additional safety.

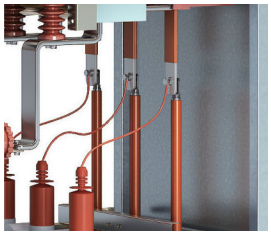


6. Current transformers

Current transformers are cast in resin, and totally enclosed. This provides superior protection against pollutants and moisture. It can be equipped with one or more independent magnetic cores with equal or different characteristics for measuring, metering and protection purposes.

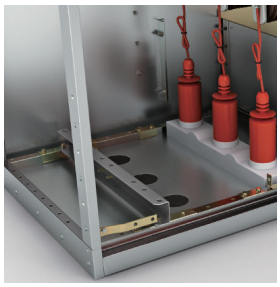
7. Voltage transformers

Voltage transformers are cast in resin, and totally enclosed. This provides superior protection against pollutants and moisture. It can be equipped with one or more independent magnetic cores with equal or different characteristics for measuring, metering and protection purposes.



8. Cable compartment

Cable supports are provided to secure cables. Cable clamps are applied for fix the cables. And the metal floor cover is removable. Infrared sight glass window can be offered.



9. Earth bar

Earth bar is made of copper and installed in the bottom of cable compartment. The earth bar system has been fault tested and runs vertically and horizontally with each panel section and is connected to the earth switch.

10. Surge arrester

Surge arrester is used to protect electric equipment against transient operating or lightning over-voltage. It is connected between primary conductor and ground for protecting protective load from damage effect. When the operating or lightning over-voltage occurs, surge arrester immediately limits over-voltage amplitude and protects the insulation of device.

Control and Operation

1. Low voltage control and protection compartment

Panel with all controls and indicators clearly visible and easy to operate

2. Protection relay

GEIS has a range of Multilin relay options that can be fitted as standard. However, customer specific protection relays from any manufacturer can be fitted to the compartment door

3. Mimic diagram

Easy to understand mimic diagram of each circuit

4. Apparatus position indicator

Apparatus position indication shows the apparatus in the connected or test position

5. Voltage detection system

Each panel can be equipped with an optional standard three phase voltage detection system for voltage detection to IEC 61243-5

6. Viewing windows

The apparatus compartment door viewing window provides visual indication of the position of the apparatus indicating:

- The status of the apparatus
- The status of the spring charged mechanism

7. Apparatus racking operate hole

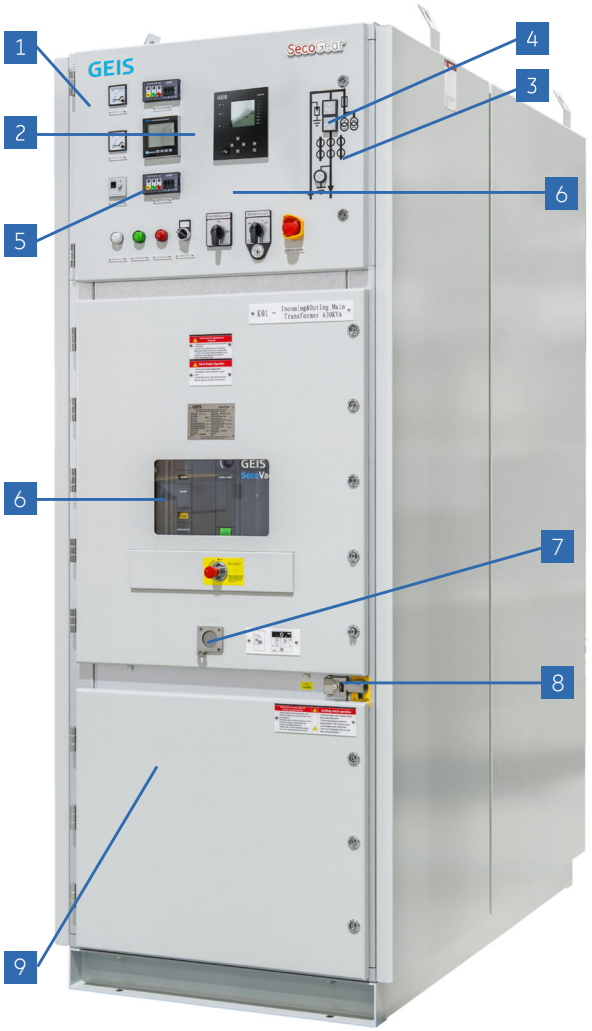
Apparatus racking in/out operate hole
Electrical operation for racking in/out available

8. Earthing switch operate hole

Earthing switch open/close
Electrical operation for Earthing switch available

9. Viewing windows and IR glass

Optional viewing windows on the cable compartment door.
Optional IR glass for cable compartment



Product Introduction

Technical Characteristics

		For VCB				For FC	
Product Type		SecoGear 550	SecoGear 17.5	SecoGear 27		SecoGear FC	
Rated voltage	kV	12	up to 17.5	24	27	7.2	12
Rated power frequency (min)	kVp	28	38	50	65	20	28
Rated lightning impulse (1.2/50μs)	kV	75	95	125	125	60	75
Rated frequency	Hz	50/60	50/60	50/60		50/60	
Rated current	A	630/1250	630/1250/1600/2000/2500 /3150/4000*	630/1250/1600/2000/2500		400**	
Rated short time withstand	kA	25/31.5	25/31.5/40/50	31.5		4**	
Rated peak value withstand current	kAp	65/82	65/82/104/130	82		10.4	
IP level for weather protection	Enclosure	up to IP44	IP4X/41/42/43				

* Forced cooling
** Only for contactor

Protection

- IP4X for the enclosure
- IP2X between each compartment
- IP41 / IP42 / IP43 optional

Connections

- Front and/or rear access
- Cable entry from bottom or top
- Bus Duct entry bottom or top

Construction

- Internal arc withstand (classification IAC): AFLR up to 50kA/1sec
- 3 compartments (classification LSC2B according to IEC 62271-200)
- All the metal surfaces in the panels are corrosion proof
- Panels are produced using hot dipped galvanized steel sheet
- Busbar fully insulated for 12kV, 15kV, 17.5kV, 24kV, 27kV

Operating Conditions

Normal operating conditions

The switchgear is fundamentally designed for the normal service conditions for indoor switchgear to IEC Publication 62271-1. The following limit values, among others, apply.

- Ambient temperature
  - Maximum +40°C
  - 24h-Medium +35°C
  - Minimum -15°C
- Humidity
  - Highest average value measured over 24 hours
  - Relative humiGity 95%
  - Highest average value measured over 1 month
  - Relative humidity 90%
- The maximum site altitude is 1000m above sea level
- Seismic Rating up to Uniform Building Code (UBC) 1997 Zone 4
- Seismic Rating up to IBC 2012 for 27kV SecoGear

Special operating conditions

SecoGear is suitable for indoor type installations according to IEC standard. Special operating conditions must be discussed with GEIS in advance.

For example: At site altitudes above 1000m, the effects of the reduction in density of the air on the dielectric properties must be taken into account.

Increased ambient temperatures must be compensated for in the design of the busbar and the branch conductors as well as the withdrawable parts; otherwise the current carrying capacity will be reduced. Fitting additional ventilation facilities can assist heat dissipation in the switchgear panel.

High altitude application

The insulating capacity of the switchgear with rated values of short-time power-frequency withstand voltage and impulse withstand voltage according to IEC 62271-1.

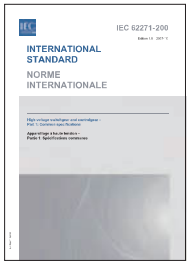
Note on any special climatic operating conditions

When the switchgear is operated in areas with high humidity and/or major rapid temperature fluctuations, there is a risk of condensation. Preventative action (e.g.fitting an electric heater) must be taken in consultation with the manufacturer to avoid the condensation and any resulting corrosion or other adverse effects.

Product Introduction

IEC Standards

SecoGear complies with the standards and specifications for factory assembled metal-clad switchgear and has been type tested in accordance with the IEC publications as given below.



IEC 62271-100	High-voltage alternating current circuit breakers.
IEC 62271-200	AC Metal-Clad switchgear and control gear for rated voltages above lkV and up to 52kV.
IEC 62271-102	High-voltage alternating current disconnector and Earth Switches.
IEC 62271-1	The common specification for high voltage switchgear and control gear Standards.
IEC 60529	Degrees of protection as provided by enclosures (IP Code).
IEC 62271-106	High-voltage Alternating Current Contactors and Contactor-based Motor-Starters.

Storage Conditions

In order to retain all of the functional unit's qualities when stored for pfolonged periods, we recommend that the equipment is stored in its original packaging, in dry conditions sheltered from the sun and rain at a temperature of between -15°C and + 40°C. For storage: -30°C.

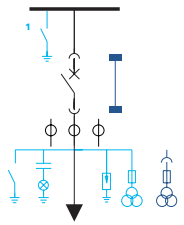
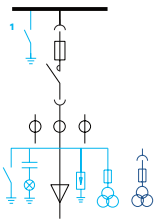
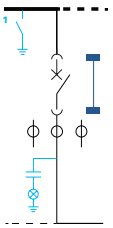
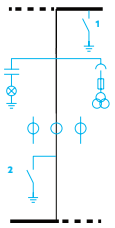
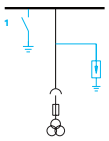
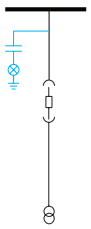
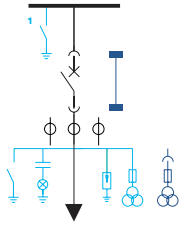
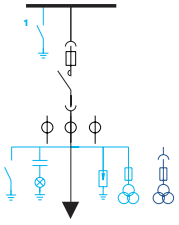
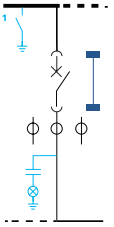
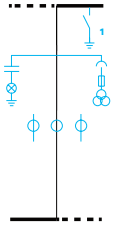
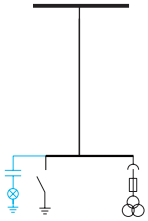
Configurations

Typical Panels

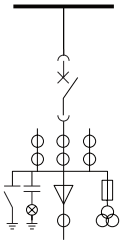
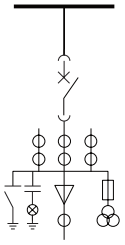
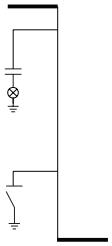
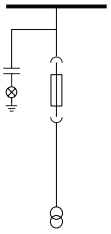
The SecoGear 550 series comprises 6 basic configuration applications.

The SecoGear standard series comprises 11 basic configuration applications The table below can be used to link requirements to functional units and gives basic information on the general composition of each unit.

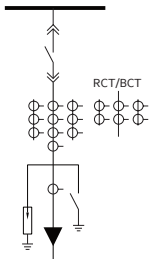
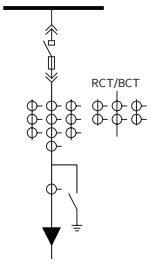
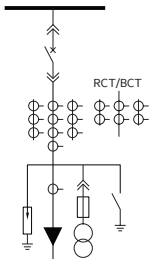
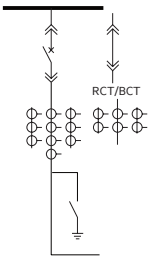
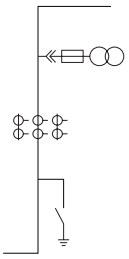
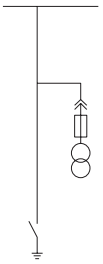
SecoGear

Incoming/Feeder	Fuse Contactor	Bus Tie	Riser	VT Panel	CPT Panel
					
Incoming/Feeder Front Access	**Fuse Contactor Front Access**	**Bus Tie Front Access**	**Riser Front Access**	**VT Panel Front Access**	
					

SecoGear 24kV-27kV

Incoming with ES & VT (24kV)	Incoming with ES & VT (27kV)	Riser with ES	CPT
			

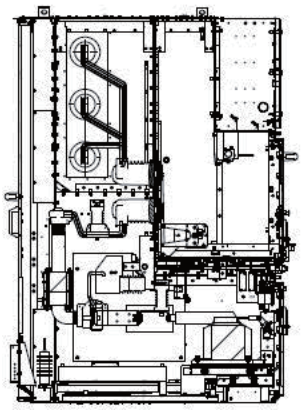
SecoGear 550 12kV

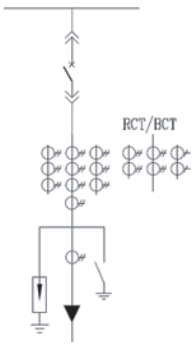
Incoming/Feeder	Feeder with Fuse Contactor	Feeder with VT	Busbar Tie with VCB	Riser with VT	Measuring with ESW
					

Configurations

SecoGear 550 Incoming/Feeder

Rated Voltage (kV)		
		12
Rated Insulation Level		
Power frequency withstand voltage (kV)		28
Lighting impulse withstand voltage (kV)		75
Rated Current (A at 40°C)	400	
	630	■
	1250	■
Breaking capacity (kA)	25	■
	31.5	■
Short time withstand current (kA/3s)	25	■
	31.5	■
Dimensions (mm)		
Width (W)		550
Height (H)		2200
Depth (D)	Top access	1900
	Botton access	1400
Weight (kg)		800-900
Apparatus		
SecoVac iVB		■
SecoVac VB2 Plus		■

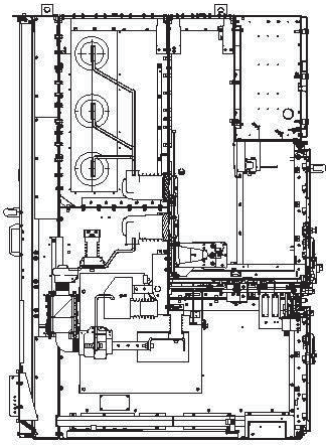


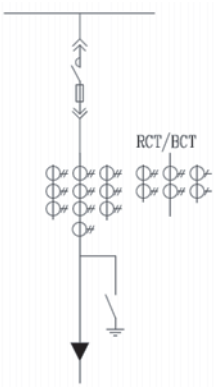


Configurations

SecoGear 550 12kV Feeder with Fuse contactor

Rated Voltage (kV)			
		7.2/12	
Rated Insulation Level			
Power frequency withstand voltage (kV)		20	28
Lighting impulse withstand voltage (kV)		60	75
Rated Current (A)	200		
	400	■	
	630	■	
Breaking capacity (kA)	25	■	
	31.5	■	
	40	■	
	50	■	
Short time withstand current (kA/3s)	25	■	
	31.5	■	
	40	■	
	50	■	
Dimensions (mm)			
Width (W)		550	
Height (H)		2200	
Depth (D)		1400	
Weight (kg)			
Estimated weight (kg)		800	
Apparatus			
SecoVac FC		■	

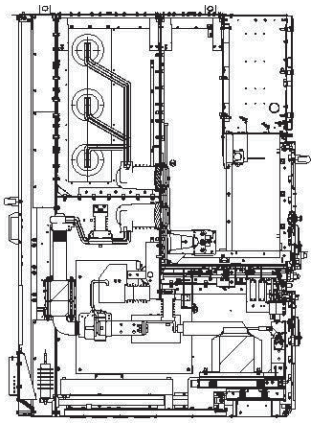


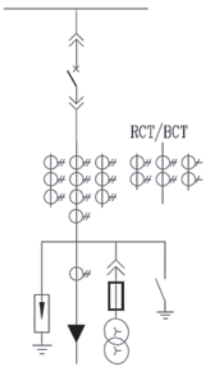


Configurations

SecoGear 550 12kV Feeder with VT

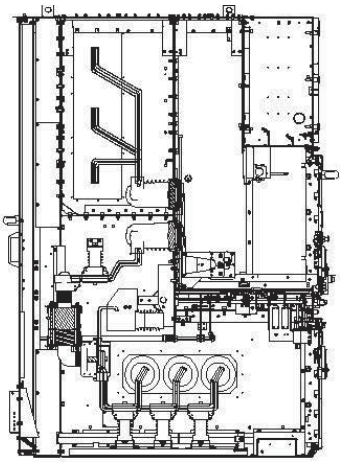
Rated Voltage (kV)		
		12
Rated Insulation Level		
Power frequency withstand voltage (kV)		28
Lighting impulse withstand voltage (kV)		75
	630	■
	1250	■
	1600	
	2000	
Breaking capacity (kA)	25	■
	31.5	■
Short time withstand current (kA/3s)	25	■
	31.5	■
Dimensions (mm)		
Width (W)		550
Height (H)		2200
Depth (D)		1400
Weight (kg)		
Estimated Weight (kg)		800
Apparatus		
SecoVac iVB		■
SecoVac VB2 Plus		■

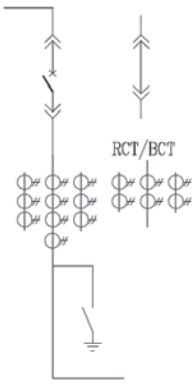




SecoGear 550 12kV Bus Tie with VCB

Rated Voltage (kV)		
		12
Rated Insulation Level		
Power frequency withstand voltage (kV)		28
Lighting impulse withstand voltage (kV)		75
	630	■
	1250	■
	1600	
	2000	
Breaking capacity (kA)	25	■
	31.5	■
	40	
Short time withstand current (kA/3s)	25	■
	31.5	■
	40	
Dimensions (mm)		
Width (W)		550
Height (H)		2200
Depth (D)		1400
Weight (kg)		
Estimated Weight (kg)		800
Apparatus		
SecoVac iVB		■
SecoVac VB2 Plus		■

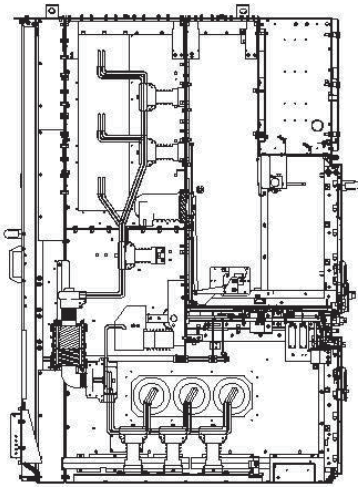


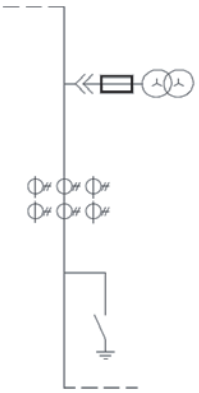


Configurations

SecoGear 550 12kV Riser Panel with Measuring

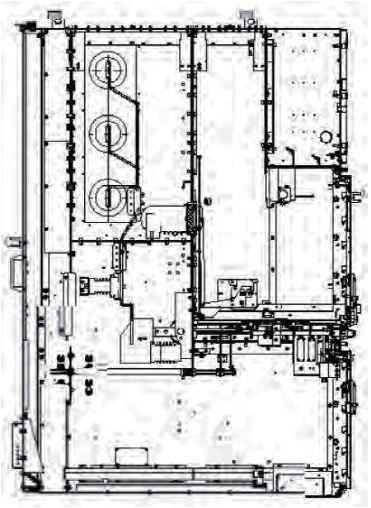
Rated Voltage (kV)		
		12
Rated Insulation Level		
Power frequency withstand voltage (kV)		28
Lighting impulse withstand voltage (kV)		75
	630	
	1250	■
	1600	
	2000	
Breaking capacity (kA)	25	
	31.5	■
	40	
Short time withstand current (kA/3s)	25	
	31.5	■
	40	
Dimensions (mm)		
Width (W)		550
Height (H)		2200
Depth (D)		1400
Weight (kg)		
Estimated Weight (kg)		800

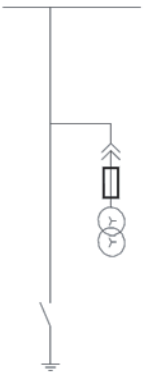




SecoGear 550 12kV Measuring panel with Earthing switch

Rated Voltage (kV)		
		12
Rated Insulation Level		
Power frequency withstand voltage (kV)		28
Lighting impulse withstand voltage (kV)		75
	630	
	1250	■
	1600	
	2000	
Breaking capacity (kA)	25	
	31.5	■
	40	
Short time withstand current (kA/3s)	25	
	31.5	■
	40	
Dimensions (mm)		
Width (W)		550
Height (H)		2200
Depth (D)		1400
Weight (kg)		
Estimated Weight (kg)		800

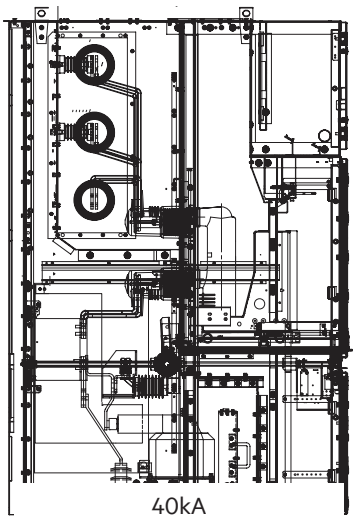




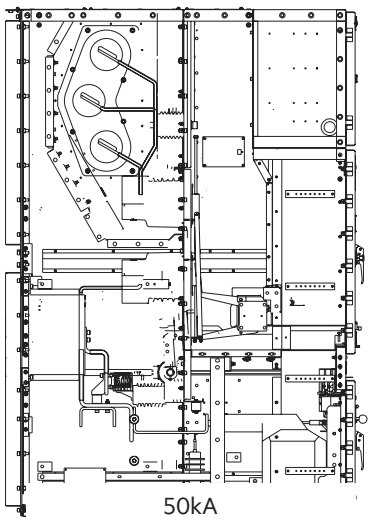
Configurations

Standard SecoGear Incoming/Feeder

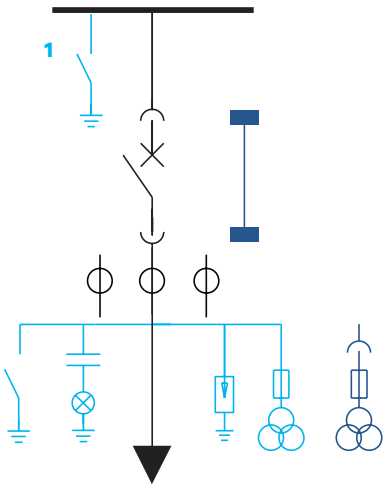
Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■		■	
	1250	■	■		■	
	1600		■			■
	2000		■			■
	2500			■		■
	3150			■		
	4000			■		
Breaking capacity (kA)	25	■			■	
	31.5	■	■	■	■	■
	40		■	■		
	50		■	■		
Short time withstand current (kA/3s)	25	■			■	
	31.5	■	■	■	■	■
	40		■	■		
	50		■	■		
Dimensions (mm)						
Width (W)		650	800	1000	800	1000
Height (H)	Standard	2200	2200	2200	2400	2400
	Top Mounted ESW	2600	2600	2600	-	-
Depth (D)	Top Access	1900	1900	1900	-	-
	Bottom Access	1400	1400	1400	1800	1800
Weight (kg)						
Estimated Weight (kg)		900-950			1100-1200	
Apparatus						
SecoVac VB2 Plus		■	■	■	■	■
SecoVac VB2 Plus-G				■		



40kA



50kA



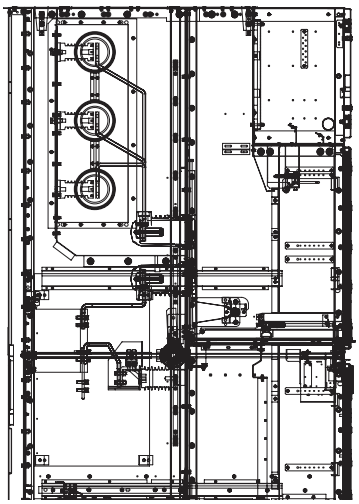
Notes:

1. Only Available for SecoGear 17.5kV, up to 40kA.

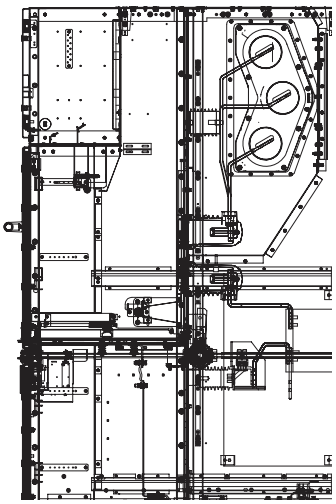
Configurations

Standard SecoGear Fuse Contactor

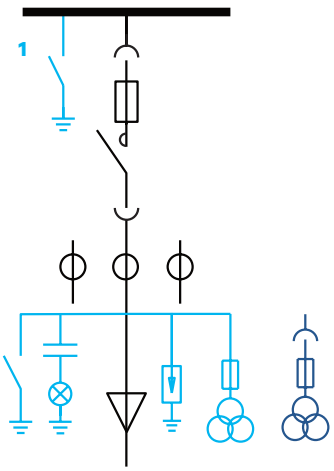
Rated Voltage (kV)						
		12			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28			50/65	
Lighting impulse withstand voltage (kV)		75			95/125	
Rated Current (A at 40°C)	400					
	630	■				
	1250					
	1600					
	2000					
	2500					
	3150					
	4000					
Breaking capacity (kA)	25	■				
	31.5	■				
	40	■				
	50	■				
Short time withstand current (kA/3s)	25	■				
	31.5	■				
	40	■				
	50	■				
Dimensions (mm)						
Width (W)		650				
Height (H)	Standard	2200				
	Top Mounted ESW	2600				
Depth (D)	Top Access	1900				
	Bottom Access	1400				
Weight (kg)						
Estimated Weight (kg)		900-950				
Apparatus						
SecoVac FC		■				



40kA



50kA



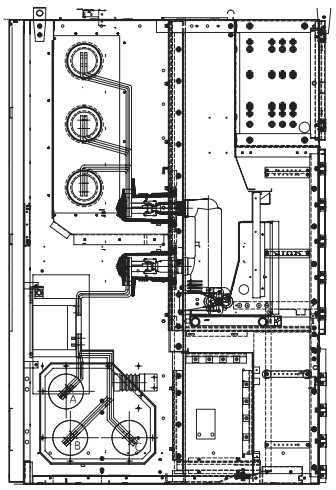
Notes:

1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.

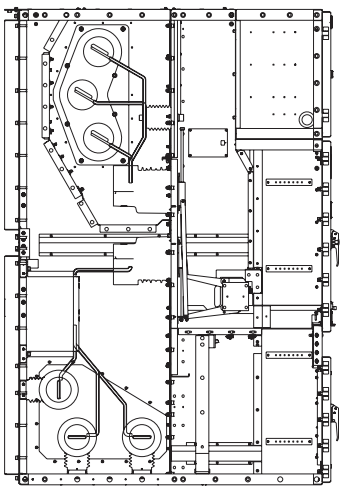
Configurations

Standard SecoGear Bus Tie

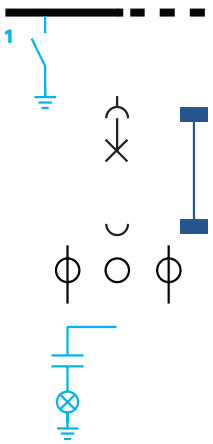
Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■		■	
	1250	■	■		■	
	1600		■			■
	2000		■			■
	2500			■		■
	3150			■		
	4000			■		
Breaking capacity (kA)	25	■			■	
	31.5	■	■	■	■	■
	40		■	■		
	50		■	■		
Short time withstand current (kA/3s)	25	■			■	
	31.5	■	■	■	■	■
	40		■	■		
	50		■	■		
Dimensions (mm)						
Width (W)		650	800	1000	800	1000
Height (H)	Standard	2200	2200	2200	2400	2400
	Top Mounted ESW	2600	2600	2600	-	-
Depth (D)	Top Access	1900	1900	1900	-	-
	Bottom Access	1400	1400	1400	1800	1800
Weight (kg)						
Estimated Weight (kg)		900-950			1100-1200	
Apparatus						
SecoVac VB2 Plus		■	■	■	■	■
SecoVac VB2 Plus-G				■		



40kA



50kA



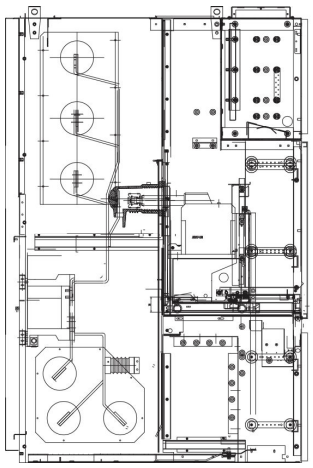
Notes:

1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.

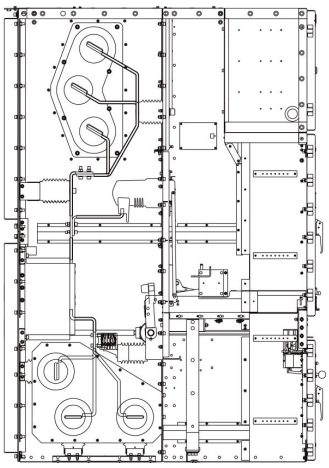
Configurations

Standard SecoGear Riser

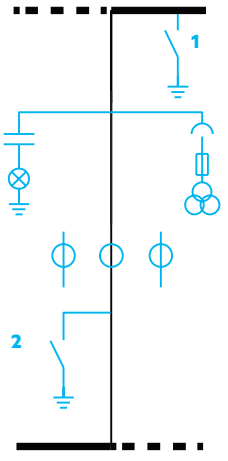
Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■		■	
	1250	■	■		■	
	1600		■			■
	2000		■			■
	2500			■		■
	3150			■		
	4000			■		
Breaking capacity (kA)	25					
	31.5					
	40					
	50					
Short time withstand current (kA/3s)	25	■			■	
	31.5	■	■	■	■	■
	40		■	■		
	50		■	■		
Dimensions (mm)						
Width (W)		650	800	1000	800	1000
Height (H)	Standard	2200	2200	2200	2400	2400
	Top Mounted ESW	2600	2600	2600	-	-
Depth (D)	Top Access	1900	1900	1900	-	-
	Bottom Access	1400	1400	1400	1800	1800
Weight (kg)						
Estimated Weight (kg)		900-950			1100-1200	
Apparatus						
SecoVac VB2 Plus		■	■	■	■	■
SecoVac VB2 Plus-G				■		



40kA



50kA



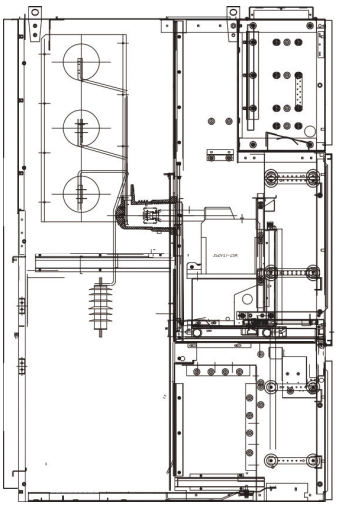
Notes:

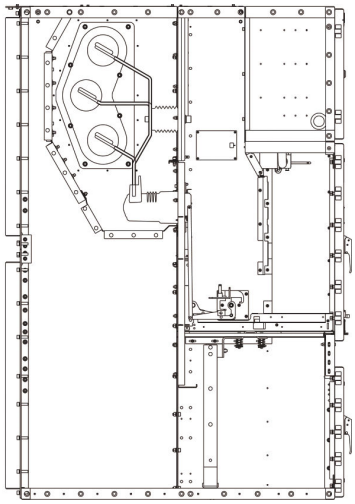
1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.
2. Only Available for SecoGear 27kV and SecoGear 17.5kV 50kA

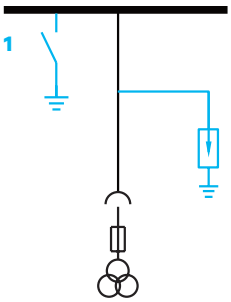
Configurations

Standard SecoGear VT Panel

Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630					
	1250					
	1600					
	2000					
	2500					
	3150					
	4000					
Breaking capacity (kA)	25					
	31.5					
	40					
	50					
Short time withstand current (kA/3s)	25	■	■		■	
	31.5	■	■		■	
	40	■	■			
	50		■			
Dimensions (mm)						
Width (W)		650	800		800	
Height (H)	Standard	2200	2200		2400	
	Top Mounted ESW	2600	2600		-	
Depth (D)	Top Access	1900	1900		-	
	Bottom Access	1400	1400		1800	
Weight (kg)						
Estimated Weight (kg)		900-950			1100-1200	





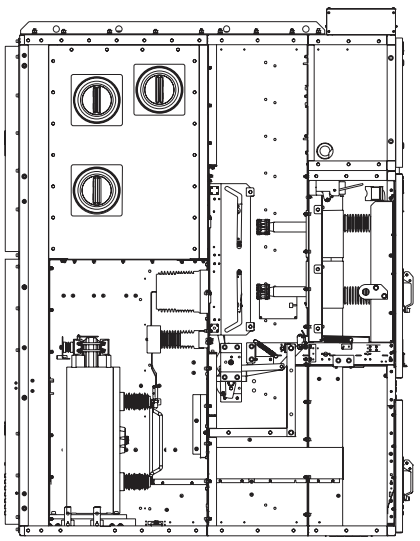


Notes:
1. Only Available for SecoGear 17.5kV, up to 40kA.

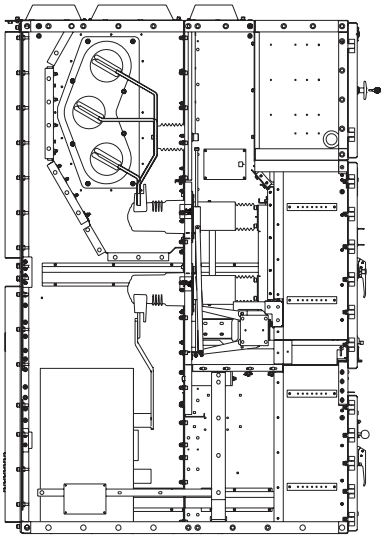
Configurations

Standard SecoGear CPT Panel

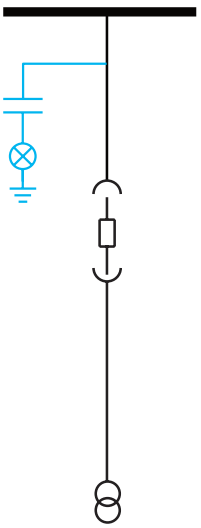
Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630				■	
	1250			■	■	
	1600			■		■
	2000			■		■
	2500			■		■
	3150			■		
	4000			■		
Breaking capacity (kA)	25					
	31.5					
	40					
	50			■	■	■
Short time withstand current (kA/3s)	25				■	
	31.5				■	■
	40					■
	50			■	■	■
Dimensions (mm)						
Width (W)		650	800	1000	800	1000
Height (H)	Standard	2200	2200	2200	2400	2400
	Top Mounted ESW	2600	2600	2600	-	-
Depth (D)	Top Access	1900	1900	1900	-	-
	Bottom Access	1400	1400	1400	1800	1800
Weight (kg)						
Estimated Weight (kg)		900-950			1100-1200	



40kA



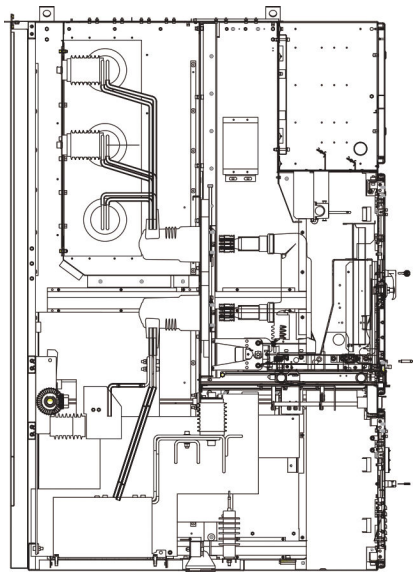
50kA

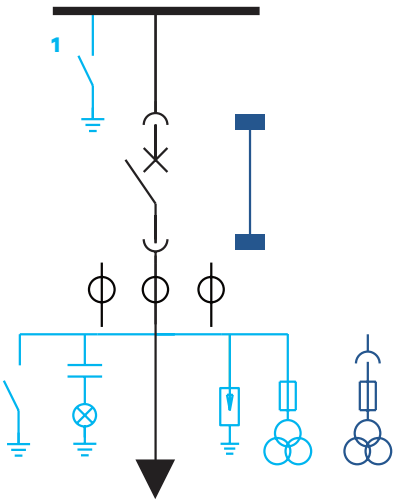


Configurations

Incoming/Feeder Front Access

Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■			
	1250	■	■			
	1600		■			
	2000		■			
	2500			■		
	3150			■		
	4000					
Breaking capacity (kA)	25	■				
	31.5	■	■	■		
	40		■	■		
Short time withstand current (kA/3s)	25	■				
	31.5	■	■	■		
	40		■	■		
Dimensions (mm)						
Width (W)		650	800	1000		
Height (H)	Standard	2200	2200	2200		
	Top Mounted ESW	2600	2600	2600		
Depth (D)	Top Access	1900	1900	1900		
	Bottom Access	1400	1400	1400		
Weight (kg)						
Estimated Weight (kg)		900-950				
Apparatus						
SecoVac VB2 Plus		■	■	■		
SecoVac VB2 Plus-G				■		





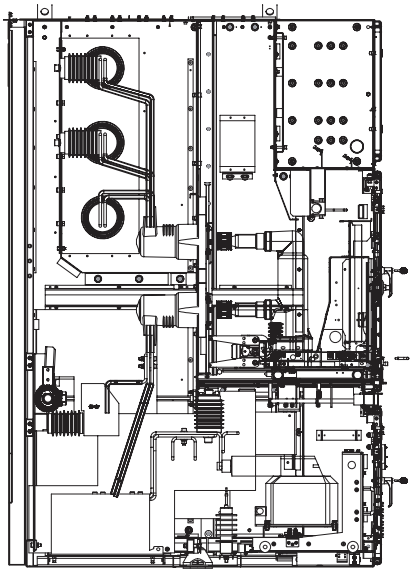
Notes:

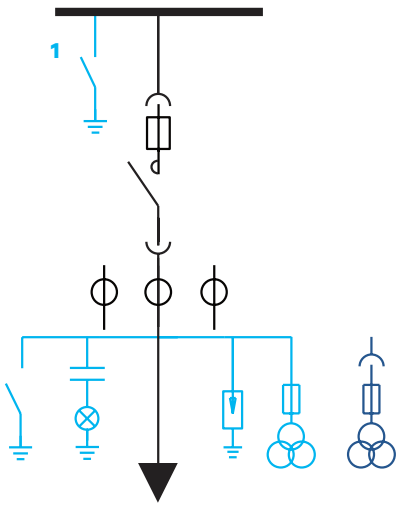
1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.

Configurations

Fuse Contactor Front Access

Rated Voltage (kV)						
		7.2/12			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		20/28			50/65	
Lighting impulse withstand voltage (kV)		60/75			95/125	
Rated Current (A at 40°C)	400	■				
	630					
	1250					
	1600					
	2000					
	2500					
	3150					
	4000					
Breaking capacity (kA)	25	■				
	31.5	■				
	40	■				
Short time withstand current (kA/3s)	25	■				
	31.5	■				
	40	■				
Dimensions (mm)						
Width (W)		650				
Height (H)	Standard	2200				
	Top Mounted ESW	2600				
Depth (D)	Top Access	1900				
	Bottom Access	1400				
Weight (kg)						
Estimated Weight (kg)		915				



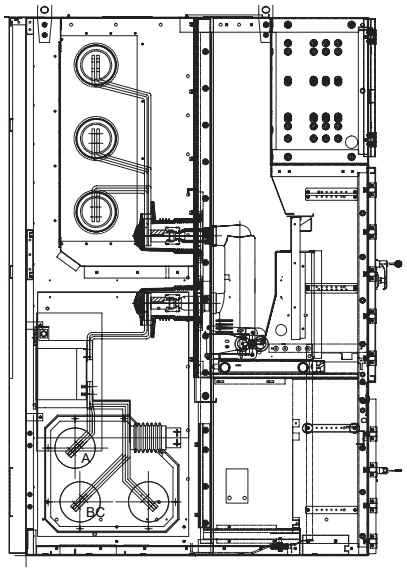


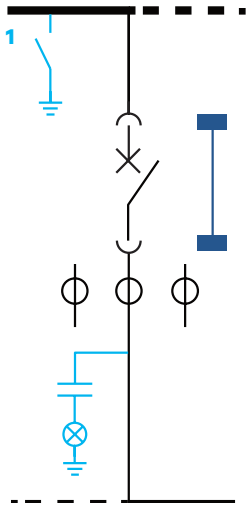
Notes:
1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.

Configurations

Bus Tie Front Access

Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■	■		
	1250	■	■	■		
	1600		■	■		
	2000		■	■		
	2500			■		
	3150			■		
	4000			■		
Breaking capacity (kA)	25	■		■		
	31.5	■	■	■		
	40		■	■		
Short time withstand current (kA/3s)	25	■		■		
	31.5	■	■	■		
	40		■	■		
Dimensions (mm)						
Width (W)		650	800	1000		
Height (H)	Standard	2200	2200	2200		
	Top Mounted ESW	2600	2600	-		
Depth (D)	Top Access	1900	1900	1800		
	Bottom Access	1400	1400	1400		
Weight (kg)						
Estimated Weight (kg)		900-1100				



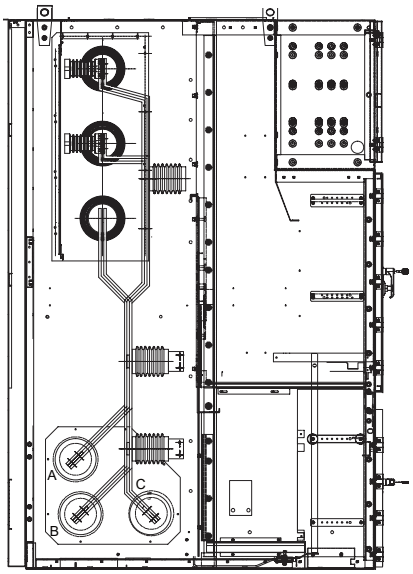


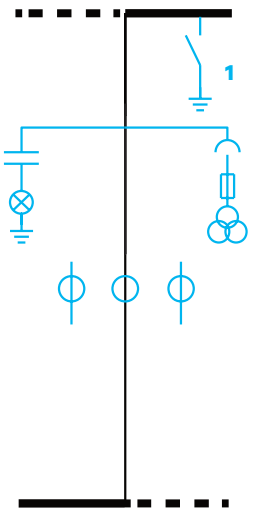
Notes:
1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.

Configurations

Riser Front Access

Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■	■		
	1250	■	■	■		
	1600		■	■		
	2000		■	■		
	2500			■		
	3150			■		
	4000			■		
Breaking capacity (kA)	25					
	31.5					
	40					
Short time withstand current (kA/3s)	25	■		■		
	31.5	■	■	■		
	40		■	■		
Dimensions (mm)						
Width (W)		650	800	1000		
Height (H)	Standard	2200	2200	2200		
	Top Mounted ESW	2600	2600	2600		
Depth (D)	Top Access	-	-	-		
	Bottom Access	1400	1400	1400		
Weight (kg)						
Estimated Weight (kg)		900-1100				



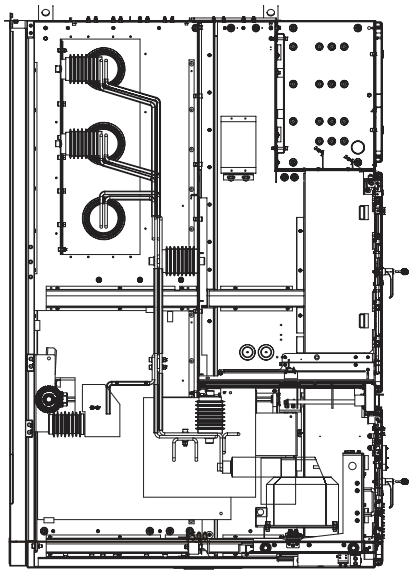


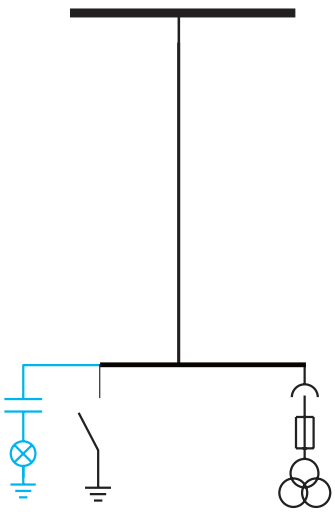
Notes:
1. Top Mounted Bus Earthing Switch only available for Secogear 17.5kV, up to 40kA. Only Available for SecoGear 17.5kV, up to 40kA.

Configurations

VT Panel with ESW Front Access

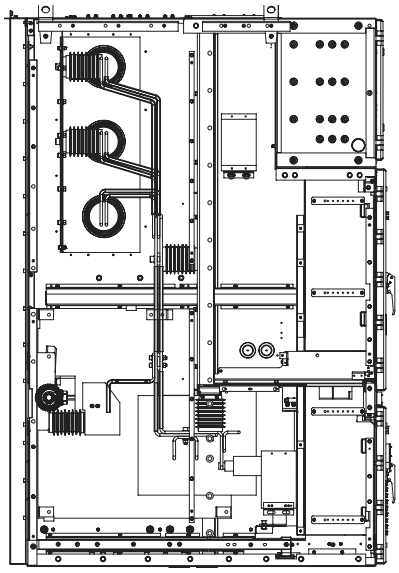
Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)		28/36/38			50/65	
Lighting impulse withstand voltage (kV)		75/95/95			95/125	
Rated Current (A at 40°C)	400					
	630	■	■			
	1250	■	■			
	1600		■			
	2000		■			
	2500					
	3150					
	4000					
Breaking capacity (kA)	25	■				
	31.5	■	■			
	40		■			
Short time withstand current (kA/3s)	25	■				
	31.5	■	■			
	40		■			
Dimensions (mm)						
Width (W)		650	800			
Height (H)	Standard	2200	2200			
	Top Mounted ESW	2600	-			
Depth (D)	Top Access	1900	-			
	Bottom Access	1400	1400			
Weight (kg)						
Estimated Weight (kg)		900-1100				

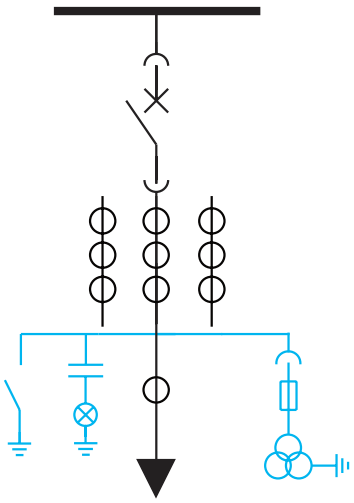




Incoming Panel with VT and Earthing Switch Front Access

Rated Voltage (kV)						
		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)						
Lighting impulse withstand voltage (kV)						
Rated Current (A at 40°C)	400					
	630	■	■			
	1250	■	■			
	1600		■			
	2000		■			
	2500			■		
	3150			■		
	4000			■		
Breaking capacity (kA)	25	■				
	31.5	■	■			
	40		■	■		
Short time withstand current (kA/3s)	25	■				
	31.5	■	■			
	40		■	■		
Dimensions (mm)						
Width (W)		650	800	1000		
Height (H)	Standard	2200	2200	2200		
	Top Mounted ESW	-	-	-		
Depth (D)	Top Access	1900	1900	1900		
	Bottom Access	1400	1400	1400		
Weight (kg)						
Estimated Weight (kg)		1000-1200				

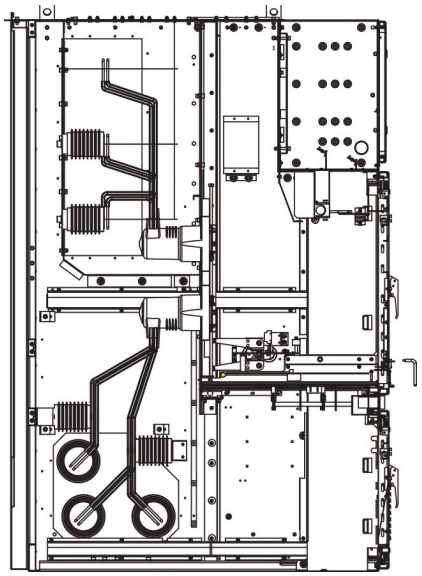


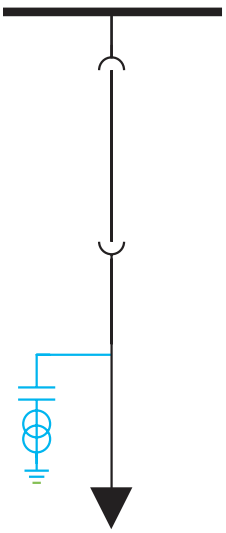


Configurations

Disconnect Panel Front Access

Rated Voltage (kV)		12/15/17.5			24/27	
Rated Insulation Level						
Power frequency withstand voltage (kV)						
Lighting impulse withstand voltage (kV)						
Rated Current (A at 40°C)	400					
	630	■				
	1250	■				
	1600		■			
	2000		■			
	2500			■		
	3150			■		
	4000			■		
Breaking capacity (kA)	25	■				
	31.5	■	■	■		
	40		■	■		
Short time withstand current (kA/3s)	25	■				
	31.5	■	■	■		
	40		■	■		
Dimensions (mm)						
Width (W)		650	800	1000		
Height (H)	Standard	2200	2200	2200		
	Top Mounted ESW	-	-	-		
Depth (D)	Top Access	1900	1900	1900		
	Bottom Access	1400	1400	1400		
Weight (kg)						
Estimated Weight (kg)		900-950				

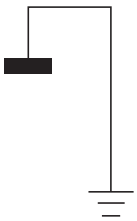
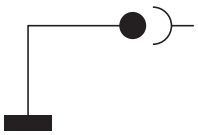
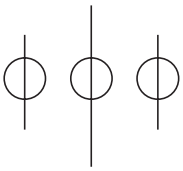




Notes and Legends

- Standard Scope of Supply
- Alternative Supply
- Optional Scope

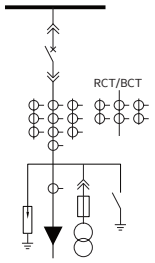
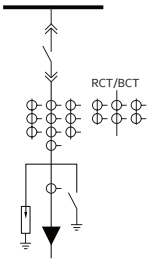
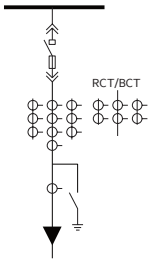
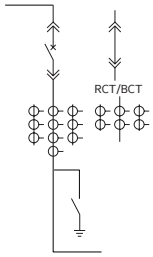
Symbol Legend

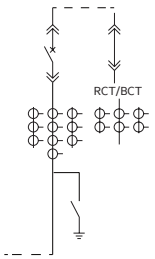
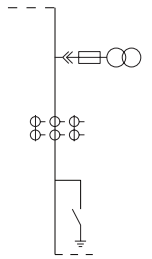
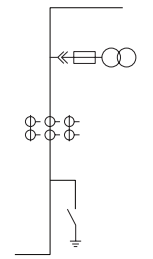
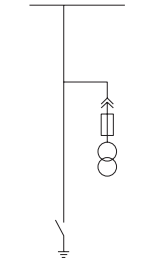
Circuit Breaker	Fuse Contactor	Disconnector Truck	Earthing Truck Bus Side
			
Earthing Truck Cable Side	**Cable Test Truck**	**Earthing Switch**	**Voltage Transformer**
			
Current Transformers	**Cable Connection**	**Withdrawable Connection**	
			

Configurations

Configurations scheme

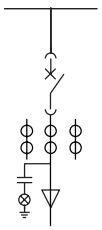
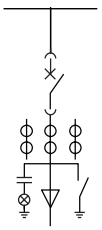
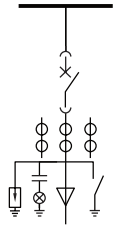
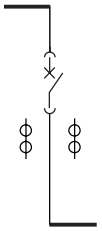
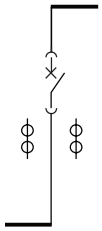
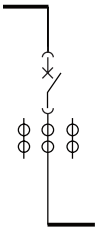
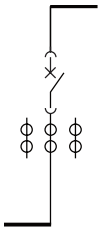
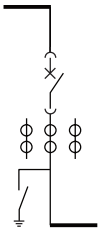
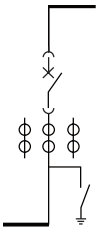
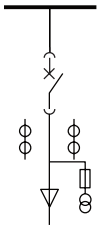
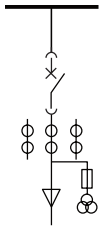
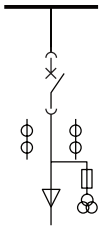
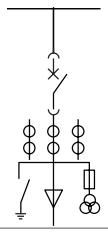
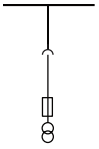
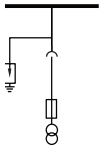
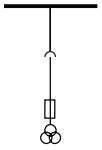
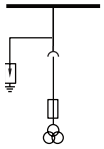
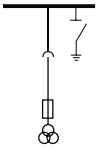
SecoGear 550/750 12kV

Scheme Number		A01	A02	A03	A04
Primary Scheme					
Rated Current(A)		630-2000	630-1250	160	1250-2000
Main Circuit Breaker	Vacuum Circuit Breaker	1	1		1
	Fuse Contactor			1	
	Current Transformer	3	3	3	3
	Voltage Transformer	2			
	High Voltage Fuse	2			
	Earthing Switch	1	1	1	1
	Arrester	3	3	3	
Application		Incomer/Feeder	Incomer/Feeder	Feeder	Bus Tie with VCB
Switchgear Width(mm)		550/750	550	550	550/750

Scheme Number		A05	A06	A07	A08
Primary Scheme					
Rated Current(A)		1250-2000	1250-2000	1250-2000	1250-2000
Main Circuit Breaker	Vacuum Circuit Breaker	1			
	Fuse Contactor				
	Current Transformer	3	3	3	
	Voltage Transformer		2	2	2
	High Voltage Fuse		2	2	2
	Earthing Switch	1	1	1	1
	Arrester				
Application		Bus Tie with VCB	Riser with Measuring	Riser with Measuring	Measuring panel with ES
Switchgear Width(mm)		550/750	550/750	550/750	550

Configurations

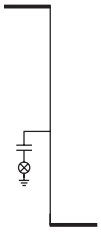
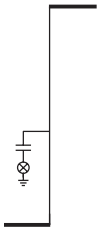
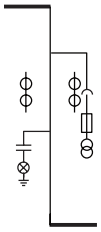
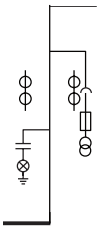
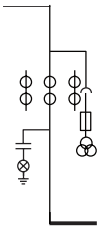
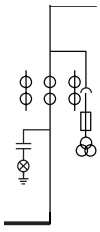
Standard SecoGear 12kV-27kV

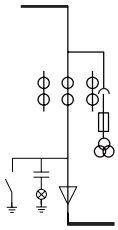
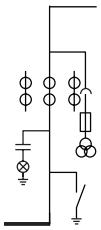
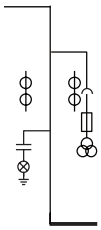
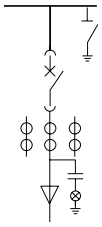
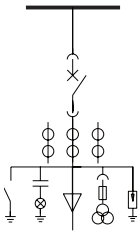
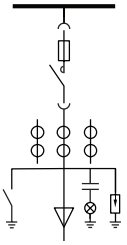
Scheme Number		01	02	03	04	05	06
Primary Scheme							
Rated Current(A)		630-4000	630-4000	630-4000	630-4000	630-4000	630-4000
Main Circuit Breaker	Vacuum Circuit Breaker	1	1	1	1	1	1
	Current Transformer	3	3	3	2	2	3
	Voltage Transformer						
	High Voltage Fuse						
	Earthing Switch		1	1			
	Arrester			3			
Application		Incomer/Feeder	Incomer/Feeder	Incomer/Feeder	Bus Tie	Bus Tie	Bus Tie
Switchgear Width(mm)		650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000
Scheme Number		**07**	**08**	**09**	**10**	**11**	**12**
Primary Scheme							
Rated Current(A)		630-4000	630-4000	630-4000	630-4000	630-4000	630-4000
Main Circuit Breaker	Vacuum Circuit Breaker	1	1	1	1	1	1
	Current Transformer	3	3	3	2	3	2
	Voltage Transformer				2	3	3
	High Voltage Fuse				2	3	3
	Earthing Switch		1	1			
	Arrester						
Application		Bus Tie	Bus Tie	Bus Tie	Incomer/Feeder	Incomer/Feeder	Incomer/Feeder
Switchgear Width(mm)		650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000
Scheme Number		**13**	**14**	**15**	**16**	**17**	**18**
Primary Scheme							
Rated Current(A)		630-4000	630-4000	630-4000	630-4000	630-4000	630-4000
Main Circuit Breaker	Vacuum Circuit Breaker	1					
	Current Transformer	3					
	Voltage Transformer	3	2	2	3	3	3
	High Voltage Fuse	3	3	3	3	3	3
	Earthing Switch	1					1
	Arrester			3		3	
Application		Incomer/Feeder	VT	VT	VT	VT	VT
Switchgear Width(mm)		650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000

Remark: for up to 17.5kV SecoGear, special requirement for 6 CT is available. Please contact GE for details.

Configurations

Standard SecoGear 12kV-27kV

Scheme Number		19	20	21	22	23	24
Primary Scheme							
Rated Current(A)		630-4000	630-4000	630-4000	630-4000	630-4000	630-4000
Main Circuit Breaker	Vacuum Circuit Breaker						
	Current Transformer			2	2	3	3
	Voltage Transformer			2	2	3	3
	High Voltage Fuse			2	2	3	3
	Earthing Switch						
	Arrester						
Application		Riser	Riser	Riser/Metering	Riser/Metering	Riser/Metering	Riser/Metering
Switchgear Width(mm)		650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000

Scheme Number		25	26	27	28	29	30
Primary Scheme							
Rated Current(A)		630-4000	630-4000	630-1250	630-4000	630-4000	400A*
Main Circuit Breaker	Vacuum Circuit Breaker				1	1	
	Current Transformer	3	3	2	3	3	3
	Voltage Transformer	3	3	3		3	
	High Voltage Fuse	3	3	3		3	3
	Fuse Contactor						1
	Earthing Switch	1	1		1	1	
	Arrester					1	
Application		Riser/Metering	Riser/Metering	Riser/Metering	Incomer/Feeder	Incomer/Feeder	Feeder
Switchgear Width(mm)		650/800/1000	650/800/1000	650/800/1000	650/800/1000	650/800/1000	650

* 400A is rated current of contactor. Fuse selection will define the actual rated current.
** Rating and class of CT & VT may affect number that can be accommodated in the panel. Check with Local GE representative.

Generator circuit breaker and Generator swithgear

Generator Faults

The fault conditions in the proximity of a generator source are more demanding than those in normal distribution circuits. These special fault characteristics require specircally designed and tested circuit breakers.

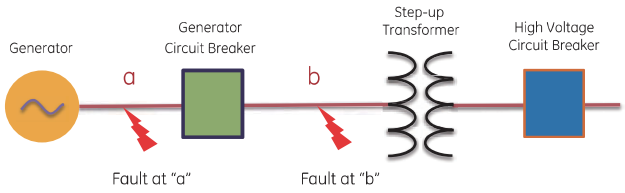
The critical points to be considered are:

Generator Circuit Configuration

As a result of the circuit configuration, two key unique fault current conditions are encountered by generator circuit breakers(figure 1)

System-source short-circuit current

The short circuit fed by the transformer(point “a”, figure 1) on the generator side leads to high thermal and mechanical stresses on the vacuum interrupters because the full energy of the power system feeds the fault . To clear these faults, Generator Circuit Breakers are capable to interrupt not only the symmetrical fault but also the higher asymmetrical fault currents with a DC component of up to 75%. This will be the maximum short circuit current the breaker needs to interrupt with peak making and withstand capacity of 2.74 times the RMS current

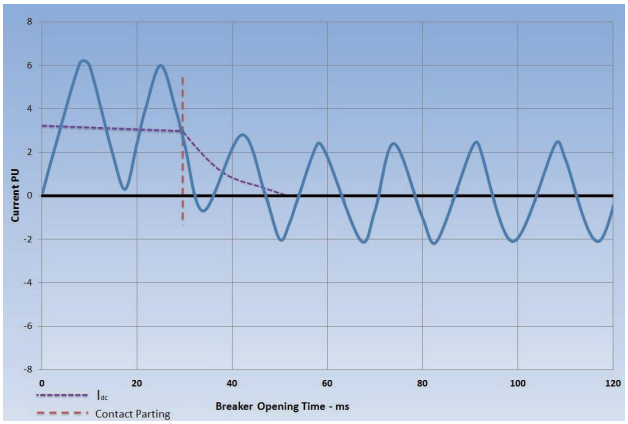


Generator-Source Short-circuit current

If there is a short circuit (point “b”, figure 1) the current is fed by the generator on the transformer side. The fault currents, while relatively smaller in magnitude, are subject to a phenomenon called Delayed Current Zero. This unique characteristic is a result of the very high X/R ratio of the circuit and the operating conditions of the generator, which can combine to produce a DC component of the fault current exceeding 100%. The asymmetrical fault current peak becomes so high and its decay becomes so slow, that the current zero can be delayed for several cycles.

As vacuum interrupters rely on a current zero to break the current, the delay it results in longer arcing time with extreme thermal stress on the interrupter.

The generator circuit breakers are tested according to IEC/IEEE 62271-37-013 to withstand the high electrical, thermal and mechanical stress during the interruption of fault currents with a DC component of up to 130%. Normally this short circuit current will be 50% of system source short circuit current with very high DC component.



Generator circuit breaker and Generator swithgear

Unique Voltage Conditions

Generator circuits are typically designed for high effciency in order to minimize the power loss of the system. Therefore, the generator circuit breaker may be located very close to both the generator and transformer, connected by short conductors with a large cross-section, resulting in a very low resistance and low stray capacitance. These characteristics combine to produce very high natural circuit frequencies resulting in extreme Transient Recovery Voltages (TRV) with high Rates of Rise of Recovery Voltage (RRRV).

Transient Recovery Voltages (TRV)

The circuit produces the peak value of TRV, which is nearly double the line-to- line system voltage, across the contacts within microseconds following the current zero. The Vacuum Interrupter must re-establish dielectric strength across the open contacts gap in order to withstand this fast rising TRV. If the interrupter is able to withstand that voltage, then the interruption is successful.

Very fast Rate of Rise of Recovery Voltage (RRRV)

An important factor is how fast the TRV rises across the recovering gap after current zero. This is measured by the RRRV, which is proportional to the peak value of the transient voltage in kV, divided by the time it takes the voltage to reach that peak value in microseconds.

Values for standard Medium Voltage distribution circuits are in the range of 0.4 to 1kV/microsecond, while RRRV values for generator circuits are about 3.5kV/microsecond.

These characteristics where tested for the for the first time at the KEMA laboratories in Netherlands using a Direct on Line connection with SecoVac VB2 Plus G Generator Vacuum Circuit Breaker.

Out of phase switching

The out-of-phase voltage conditions can occur during normal start-up when the generator and power system voltages are not in sync. Initially, the generator is off and the generator circuit breaker is in the open position with the power system operating. The voltage across the open circuit breaker contacts is equal to the normal power system voltage. When additional or emergency power is desired, the generator is started and begins to produce voltage. As the generator comes up to speed, the generator output voltage and frequency slowly increase. This causes the voltage across the open contacts of the circuit breaker to vary.

IEC/IEEE 62271-37-013 requires that the generator circuit breaker can switch off under out-of-phase conditions (out-of-phase angle 90°) while the voltages across the open contacts can be as high as twice the rated line-to ground voltage of the system.

Generator circuit breaker and Generator swithgear

SecoVac VB2 Plus G

Performance requirements for Generator Circuit Breakers are specified in the IEC/ IEEE 62271-37-013 standard. This is a combined standard intended to replace the IEEE C37.013 and fill the gap of the IEC which has never had a generator breaker standard previously.

The new SecoVac VB2 Plus G 15kV have passed all the Type Tests as per the new IEC/IEEE combined standard, becoming the first Generator Circuit Breaker of the SecoVac family.

The standard SecoVac VB2 Plus breaker and the SecoVac VB2 Plus G generator circuit breaker can be used in all SecoGear IEC switchgear panels. With the same functionality and footprint of conventional IEC Switchgear while getting all the benefits from a fully proven Generator Circuit Breaker.

SecoVac VB2 Plus G can also be installed in SecoBloc modules, producing the perfect combination for OEM manufacturers building generator switchboards.

Applications

A properly protected generator unit increases its levels of reliability, availability and safety, and by extension the same for the complete electrical system where is being operated. Even the smaller generator units can produce high DC component or Transient Overvoltage levels requiring special breakers intended to protect such fault conditions.

With this new addition to the SecoVac family, SecoGear is perfectly set to protect Generators. Applications up to 60MVA, 31.5kA, 15kV can be operated with SecoVac VB2 Plus G. These power output ranges are commonly used on:

- Distributed Power Generation
  - Diesel/Gas Engines
  - Small Frame Gas Turbines
  - Aero Derivative Turbines
- Marine Diesel-Electric Generators
- Marine Diesel-Electric Generators
- Oil and Gas Start-up/Back-up Generator units
- Mining Power Plants
- Small Hydro

Benefit

The SecoVac VB2 Plus G generator circuit breaker is based upon the same design principles as our distribution type SecoVacVB2 Plus breaker this results in advantages for electrical designers, operating personnel and maintenance staff.

The SecoVac VB2 Plus G is designed to be fitted into GEIS's SecoGear range of medium voltage type tested IEC panels. The SecoGear range can accommodate generator, distribution circuit breakers and fuse contactors within the same standard panel design offering industry leading safety, reliability and performance features to meet the requirements for all Medium Voltage Distribution in Power Plant applications.

In addition to being able to be supplied as part of a complete switchgear lineup, SecoVac VB2 Plus G can be supplied as part of SecoBloc OEM modules. SecoBloc is designed specifically to allow OEM panel builders to incorporate a type tested circuit breaker and cable compartment into their customer built switchboard arrangement. VB2 Plus G modules are available in various configurations to suit specific generator applications.

Generator circuit breaker and Generator swithgear

SecoVac VB2 Plus G Electrical Parameters

Rated short-circuit breaking current	kA	31.5		40		50	
Rated Voltage	kV	15		15		15	
Rated Current	A	2500/3150/4000*		2500/3150/4000*/5000*		2500/3150/4000*	
Rated Frequency	Hz	50/60		50/60		50/60	
Rated power Freq withstand voltage (1 min)	kV	38		38		38	
Rated lightening impulse withstand voltage	kVp	95		95		95	
Operation sequence		CO-30min-CO		CO-30min-CO		CO-30min-CO	
Generator Circuit Class		G2		G2		G2	
Location of fault		'a' - System supplied fault	'b' - Generator supplied fault	'a' - System supplied fault	'b' - Generator supplied fault	'a' - System supplied fault	'b' - Generator supplied fault
Rated short-circuit breaking current	kA	31.5	15.8	40	25	50	25
Rated short-circuit making current Ipeak	kAp	86.3	34.1	110	54	137	54
Interrupting Time	ms	50		50		50	
Minlmum Opening Time	ms	24.3		24.3		24.3	
Degree of Asymmetry	%	75	130	75	130	75	130
Rated short time withstand current	kA	31.5	N/A	40	N/A	50	N/A
Rated duration time for short-circuit	s	3	N/A	3	N/A	3	N/A
Rate of Rise of Recovery Voltage (RRRV)	kV/μs	3.5	3.5	3.5	3.5	3.5	3.5
Peak Recovery Voltage	kV	27	27	27	27	27	27
Out-of-Phase Current Switching							
Duty Voltage	kV	21.5	N/A	21.5	N/A	21.5	N/A
Breaking Current	kA	15.8	N/A	20	N/A	25	N/A
Max. Making Current (V-C)	kAp	31.5	N/A	40	N/A	40	N/A
Rate of Rise of Recovery Voltage (RRRV)	kV/μs	3.3	N/A	3.3	N/A	3.3	N/A
Peak Recovery Voltage	kV	39	N/A	39	N/A	39	N/A
Mechanical life operations	Number	10000		10000		10000	
Center distance between phase	mm	275		275		275	

*is VCB with force cooling.

Switchgear Compartments

Switchgear Apparatus

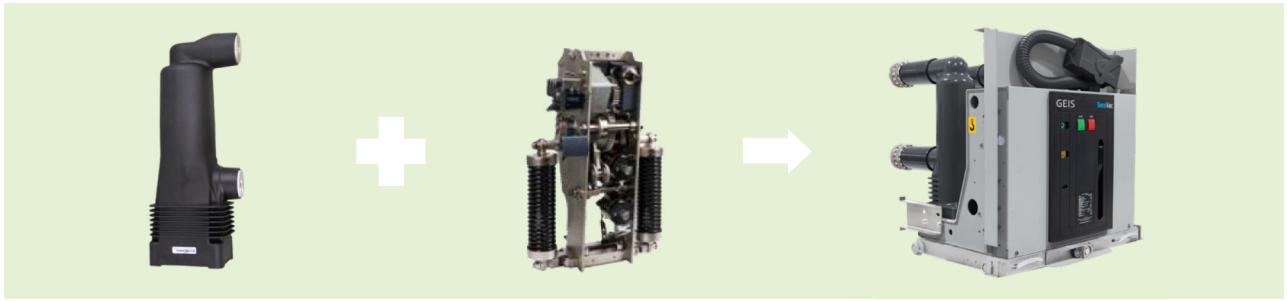
SecoVac VB2 Plus embedded pole vacuum circuit breaker 12kV, 17.5kV, 24kV and 27kV

Safety, more reliability and High performance in a compact package

The range of Apparatus available for SecoGear Medium Voltage switchgears includes:

- Withdrawable vacuum circuit breakers: SecoVac VB2 Plus
- Withdrawable vacuum generator circuit breakers: SecoVac VB2 Plus G
- Withdrawable vacuum contactors with fuses
- Disconnector trucks
- Voltage transformer trucks
- Earthing trucks

SecoVac VB2 Plus of Modular design



Features and benefit

Industry leading vacuum and solid insulation technology

- Fixed and withdrawable versions available
- Environmentally friendly design - no SF6 gas
- Conformance to the latest IEC standards - IEC 62271-100 IEC/IEEE 62271-37-031 and IEC 62271-1
- Numerous safety features for maximum personnel protection
- User friendly operation with easy access and minimal inspection
- Compact and cost effective
- Flexible with a full line of accessories and OEM Solution
- Standard distribution breakers and generator circuit breakers with compatible accessories

Applications

- Serving global 50 Hz and 60 Hz
- Segments of the electrical industry: industrial, commercial, utility, mining, marine and off-shore
- Protecting transformers, capacitor banks, motors, busbar sections and cables
- Suitable for special environment conditions: shock, vibration and high ambient temperature
- Suitable for generation protection

Switchgear Compartments

Switchgear Apparatus

Circuit Breaker Characteristics

Rated Voltage	kV	12	15	17.5	24	27
Rated power frequency withstand (Imin)	kV	28	36	38	50	65
Rated lightning frequency impulse withstand voltage (1.2/SOμs)	kVp	75	95	95	125	125
Rated Frequency	Hz	50/60				50/60
Rated Current	A	630/1250/1600/2000/2500/3150/4000*				1250, 2500
Rated short-circuit breaking current	kA	25/31.5/40/50				31.5
Percentage of DC component		Up to 50%				52%
Rated short-circuit closing current	kAp	65/82/104/130				82
Rated short time withstand current	kA	25/31.5/40/50				31.5
Rated peak value withstand current	kAp	65/82/104/130				82
Rated duration time for short-circuit	s	3				3
Opening Time	ms	20-50				20-50
Closing Time	ms	30-70				30-70
Rated auxiliary control voltage	V	36/48/60/110/220 V DC 110/220 V AC				
Mechanical life operations	Quantity	15,000 (M2)				10,000 (M 2)
Electrical Endurance class		E2				E2
Single capacitor bank Switching current	A	400**				400
Rating for Earthing Switch short time withstand current		40kA 1s				31.5/40/50kA 1s

* Force cooling

** 3 phase back to back capacitor bank switching current 630A only for 17.5kV 3150A 40kA breaker

Main circuit resistance of SecoVac

Item	Unit	Value	
Rated Current	A	630-1600	2000-4000
Resistance	μΩ	≤45	≤25

Rated Voltage (DC.V)	Resistance Value (0)	Rated Current (Al	Inrush Current (A)	Maximum Power (W)
110 (DC/AC)	51	2.2	12.9	237.3
220 (DC/AC)	198	1.1	6.7	244.4
24	1.8	13.3	80	320
24	1.3	18,5	110.8	443.1
48	3.1	15.5	92.9	743.2
125 (DC/AC)	45	2.8	16.7	347.2
230-240 (DC/AC)	320	0.7-0.8	4.3-4.5	165.9-180

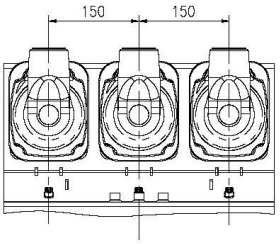
Motor Characteristics

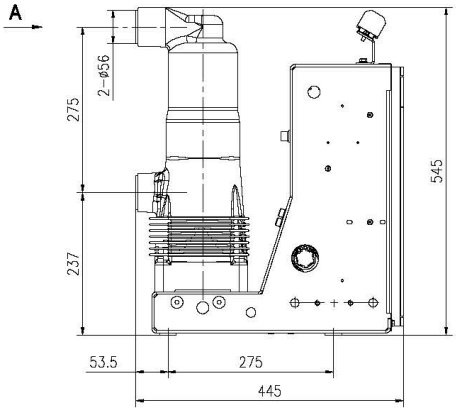
Rated voltage (V)	Normal operation voltage range	Charging time at rated voltage (s)	Input Power (W)
DC 24	85%-110%	<15s	150
DC 48	85%-110%	<15s	150
DC 110	85%-110%	<15s	150
DC 125	85%-110%	<15s	150
DC 220	85%-110%	<15s	150
DC 230-240	85%-110%	<15s	150
AC 110	85%-110%	<15s	150
AC 125	85%-110%	<15s	150
AC 220	85%-110%	<15s	150
AC 230-240	85%-110%	<15s	150

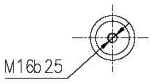
Switchgear Compartments

Switchgear Apparatus

Overall Dimension
12kV/630~1250A—25kA, 31.5kA (P=150mm)
Withdrawable type



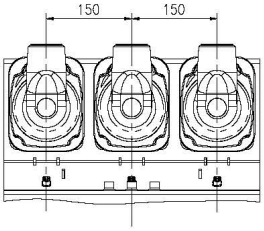


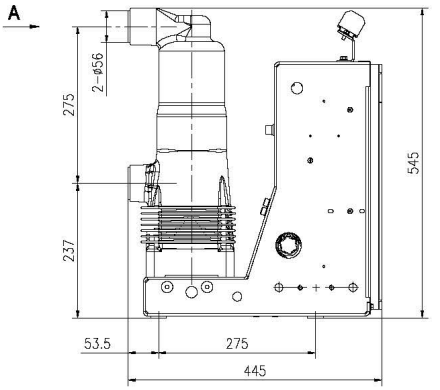


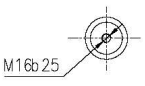
A

Specification (spring mechanism)	D	D1	Net weight (kg)
630A/25-31.5kA	Ø35	Ø84	100
1250A/25-31.5kA	Ø49	Ø97	105

Fixed type







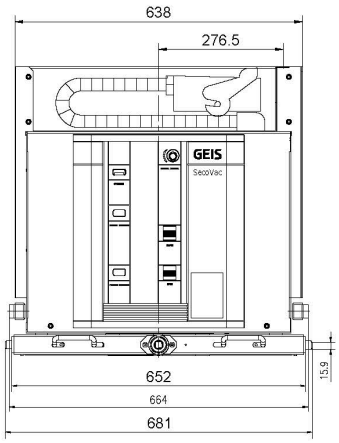
A

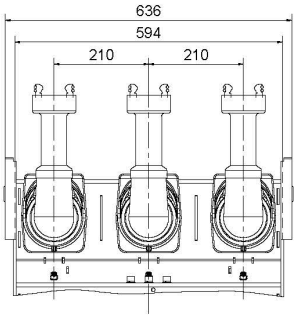
Specification
630A/25-31.5kA
1250A/25-31.5kA

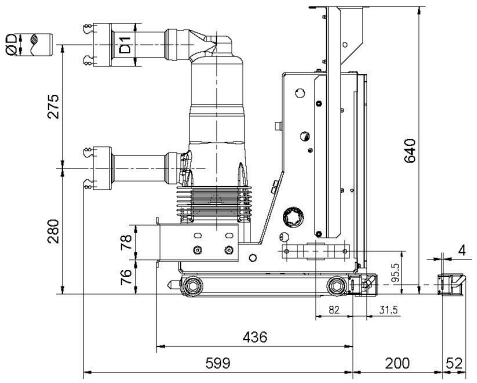
Switchgear Compartments

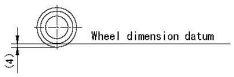
Switchgear Apparatus

Overall Dimension
12kV/630~1600A—25kA, 31.5kA, 40kA (P=210mm)
Withdrawable type



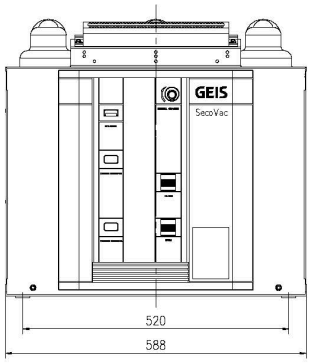


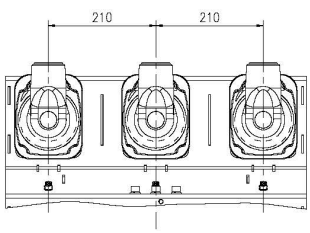


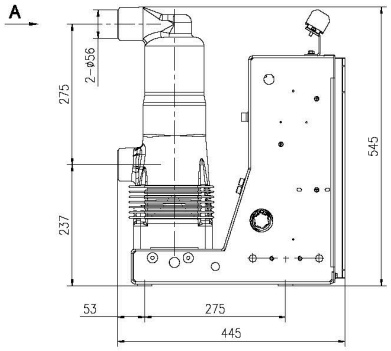


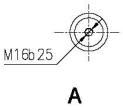
Specification (spring mechanism)	D	D1	Net weight (kg)
630A/25-31.5kA	Ø35	Ø84	110
1250A/25-31.5kA	Ø49	Ø97	115
1250A/40kA	Ø49	Ø97	120
1600A/31.5-40kA	Ø55	Ø104	130

Fixed type









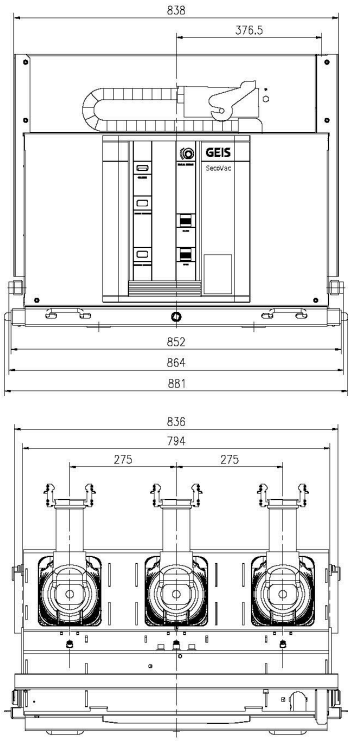
Specification
630A/25-31.5kA
1250A/25-31.5kA
1250A/40kA
1600A/31.5-40kA

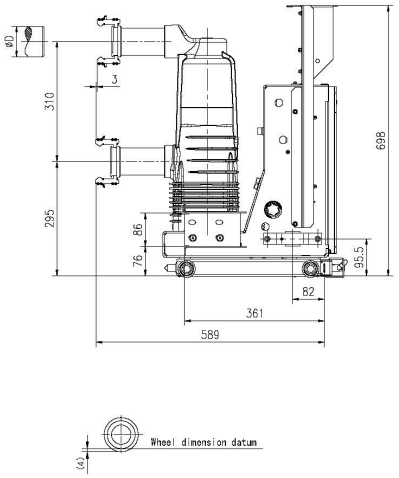
Switchgear Compartments

Switchgear Apparatus

Overall Dimension
12kV/1600~2000A—31.5kA, 40kA (P=275mm)

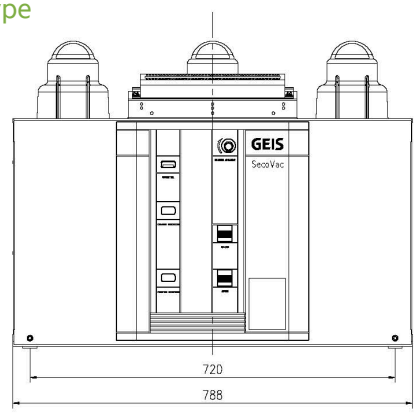
Withdrawable type

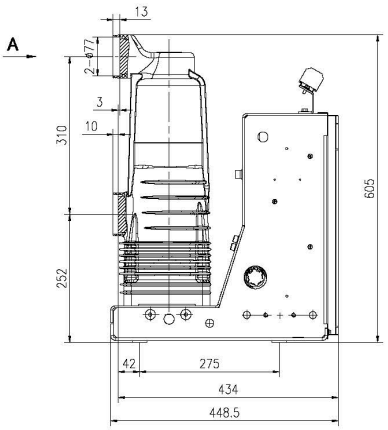


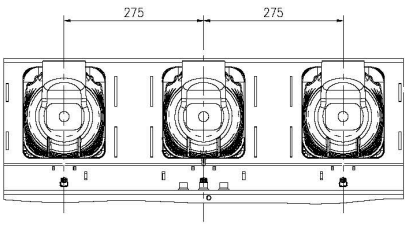


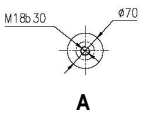
Specification	D
1600A/31.5-40kA	Ø79
2000A/31.5-40kA	Ø79

Fixed type







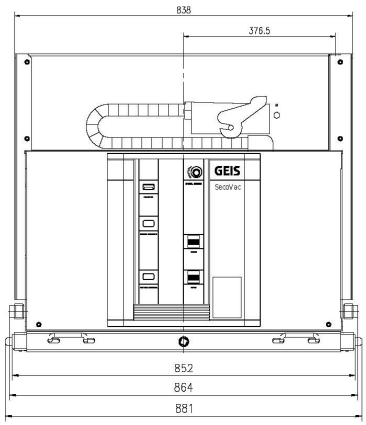


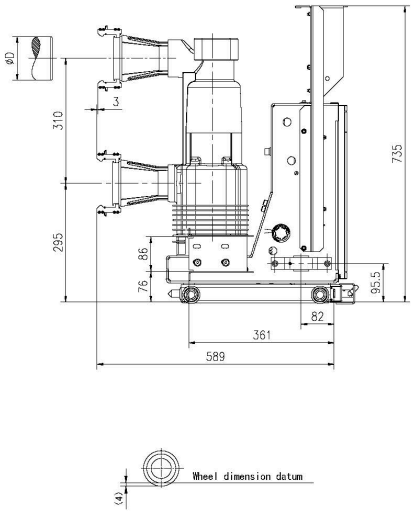
Specification
1600A/31.5-40kA
2000A/31.5-40kA

Switchgear Compartments

Switchgear Apparatus

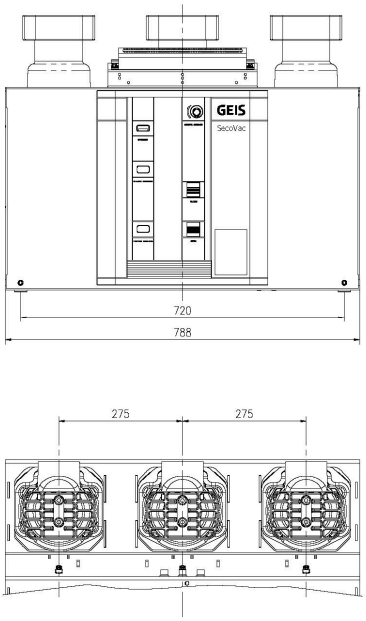
Overall Dimension
12kV/2500~4000A—31.5kA, 40kA (P=275mm)
Withdrawable type

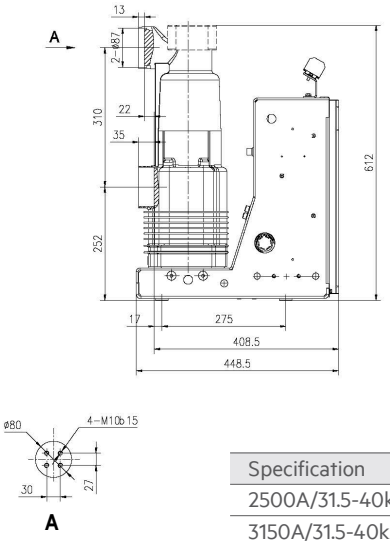




Specification	D
2500A/31.5-40kA	Ø109
3150A/31.5-40kA	Ø109
4000A/40kA	Ø109

Fixed type





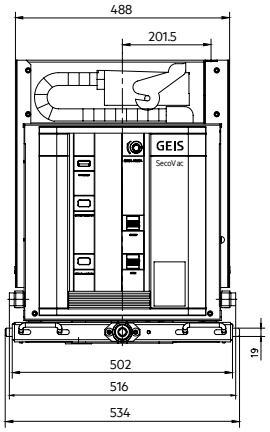
Specification
2500A/31.5-40kA
3150A/31.5-40kA
4000A/40kA

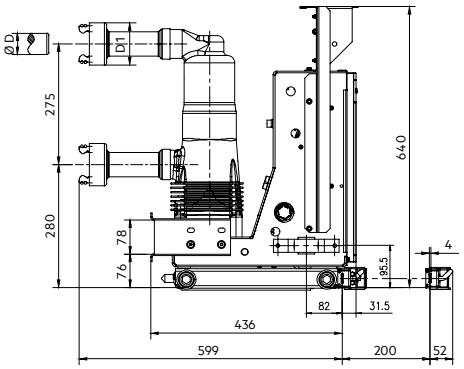
Switchgear Compartments

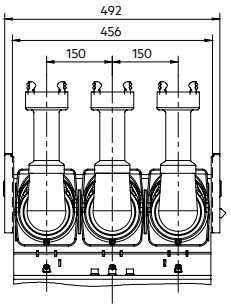
Switchgear Apparatus

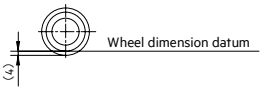
Overall Dimension
17.5kV/630~1250A—25kA, 31.5kA (P=150mm)

Withdrawable type



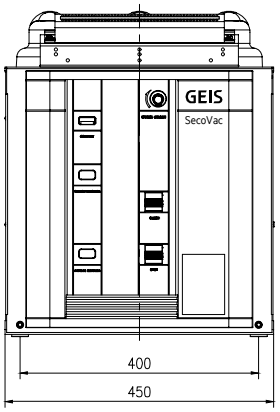


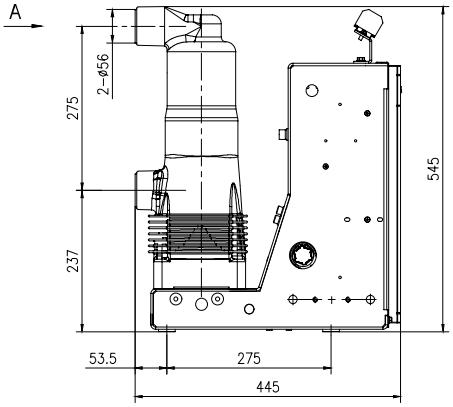


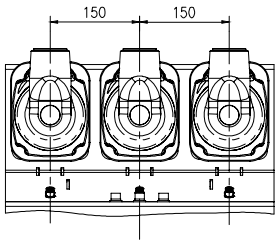


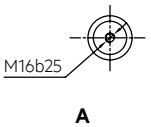
Specification	D	D1	Net weight (kg)
630A/25-31.5kA	Ø35	Ø84	100
1250A/25-31.5kA	Ø49	Ø97	105

Fixed type









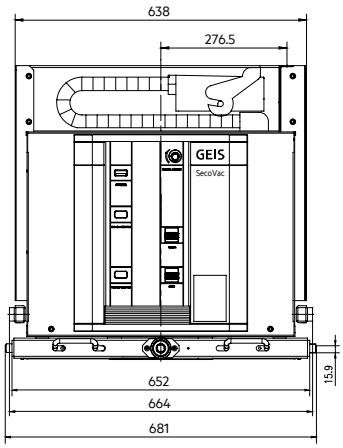
Specification
630A/25-31.5kA
1250A/25-31.5kA

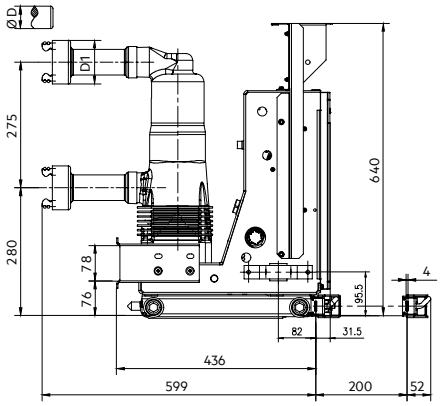
Switchgear Compartments

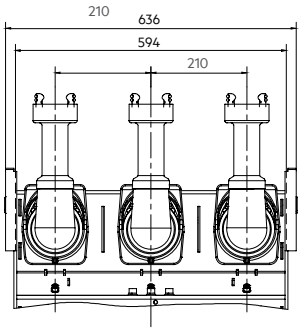
Switchgear Apparatus

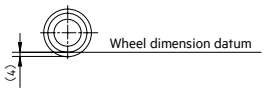
Overall Dimension
17.5kV/630~1600A—25kA, 31.5kA, 40kA (P=210mm)

Withdrawable type



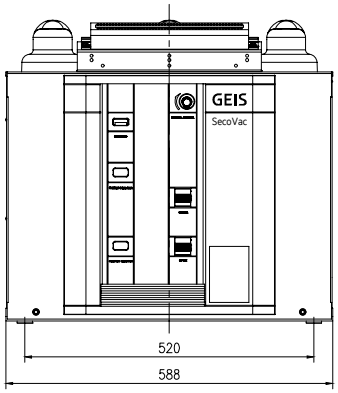


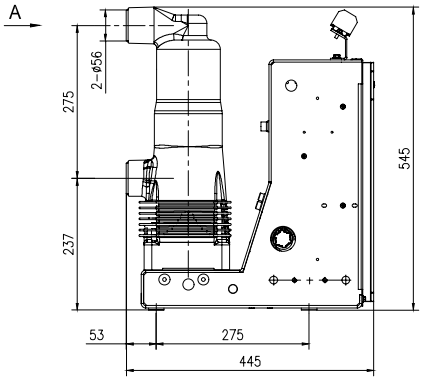


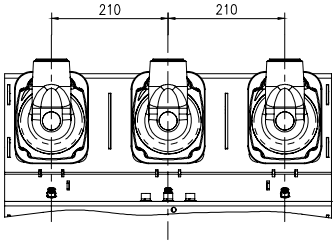


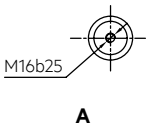
Specification (spring mechanism)	D	D1	Net weight (kg)
630A/25-31.5kA	Ø35	Ø84	110
1250A/25-31.5kA	Ø49	Ø97	115
1250A/40kA	Ø49	Ø97	120
1600A/31.5-40kA	Ø55	Ø104	130

Fixed type







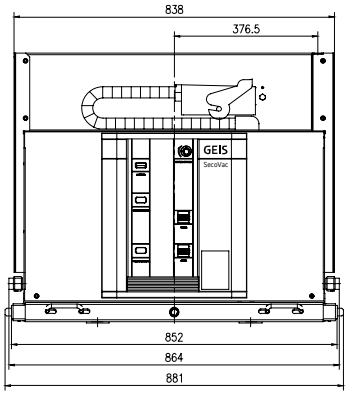


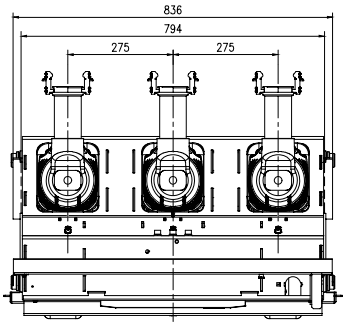
Specification
630A/25-31.5kA
1250A/25-31.5kA
1250A/40kA
1600A/31.5-40kA

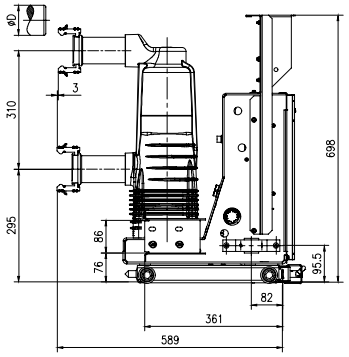
Switchgear Compartments

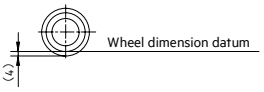
Switchgear Apparatus

Overall Dimension
17.5kV/1600~2000A—31.5kA, 50kA (P=275mm)
Withdrawable type



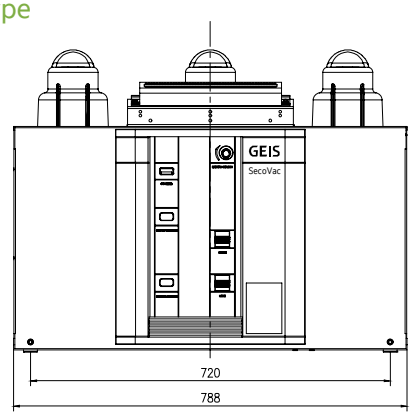


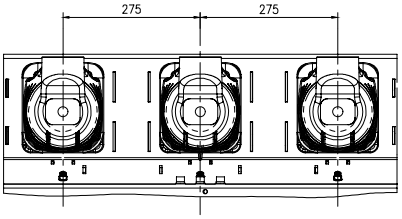


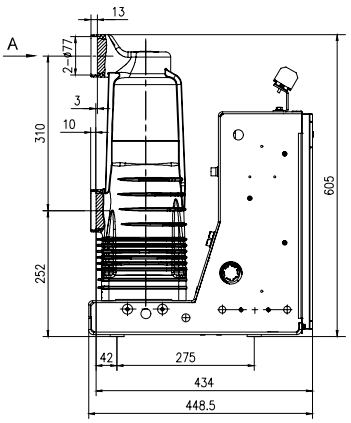


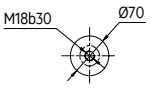
Specification	D
1600A/31.5-50kA	Ø79
2000A/31.5-50kA	Ø79

Fixed type









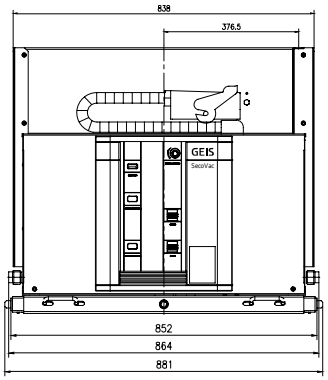
A

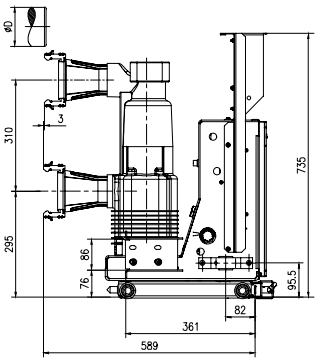
Specification
1600A/31.5-50kA
2000A/31.5-50kA

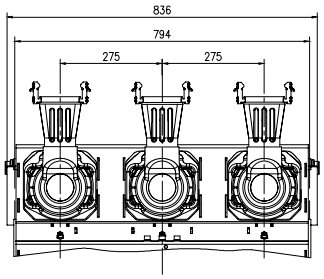
Switchgear Compartments

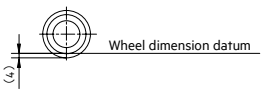
Switchgear Apparatus

Overall Dimension
17.5kV/2500~4000A—31.5kA, 50kA (P=275mm)
Withdrawable type



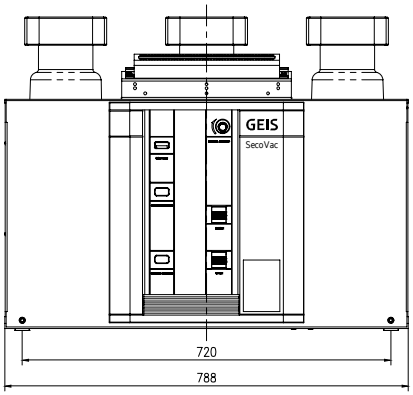


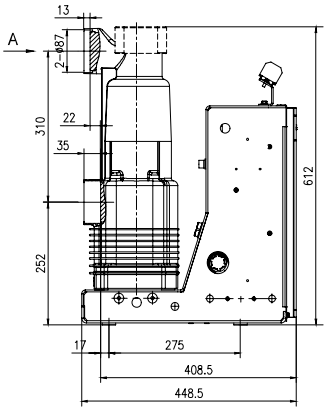


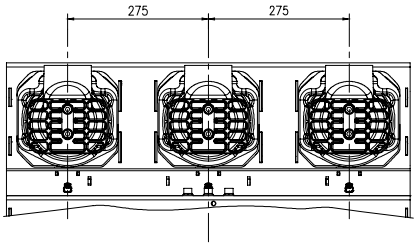


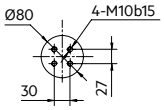
Specification
2500A/31.5-50kA
3150A/31.5-50kA
4000A/50kA

Fixed type







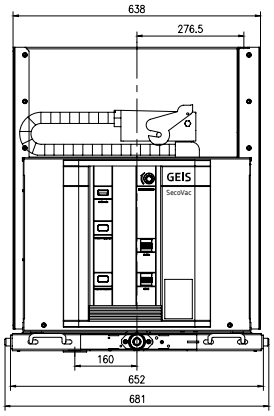


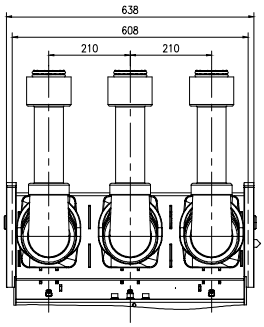
A

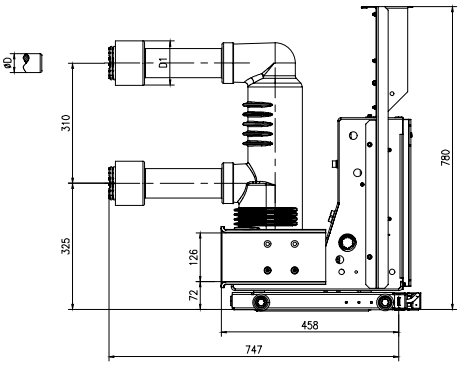
Specification
2500A/31.5-50kA
3150A/31.5-50kA
4000A/50kA

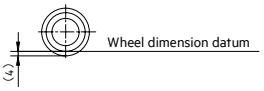
Switchgear Apparatus

Overall Dimension
24-27kV/630~1600A—25kA, 31.5kA (P=210mm)
Withdrawable type



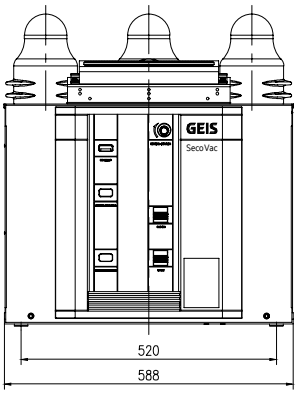


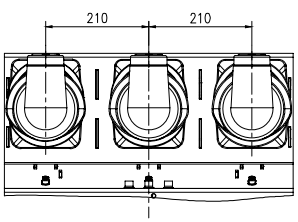


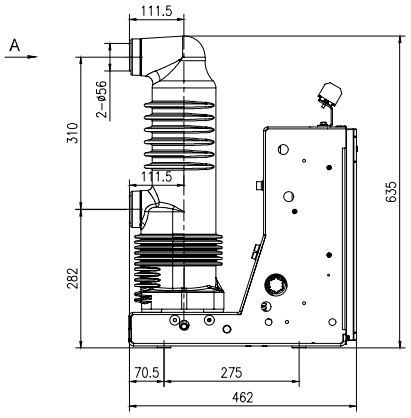


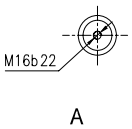
Specification	D	D1
630A/25-31.5kA	Ø35	Ø114
1250A/25-31.5kA	Ø49	Ø114
1600A/25-31.5kA	Ø49	Ø114

Fixed type







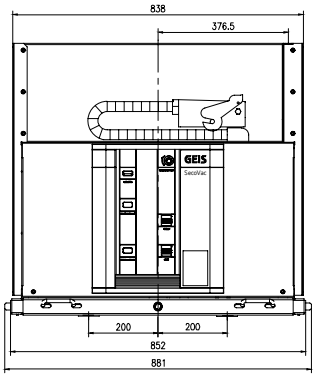


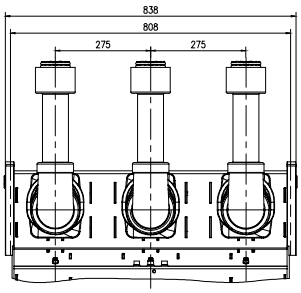
Specification
630A/25-31.5kA
1250A/25-31.5kA
1600A/31.5kA

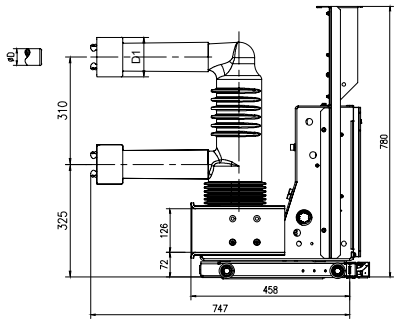
Switchgear Compartments

Switchgear Apparatus

Overall Dimension
24-27kV/630~1600A—25kA, 31.5kA (P=275mm)
Withdrawable type

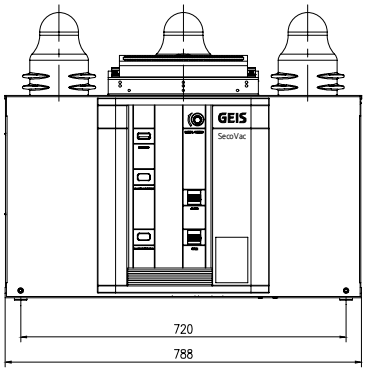


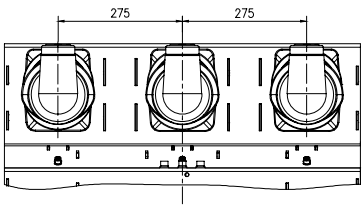


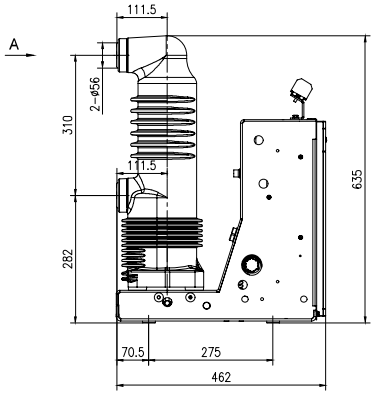


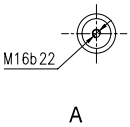
Specification	D	D1
630A/25-31.5kA	Ø35	Ø114
1250A/25-31.5kA	Ø49	Ø114
1600A/25-31.5kA	Ø49	Ø114

Fixed type









A

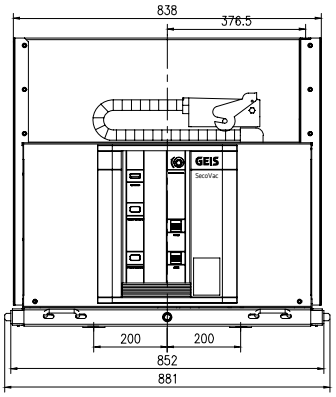
Specification
630A/25-31.5kA
1250A/25-31.5kA
1600A/31.5kA

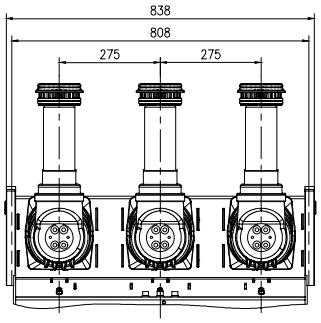
Switchgear Compartments

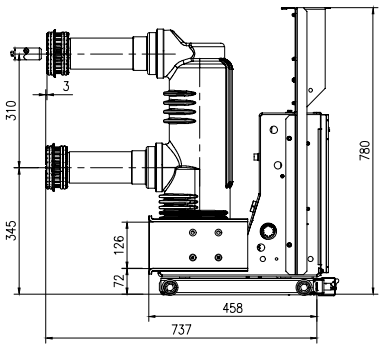
Switchgear Apparatus

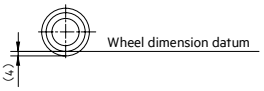
Overall Dimension
24-27kV/2000A—25kA, 31.5kA (P=275mm)

Withdrawable type



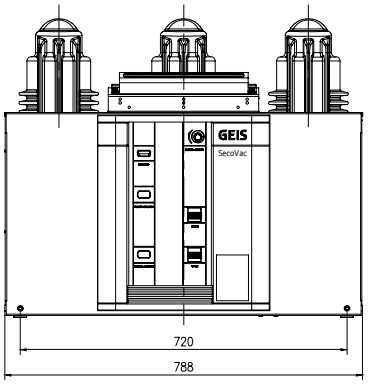


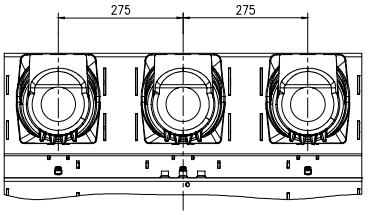


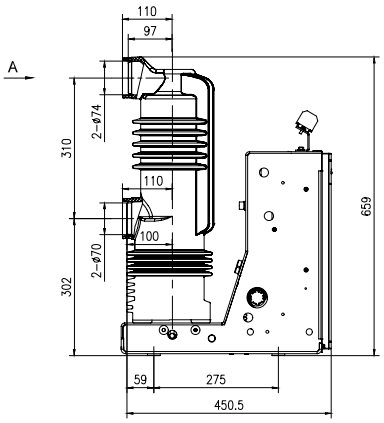


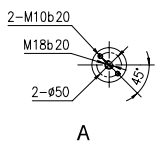
Specification	D
2000A/25-31.5kA	Ø79

Fixed type









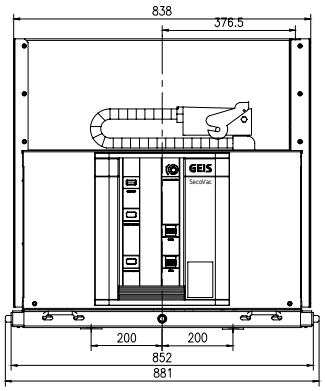
A

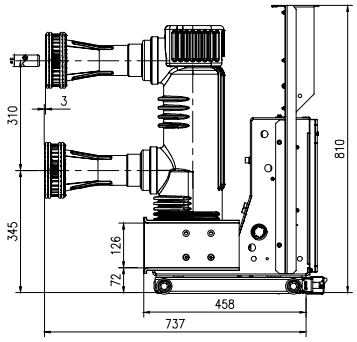
Specification	D
2000A/25-31.5kA	Ø79

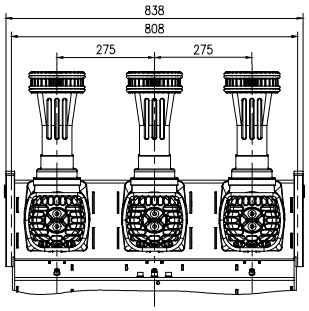
Switchgear Compartments

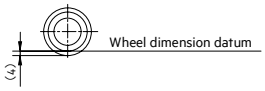
Switchgear Apparatus

Overall Dimension
24-27kV/2500~3150A—25kA, 31.5kA (P=275mm)
Withdrawable type



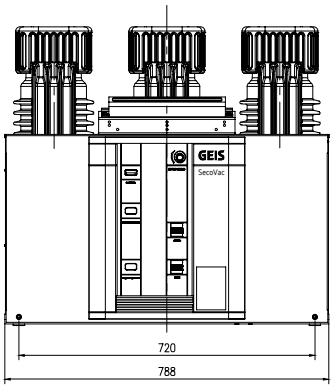


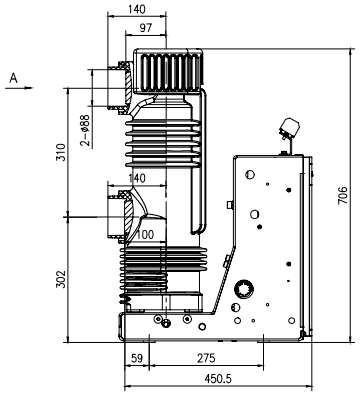


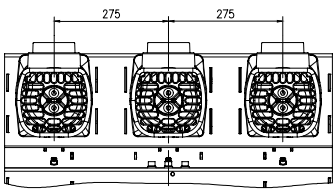


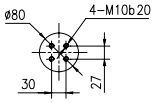
Specification	D
2500A/25-31.5kA	Ø109
3150A/25-31.5kA	Ø109

Fixed type









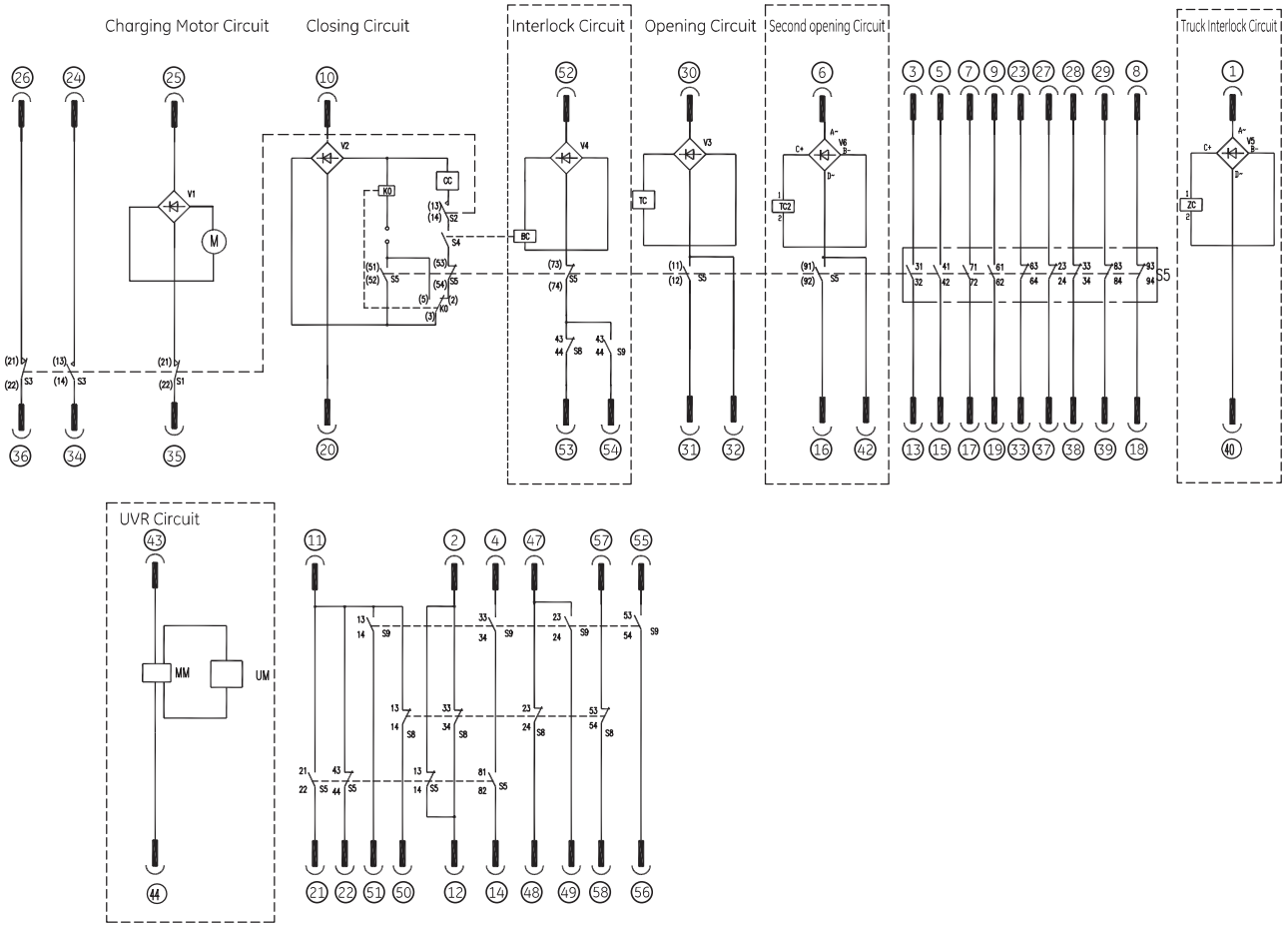
A

Specification
2500A/25-31.5kA
3150A/25-31.5kA

Switchgear Compartments

Switchgear Apparatus

SecoVac Vacuum Circuit Breaker Internal wiring diagram (AC) 17.5kV/27kV



S9: Limit switch (working position)	CC: Closing coil	KO: Anti-pumping relay (optional)
S8: Limit switch (testing position)	TC: Opening coil	SC: Over current release Coil (optional)
S4: Electromagnet for locking's auxiliary switch	M: Energy storing motor	BC: Electromagnet for locking (optional)
S5: AuxiOiary switch	TC2: Second opening coil	UM, MM: UVR coil
S1~S3: Energy storing travel switch	Vl~V6: Rectifier	

Notes:

1. This wiring diagram describes that a breaker is uncharged and is in an opening state, and the handcart is in the testing position.
2. The dotted box for optional feature

Switchgear Compartments

Switchgear Apparatus

Vacuum Contactor

SecoVac fuse contactors are provided in withdrawable type and includes high voltage fuses

Features

- Withdrawable type
- Conformance to the latest IEC standards. IEC 62271-1 and IEC 62271-106
- Comformance to IEC 60282-1 for high voltage fuse
- With/without mechanical latch
- HV fuse protection
- Interlocking features for safety
- Compact and robust

Applications

- Serving for global 50 Hz and 60 Hz
- Segments of industry: Power generation, marine, water treatment, mining
- Medium voltage motor control applications
- Suitable for special environment conditions: Shock, vibration, high ambient temperature
- Suitable for marine application

Fuse Contactor Characteristics

Item	Unit	Value
Rated Voltage	kV	7.2/12
Rated Frequency	Hz	50/60 Hz±5%
Rated power freq withstand voltage (lmin)	kV	28
Rated lightning impulse withstand voltage	kV	75
Rated Currents for contactor	A	400
Rated short-time withstand current (3s)	kA	4
Rated making current	kA	4
Rated peak withstand current	kA	10.4
Maximum rated breaking current	A	3200
Minmum rated breaking current	A	80
Use type		AC3/AC4
Latch type both latched & non latched required		Mechanical
Mechanical life	Times	300k
Number of auxiliary contacts		5a/5b
Minimum Auxillary contacts rating		AC 110V/10A, AC 220V/5A or DC
Control voltage		48/110/125/220/230 VDC, 110/125/220/230 VAC
Under voltage and tripping coil for Mechanical La tched type contactor		Required
Anti-pumping relay		Required
The drop-out voltage of contactor		AC 85%/DC 70%
SC breaking capacity for fuse	kA	50
Rated take-over current	A	3200

High Voltage Fuse Characteristics

Item	Unit	EFEN	SIBA
Rated Current	A	200	250
Thermal Current	A	140	160

High Voltage Fuse Characteristics

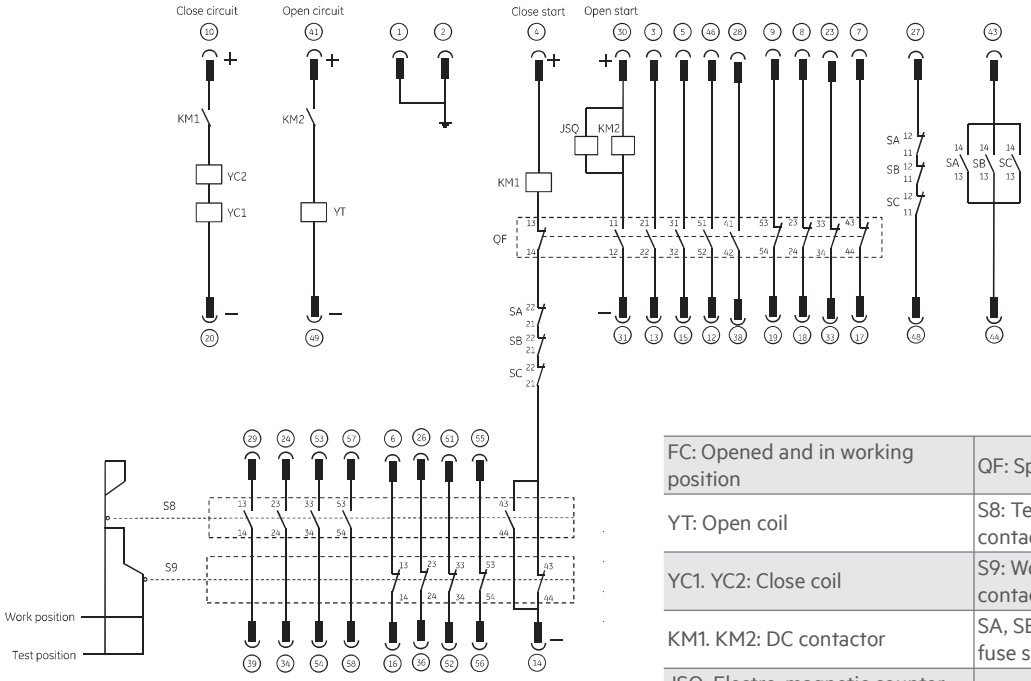
Item	Unit	Fuse-Contactor
Rated Current	A	400
Withdrawable	μΩ	≤250

Switchgear Compartments

Switchgear Apparatus

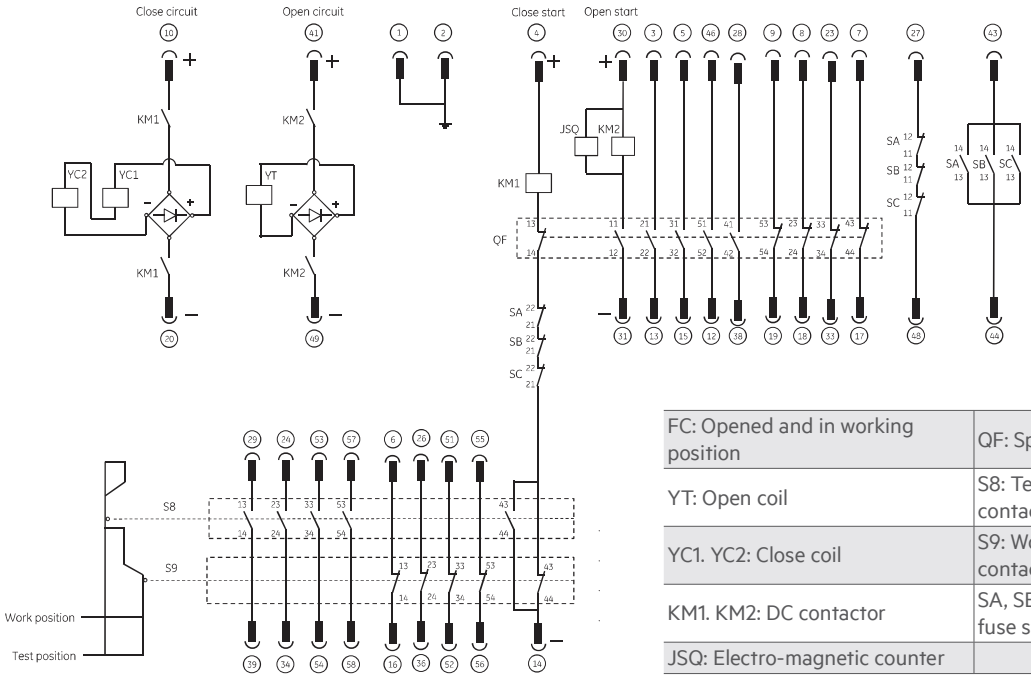
Internal wiring diagram for mechanical latch type contactor

DC control circuit scheme



FC: Opened and in working position	QF: Spindle auxiliary contact
YT: Open coil	S8: Test position auxiliary contact
YC1. YC2: Close coil	S9: Work position auxiliary contact
KM1. KM2: DC contactor	SA, SB, SC: Limit switches for fuse strikers
JSQ: Electro-magnetic counter	

AC control circuit scheme



FC: Opened and in working position	QF: Spindle auxiliary contact
YT: Open coil	S8: Test position auxiliary contact
YC1. YC2: Close coil	S9: Work position auxiliary contact
KM1. KM2: DC contactor	SA, SB, SC: Limit switches for fuse strikers
JSQ: Electro-magnetic counter	

Switchgear Compartments

Component

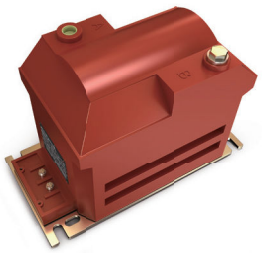
Ground Fault Sensing CT

It is of the type insulated in resin and is used to supply measurement and protection devices. These CTs can be furnished in either a solid or split core design. They can be used either for measuring phase currents or for detecting the earth fault current. They conform to the IEC 61869-2 Standards.

Voltage Transformer

Voltage transformers are cast in resin, and totally enclosed. This provides superior protection against pollutants and moisture. It can be equipped with one or more independent magnetic cores with equal or different characteristics for measuring, metering and protection purposes.

Current Transformer



Current transformers are cast in resin, and totally enclosed. This provides superior protection against pollutants and moisture. It can be equipped with one or more independent magnetic cores with equal or different characteristics for measuring, metering and protection purposes.

Recommended CT

Primary Current	Ratio	Accuracy Class	Protection Class
500A 25kA/3s	500/5A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	500/1A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	500-250/5A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	500-250/1A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
1000A 25kA/3s	1000/5A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	1000/1A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	1000-500/5A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	1000-500/1A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
3000A 25kA/3s	3000/5A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	3000/1A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	3000-1500/5A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	
	3000-1500/1A	0.5 or 0.5s	5P or 10P
		0.2 or 0.2s	

Switchgear Compartments

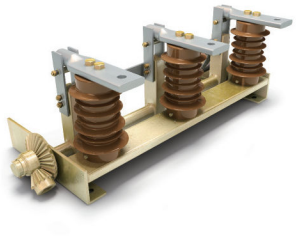
Component

Surge arrester

Surge arrester is used to protect electric equipment against transient operating or lightning over-voltage. It is connected between primary conductor and ground for protecting protective load from damage effect. When the operating or lightning over-voltage occurs, surge arrester immediately limits over-voltage amplitude and protects the insulation of device.

Voltage Transformer Truck

The withdrawable trucks also allow replacement of the fuses with the switchboard in service. Truck racking- out with the door closed automatically operates closure of a metallic segregation shutter between the live parts of the switchgear and the instrument compartment.



Earthing Switch

The earthing switch can be operated from the front of the switchgear. It is mechanically interlocked with the apparatus truck so that the earthing switch can only be operated when the apparatus is open in the Test position as well. The switch is so mechanically interlocked with the cable compartment for additional safety.

Disconnector Truck

Disconnector truck is used to disconnect primary circuit and normally coupling with busbar tie breaker to achieve two section power supply. Disconnector truck can be provided with bus tie/riser panels.

Earthing switch characteristics

Specification	Unit	EFEN	SIBA	
Rated voltage	kV	12/15/17.5	24	27
Rated Work frequency withstand voltage (Imin) in open condition of switch	kV	28/36/38	50	65
Rated Lighting impulse withstand voltage (peak value) in open condition of switch	kVp	75/95/95	125	125
Rated short-time withstand current (3s)	kA	31.5/40/50	31.5	
Rated peak value withstand current	kAp	82/104/130	82	
Rated short circuit making current	kAp	82/104/130	82	
Centre distance between phases	mm	170/210/275	220/275	
Electric enduronce closs		E1	E1	
Mechanical endurance	Times	2000	2000	

Switchgear Compartments

Disconnector truck characteristics

Specification	Unit	Data			
Rated voltage	kV	17.5			
Rated power frequency withstand voltage (Imin)	kV	38			
Rated Lighting impulse withstand voltage	kV	95			
Rated Frequency	Hz	50/60			
Rated Current	A	1250	1250	2000	3150
Rated short time withstand current	kA	31.5	40	40	40
Rated peak value withstand current	kAp	82	104	104	104
Rated duration time for short-circuit	s	3			
Dimension		As same current rating VCB			

Cable Connection

The cable compartment contains current transformers, voltage transformers (fixed), withdrawable, and earthing switch, depending on the individual operating requirements.

The cable compartment is constructed for installation of three current transformers. When all the three current transformers are not required, dummies can be installed in their place to maintain the same installation and connection procedures.

The fixed voltage transformers (optional) are connected on the primary side with busbar and fitted with HRC fuses. The earthing switch can be operated by manual, with position indicated by mechanical indicator on the driveshaft and the auxiliary switch. Three surge arrestor (optional) can be mounted in the space available.

Rated voltage	Panel Width	Panel Type	Max # of cables	Max Corss section	Range of Cable clamp	Range of reducer ring
kV	mm		per phase	mm2	mm	mm
7.2/12/15/17	550	without VTs	2*	630	35-54	26-62
	650	with VTs	3*			
	750	w or w/o VTS	4*			
	1000	w or w/o VTS	4*			
24/27	800	w or w/o VTS	6*	630	35-54	26-62
	1000	w or w/o VTS	6*			

* If more cable required need increase the depth of switchgear. Please consult your GE.

Operation Tools

Gear door lock's key

Rack handle for truck

Earthing switch handle

Layout Detail

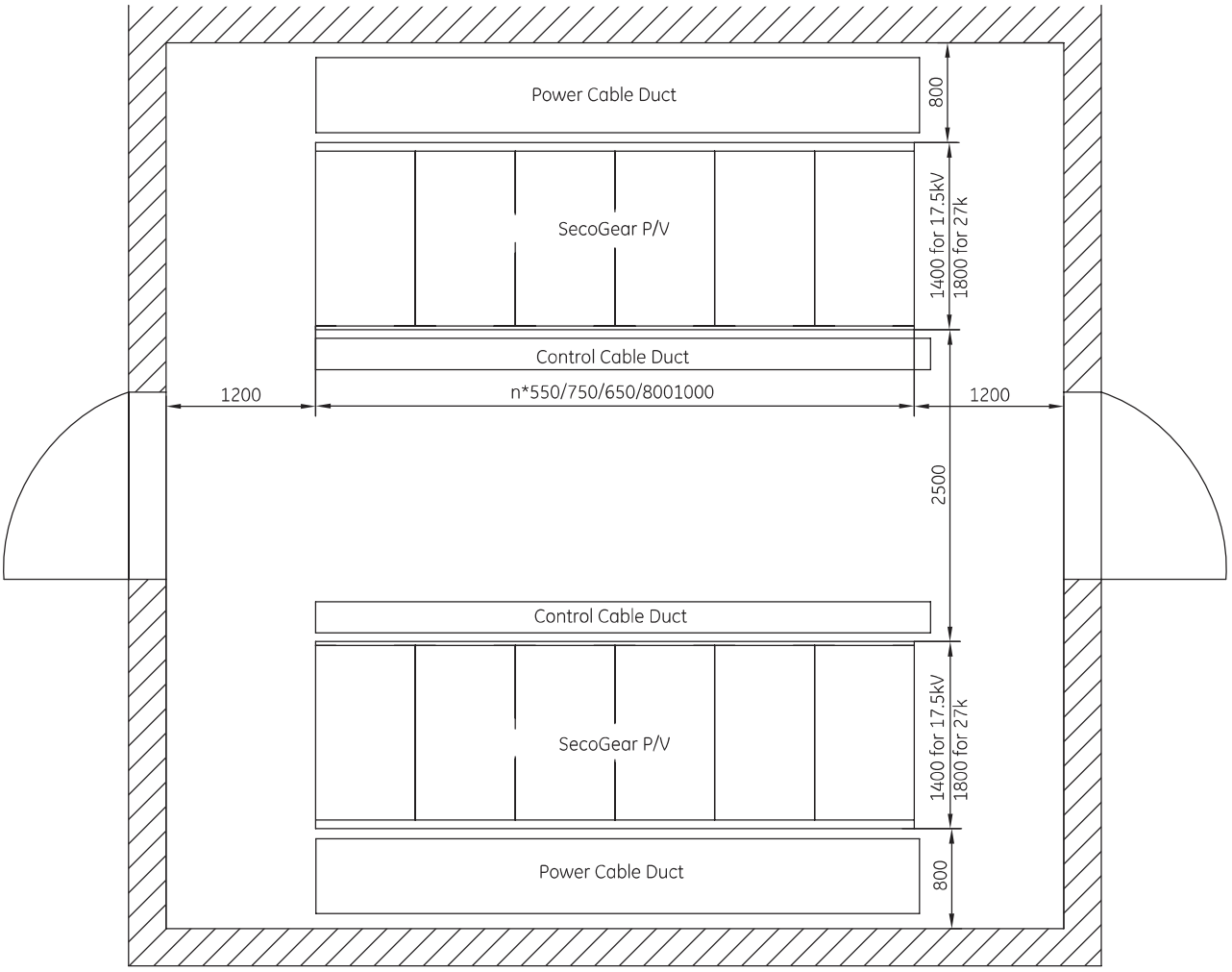
Layout Detail

In order to obtain an optimum installation sequence and ensure high quality standards, site installation of the switchgear should only be carried out by specially trained per sonnel, or supervised and monitored by quali ed personnel, or by personnel supervised and monitored by responsible persons.

On commencement of installation on site, the switch-room must be fundamentally finished, provided with lighting and the electricity supply, lockable, dry and with facilities for ventilation, It is also required that the basic frame and indoor ground of substation should be checked and accepted before the construction, It must be ensure that the ceiling height is sufficient for the opening travel of the pressure relief plates and clearance for exhaust.

Tolerances for laying the floor frame are: Evenness tolerance: ± 1mm within a measuring length of 1m, Straightness tolerance: 1mm per 1m, but not more than 3mm over entire length of frame.

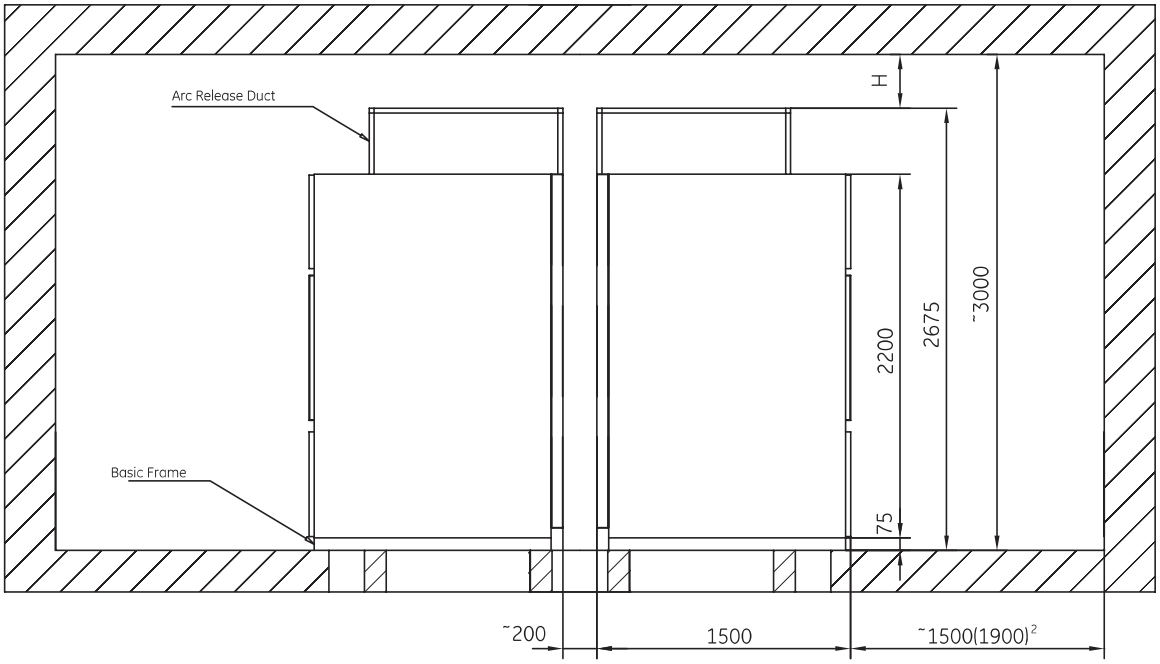
Layout Detail



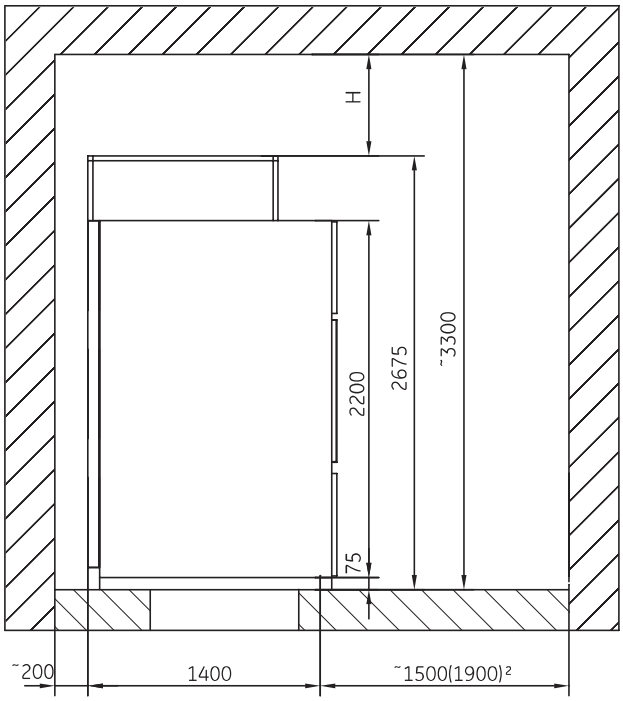
Installation Detail

Layout Detail

SecoGear FA 17.5kV layout



a) Back to back scheme



b) Back to wall

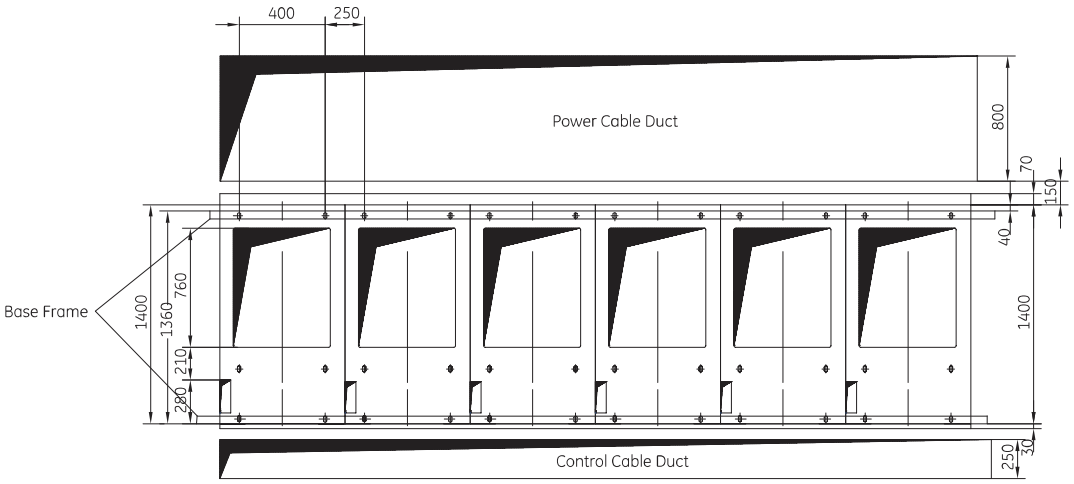
H: Maintain space, should make sure at least 300mm.
**: 1900mm are required for panel replacement.

Layout Detail

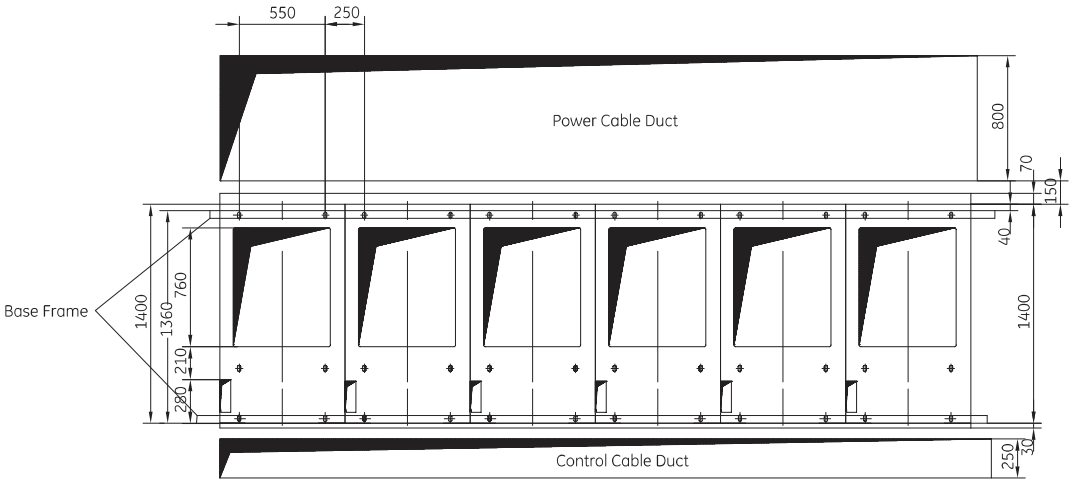
Switch room cable duct arrangement

12/17.5kV

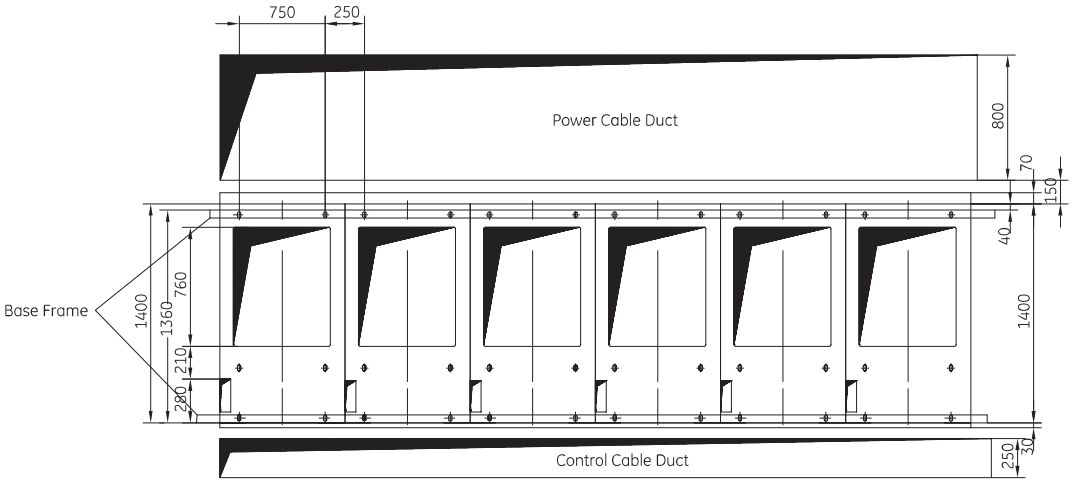
For 550/650mm panel



For 750/800mm panel



For 1000mm panel

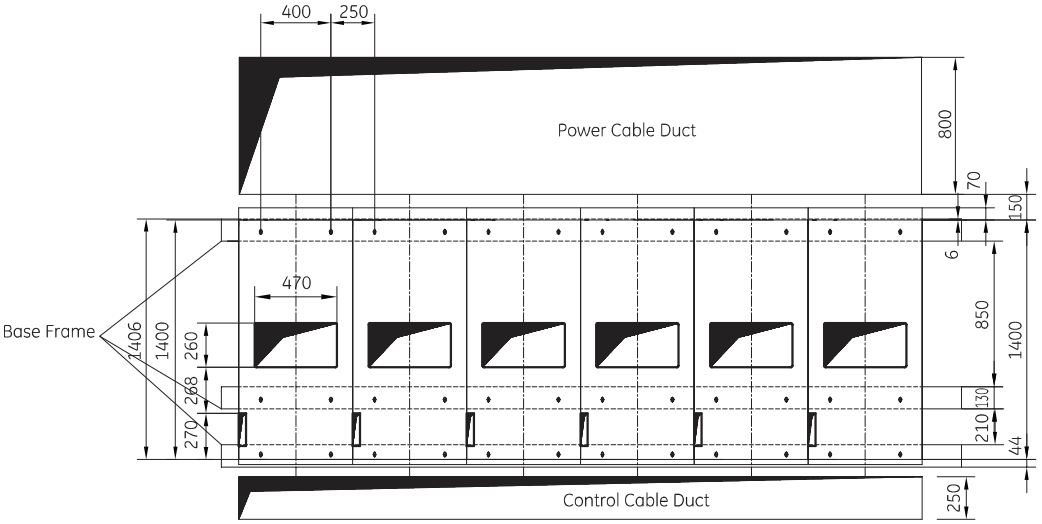


Installation Detail

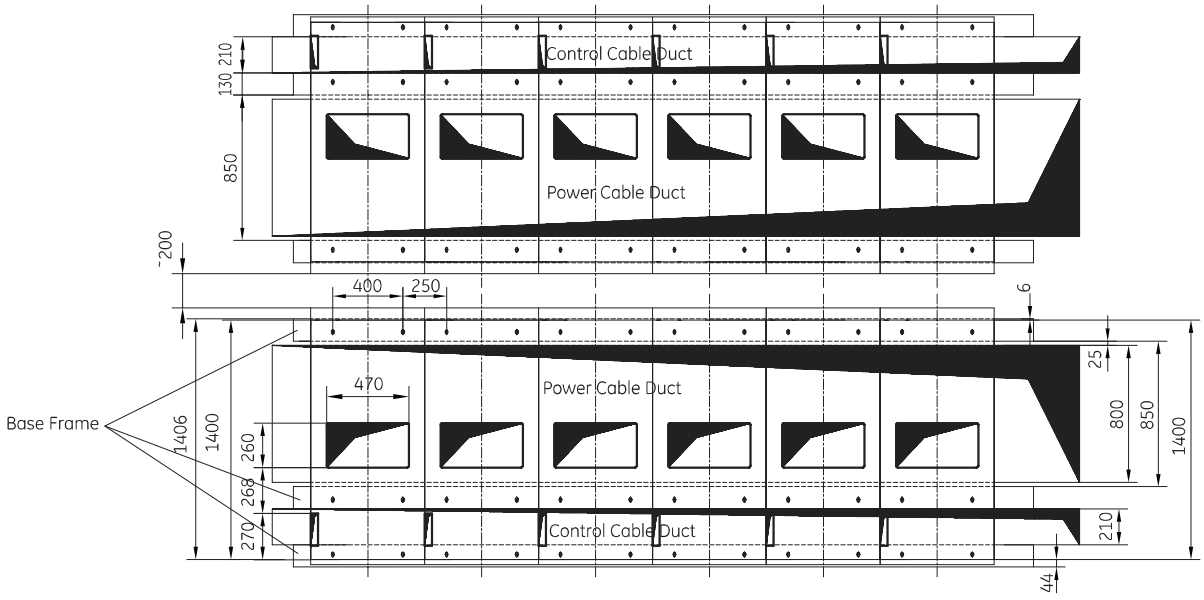
Layout Detail

SecoGear FA17.5kV

Normal Laylout



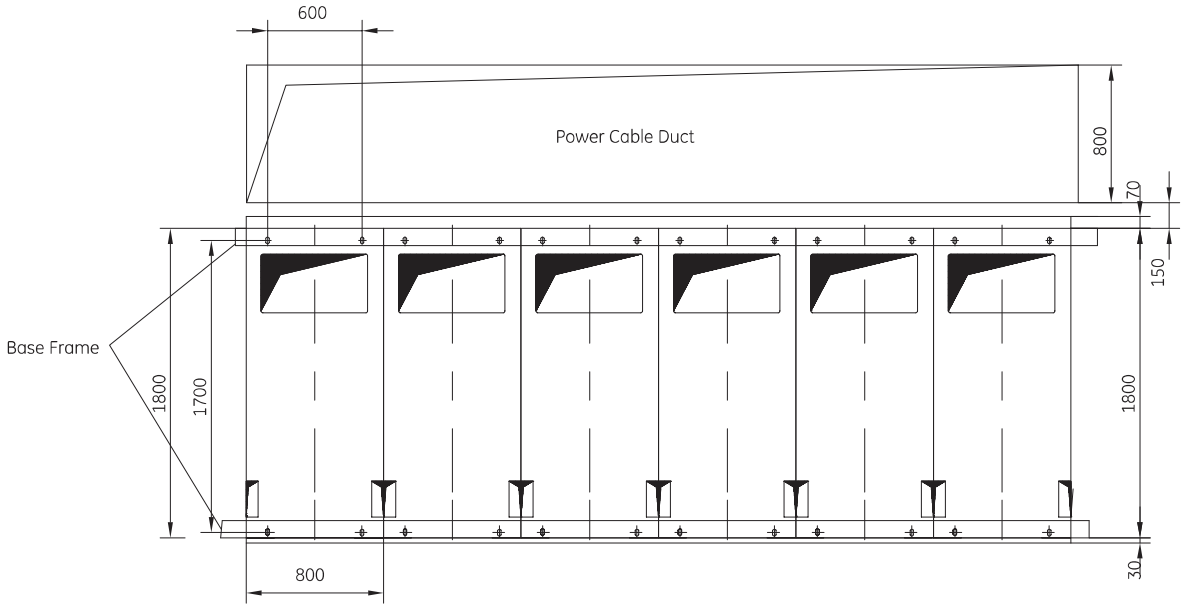
Back to Back Layout

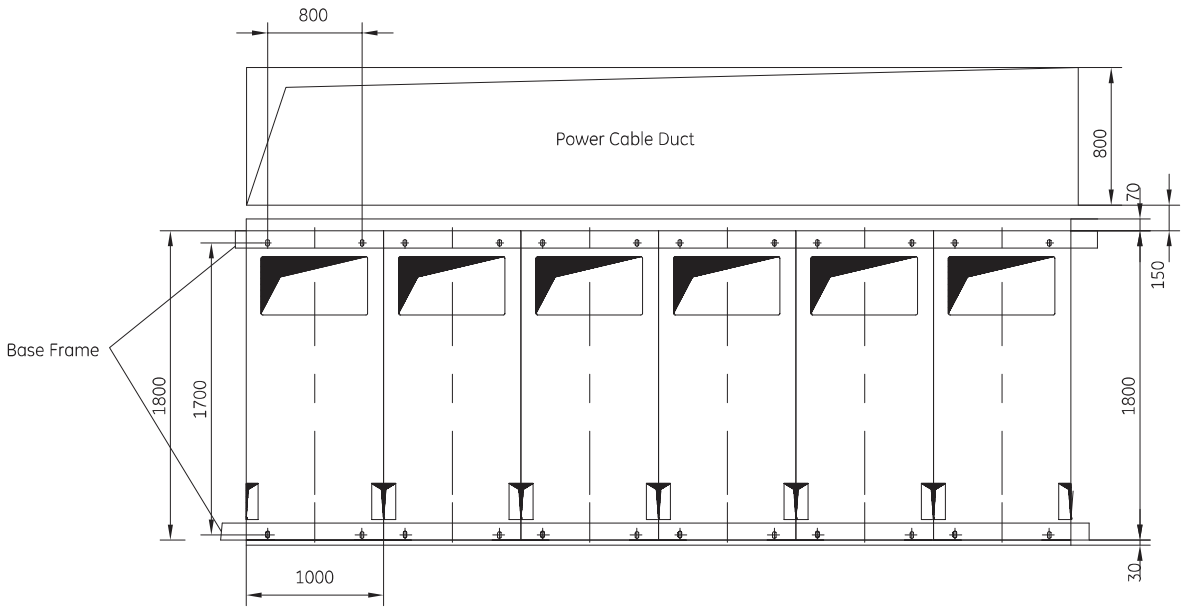


Layout Detail

Switch room cable duct arrangement

27kV



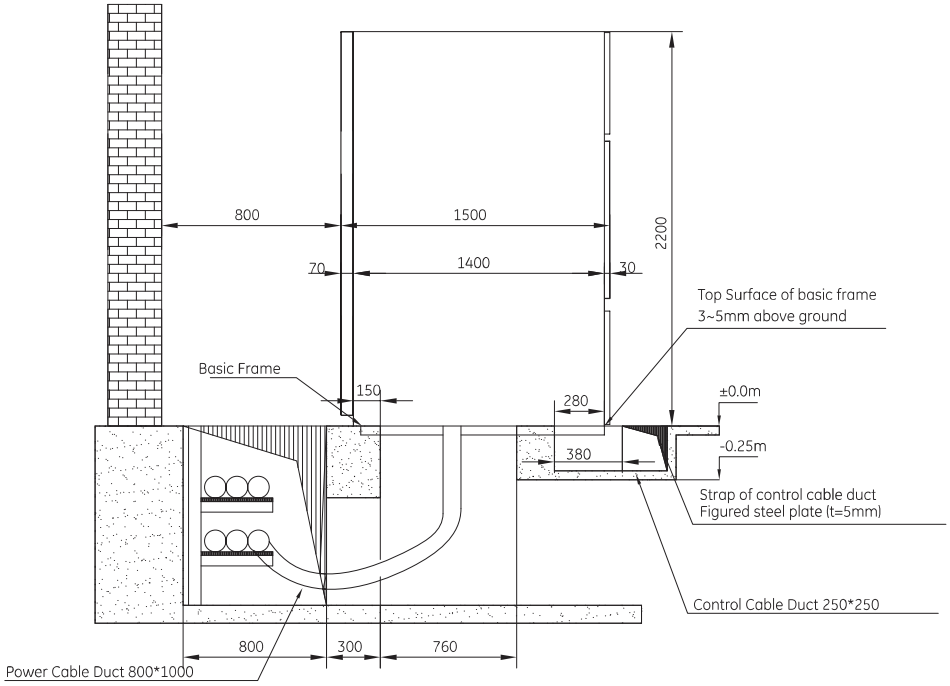


Installation Detail

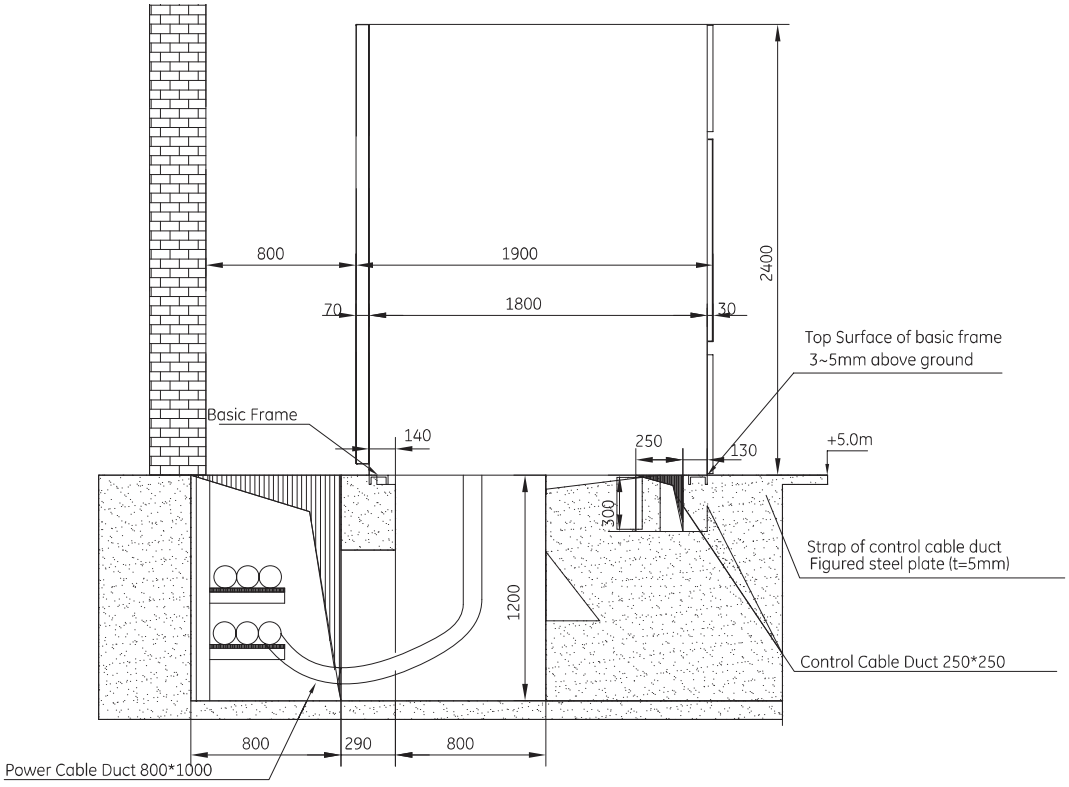
Layout Detail

Cross section view of switchgear room layout

12/17.5kV



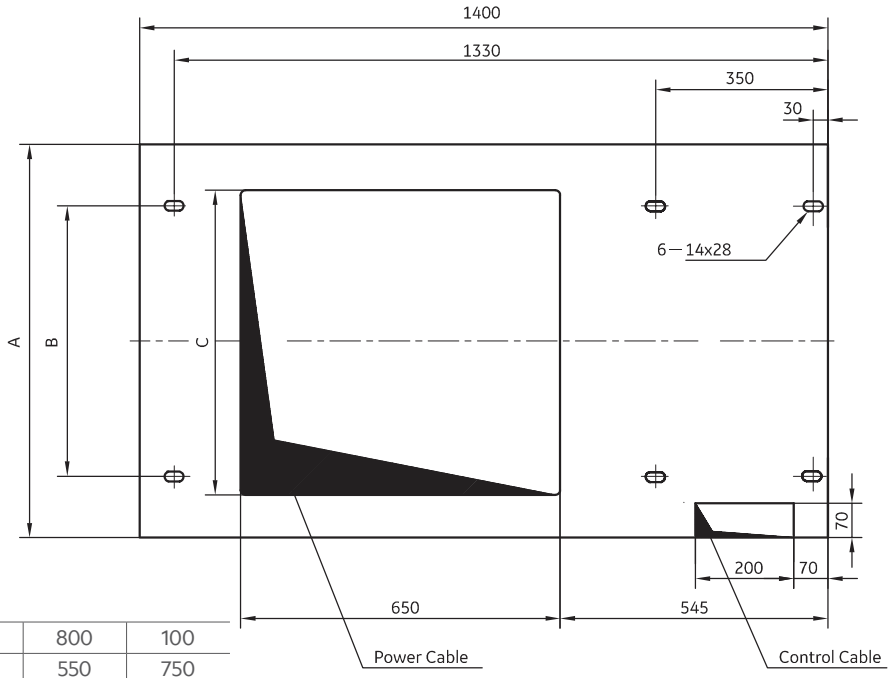
27kV



Layout Detail

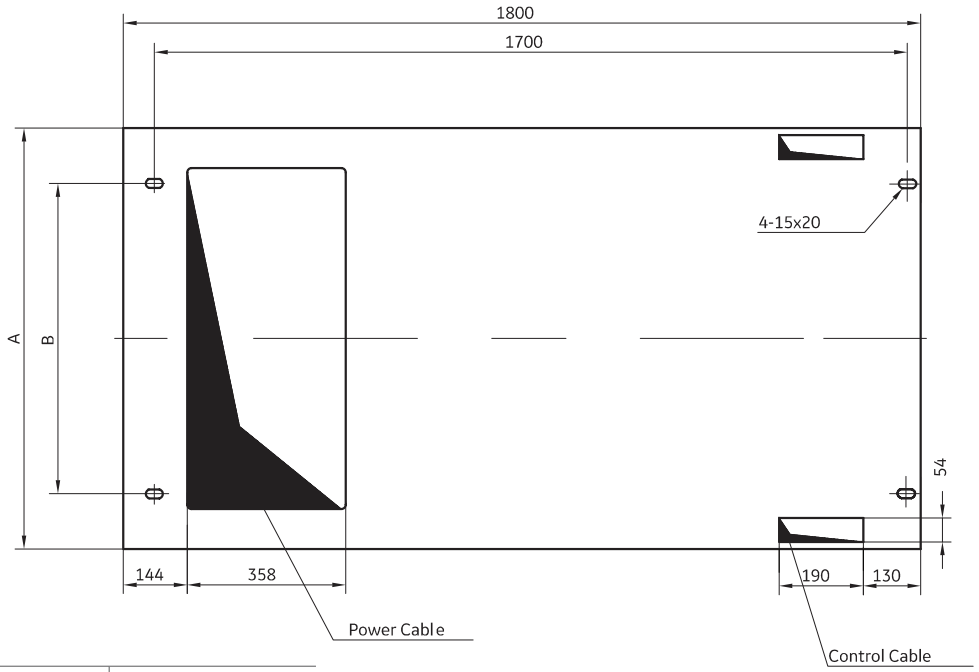
Detail of switchgear cable access cutout

12/17.5kV



Width A	550	650	750	800	100
B	300	400	550	550	750
C	370	470	600	620	820

27kV



Width A	800	1000
B	600	800
C	595	695

GEIS

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