

DISTRIBUTION SOLUTIONS

# SafeLink CB

## Gas insulated ring main unit



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**SafeLink CB is an extremely compact & robust gas insulated switchgear suitable for secondary distribution network, fitted with hermetically sealed SF6 gas tank, suitable for outdoor applications, ensuring best personnel safety as per latest IEC standards, compatible with SCADA integrated network.**

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# 1. Introduction

SafeLink CB ring main units for secondary distribution were developed by ABB and introduced to the markets in 2011, adding new product in SF6 compact switchgear family. The installed base of SafeLink CB is more than 10000 switchgears in more than 20 countries all over the world. The switchgear portfolio is constantly under development to adjust to new market requirements and customers' needs.

SafeLink CB is available in standard configurations based on high-volume production. These standardized RMUs, which are the most required configurations within a distribution network, can be extensible upon request. Additionally, they can also be offered with extended flexibility & modularity.

## Customer benefits

- A wide range of functional units, easy to extend and upgrade
- Up to three modules in one common gas tank
- No live parts exposed
- Fully sealed for lifetime
- Climatically independent
- Designed and tested according to IEC
- High reliability and safety
- Compact dimensions
- Safe and easy for operators in both maintenance and operating conditions
- All switching operations are carried out from the front of the switchgear





#### Industry

- Pulp and paper
- Cement
- Textiles
- Chemicals
- Food
- Automotive
- Petrochemical
- Quarrying
- Oil and gas pipelines
- Rolling mills
- Mines



#### Utilities and power plants

- Power generation stations
- Transformer stations and metering
- Main and auxiliary switchgear



#### Transport

- Airports
- Ports
- Railways
- Underground transport



#### Infrastructure

- Hotels
- Shopping centers
- Hospitals
- Large infrastructure and civil works

#### Renewables

- Wind
- Solar/PV

#### Applicable standards

SafeLink CB is tested according to the following IEC-standards:

- IEC 62271-1: Specifications high voltage switchgear
- IEC 62271-100: Alternating current circuit breakers
- IEC 62271-102: Alternating current disconnectors earthing switches
- IEC 62271-103: High voltage switches
- IEC 62271-200: Arc fault and switchgear
- IEC 60529: Degrees of protection provided by enclosures

SafeLink CB is also tested together with ABB make CSS (Compact Secondary Substations) according to IEC 62271-202.

#### Normal operation conditions

The rated characteristics of the switchgear are valid under the following ambient conditions:

- Minimum ambient temperature:  $-25\text{ }^{\circ}\text{C}$
- Maximum ambient temperature:  $+40\text{ }^{\circ}\text{C}$

For different temperature ranges, please contact your ABB sales representative.

#### Ambient humidity:

- Maximum 24 h average of relative humidity 95%
- Maximum monthly average of relative humidity 90%

The normal operational altitude is up to 1,000 m above sea level. For higher altitude applications, please contact your ABB sales representative. The switchgear is designed for operation in a normal, non-corrosive and uncontaminated atmosphere.

**General**

SafeLink CB is a SF6-insulated ring main unit for the secondary distribution network.

SafeLink CB can be supplied in different configurations suitable for most switching applications in 12 kV distribution networks. As an option, SafeLink CB can be delivered as an extensible ring main unit.

SafeLink CB is a completely sealed system with a stainless steel tank containing all the live parts and switching functions. A sealed steel tank with constant atmospheric conditions ensures a high level of reliability as well as personnel safety and a virtually maintenance-free system. The SafeLink CB can be offered with circuit breaker & relay for protection of the transformer. SafeLink CB can be supplied with an integrated remote control and monitoring unit.

**Modularity and external busbars**

SafeLink CB can be configured with a maximum of three modules in one SF6 tank with an internal busbar.

To configure switchgears with more than three modules as many tanks as needed can be joined together by use of an external busbar.

The external busbar is fully insulated in order to maintain climatic independence and a maintenance free solution. All modules can be compatible for future extension.

**Transformer protection**

SafeLink CB offers circuit breaker with relay for transformer protection. Circuit breaker with relay offers optimal protection against short circuits along with better protection against low over currents. Circuit breaker with relay is always recommended for larger transformers.



## 2. Design philosophy

### Evolution - more functionality, compact dimensions

Secondary distribution switchgears have been subject to significant development in recent 20 years. The traditional switching cells are substituted with complete switchgear systems. Specific functions such as grounding, disconnecting, cable connections, busbar extension, protection and switching have become integrated features in compact functional units. Compact switchgear systems fulfill customers MV application requirements. ABB has always taken an active part in this development. The most unique specialization is the development of the compact secondary switchgear. The numerous distribution substations requested a unified switching functionality that evolved into the Ring Main Unit concept. ABB's SafeLink CB is adapted to the needs in the utility distribution networks.

### Customer's involvement

The applied functionality in SafeLink CB is a result of input from customers all over the world. Key customers are continuously involved with ABB design staff to ensure optimised switchgear operation.

### Personnel – safety operation

All products are designed and manufactured in compliance with ISO 9001, ISO 14001 and ISO 18001. The latest edition of relevant IEC standards will always apply to our continuous test programme. Safety is not only a specification and rating issue, but also a real life experience.

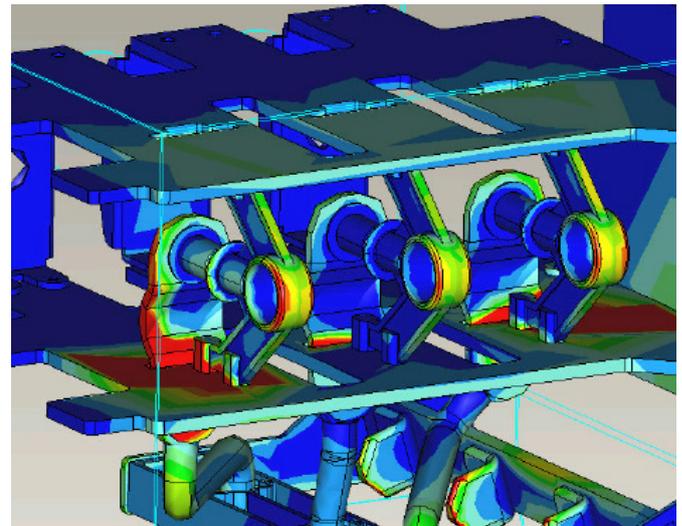
All units are factory routine tested according to international standards. ABB takes this further to be an objective related to durability and repetitive manufacturing quality. Features for further enhancing personnel safety are available. "integrated functionality" is a key objective to reduce the number of moving components, further reducing the risk of any mechanical defect.

### We are responsible for the environment

Green policy assures focus on environmental factors in manufacturing as well as over the switchgear's life span. All products are manufactured in accordance with our ISO 14001 certification. Materials are carefully selected, to ensure reuse at end of life. Recycling capability is 95% (for details, see chapter 10). To facilitate the recycling process we continuously work along with our partners to improve end-of-life handling.

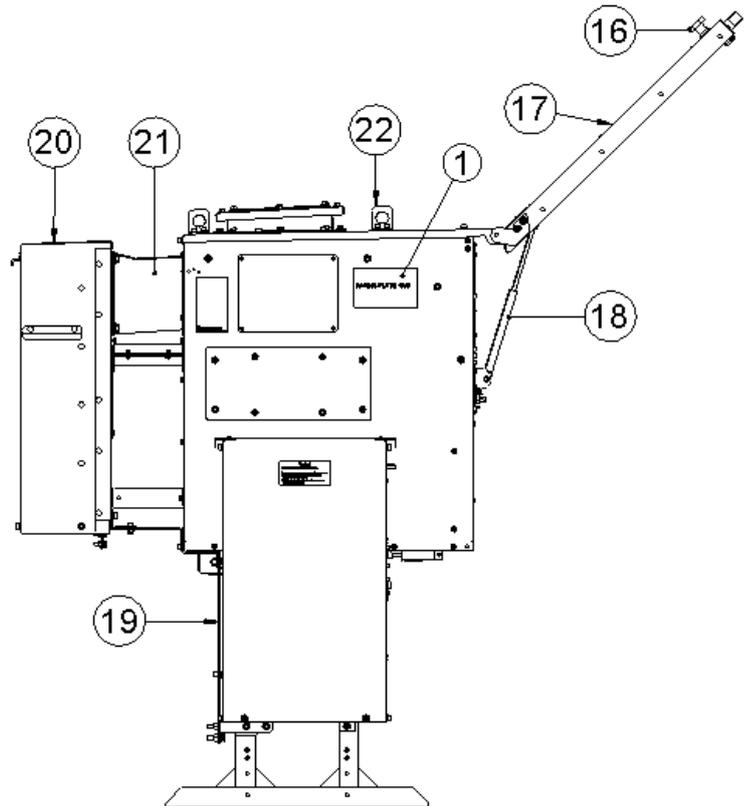
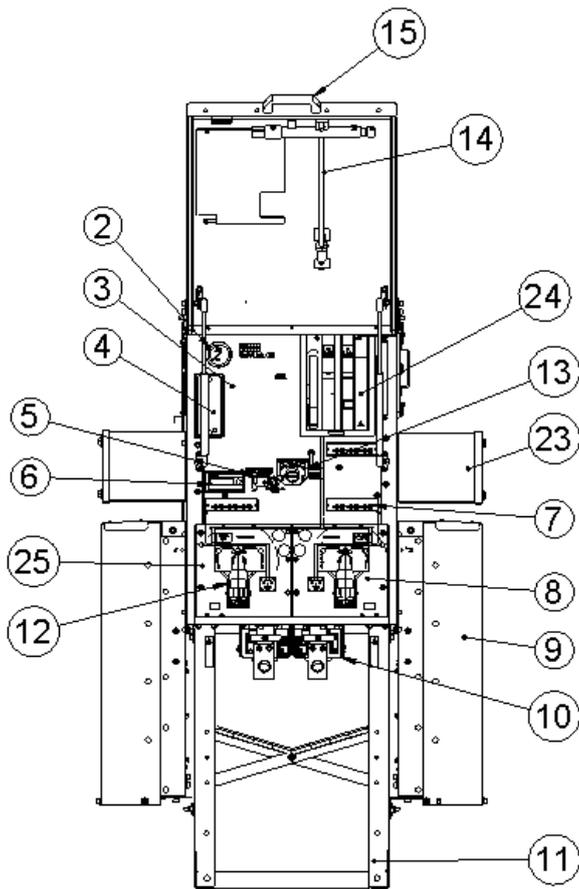
### Modern - development and manufacturing

Numerical simulations together with long experience ensure reliable and safe, compact and robust design. Dielectric simulations ensure that compactness does not influence the dielectric capability. The combination of design techniques; experience and the most modern production technology guarantee state-of-the-art products and durability.



## 3. Arrangement

1. Rating plate
2. Manometer
3. Front upper mimic
4. Relay
5. VCB disconnector padlock
6. Fault indicator
7. VPIS for ring switch RHS
8. Ring switch RHS
9. Cable box for ring switch RHS
10. Test point box for ring switch RHS
11. Switchgear stand
12. Earth & circuit slider for ring switch
13. VCB disconnector
14. Operating handle
15. Door handle
16. Padlocking for switchgear front door
17. Switchgear front door
18. Gas spring for switchgear front door
19. Switchgear earthing
20. T-Off cable box (for VCB)
21. Current transformer  
(Directly mounted on VCB bushings)
22. Lifting hook for switchgear
23. End box (for extensible version only)
24. 'V' module section
25. 'C' module section



## 4. Manufacturing

### 4.1 Completely sealed system

#### Exterior

Upper and lower front mimic are made of 2 mm painted steel with screen printing. These mimics contain the mimic diagram of the main circuit integrated with the position indicators for the switching devices. Background color for these mimics is light grey (RAL 7035). The upper & lower mimics are removable.

All cable compartment covers are arc proof & powder painted. All cable compartment covers are removable. Each module has a separate cable compartment. The removable cable covers allows comfortable access for connection of cables. These covers are mechanically interlocked with earthing switch of each module. In case of an arc fault inside the SF6 tank, followed by an opening of the pressure relief valve in the top of the tank. In case of an arc fault inside the cable compartment, followed by an opening in the rear of the cable compartment of the pressure relief plates releasing the plasma towards bottom.

#### Enclosure

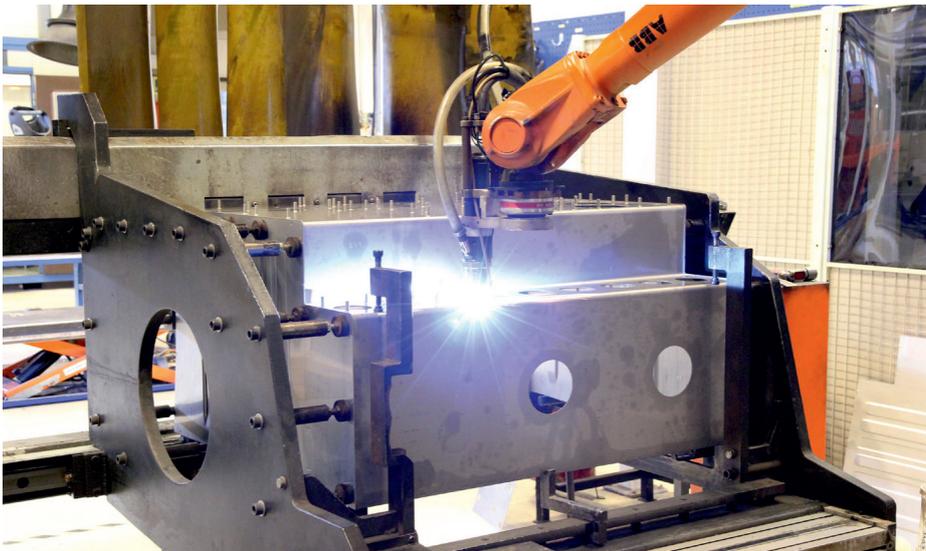
SafeLink CB use SF6 gas (Sulphur hexafluoride) as insulation and quenching medium. The SF6 gas is contained in a

welded stainless steel tank, which is sealed for life.

The pressure system is defined as a sealed for life system with an operating lifetime exceeding 30 years. The leakage rate is less than 0,1% per year. In order to ensure a reliable and tight welding, all welding work is carried out by computer controlled robots. Electrical and mechanical bushings penetrating the tank are clamped and sealed to the tank by high quality O-rings. The mechanical bushing has in addition a rotating shaft which connects the shaft of the switch to the corresponding shaft of the mechanism.

All SF6 tanks have to pass a leakage test before gas filling. Leakage test and gas filling are done inside a vacuum chamber. The first step in the leakage test is to evacuate all air inside both the SF6 tank and vacuum chamber simultaneously. Then the SF6 tank is filled with helium. Due to the characteristics of helium this test will detect all possible leakages. If the SF6 tank passes this test the helium will be evacuated and replaced by SF6.

The SF6 tank has a degree of protection of IP67 and can be immersed into water and still maintain all functions in a satisfactory way.



## 4.2 Factory routine tested

ABB has set a high quality automated system for production and quality control which assures sustainability of factory output. Part of the assurance is standard routine testing procedures according to IEC62271-200 performed on every manufactured switchgear.

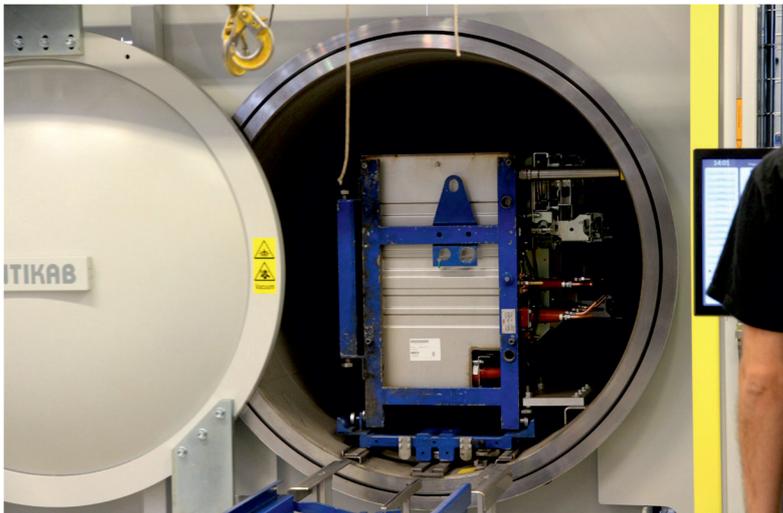
### IEC factory routine tests

- Visual inspection and check
- Mechanical operations check
- Check of secondary wiring
- Electrical sequence operations
- Power frequency withstand voltage test
- Partial discharge measurement
- Measurement of resistance of the main circuits
- Secondary insulation test
- Control of the gas tightness

### State-of-the-art:

For routine testing, ABB uses the latest technologies and systems, such as:

- Fully automated high voltage testing cabin
- Temperature compensated gas filling system
- Automated connection counting system
- Automated screw torque control
- Computer aided mechanical characteristics control



# 5. Safety

## 5.1 Internal arc classification

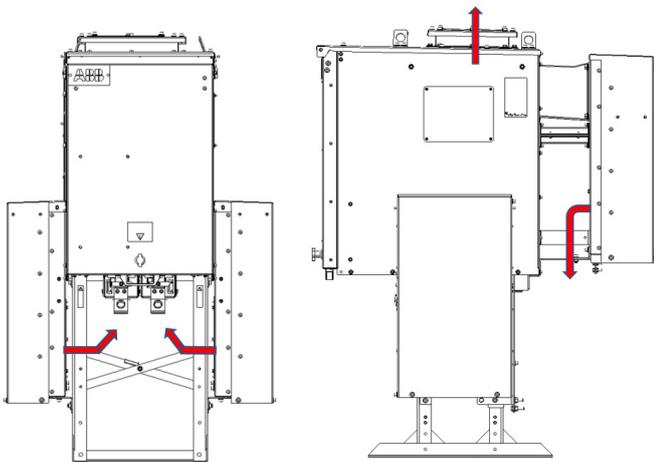
SafeLink CB is available for a wide range of installations and applications in order to secure the highest safety for operators. Switchgears are designed and type tested for internal arc classification according to the following configurations.

### Internal arc classification – 10kA 0.1s

With this configuration, for any internal arc inside SF6 gas tank, hot gases and pressure are evacuated towards switchgear top. For internal arc inside cable compartment, hot gases and pressure are evacuated towards switchgear bottom. In this setup the switchgear can be installed as free standing.

Basic parameters of set-up:

- IAC AFLR 10kA 0.1s (for cable compartment)
- IAC AFL 21kA 1s (for SF6 gas tank)
- Switchgear needs to be installed and fixed to the floor in accordance with “SafeLink CB installation and operating instructions”

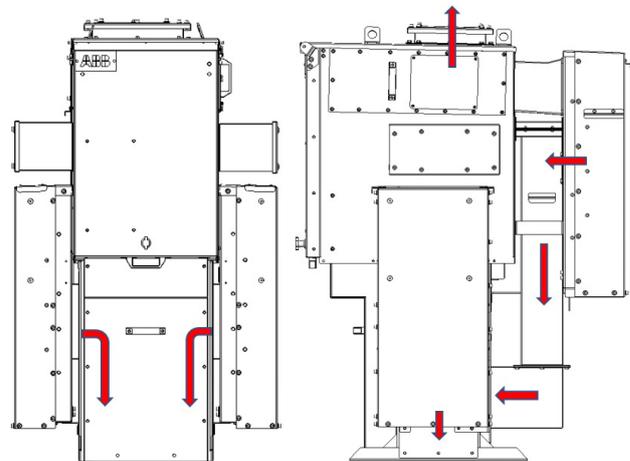


### Internal arc classification – 21kA 1s

With this configuration, for any internal arc inside SF6 gas tank, hot gases and pressure are evacuated towards switchgear top. For internal arc inside cable compartment, hot gases and pressure are evacuated towards switchgear bottom. In this setup the switchgear can be installed as free standing.

Basic parameters of set-up:

- IAC AF 21kA 1s (for cable compartment)
- IAC AFL 21kA 1s (for SF6 gas tank)
- Switchgear needs to be installed and fixed to the floor in accordance with “SafeLink CB installation and operating instructions”



## 5.2 Interlocking & padlocking

### Interlocks

The safety mechanical interlocks between switches are standard and detailed information is described for each module. They are set out by the IEC standards and are necessary to guarantee the correct operation sequence. ABB safety interlocks enable the highest level of reliability, even in the case of an accidental error, and ensure operator safety.

### Padlocks

The front doors can be locked in the closed position by means of padlocks. The padlock can also be applied to the switches/breakers to avoid improper operation of the

switchgear. For a more detailed description, see dedicated interlocking pages for each module. Padlocks from 4 to 7 mm diameter can be accommodated.

### Electrical interlocking

Electrical interlocking between switches/breakers can be provided for achieving specific logics based on customer request.

### Undervoltage release

This release opens the circuit breaker when there is a sharp reduction or cut in the power supply voltage. This is an optional feature.

Interlock Type	Operation	Condition	Comment
Mechanical Interlock - C Module	Closing LBS	ES is open, Cable Door is closed	Standard interlock
Mechanical Interlock - C Module	Opening LBS	ES is open	Standard interlock
Mechanical Interlock - C, V Modules	Closing ES	LBS/Disconnecter is open, Cable door is closed	Standard interlock
Mechanical Interlock - C, V Modules	Opening ES	LBS/Disconnecter is open, Cable door is closed	Standard interlock
Mechanical Interlock - C, V Modules	Opening cable door	ES is closed	Standard interlock
Mechanical Interlock - V Module	Closing CB	No interlock	
Mechanical Interlock - V Module	Opening CB	Cable door is closed	Standard interlock
Mechanical Interlock - V Module	Closing Disconnecter	CB is open, ES is open Cable door is closed	Standard interlock
Mechanical Interlock - V Module	Opening Disconnecter	CB is open, ES is open	Standard interlock
Electrical Interlock	Closing/Opening - LBS/VCB	As per customer request	Optional
Padlock	Closing/Opening - LBS/DS/ES/VCB	Only provision	Optional

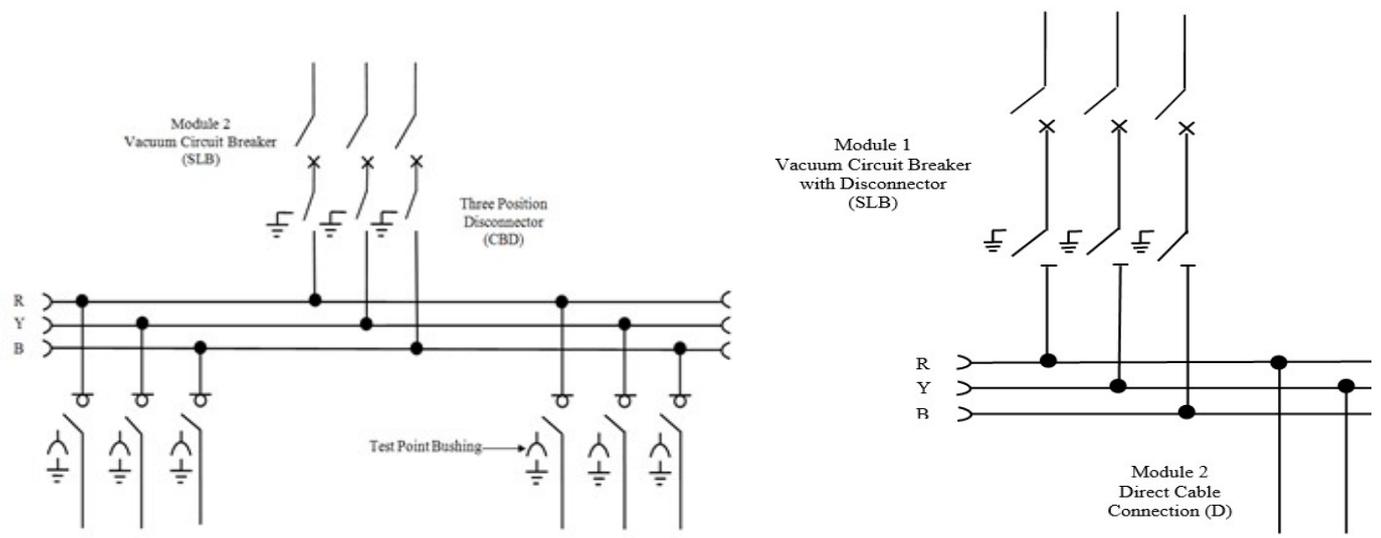
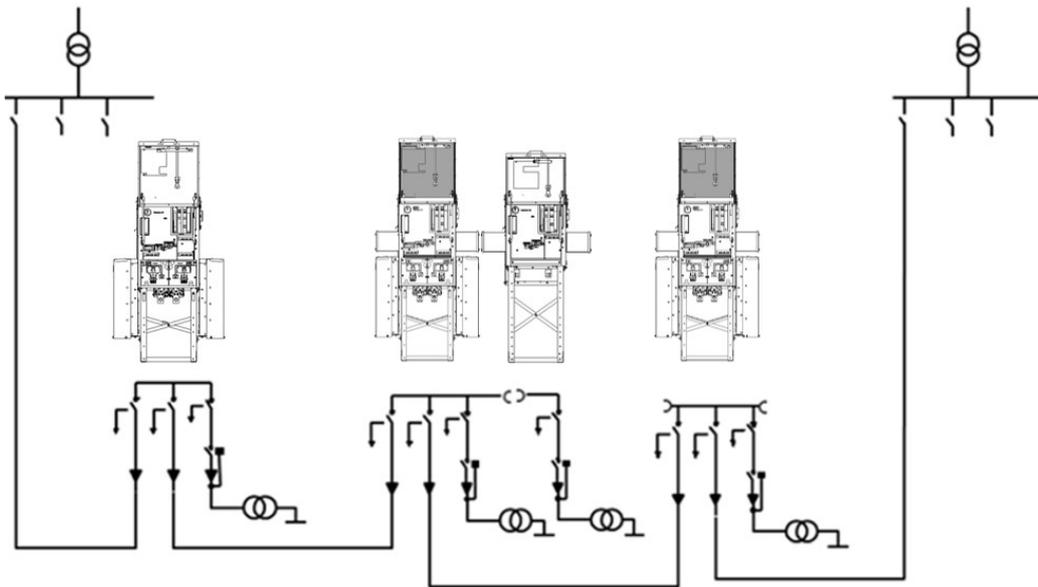


# 6. SafeLink CB

## 6.1 Applications

SafeLink CB is a SF6 insulated outdoor ring main unit for applications in 12 kV / 13.8 kV medium voltage distribution networks. SafeLink CB can be supplied with ring switch and / or vacuum circuit breaker with various possible configurations with extensibility options.

SafeLink CB offers a sealed stainless steel tank which contains all the live components and switching functions. The stainless steel tank is robotically welded and is sealed for life ensuring high level of personnel safety as well as maintenance free system.



**SafeLink CB can be offered with following configurations:**

- CVC – 2 load break switch & 1 vacuum circuit breaker
- +CVC+ – 2 load break switch & 1 vacuum circuit breaker with extensibility
- +VC+ – 1 load break switch & 1 vacuum circuit breaker with extensibility
- +V+ – 1 vacuum circuit breaker with extensibility
- +C+ – 1 load break switch with extensibility
- VD - 1 vacuum circuit breaker & 1 direct cable connection
- +DC+ - 1 load break switch & 1 direct cable connection with extensibility

**The above configurations are supplied with following modules:**

- C – Cable / Ring switch
- V – Vacuum circuit breaker  
(with disconnecter on the busbar side)
- D – Direct cable connection
- '+' symbol represents extensibility option

For more configurations & extensibility options, please contact ABB sales representative.

**SafeLink CB is designed for use in the following applications:**

- Compact secondary substations
- Small industries
- Wind power plants
- Solar/PV plants
- Hotels, shopping centres, office buildings, business centres etc.
- Light mining applications, airports, hospitals, tunnels and underground railways

## 6.2 Features

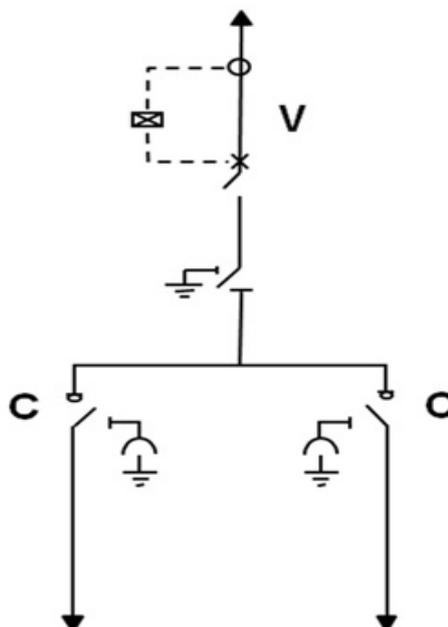
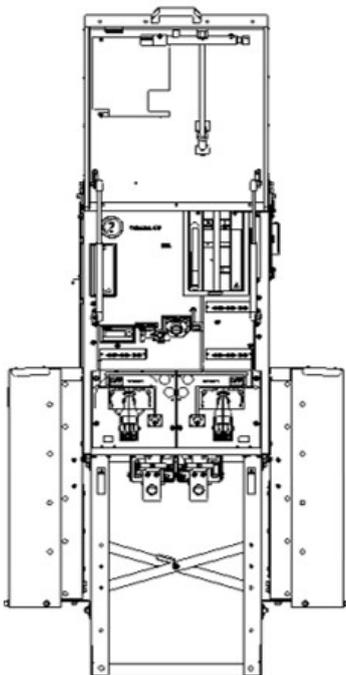
- C Switch Disconnecter module with optional test point facility (3 positions ON-OFF-EARTH)
- V vacuum circuit breaker module for relay transformer protection (with manually operated Disconnecter)
- D Direct Cable Connection module

### SafeLink CB is supplied with the following standard features:

- Vacuum circuit breaker with disconnecter
- Mechanical indication for vacuum circuit breaker ON, OFF and spring charge.
- Two-position mechanism with auto reclosing duty for vacuum circuit breaker
- Self powered/Auxiliary powered OC+EF relay with series/shunt trip coil
- Manually operated 3 position disconnecter with earthing switch
- 2 Nos. of 3 position switch disconnecter with earthing switch
- Switch position indication for load break switch, earthing switch and disconnecter
- Snap energy spring mechanism for 3 position switch disconnecter & earthing switch
- Cable bushings 400 series bolted compatible for capacitive voltage indication
- Capacitive voltage indication (VPIS)
- Busbars 630 A
- Earthing bar
- Operating handle
- 4 Lifting lugs for easy handling
- Manometer for SF6 pressure
- All cable compartments fully interlocked with respective Earthing switches
- External structure - painted
- Arc proof cable compartments

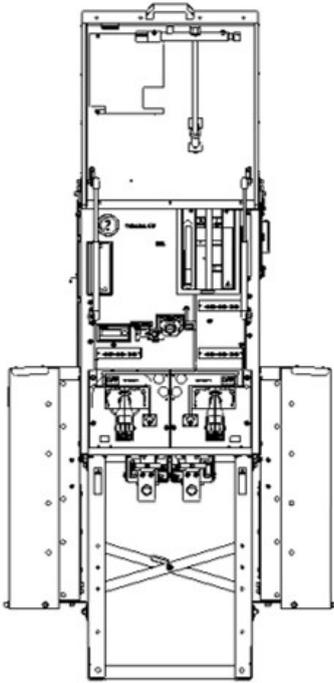
### SafeLink CB is supplied with the following optional features:

- Optional test point facility for ring cable switches, fully interlocked with earthing switches
- Optional padlocking provision for switch disconnecter, earthing switch, disconnecter & VCB
- Signal (1 NO) from internal pressure indicator wired to terminals (one for each SF6 tank)
- Motorised operation
- Shunt opening (MO) and closing (MC) release/coil (for vacuum circuit breaker)
- Aux. switch (2 NO+3 NC or 3 NO+2 NC) for vacuum circuit breaker positions
- Aux. switch (2 NO+2 NC) for switch disconnecter/disconnector positions
- Aux. switch (1 NO+1 NC) for earthing switch positions
- Short circuit indicator and/or earth fault indicator for switch disconnectors
- Extensible bushings (630 A) on the sides for connection of external busbars
- Protective end box for extensible bushings
- External busbars for coupling 2 RMUs along with its covering box (for extensible version)
- Side LV box for motorized operations, battery, battery charger & control equipment
- Top LV box for other auxiliary equipments including annunciation, FRTU, SCADA integration
- LR Switch for local/remote operation
- Mechanical counter for switch disconnecter & vacuum circuit breaker

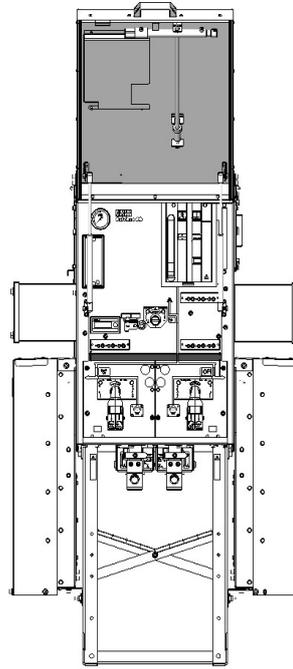


## 6.3 Configurations

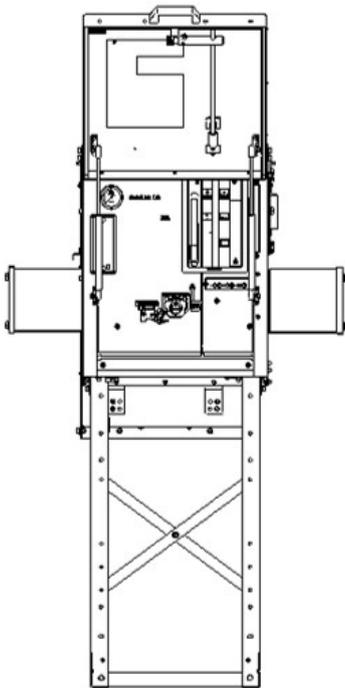
SafeLink CB is available in following configurations



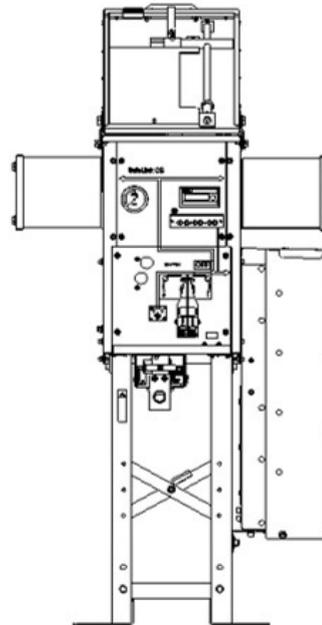
CVC Non Extensible with Test Point Bushing



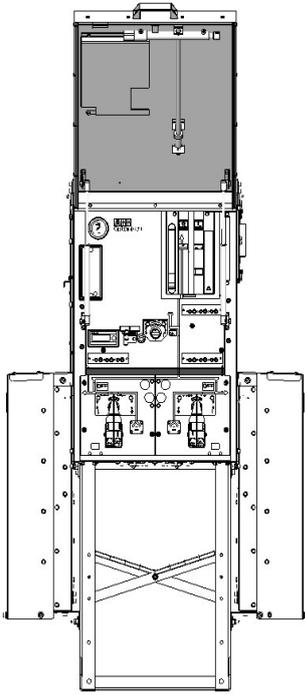
+CVC+ Extensible with Test Point Bushing



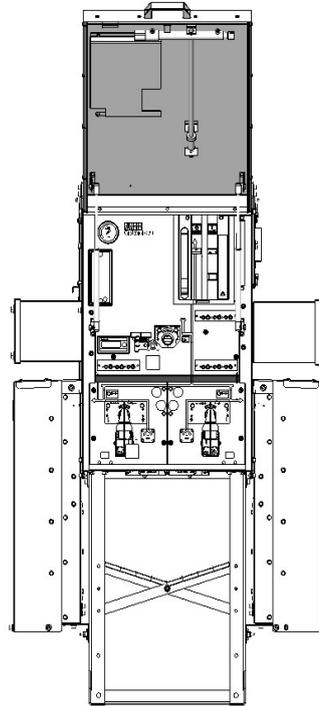
+V+ Extensible



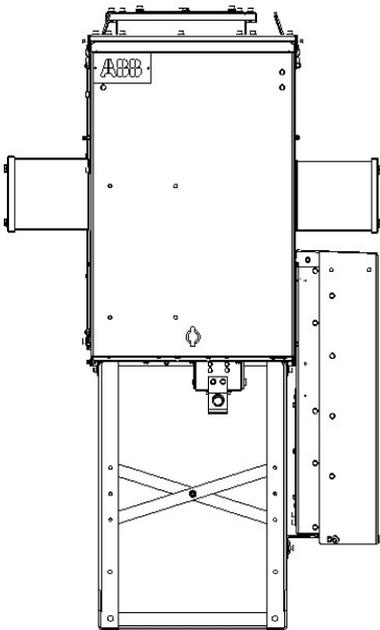
+C+ Extensible with Test Point Bushing



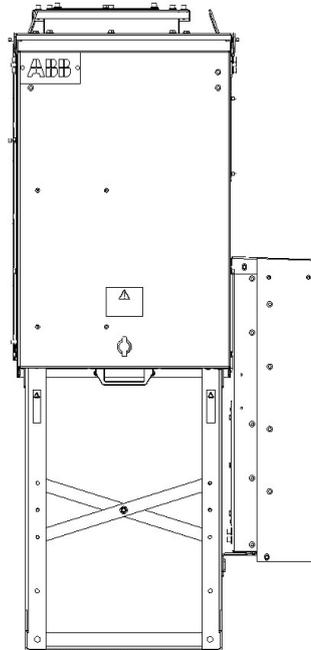
CVC Non Extensible without Test Point bushing



+CVC+ Extensible without Test Point bushing



+VC+ Extensible without Test Point Bushing

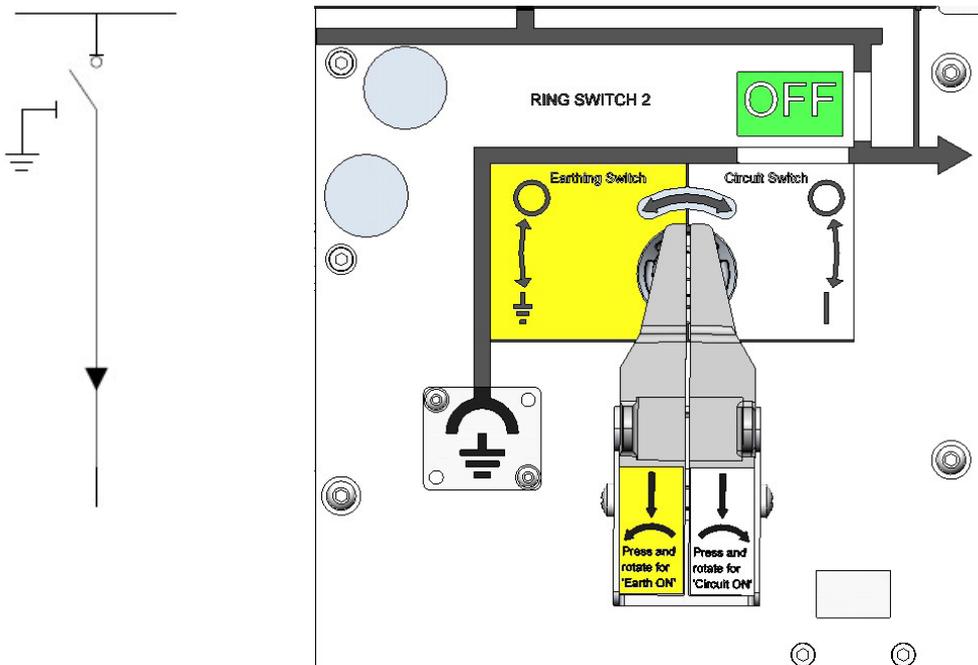


VD Non-Extensible without Test Point bushing

## 6.4 C – Load break switch module

The Load break switch (C-Module) is a three position switch disconnecter and earthing switch using SF6 gas as an arc quenching and insulating medium. The switch positions are close – open – earthed. In the open position the switch

satisfies the disconnecter requirements. C module is optionally provided with test point bushings protruding on bottom side of the tank.



### Standard features

- Three position load break switch with earthing switch (ON-OFF-EARTH)
- Single spring latched snap energy mechanism with common operating shaft for load break and earthing functions
- Switch position indication for load break switch and Earthing Switch
- Cable bushings horizontal on the sides, Interface C (400 series bolted) with integrated capacitor for voltage indication
- Busbars 630A
- Arc proof cable covers
- Cable compartment interlocked with respective Earthing switch
- Earthing switch interlocked with load break switch
- VPIS (Voltage Presence Indicating System) with integrated indicator lamps
- Padlock for all three positions of ON-OFF-EARTH
- End box for extensible bushings (if ordered as extensible)

### Optional features (also available as retrofit)

- Extensible bushing for connection of external busbars on side (630 A)
- Signal (1 NO) from internal pressure indicator wired to terminals (only one for each SF6 tank)
- Motorised operation for load break switch
- Aux. switch 2 NO+2 NC for switch disconnecter & 1NO+1NC for Earthing switch positions
- Short circuit and/or earth fault indicator
- Bushings for cable testing (incl. earthing device test points) with interlocking facility

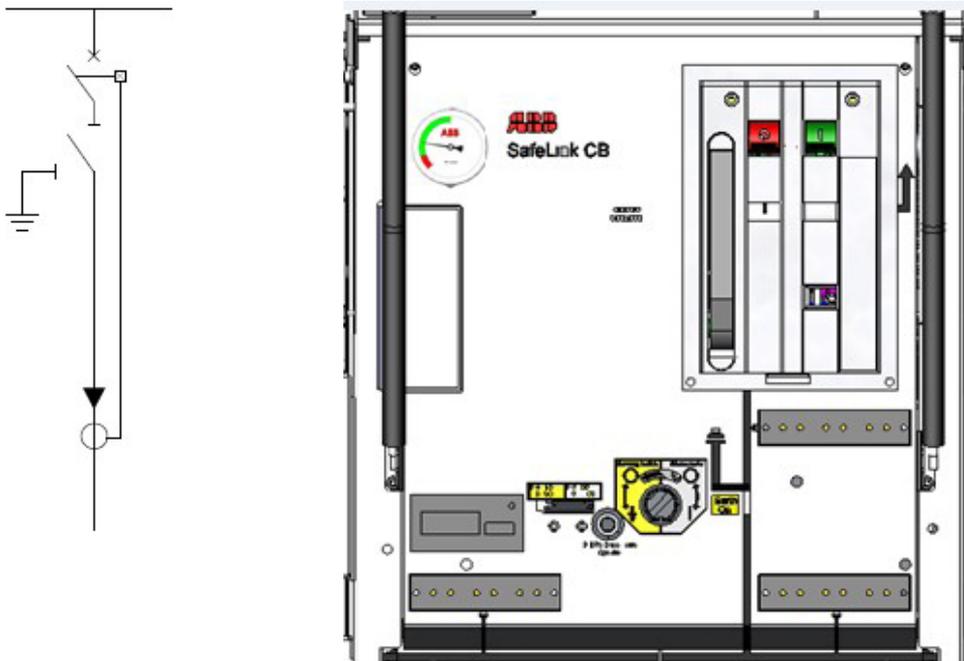
### Interlocking feature

The ring switch mechanism has one single operating shaft for the load break switch and for the earthing switch function. Shaft is operated by single spring. When both load break switch and earthing switch are in open position the switch satisfies the specifications of disconnecter. Due to selector switch interlock inside the mechanism, it is impossible to operate the load break switch when Earthing switch is in earthed position or operate the Earthing switch when the load break switch is in closed position.

## 6.5 V – Vacuum circuit breaker module

The vacuum circuit breaker (V-module) has vacuum interrupters for short-circuit current interruption. A three position disconnector is connected in series with the circuit breaker on the busbar side. The operation between

vacuum circuit breaker and disconnector as well as between disconnector and earthing switch are mechanically interlocked. The earthing of the T-off side cable is done through the vacuum interrupters.



### Standard features

- 630 A vacuum circuit breaker
- Two position EL2 trip free mechanism with auto reclosing facility for vacuum circuit breaker
- Mechanical signaling device for closing springs charged/discharged
- Mechanical signaling device for circuit breaker open/closed
- Lever for manually spring charging
- Closing & opening mechanical push button
- O-C-O operation possibility with closing spring in charged condition
- Manually operated three position disconnector with earthing switch in series
- Interlocking between vacuum circuit breaker and disconnector
- Interlocking between disconnector and earthing switch
- Interlocking between cable compartment and earthing switch
- Position indication for disconnector and earthing switch
- Self-powered/auxiliary powered OC+EF relay with series/shunt trip coil
- Cable bushings with interface C (400 series bolted) with integrated capacitor for voltage indication
- Main busbar, 630A
- Arc proof cable compartment cover on the back side
- Manometer
- VPIS (Voltage Presence Indicating System) with integrated indicator lamps

### Optional features available as retrofit

- Extensible bushing for connection of external busbars on side (630 A) with end box
- Signal (1 NO) from internal pressure indicator wired to terminals (only one for each SF6 tank)
- Spring charging geared motor with electrical signaling of spring charged
- Vacuum circuit breaker position 3 NO+2 NC or 2 NO+3 NC
- Disconnector 2 NO+2 NC & Earthing switch 1 NO+1 NC
- Shunt opening and closing release/coil
- Operation counter for breaker ON-OFF operations
- Contact signaling closing spring charged/discharge

**Interlocking feature**

This module has two mechanisms; the upper one (EL2) is for vacuum circuit breaker and the lower one is manually operated with single operating shaft for the three position disconnecter. The EL2 mechanism is provided with a lever for manually charging the closing spring. The vacuum circuit breaker has the possibility of rapid auto reclosing duty.

By means for mechanical push buttons it is possible to close and open the circuit breaker. The opening spring is always charged when the circuit breaker is in closed position and will be ready to open immediately if the protection relay gives a trip signal. If the mechanism is recharged after closing, it is possible to perform open - close - open sequence.

The EL mechanism is fitted with a mechanical anti-pumping device which prevents re-closing due to either electrical or mechanical commands. Should both the closing command and any one of the opening commands (local or remote) be active at the same time, there would be a continuous succession of opening and closing commands. The anti-pumping device avoids this situation, ensuring that each closing operation is only followed by an opening

operation and that there is no other closing operation after this. To obtain a further closing operation, the closing command must be released and then re-launched.

Furthermore, the anti-pumping device only allows circuit breaker closure if the following conditions are present at the same time

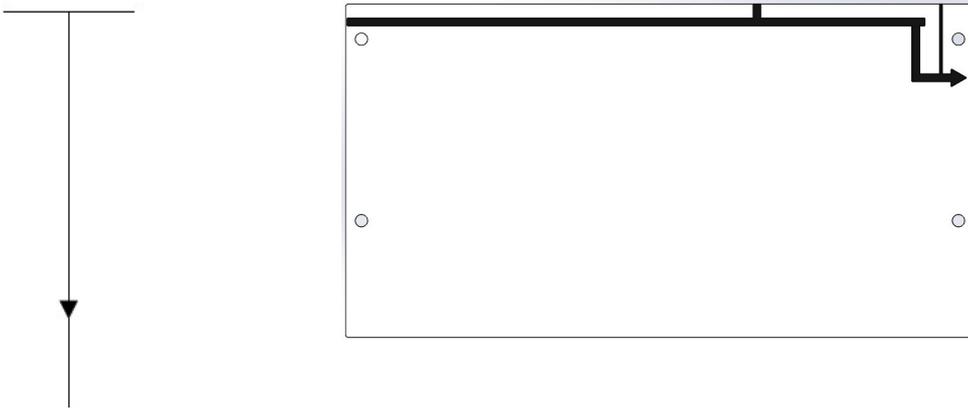
- Operating mechanism spring fully charged
- Opening pushbutton and/or shunt opening release (-MO1/-MO2) not activated
- Circuit breaker open

The lower mechanism is manually operated and is without any spring/latched action. It has 3 positions of OPEN, CLOSE and EARTH which can be padlocked after the pull for disconnecter knob is in the respective slot/position.

There is a mechanical interlock between these two mechanisms which prevents operating of the disconnecter and/or earthing switch when the circuit breaker is in closed position.

## 6.6 D – Direct cable connection module

The Direct cable connection (D-Module) is a direct cable module for incoming cable connection.



### Standard features

- Cable bushings horizontal on the sides, interface C (400 series bolted) with integrated capacitor for voltage indication
- Busbars 630A
- Arc Proof Cable Covers
- VPIS (Voltage Presence Indicating System) with integrated indicator lamps
- End box for extensible bushings (if present)

### Optional features (also available as retrofit)

- Extensible bushing for connection of external busbars on side (630 A)
- Signal (1 NO) from internal pressure indicator wired to terminals (only one for each SF6 tank)

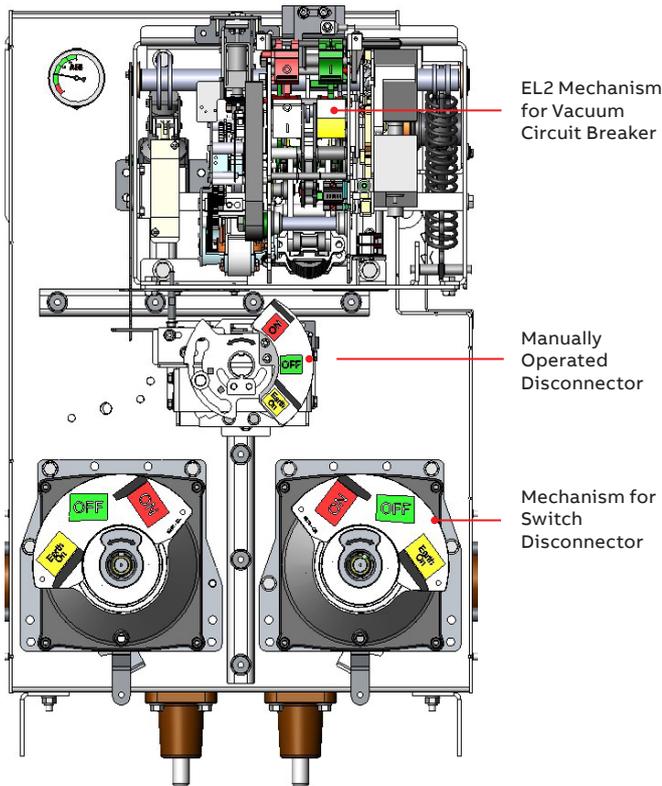
# 7. Mechanisms

All operating mechanisms are situated outside the SF6-tank behind the front mimic covers with degree of protection of IP2X. This gives the opportunity of access to all operating mechanisms if retrofit or service should be required.

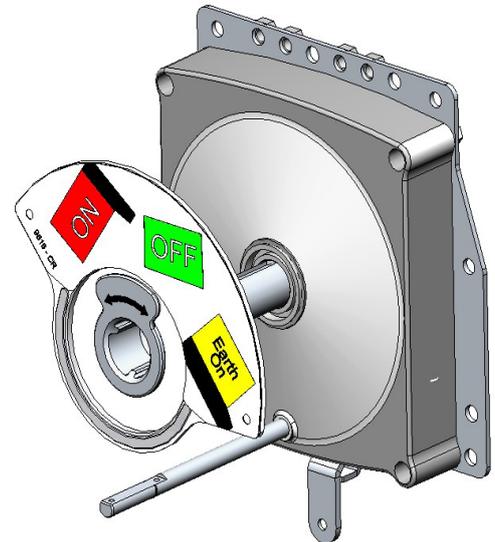
The speed of operation of these mechanisms is independent of the operator (except the manually operated three position disconnecter of the circuit breaker).

To prevent access to cable compartment before earthing switch is in closed position, all mechanisms are provided with mechanical interlocks which make it impossible to remove the cable compartment covers. It will then also be not possible to operate load break / disconnecter switch to open position before cable compartment cover is mounted properly.

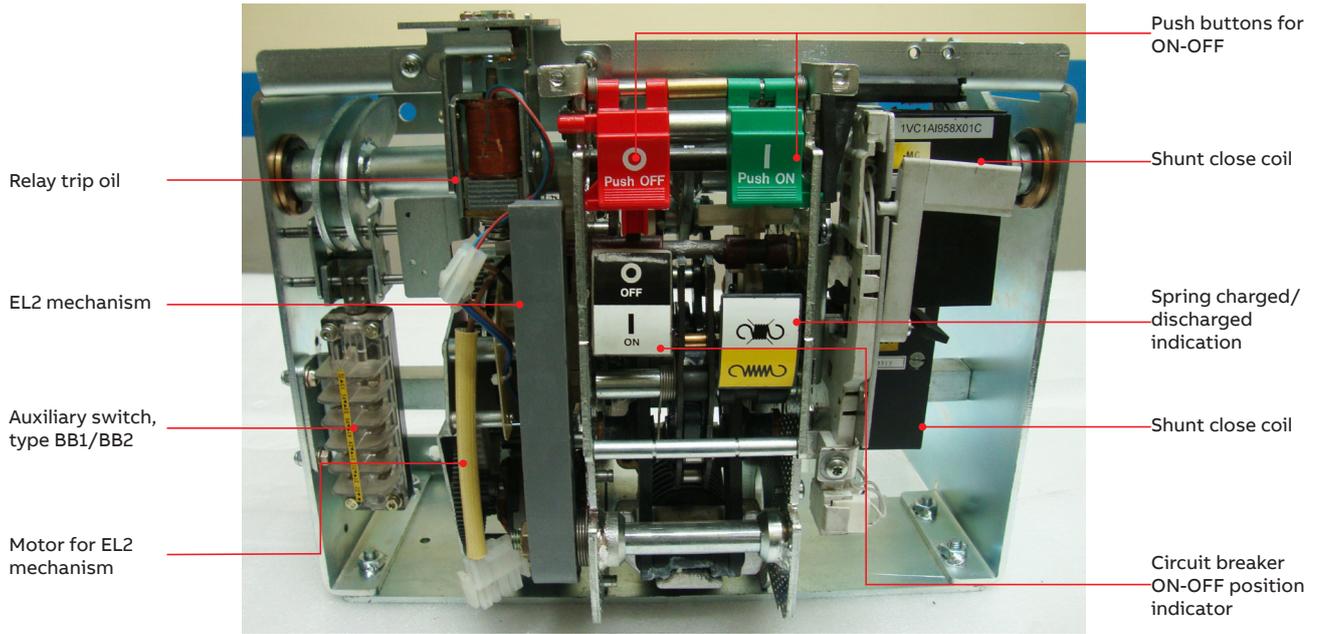
Ring switch and disconnecter mechanisms are equipped with padlocking facility with suitable holes which when used will restrict the access to operate the mechanism. All operating mechanisms are equipped with mechanical position indicators for ON-OFF-EARTH conditions. In addition the circuit breaker mechanism also has indication to show spring charged/discharged condition. Operating handle is required only for the ring switch disconnecter and manually operated disconnecter. For ring switch mechanism there is anti-reflex system which prevents an immediate re-operation of the switch. All steel parts are electroplated with zinc and then chromotised.



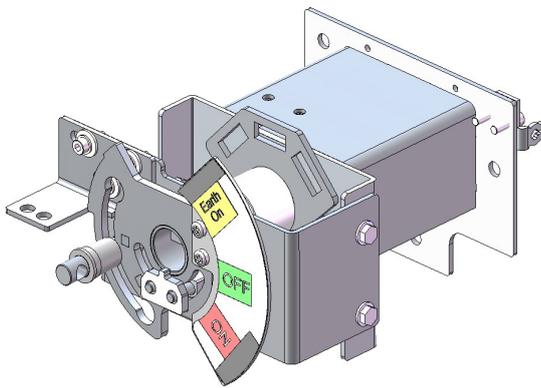
Mechanism Compartment View



Ring Switch Mechanism



— Vacuum Circuit Breaker Mechanism



— Disconnecter Mechanism (SW Photo)

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## 8. Cable bushing

The connection of the HV-cables is made by cable bushings. The bushings are made of cast resin with moulded-in conductors. In addition, an earthed screen is moulded into control the electrical field and is also used as the main capacitor supplying the voltage indicating systems.

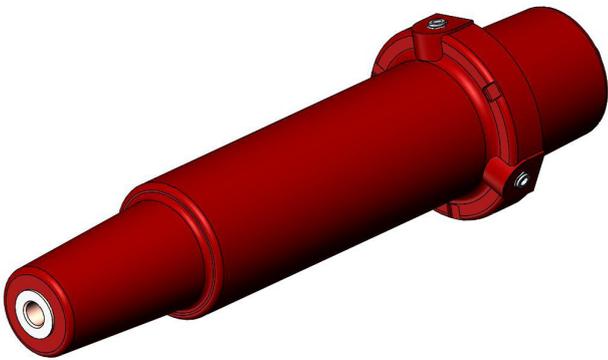
ABB also has experience with bushings for SF6 switchgears since 1985 with high performance and quality. A very large number has been installed worldwide in distribution networks, power stations and industrial complexes.

Used together with fully screened connectors it is an ideal solution for areas with humidity or condensation problems.

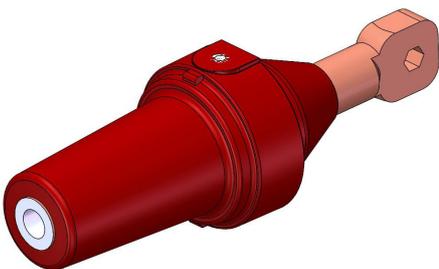
SafeLink CB has 2 types of cable bushings as shown below:

- 1) For ring switch cable
- 2) For T-Off side vacuum circuit breaker

The bushings are designed according to EN 50181 and are of type Interface C (400 series with M16 bolted contact,  $I_n = 630A$ ).



T-off cable bushing



Switch Cable Bushing

# 9. Cable terminations

SafeLink CB is equipped with cable bushings which comply with EN 50181 and IEC 60137 for termination of cables. The cable bushing has following external interface:

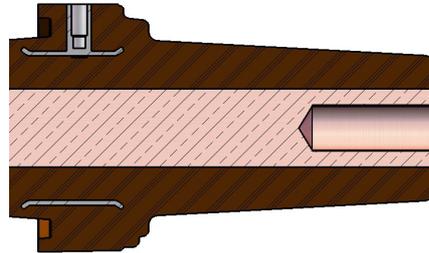
Interface C with M16 x 2 metric threads  
 400 series, In = 630 A  
 Standard on C, V (In=630A)

All cable bushings are protected by cable compartment cover.

**The following manufacturers of cable terminations are recommended:**

- Nkt
- Euromold/Nexans
- Tyco/Raychem
- 3M

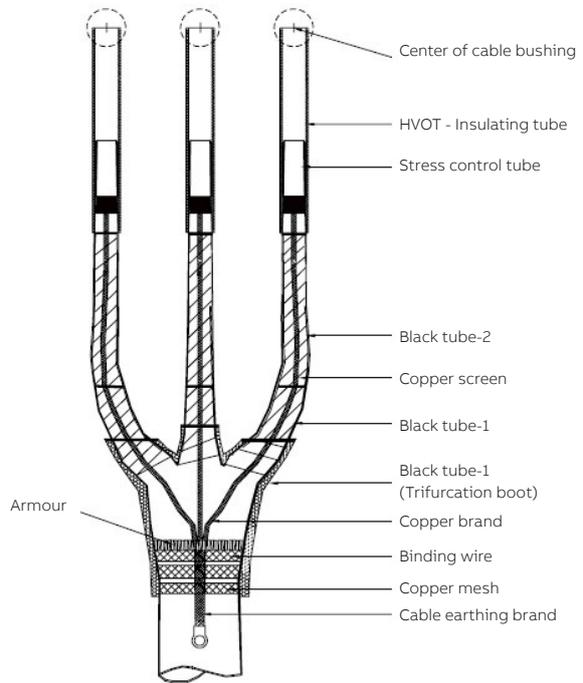
Either the cable termination shall be screened touch proof cable terminations with Elbow connector or insulated terminal protectors.



Cable Bushing Cross Section

The cable bushings are situated on a height from the foundation level as per the details provided in “Dimensions”.

Below is the basic representative cable termination for 12kV SafeLink CB from cable box gland plate to bushing centre.



Representative Cable Termination

The installation instructions from the manufacturer of cable terminations must be followed. Be sure to lubricate the bushings thoroughly with the silicone grease supplied.

Where cables are not connected, the Earthing Switch must be locked in closed position or the bushings must be fitted with dead end receptacles before the unit is energized.

Following pictures shows the tightening torque and fasteners to be used for the bushing terminations. Cable size of maximum 300 sq. mm can be used.

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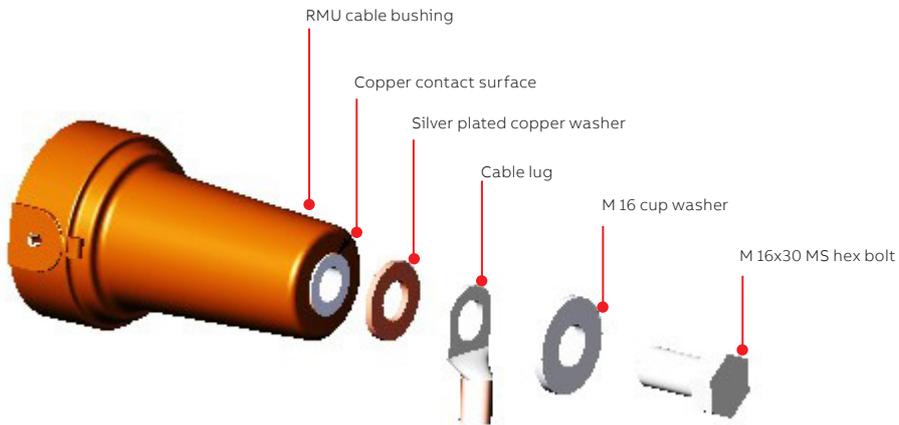
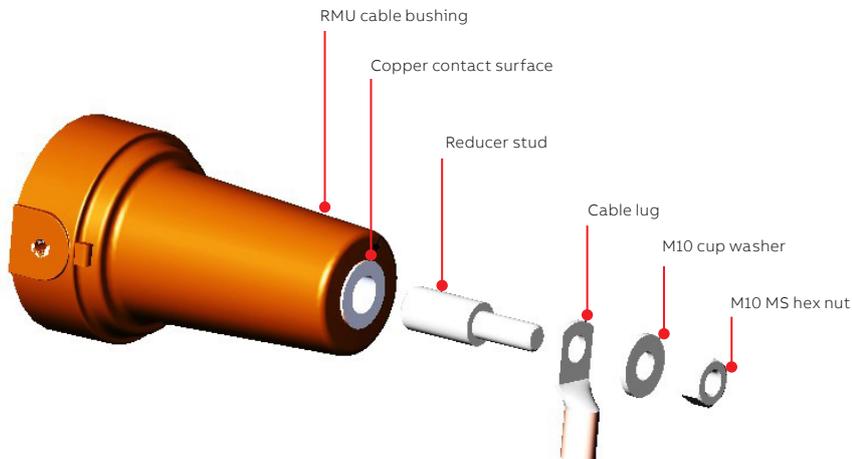
**Warning**


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Proper tightening torque of 50 N-m should be given to ensure good connection/contact of cable lug to bushing copper face.

---

**For cable lug hole size = 16.2 mm**

**For cable lug hole size < 16.2mm**



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**Warning**


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M16/M10 reducer stud should be inserted properly inside the bushing, such that lug touches the bushing copper face properly. Tightening torque of 30 N-m should be also properly ensured.

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## 10. Cable test point bushings

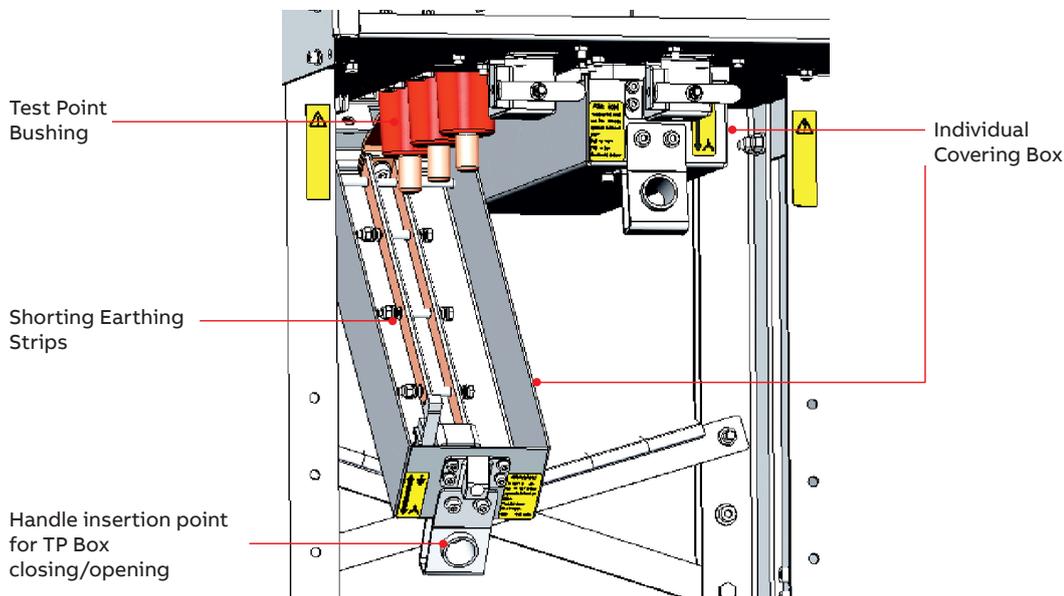
'C' modules of SafeLink CB are equipped with cable test bushings on the bottom side of the tank. Each set of test cable bushings have separate covering box which is interlocked with respective earthing switches to avoid access to the cable test compartment before earthing switch is in closed position.

When these bushings are mounted, cable insulation test can easily be done according to the following procedure:

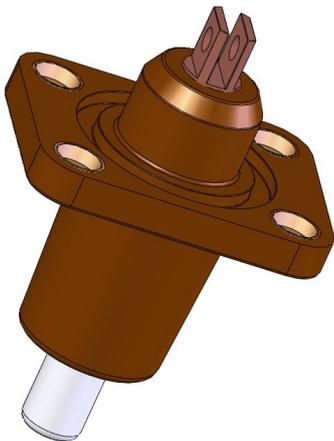
- Close the earthing switch after having checked the voltage indicators

- Remove the handle and bring the mimic selector switch to 'blocked position'
- Open the test point box which removes the common earthing bar
- Install the injection device onto the access terminals and perform cable testing
- After cable testing, close the test point box
- Insert the handle, open the Earthing Switch

Please follow cable manufacturer instructions for cable testing purpose.



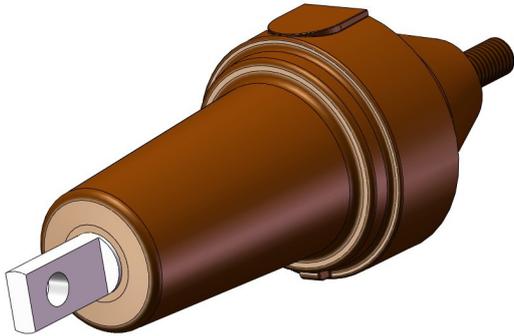
—  
Test Point Bushing Area



—  
TP Bushing

# 11. Extension of switchgear

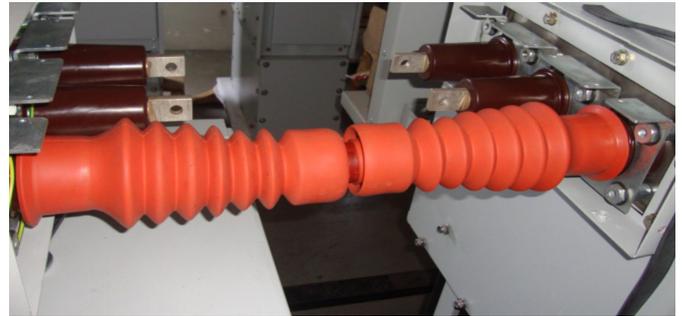
SafeLink CB can be provided with extensible bushings on side(s), for connection of external busbars on LHS and/or RHS side. The extensible bushings are rated for 630 A has molded screen and is earthed to the switchgear body. A factory fitted end box is provided for covering extensible bushings. The extensible connection is bolted type with sleeved busbars & Raychem Make straight boots.



Extensible Connection Bushing

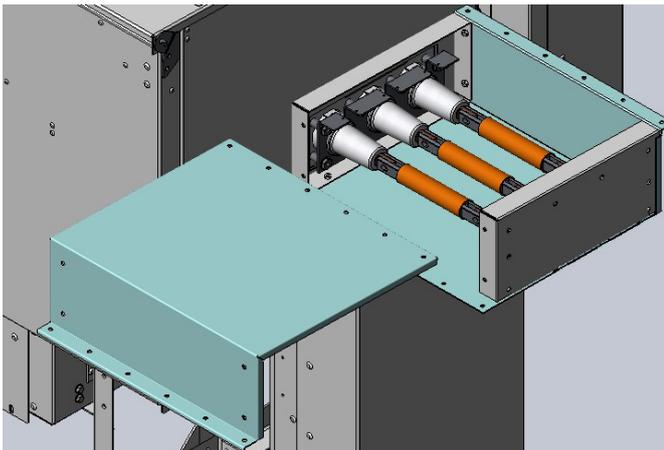
The length of the coupling busbar is of standard size irrespective of the configuration of extensible RMUs. For detailed coupling instruction between two extensible SafeLink CB RMUs separate instruction document 1VYN403090-067 & 1VYN403090-097 is to be followed.

Sleeved busbar in coupled condition and with insulating boot/covering (RCAB) version is shown below.



Sleeved busbars in coupled condition with insulating boot

Covering box as shown below is used to protect the busbars in coupled condition during installation at site.



## 12. Accessories

### 12.1 Low voltage box

#### Side LV compartment

SafeLink CB can be supplied with an optional low voltage box on the RHS side.

The relays, auxiliary switches, limit switches, coils are mounted inside the top front & bottom mimic covers. However, when SafeLink CB is motorized, motor control kits, MCBs and other accessories are mounted in this low voltage box.

This low voltage compartment is fixed to the side sheet of SafeLink CB and having hinge type lockable doors and comes with IP54 protection. The low voltage compartment has the possibility of external LV cable entry from either left- or right-hand side. A locking system for the door is available on request.



#### Top LV compartment

Optionally, if the side low voltage box is not able to accommodate all accessories, optionally, low voltage box on top of SafeLink CB can be provided for accommodating equipments like FRTU/Modem, battery charger, SCADA terminal blocks, etc.

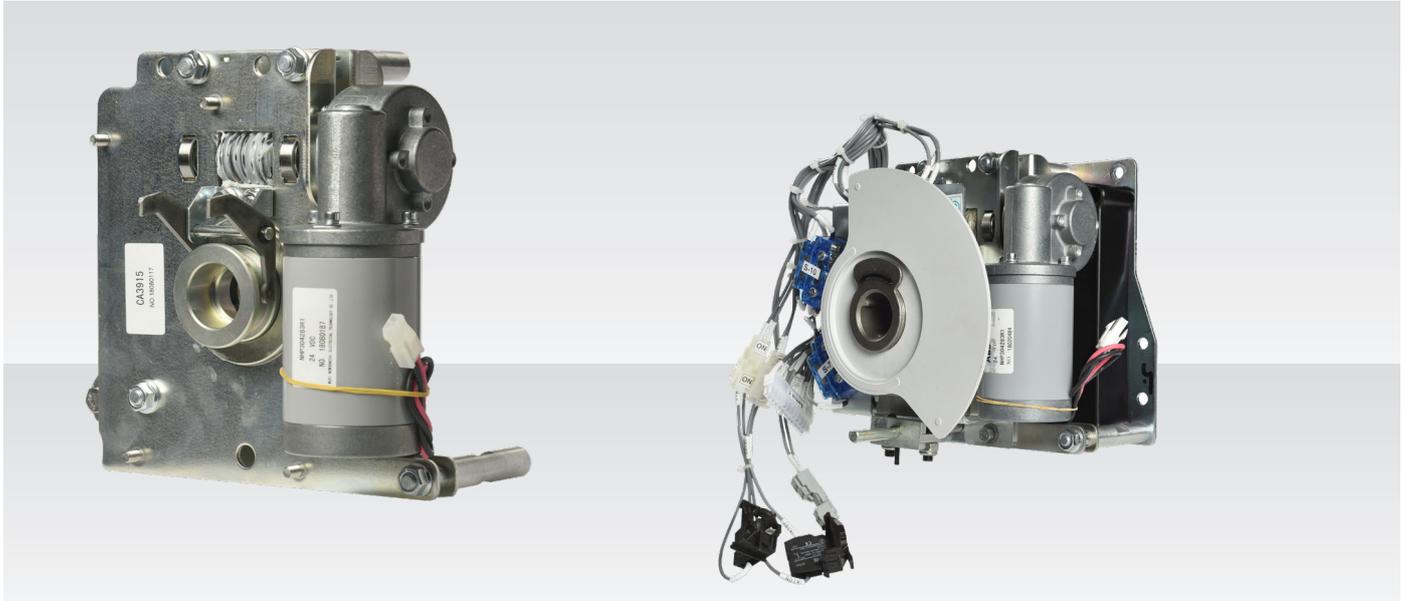
Side & top low voltage box is optional & for feasibility confirmation, please contact your ABB sales representative.



## 12.2 Motorised operations

### 12.2.1 Motorised version for ring cable switch

Optionally, closing and opening operations of mechanism for switch disconnecter can also be performed with motorized operations.



Motorised version for C module

Operating cycle for motor operation is CO - 3 min (i.e. it may be operated with a frequency of up to one close and one open operation every third minute).

Motors and coils can easily be mounted to the mechanisms after delivery (retrofit). Test voltage for tables below is + 10/ -

15 % for motor operations and closing coils and +10/ -30% for trip coils and opening coils. The motor and coils can be retrofitted after delivery.

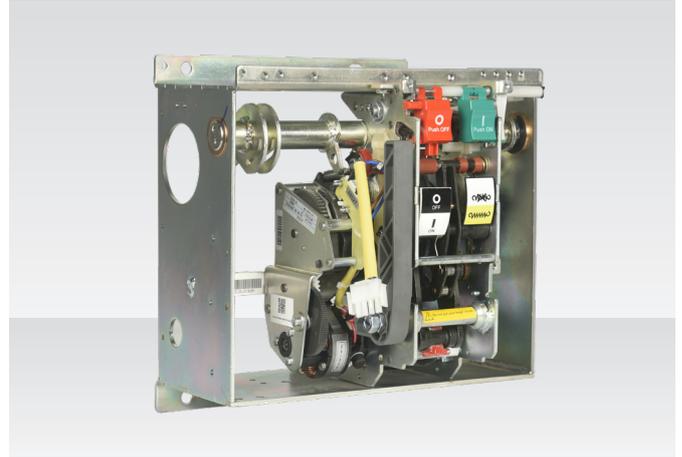
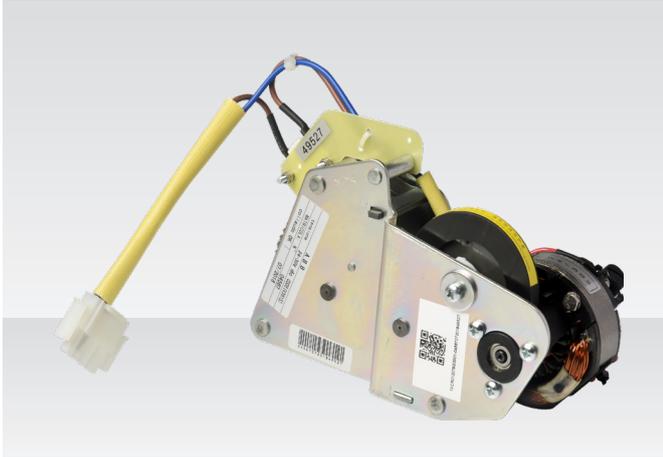
Auxiliaries like motor drives and auxiliary switches are located behind the bottom mimic.

Characteristics	Specifications
Rated voltages for motor (Un)	24 VDC, 48 VDC, 60 VDC, 110 VDC, 220 VDC, 110 VAC, 230 VAC
Voltage variation	85-110% Un
Rated power consumption (max)	90 W, 90 VAC
Charging time	< 8 sec
Insulation voltage	2 kV 1 min (50 Hz)

## 12.2.2 Motorised version for vacuum circuit breaker

Charging of the closing spring of the EL2 mechanism for the vacuum circuit breaker can be performed with motorised operation. However, disconnecter & earthing switch of V module shall be still manually operated considering safety aspects.

closing springs. In the case of a power cut or during maintenance work, the closing spring can be charged manually in any case (by means of the crank handle incorporated in the operating mechanism).

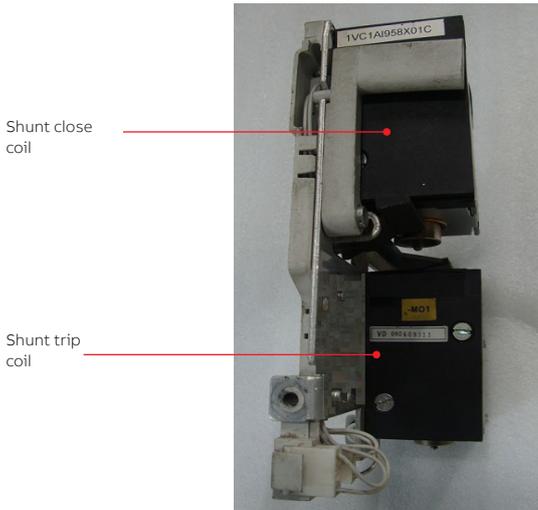


Motor for V module

This carries out automatic charging of the circuit breaker operating mechanism closing spring. After circuit breaker closing, the geared motor immediately recharges the

Characteristics	Specifications
Rated voltages for motor ( $U_n$ )	24 VDC, 48 VDC, 60 VDC, 110 VDC, 220 VDC, 110 VAC, 230 VAC
Voltage variation	85-110% $U_n$
Inrush power ( $P_s$ )	600 W, 600 VAC
Rated power ( $P_n$ )	200 W, 200 VA
Charging time	< 10 sec
Inrush time	0.2 sec
Insulation voltage	2 kV 50 Hz for 1 min

## 12.3 Shunt releases



### Shunt opening release (-M01)

This allows remote opening control of the circuit breaker. The release can operate both in direct and alternating current. This release is suitable for both instantaneous and permanent service. In the case of instantaneous service, the minimum current impulse time must be 100 ms.

### Shunt closing release (-MC)

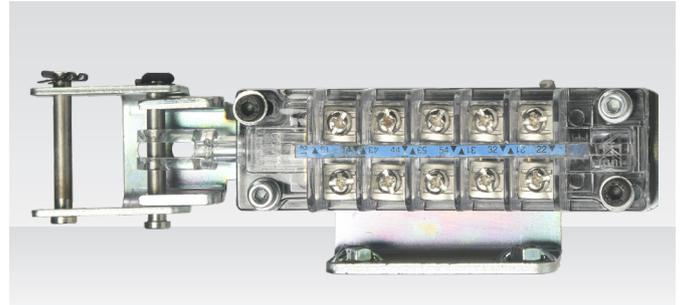
This allows remote closing control of the circuit breaker. The release can operate both in direct and alternating current. This release is suitable both for instantaneous and permanent service. In the case of instantaneous service, the minimum current impulse time must be 100 ms. Use of the permanently supplied release is recommended to carry out the electrical anti-pumping function.

Characteristics	Specifications
Rated voltages for motor (Un)	24 VDC, 48 VDC, 60 VDC, 110 VDC, 220 VDC, 110 VAC, 230 VAC
Operating limits	70-110% Un
Inrush power (Ps) max	300 W, 300 VAC
Continuous Power (Pc)	5 W, 5 VA
#Closing time* (ms) (with VCB)	40-70
#Opening time (ms) (with VCB)	40-80
Inrush duration (ms) approx	100
Insulation voltage	2 kV 50 Hz for 1 min

## 12.4 Auxiliary/ Signal contacts

### 12.4.1 Vacuum circuit breaker auxiliary contacts (-BB1,-BB2)

Electrical signaling of vacuum circuit breaker open/closed position can be provided with a group of 5 auxiliary contacts as standard. These are with combination of break contacts (signaling circuit breaker open) and make contacts (signaling circuit breaker closed) i.e. 3NO+2NC. Optionally, 2nd set of such signaling contacts can be provided with 3NO+2NC. These auxiliary/signaling contacts are true contacts of auxiliary switch directly coupled to EL2 spring mechanism, which gives true indication of vacuum circuit breaker ON/OFF indication.



### 12.4.2 Switch disconnecter / Circuit breaker disconnecter auxiliary contacts

Switch disconnecter, earthing switch and disconnector can be provided with 1NO+1NC auxiliary contacts. In case of switch disconnecter & disconnector, 2 Nos. switch i.e., 2 NO+2 NC, but for earthing switch, only 1NO+1NC is possible.



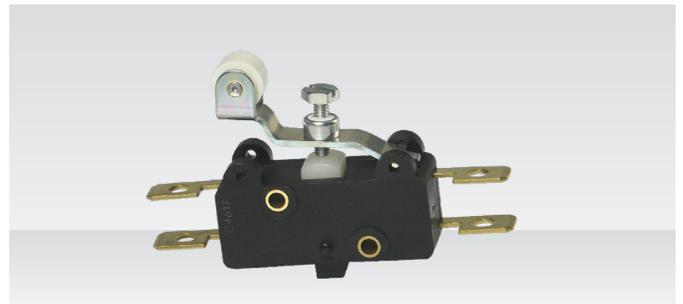
### 12.4.3 Contact for signaling circuit breaker closing spring charged/discharged (-BS2)

This consists of a micro switch which allows remote signaling of the state of the circuit breaker operating mechanism closing spring.

The following signals are possible:

Contact open: signaling spring charged

Contact closed: signaling spring discharged



## 12.5 Capacitive voltage indicators

All modules are equipped with capacitive voltage indication type VPIS (Voltage Present Indicating System). This system has integrated LEDs. The LED starts to flicker when there is a system voltage between 10%-45% of line to ground voltage. By means of the sockets in VPIS it is possible to carry out phase balance check using suitable phase comparators.

VPIS are available for:

- System voltage range 3 - 3.6 kV
- System voltage range 9 - 15 kV

Optionally, these voltage indicators can be supplied with SCADA contact of 1NO+1NC which will provide signal to SCADA on voltage present or not present.



## 12.6 Short circuit and/or Earth fault indicators

Earth fault and/or short circuit indicators according to the IEC standards can be provided for both the ring cable switches.

Shown above are panel mounted reading instruments. The reading instrument is equipped with a LED. The LED starts to blink, if the pre-adjusted operating current has

been reached or exceeded. It can be reset manually or automatically after a certain defined delay. Test push button is provided and contact(s) for remote indication can be also provided. For different operating points/current settings, kindly check individual catalogues of different manufacturers.



Combined short circuit and earth fault can be also provided. The indicator set consists of one reading instrument, four sensors (one sensor on the 3 core cable and three for the individual 1 core cables) and four fibre optic/standard copper cables. Earth fault and short circuit can be indicated

via one LED each or short circuit via one LED for each core, one LED for earth fault. Besides this a remote indication for earth fault and short circuit via one relay contact can also be provided.



## 12.7 Manometer & pressure indicators

SafeLink CB are sealed systems designed and tested according to IEC 62271-200 as maintenance free switchgear for lifetime (30 years). The switchgear does not require any gas handling. ABB applies state-of-the-art technology for gas-tightness providing the equipment with an expected leakage rate lower than 0.1 % per annum, referring to the filling-pressure of 1.2 bar\*. The switchgear will maintain gas-tightness and a gas-pressure better than 1.15 bar\* throughout its designed lifespan. This pressure value is still within a good margin. From the pressure used during type testing, which is 1.2 bar\*.

\* at 20°C.



For increasing the safety under operation of the switchgear, manometers may be used for each tank. In case of need of remote indication, manometers can be equipped with signalling contacts. Detailed descriptions of manometer functions are described in the table on next page.

### Altitude

Maximum height above sea level for installation without reducing gas pressure is 1000 metres.

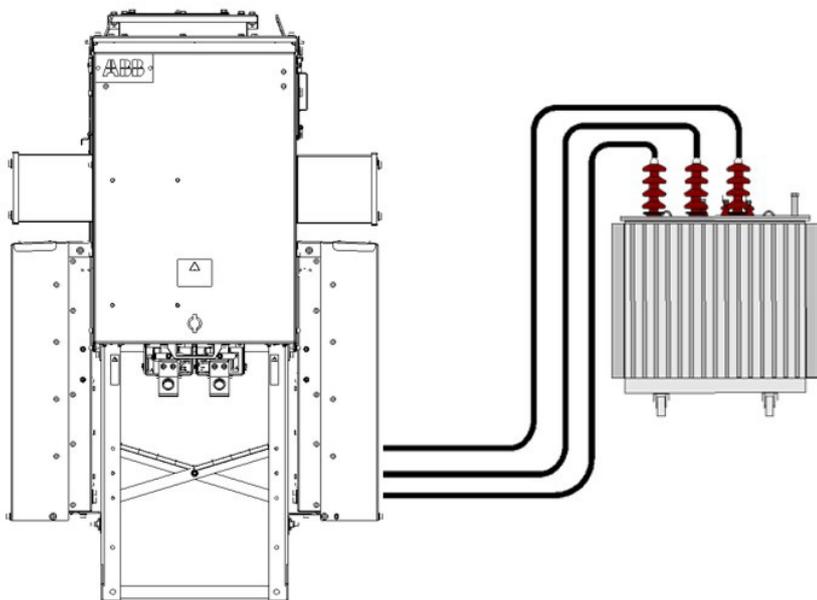
For installation above 1000 metres, please contact ABB for instructions.

## 12.8 Counters

Optionally, for all switch disconnectors & vacuum circuit breakers, mechanical operational counters are provided which will be visible from front mimic of respective switching devices. These mechanical counters are directly

connected to the respective mechanisms to the respective mechanisms and hence gives the true count of No. of operations performed in these switch disconnectors & vacuum circuit breakers.

## 13. Transformer protection and relay



SafeLink CB offers a circuit breaker in combination with relay for transformer protection which has better protection against low over currents. Circuit breaker with relay is always recommended for higher rated transformers. SafeLink CB is delivered with 630 A rated V-module. SafeLink CB has relay which is a self powered relay that utilizes the energy from the CT's under a fault situation,

for energizing the trip coil. The CTs for the vacuum circuit breaker are mounted on the T-Off side cable bushings. The self powered relay can also be used for cable protection and more details can be found in respective relay catalogues. Relay is mounted behind front door. Optionally, auxiliary powered relays can also be provided.



REJ603R 1.5



REJ603 3.0



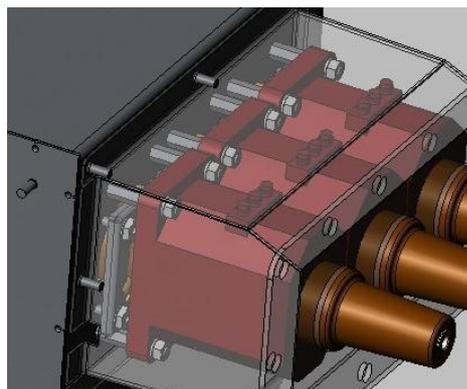
REF601

### Advantages of vacuum circuit breaker protection

- Good protection against short circuits
- Very good for protection of over currents
- Small fault currents are detected in an early stage

### Relay characteristics

- Economical
- Easy adjustment
- Perfect for large distribution transformers



# 14. SafeLink CB digital

## 14.1 Digital

The SafeLink CB 12kV ring main unit (RMU) portfolio from ABB is enhanced to meet the increasing demand for SCADA compatible devices & ready to use for various smart grid applications in secondary distribution networks. Standard automation devices for ABB's ring main units including battery back up, charger, motor kits, control MCBs etc. are located in side low voltage box.

Thanks to the flexibility of SafeLink CB, automation solutions can also be delivered with different switchgear configurations with top low voltage compartments if required.

Standard packages for Automation/Smart grid applications can provide monitoring, control and supervision functionalities including feeder automation devices with wired and/or wireless communication interfaces and power supply back-up.

FRTU/PLC along with modem for wired/wireless communication shall be mounted in top low voltage box for SCADA integration with multiple configurations.

Side & top low voltage box is optional & for feasibility confirmation, please contact your ABB sales representative.



### Customer benefits

The integrated automation functionalities enable the network operators to:

- Monitor the grid so that they are able to remotely locate the fault.
- Reconfigure the network so that the faulty part of the network is disconnected.
- Reconfigure the network so that the energy loss is minimized and/or achieve savings for future investments.

Additional benefits for utilities and energy consumers are:

- Improved quality of the power supply.
- Fewer and shorter outages and improved voltage quality.
- Ensured safety for personnel.
- Enhanced operational efficiency and network stability.
- Improved tools for the network operators and the field crews.
- Less need to travel to locations with difficult access.

## 14.2 Power back-up

In case the auxiliary power should drop/disappear, it is possible to provide batteries as back-up to make sure there is voltage on critical components all the time. These batteries are controlled/charged by suitable battery charger which will convert the station supply of 230V AC to 24V DC and simultaneously charge the batteries on float/boost mode.

The standard battery charger is rated for 5 A & optionally 7.5 A or 10 A charger shall be provided depending on available load.

The time the batteries will last depends on the components that are used in each configuration. Battery Ah calculation is done for each case and capacity is derived. Generally, 12Ah batteries will suffice the SafeLink CB RMU load. In case of additional load of FRTU/Modem or any other equipments, optionally 20Ah, 26Ah, 42Ah batteries are provided.

For more details on power back up solutions, please contact ABB sales team.

## 15. SafeLink CB transformer coupled

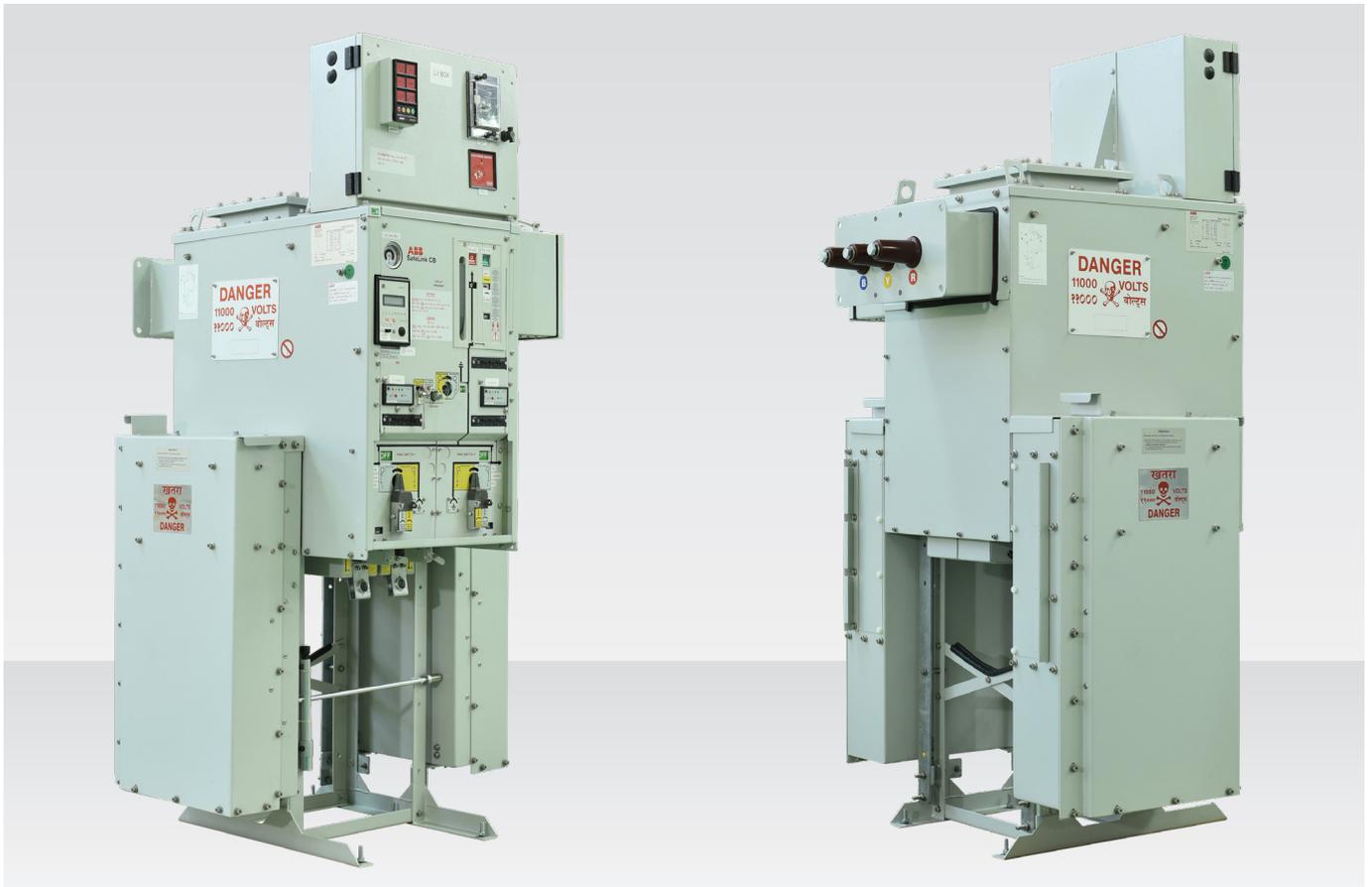
The SafeLink CB 12kV ring main unit (RMU) portfolio from ABB is always customized to meet the increasing demand of customers for various applications in secondary distribution networks.

SafeLink CB now comes with compatibility for coupling the product with transformer, specifically in compact substation solutions. This makes the compact substation extremely more compact, light weight & robust design. This has been internal arc tested for both tank & cable compartment of switch disconnectors in conjunction with ABB make CSS.

SafeLink CB has been successfully customized to ABB make compact substation and has been supplied to various distribution networks & utilities.

Also, this kind of customization is achievable for other make of compact substation/distribution transformer depending on the feasibility.

This transformer coupled SafeLink CB is suitable for both indoor (for outdoor compact substations) & outdoor (for indoor compact substations) applications. Also, this comes with SCADA compatibility & integration feasibility.



## 16. SafeLink CB ICOG solution

This solution is type tested as per latest IEC standards along with metering panel and suitable for outdoor applications with IP54 Grade.

Further to this, this solution of SafeLink CB is supplied as factory coupled with RMU & Metering coupled in single stand assembly along with complete LV inter-panel wiring

done at factory & duly tested. This helps in ETC time reduction.

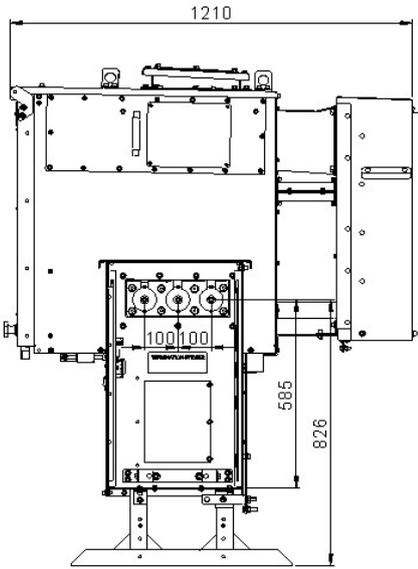
Such solutions is best suited for small/medium scale industries for tapping 12kV supply from utility side along with metering solutions.



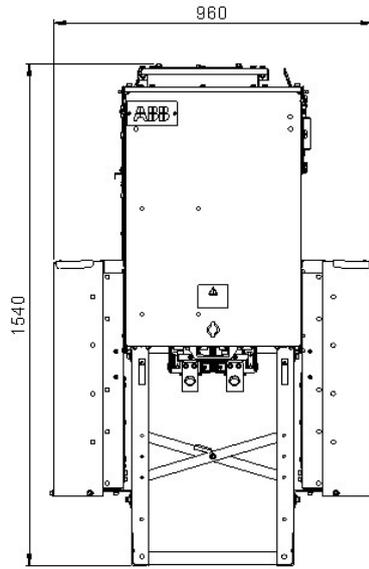
# 17. Dimensions

## CVC Non Extensible

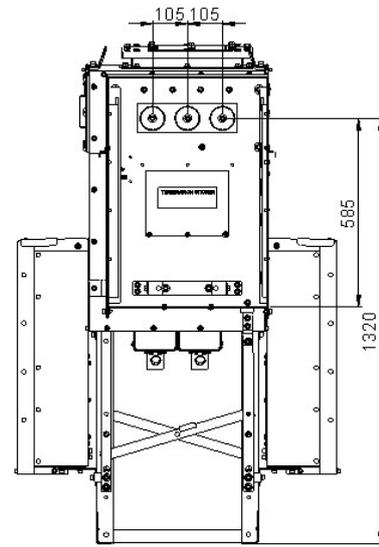
10kA 0.1s AFLR cable boxes & Vertical Front Door



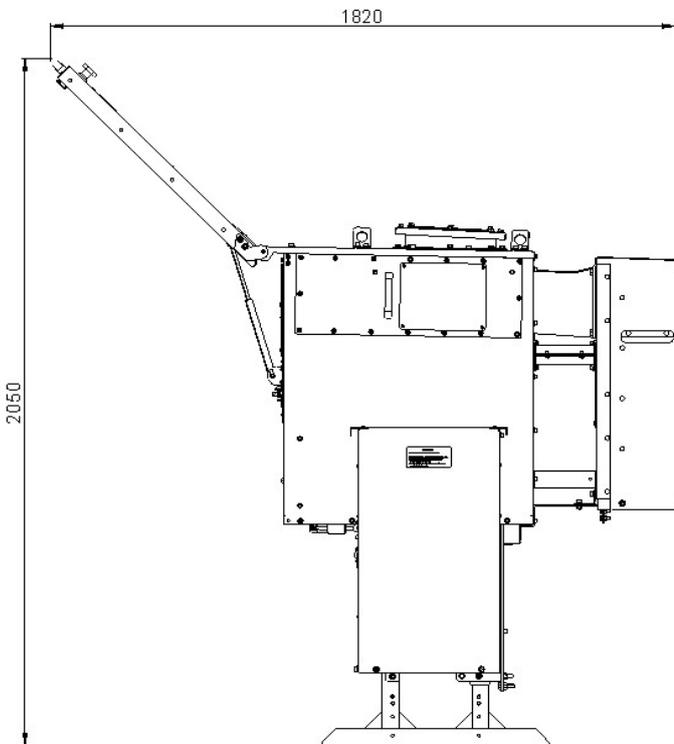
RHS view



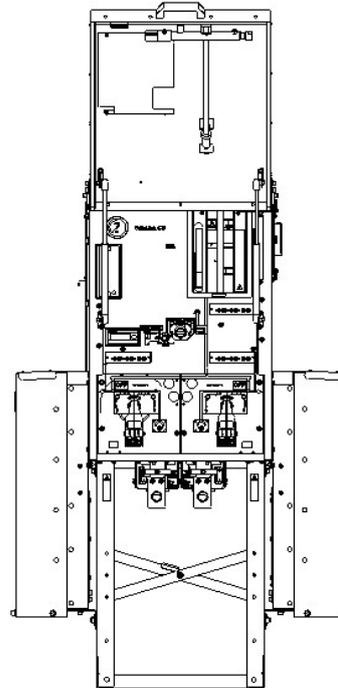
Front view



Back view



Side view with open door

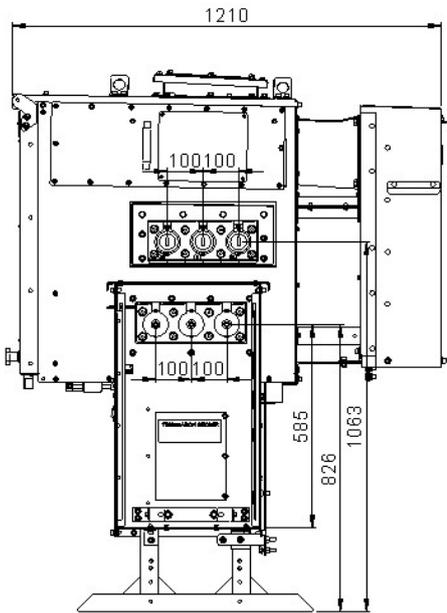


Front view with open door

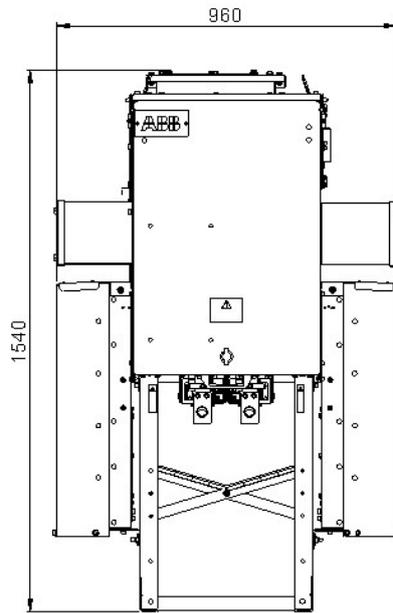
\* All dimensions are in mm

**+CVC+ Both Sides Extensible**

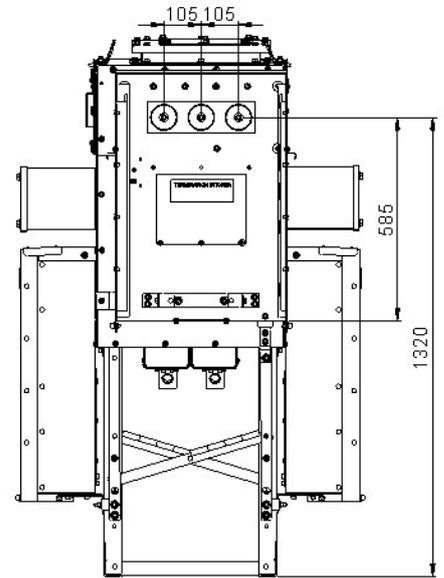
10kA 0.1s AFLR cable boxes & Vertical Front Door



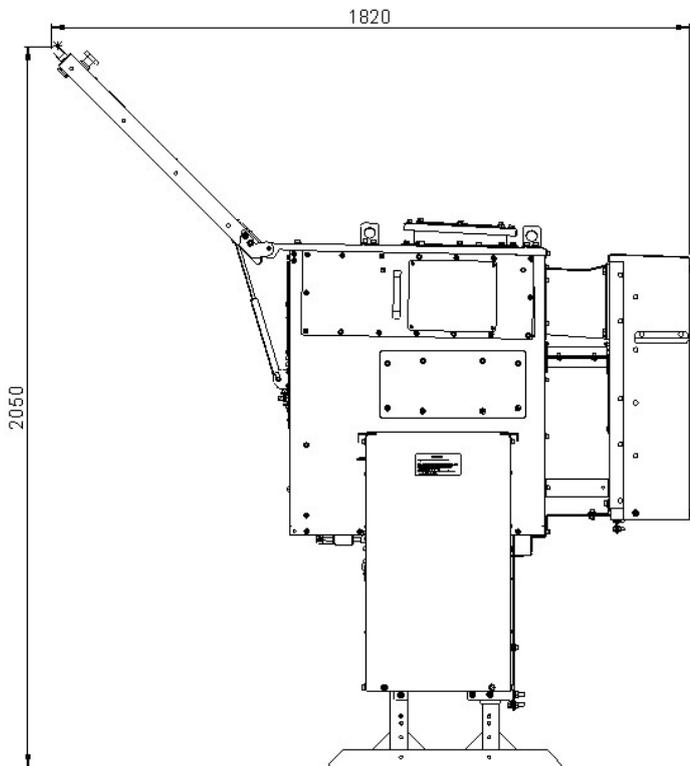
RHS view



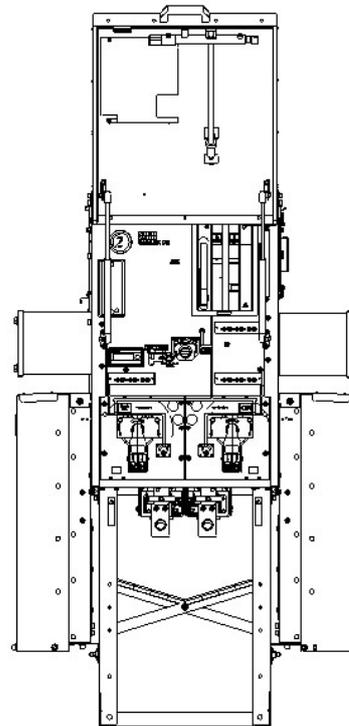
Front view



Back view



Side view with open door

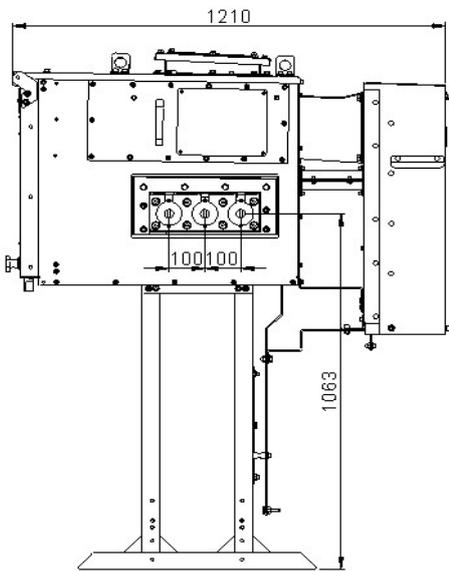


Front view with open door

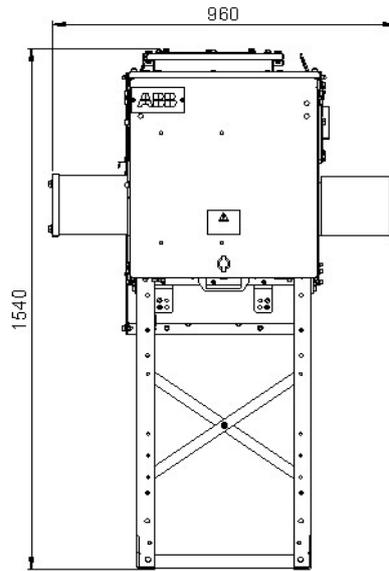
\* All dimensions are in mm

**+V+ Both Sides Extensible**

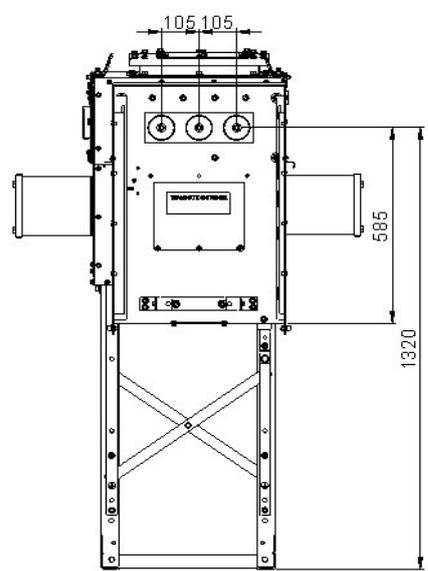
10kA 0.1s AFLR cable boxes & Vertical Front Door



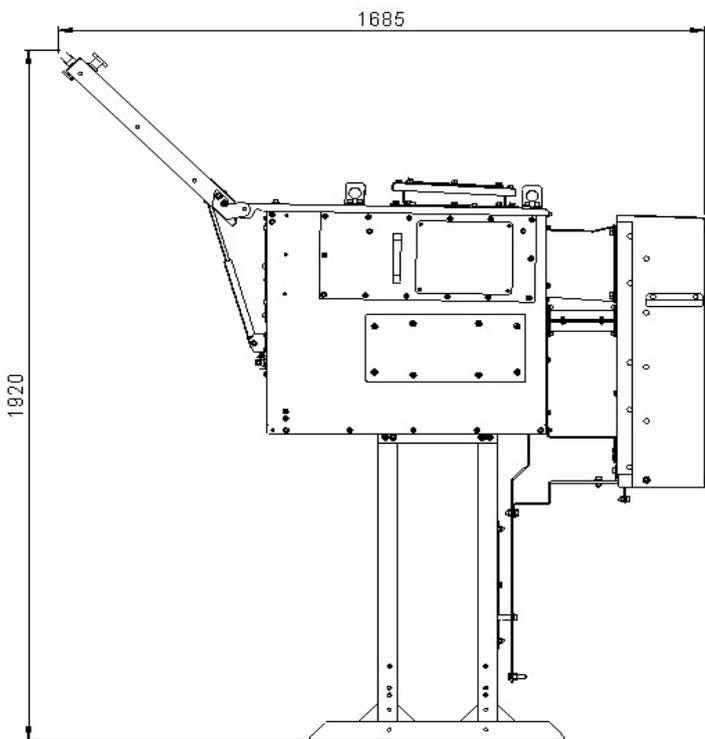
RHS view



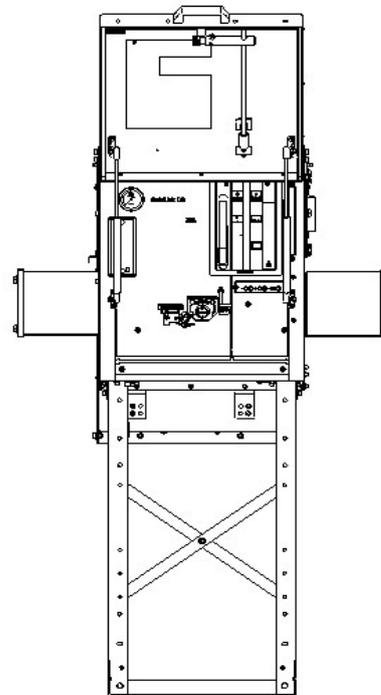
Front view



Back view



Side view with open door

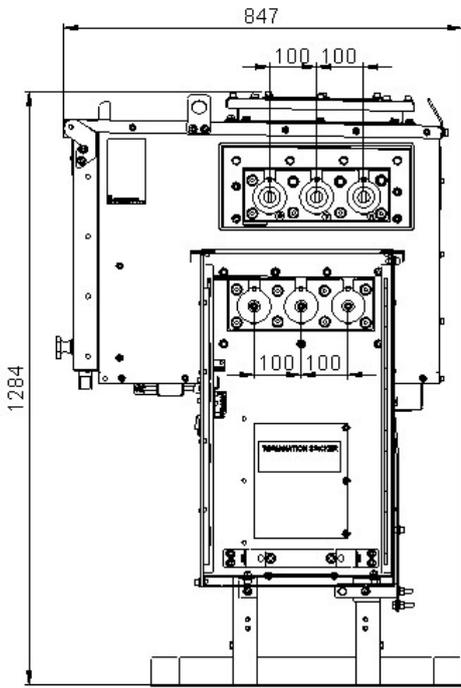


Front view with open door

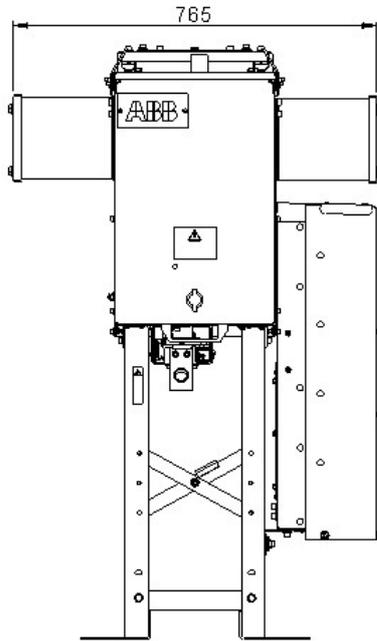
\* All dimensions are in mm

**+C+ Both Sides Extensible**

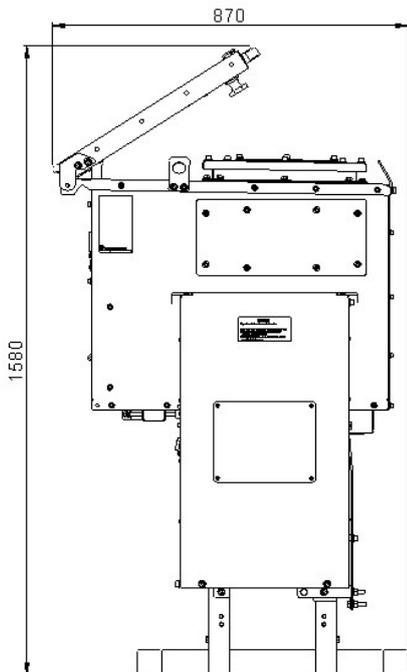
10kA 0.1s AFLR cable boxes & Vertical Front Door



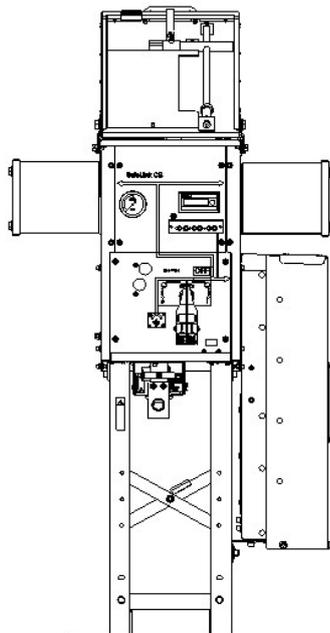
RHS view



Front view



Side view with open door

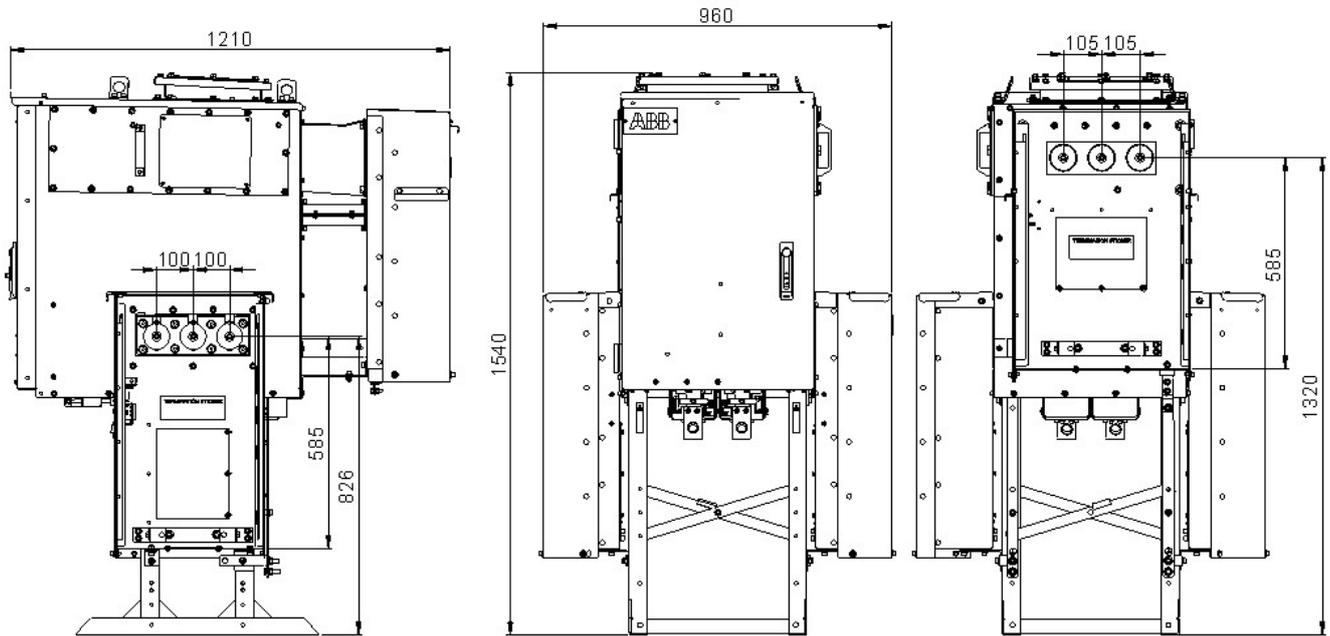


Front view with open door

\* All dimensions are in mm

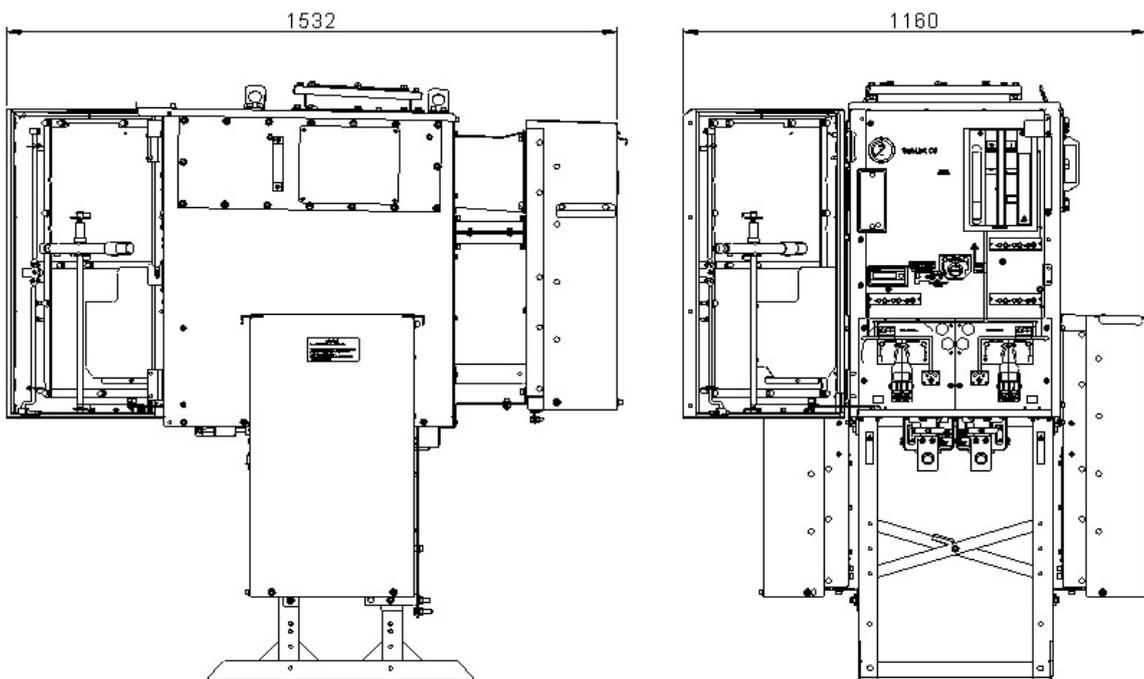
**CVC Non Extensible**

10kA 0.1s AFLR cable boxes & Horizontal Front Door



RHS view

Front view

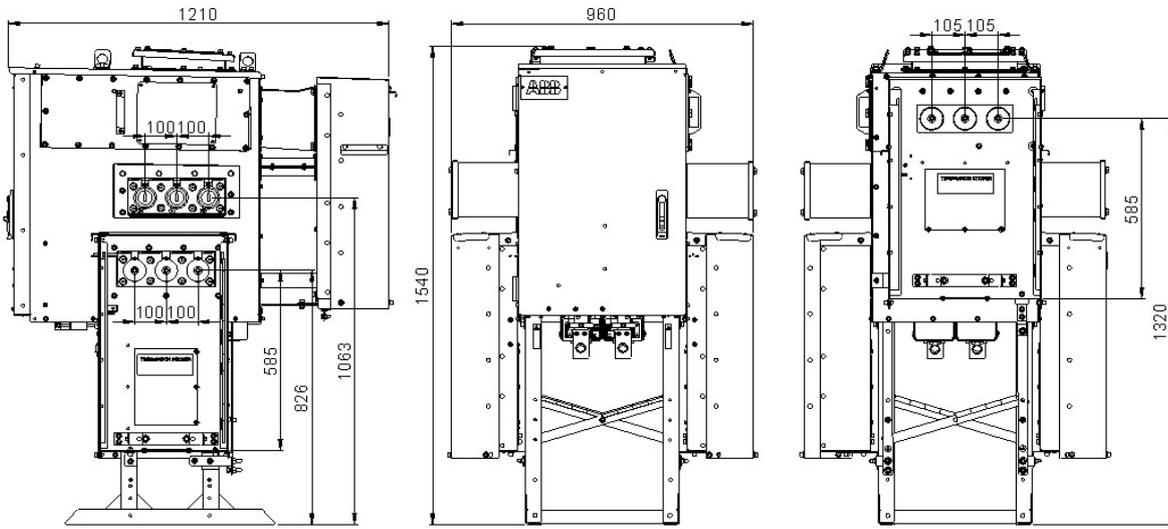


Side view with open door

Front view with open door

\* All dimensions are in mm

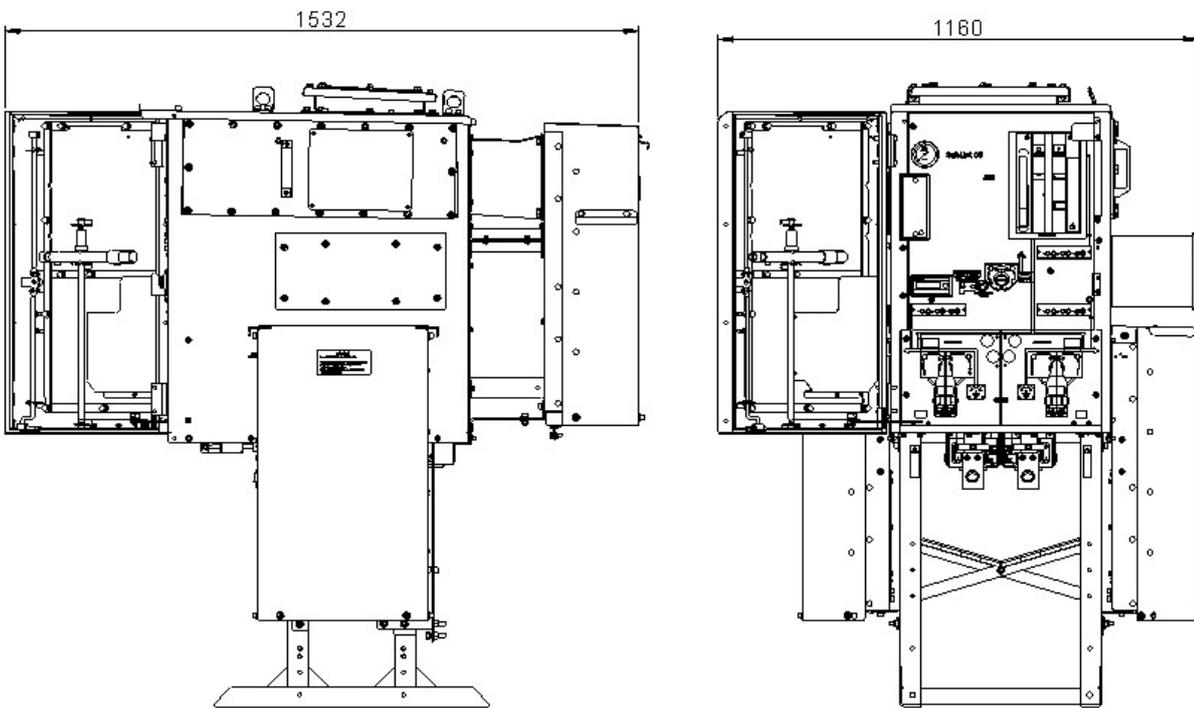
**+CVC+ Both Sides Extensible**  
**10kA 0.1s AFLR cable boxes & Horizontal Front Door**



RHS view

Front view

Back view



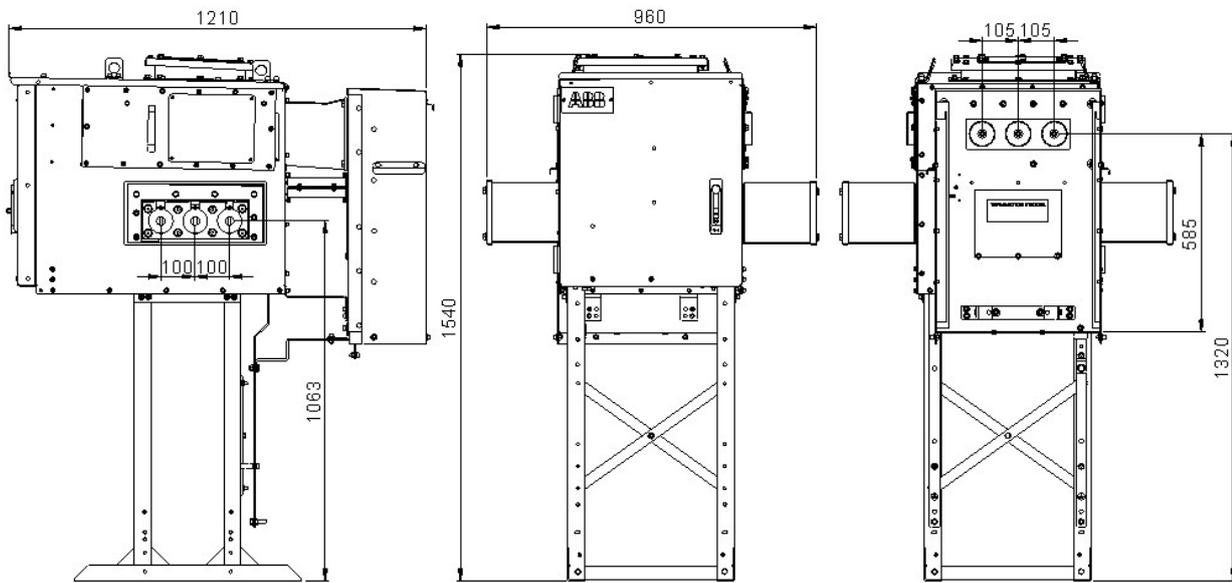
Side view with open door

Front view with open door

\* All dimensions are in mm

**+V+ Both Sides Extensible**

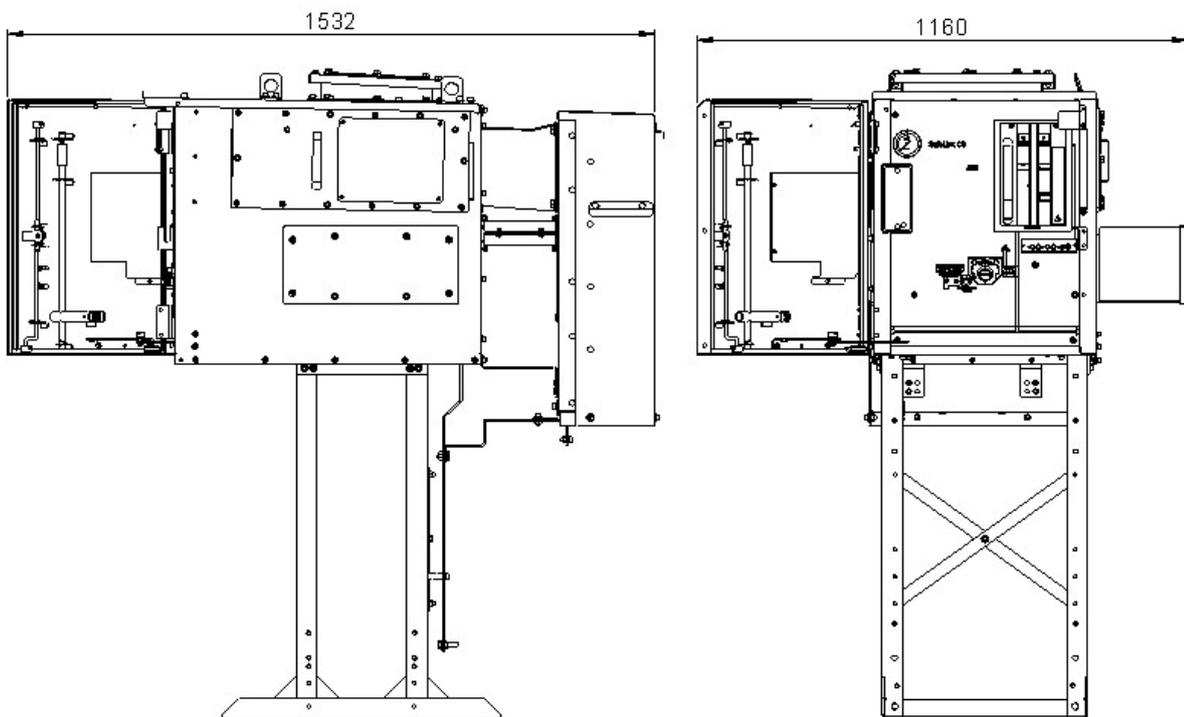
10kA 0.1s AFLR cable boxes & Horizontal Front Door



RHS view

Front view

Back view



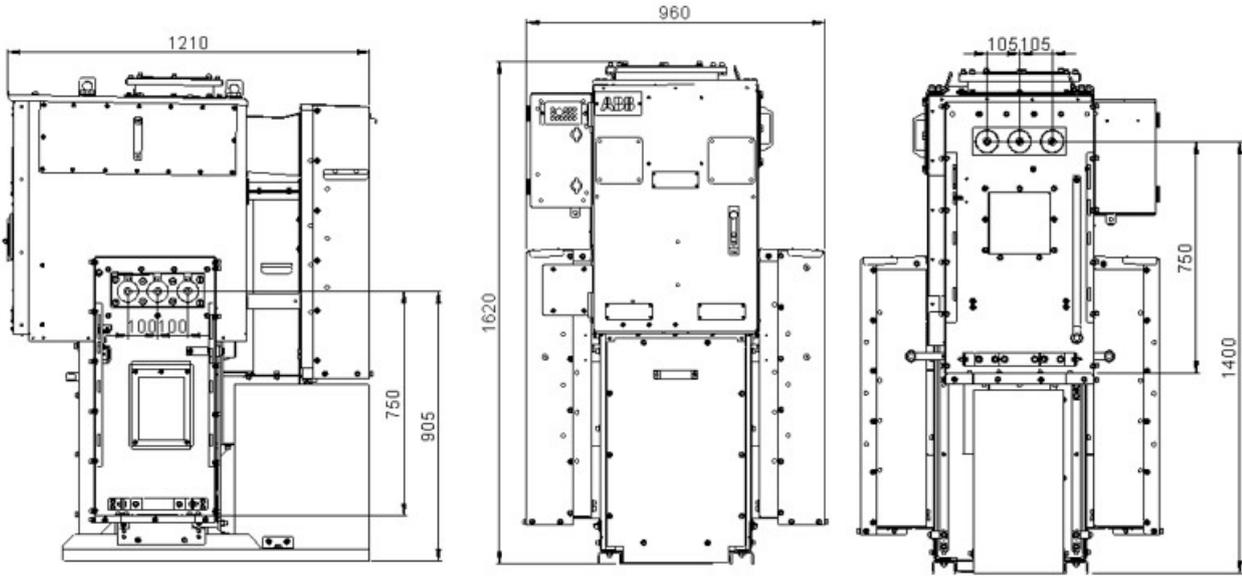
Side view with open door

Front view with open door

\* All dimensions are in mm

**CVC Non Extensible**

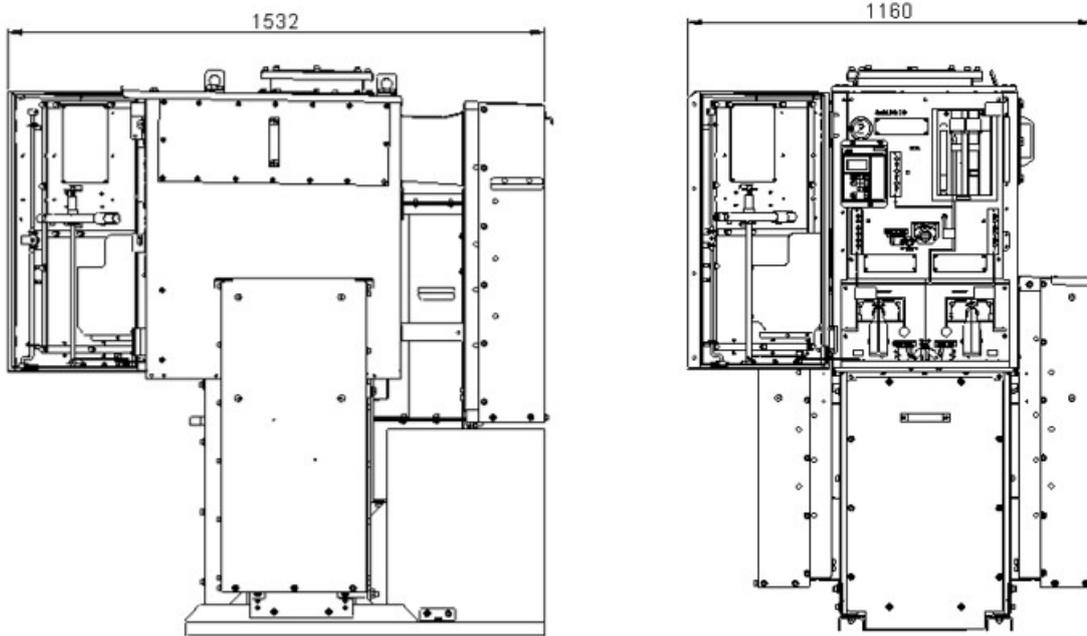
21kA 1s AF cable boxes & Horizontal Front Door



RHS view

Front view

Back view



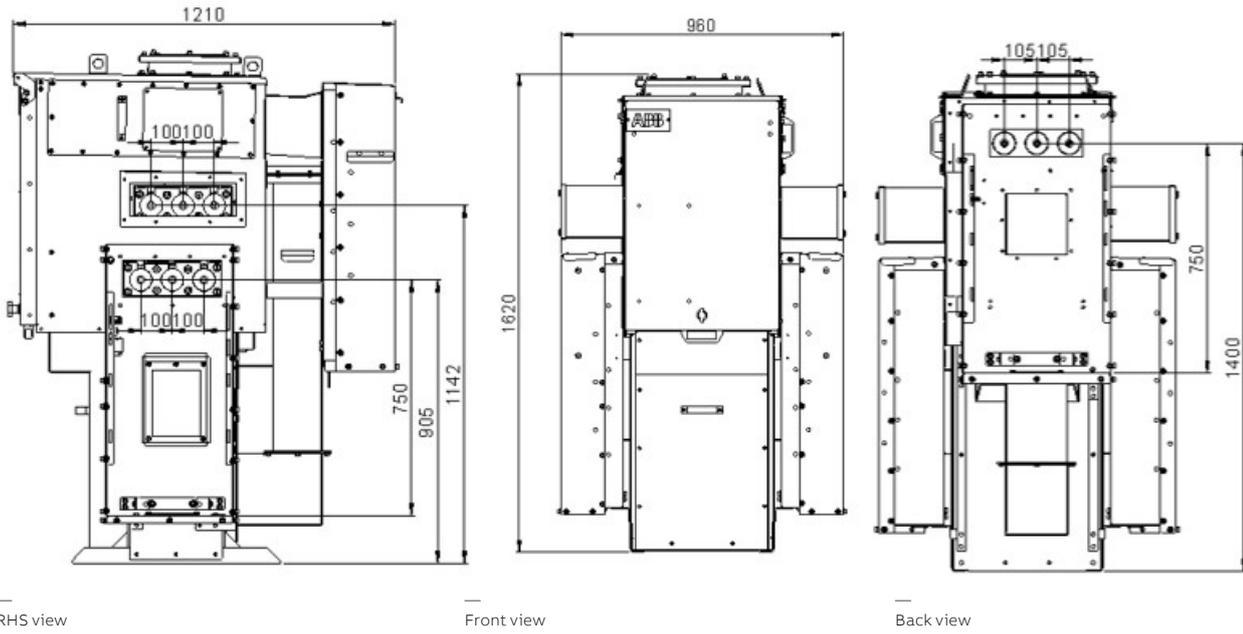
Side view with open door

Front view with open door

\* All dimensions are in mm

**+CVC+ Both Sides Extensible**

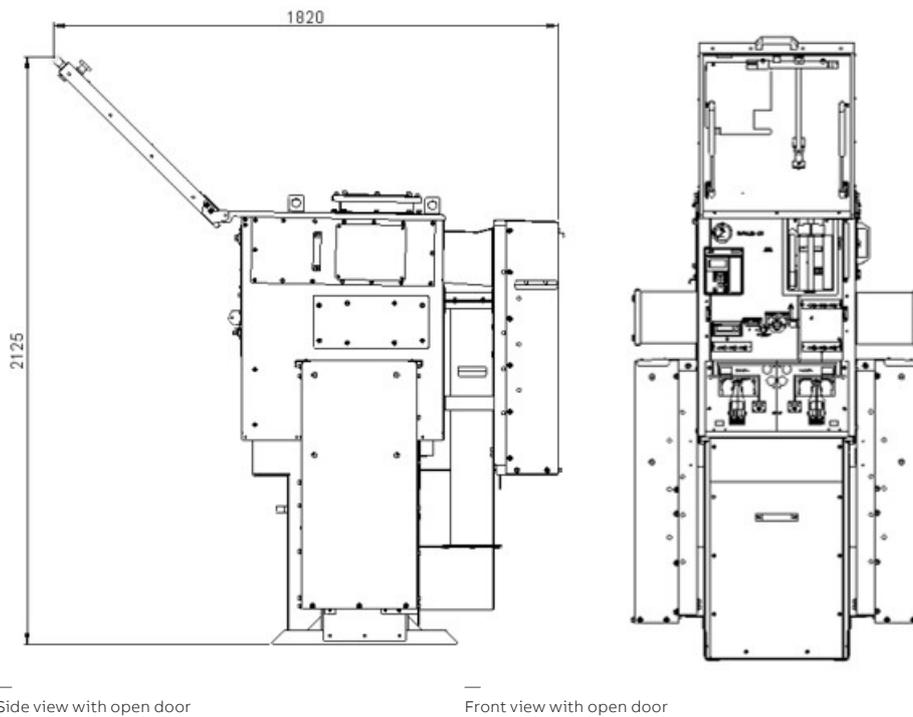
21kA 1s AF cable boxes & Vertical Front Door



RHS view

Front view

Back view



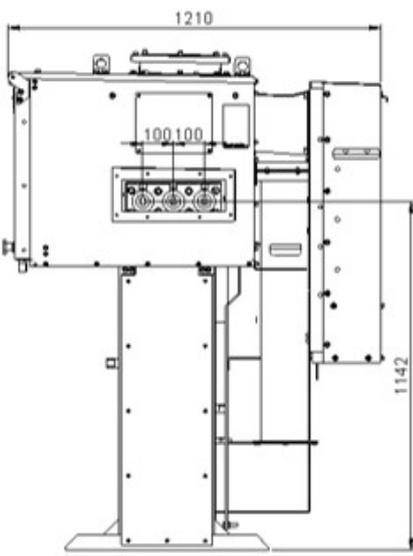
Side view with open door

Front view with open door

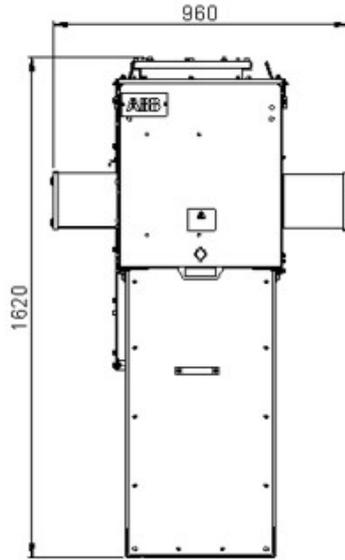
\* All dimensions are in mm

**+V+ Both Sides Extensible**

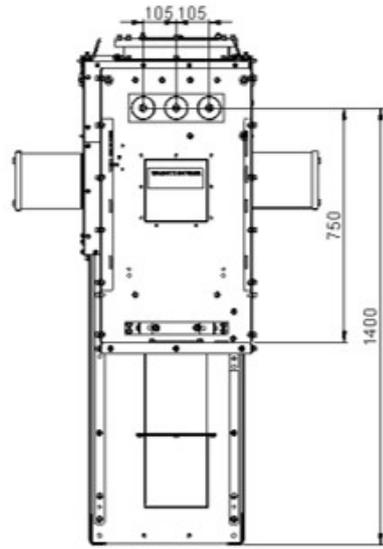
21kA 1s AF cable boxes & Vertical Front Door



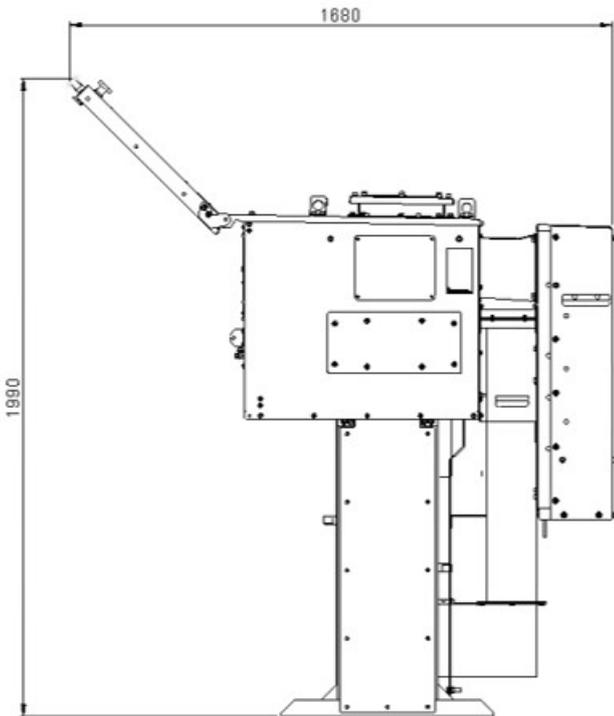
RHS view



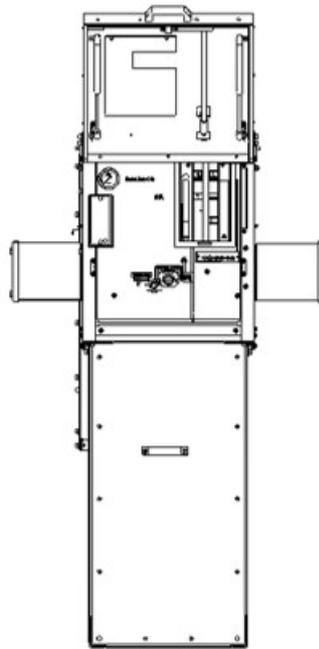
Front view



Back view



Side view with open door

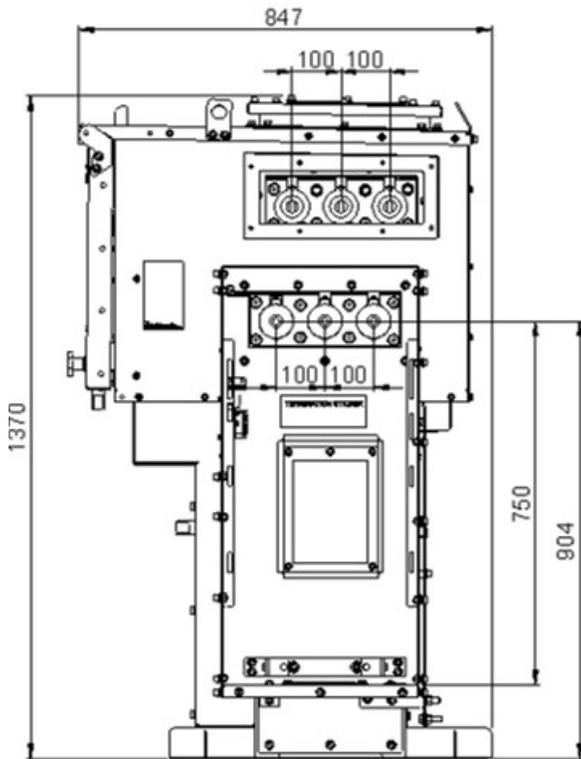


Front view with open door

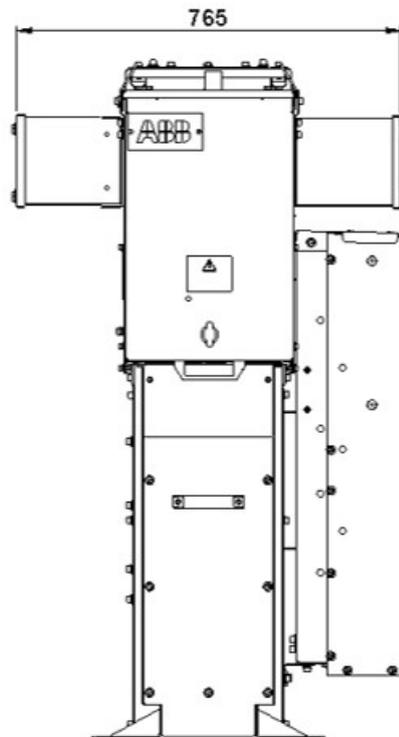
\* All dimensions are in mm

**+C+ Both Sides Extensible**

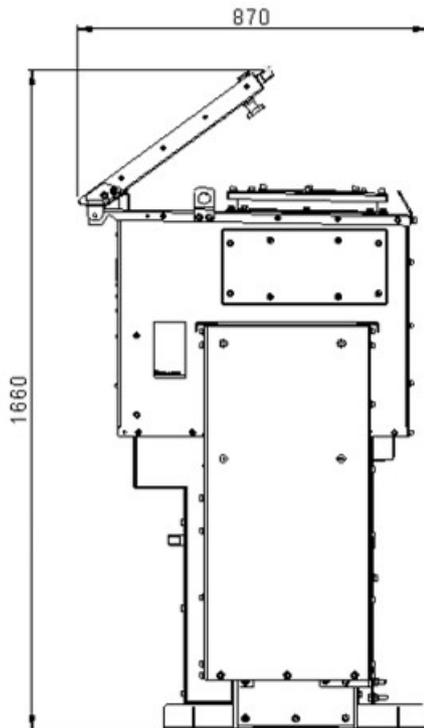
21kA 1s AF cable boxes &amp; Vertical Front Door



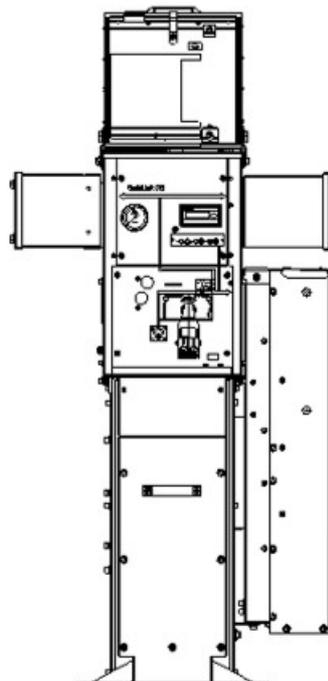
RHS view



Front view



Side view with open door



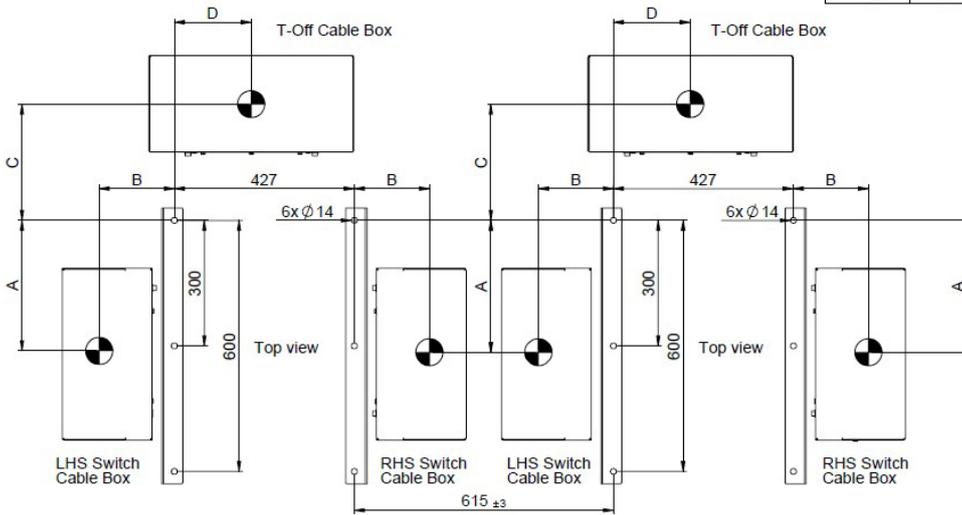
Front view with open door

\* All dimensions are in mm

**Foot Print & Foundation Details**

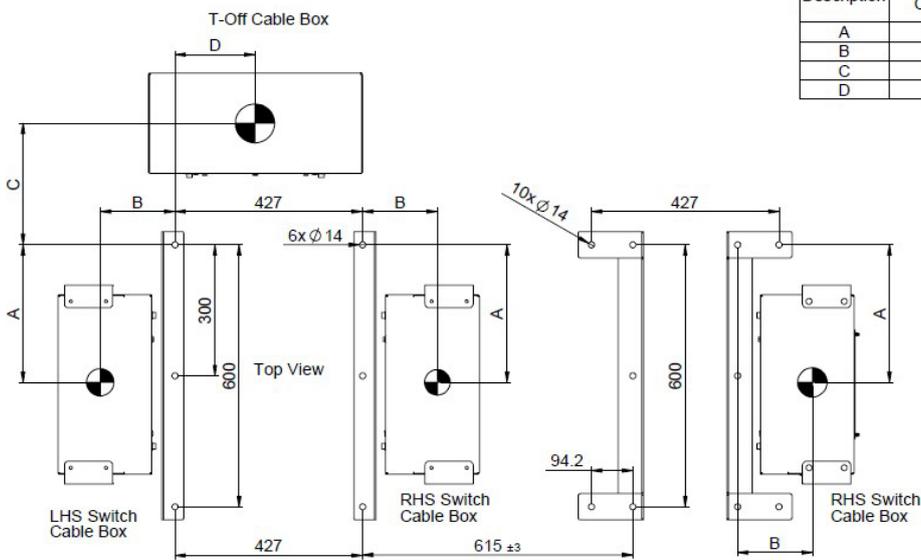
The below foundation/footprint details are applicable for all configurations except +C+ & coupled SafeLink CB involving +C+

Description	for 10 kA IAC Cable box	for 21 kA IAC Cable box
A	312 mm	312 mm
B	178 mm	178 mm
C	278 mm	290 mm
D	182 mm	182 mm



For +C+ or coupled SafeLink CB involving +C+

Description	for 10 kA IAC Cable box	for 21 kA IAC Cable box
A	312 mm	312 mm
B	178 mm	178 mm
C	278 mm	290 mm
D	182 mm	182 mm



RMU CVC Front Side

RMU C Front Side

# 18. Dimensions

## 18.1 Technical data – SafeLink CB

### 18.1.1 SafeLink CB – Basic Parameters

		C Module		V Module	
		Switch disconnecter	Earthing switch	Vacuum circuit breaker	Earthing switch
Rated voltage	kV	12/13.8	12/13.8	12/13.8	12/13.8
Rated frequency	Hz	50/60	50/60	50/60	50/60
Power frequency withstand voltage	kVrms	38	38	38	38
- across disconnecter	kVrms	45	45	45	45
Lightning impulse withstand voltage	kVp	95	95	95	95
- across isolating distance	kVp	110	110	110	110
Rated normal current*	A	630	630	630	630
Breaking capacities					
- active load breaking current	A	630			
- closed loop breaking current	A	630			
- cable charging breaking current	A	25		25 (Class C2)	
- line charging breaking current	A	1		10 (Class C2)	
- earth fault breaking current	A	75			
- earth fault cable and line charging	A	43.5			
- short circuit breaking current	kA			21	
Making capacity	kAp	52.5/54.6	52.5/54.6	52.5/54.6	52.5/54.6 <sup>1)</sup>
Short time current (3-sec)	kA	21	21	21	21
Short time current (1-sec)	kA		21 (Earthing circuit)		21 (Earthing circuit)
Rated filling level for insulation		0.02 MPa			
Internal arc classification		AFLR 10kA 0.1s / AF 21kA 1s			
Electrical & mechanical classes		E3, C2, M1	E2, M0	E2, C2, S1, M1+3000, M2 (Optional)	E2, M0
Rated operating sequence	-	0-0.3 sec-CO-3 min-CO			

1) Earthing operation is through Vacuum circuit breaker, hence no making capacity assigned

Rated filling level for insulation	0.02 MPa
Short time current (on earthing circuit)	21 kA 1 sec
Internal arc classification (IAC)	10 kA 0.1 Sec / 21 kA 1 sec**
Rated normal current for external busbar	630 A (for extensible version)

\*suitable derating shall be applied for ambient temperatures greater than 40 °C

\*\*optional against request

### 18.1.2 SafeLink CB – Operations, IP, Colour, Clearances

1	Means of switch and disconnecter operation	Separate handle
2	Means of circuit breaker operation	Inbuilt handle and push button
3	Rated operating sequence of circuit breaker	O - 0.3 sec - CO - 3 min - CO
4	Total opening time of circuit breaker	40-80 ms approx
5	Closing time of circuit breaker	40-70 ms approx
6	Mechanical operations of Switch	1000 CO
7	Mechanical operations of all Earthing Switches	1000 CO
8	Mechanical operations of disconnecter	1000 CO
9	Mechanical operations of circuit breaker	5000 CO / 10000 CO (optional)
<b>Degree of protection</b>		
10	High voltage live parts, SF <sub>6</sub> tank	IP 67
11	Front mimic and mechanism cover	IP 2X
12	Protection class for external structure and cable box	IP 54
<b>Colors</b>		
13	Front mimic	RAL 7035
14	External structure and cable covers	632 of IS:5
		More shades upon request
<b>Cable compartment data</b>		
15	Phase-to-phase center distance (Ring Switch Side)	100 mm
16	Phase-to-phase center distance (T-off side)	105 mm
17	Phase-to-phase clearance (min)	75 mm
18	Phase-to-earth clearance	65 mm
19	Phase-to-earth over insulator surface (creepage)	110 mm
20	Type of cable termination adapters	Elbow or T-connector

**18.1.3 SafeLink CB - General**

1	Type of Ring Main Unit & Compact Switchgear	Metal enclosed switchgear and control gear according to IEC 62271-200
2	Number of poles	3
3	Pressure test on gas filled tank	1.728 bar abs (1 min withstand test)
4	Facility provided with pressure relief	Yes
5	Insulation gas	SF <sub>6</sub>
6	Nominal operating gas pressure	1.2 bar abs at 20°C
7	Minimum functional gas pressure	1.1 bar abs at 20°C
8	Gas leakage rate / annum	Less than 0.1%
9	Expected operating lifetime	30 years
10	Facilities provided for gas monitoring	Yes, temperature compensated manometer can be delivered
11	Material used in tank construction	Stainless steel sheet
12	Main Busbar	320 mm <sup>2</sup> Cu for CVC and +CVC+ 240 mm <sup>2</sup> Cu for +C+ and +V+
13	Earth bar external	120 mm <sup>2</sup> Cu
14	Overall dimension of fully assembled RMU (Width x Height x Depth)	
	CVC, +CVC+, +V+	960 x 1540 x 1210
	+C+	765 x 1284 x 847
	VD	765 x 1540 x 1210
	+DC+	960 x 1540 x 810
	VC and +VC+	765 x 1540 x 1210
15	Approximate weight of standalone standard units excluding additional equipments and transport pallets	
	CVC,	325 kg
	+CVC+	355 kg
	+V+	275 kg
	+C+	190 kg
	VD	300 kg
	+DC+	300 kg
	VC	315 kg
	+VC+	330 kg
16	Distance between adjacent side sheets for extensible RMU's in coupled condition	512 mm

Other dimensions / details upon request

## 18.2 IEC standards

### SafeLink CB is validated as per the following IEC standards

IEC 62271-1	High-voltage switchgear and controlgear Part 1: Common specification
IEC 62271-100	High-voltage switchgear and controlgear Part 100: High voltage alternating current circuit breakers
IEC 62271-102	High-voltage switchgear and controlgear Part 102: Alternating current disconnectors and Earthing Switches
IEC 62271-200	High-voltage switchgear and controlgear Part 200: A.C. metal enclosed switchgear and controlgear for rated voltages above 1kV and upto and including 52 kV
IEC 62271-103	High-voltage switches- Part 1: Switches for rated voltage above 1 kV and less than 52 kV
IEC 60529	Degree of protection provided by enclosures (IP codes)

## 18.3 Operating conditions

### Normal ambient conditions

SafeLink CB is generally equipped for operation/service in normal indoor and outdoor conditions in accordance with IEC 62271-1. The following limitations apply:

#### Ambient temperature

Max. temperature	+40°C
Max. temperature (24-hour average)	+35°C
Min. temperature	- 25°C

#### Humidity

Max. average relative humidity measured over 24 hours	95%
Max. average relative humidity measured over 1 month	90%
Max. height above sea level for installation without reducing gas pressure	1000 metres

### Special conditions

In accordance with IEC 62271-1, the manufacturer and end-user must agree about special operating conditions which deviate from operation under normal conditions. The manufacturer/supplier must be consulted in advance if especially difficult operating conditions are involved. When electrical equipment is installed at more than 1000 metres above sea level, for example, the atmospheric pressure will be lower and the overpressure in the tank will have to be reduced.

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# 19. Environmental certification

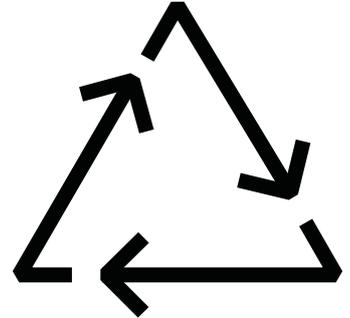
## Life expectancy of product/environment declaration

The product is in compliance with the requirements denoted by IEC 62271-200. The design incorporates a life span under normal service conditions (IEC 62271-1 subclause 2.1). The switchgear is gas-tight and classified as sealed pressure system\*) with an expected operating life exceeding 30 years and a diffusion rate of less than 0.1 % per year (IEC 62271-1 subclause 5.15 and annex E). Referring to the filling pressure of 1.2 bar, the switchgear will maintain gas tightness and a gas pressure better than 1.1 bar\*) throughout its operating life.

\*) No topping up required during operating life at 20°C

## End-of-life

ABB is committed to the protection of the environment and adhere to ISO 14001 standards. It is our obligation to facilitate end-of-life recycling for our products. There exists no explicit requirements for how to handle discarded switchgear at end-of-life. ABB's recycling service is according to IEC 61634 edition 1995 section 6: «End of life of SF6 filled equipment» and in particular 6.5.2.a: «Low decomposition»: «No special action is required; nonrecoverable parts can be disposed of normally according to local regulations.»



The production processes are carried out in compliance with the standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. This is to allow maximum recycling at the end of the useful life cycle of the switchgear.

Raw Material	Weight	% of total weight 325 kg	Recycle	Environmental effects & recycle reuse processes
Iron	200.10	61.57	Yes	Separate, utilise in favour of new source (ore)
Stainless steel	50.26	15.46	Yes	Separate, utilise in favour of new source (ore)
Copper	31.83	9.79	Yes	Separate, utilise in favour of new source (ore)
Brass	2.28	0.70	Yes	Separate, utilise in favour of new source (ore)
Aluminium	2.27	0.70	Yes	Separate, utilise in favour of new source (ore)
Zinc	3.90	1.20		Separate, utilise in favour of new source (ore)
Silver	0.08	0.02		Electrolysis, utilise in favour of new source
Thermoplastic	3.50	1.08	Yes	Make granulate, reuse or apply as energy superior additive in refuse incineration
Epoxy incl. 60% quartz	13.15	4.05	Yes	Grind to powder and use as high grade energy additive in cement mill
Bakelite	3.06	0.94	Yes	Make granulate, reuse or apply as energy superior additive in refuse incineration
Rubber	0.51	0.16	Yes	High grade energy additive in refuse incineration
SF6 gas	0.80	0.25	Yes	ABB reclaims used SF6 gas.
Total for recycling	311.73	95.92		
Not specified*	13.27	4.08		Stickers, film foils, powder coating, screws, nuts, tiny components, grease.....
Total weight	325.00	100.00		
Packing foil	0.20		Yes	High grade energy additive in refuse incineration
Wooden pallet	20.00		Yes	Reuse or use as energy additive in refuse incineration

\*All the above figures are for CVC configuration (NE)  
Not specified weight can vary based on the additional mountings and auxiliaries





**Additional information**

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Accordingly, the reader of this document acknowledges and agrees that values of dimensions and weight provided herein are neither final nor binding and that the result of their use is neither feasible nor accurate nor error free.





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