

SafeLink Manual

12kV SF₆ Insulated Ring Main Unit Installation and Operating Instructions



Product Overview

ABB's type-tested SafeLink ring main unit (RMU) is an SF₆ insulated RMU utilising the latest developments in switchgear technology to provide a very compact switchgear solution. SafeLink is a completely sealed system with a stainless steel tank containing all live parts and switching functions. A hermetically sealed tank separated from the outside environment ensures a high level of reliability as well as personal safety and a virtually maintenance free system.

SafeLink is manufactured according to the latest environmental and quality standards. The ABB assembly plant is certified according to ISO9001 (Quality) and ISO14001 (Environmental). SafeLink equipment conforms to all applicable IEC standards.

This manual provides detailed information on the handling, installation, commissioning and operation of SafeLink.

The range of SafeLink products and the specifications of the equipment are subject to change without notice as product features and benefits are added.

For further information, or to discuss SafeLink operation, please contact your local ABB office or the ABB factory in New Zealand:

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1 General Description

This manual provides details needed to install and operate the SafeLink ring main unit. The SafeLink unit is certified for use on distribution systems operating at up to 12kV. SafeLink is available in several configurations based on ring and fuse-protected switches: e.g. CFC, CCC, CFCC, and CFCF; where *C* denotes a load break switch and *F* a switch-fuse combination. The switch-fuse combination has three-phase tripping and when the switch is earthed, both ends of the fuses are connected to earth.

SafeLink units can be supplied with direct busbar connections (D) in place of load break switches to allow SafeLink units to be joined with an external cable connection. For example, units configured as CFCD and DFC, when joined, will give three ring switches and two switch-fuse combinations.

Each switch is in the form of a three-position switch giving *on*, *off* and *earthed* conditions with respect to the connected cable. The status of each switch is indicated by the symbol visible in the round hole towards the top of the mimic panel and confirmed by the mimic diagram. Active flags in the diagram match the circuit condition with black confirming open switches and white indicating switches that are closed. Access to the cable box and fuse compartment is interlocked with the switch status.

The operating handle is designed to give a delay between switching operations. Insertion of the operating handle is controlled by a rotary selector, which has one of three possible states:

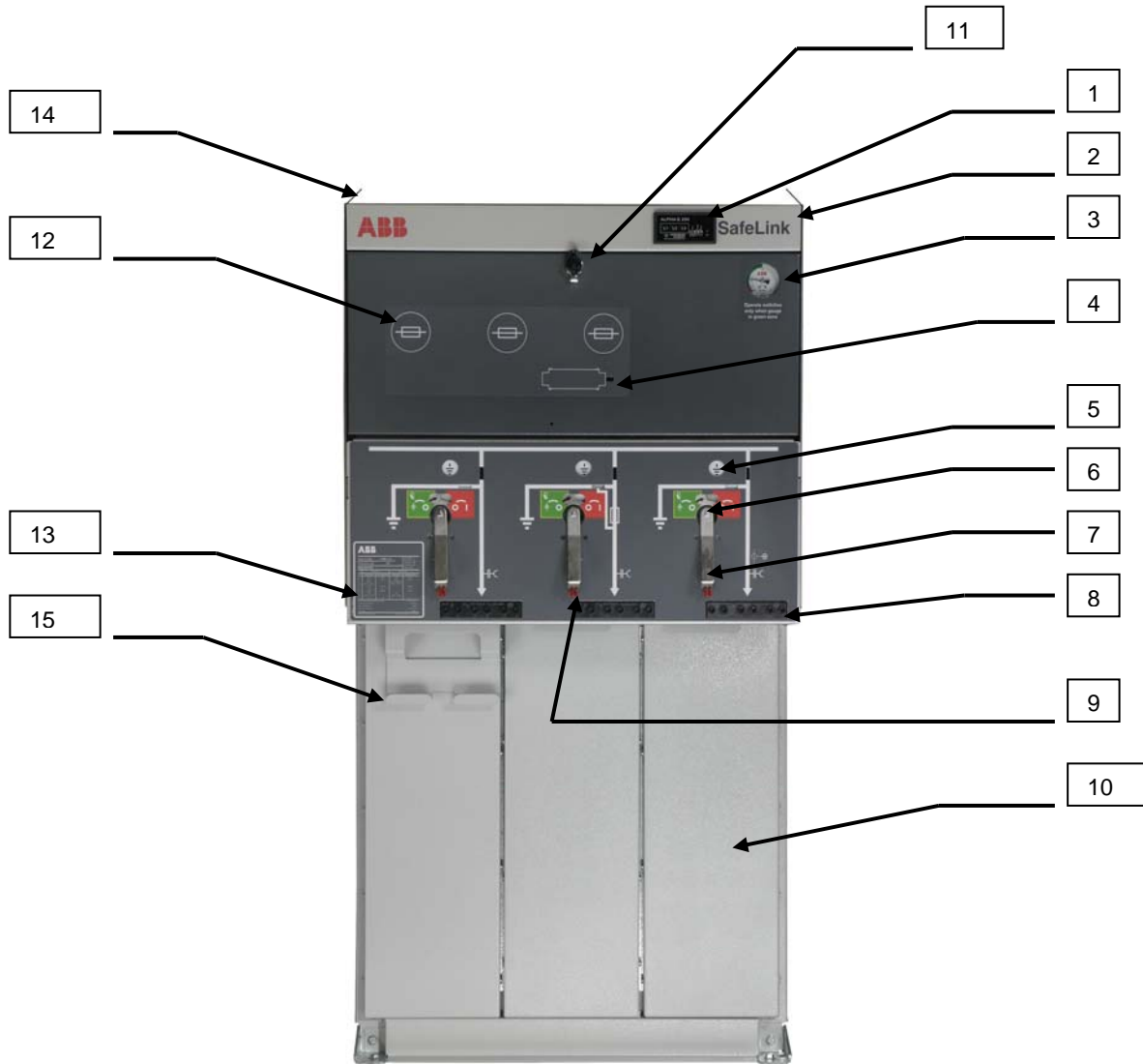
1. Handle access blocked.
2. Switching between *off* and *on* and switch-fuse *reset* possible.
3. Switching between *off* and *earth* possible.

The selector handle can be padlocked in any of these three positions.

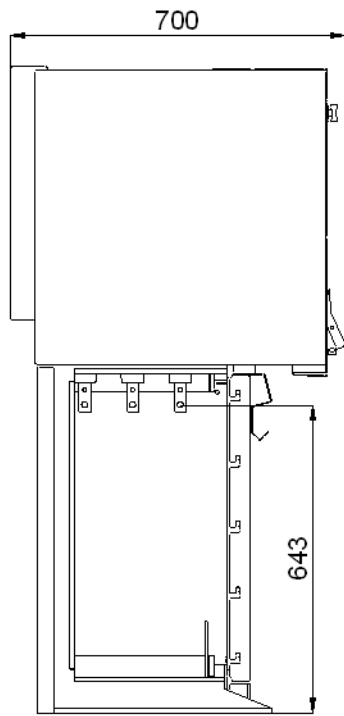


1.1 SafeLink Features

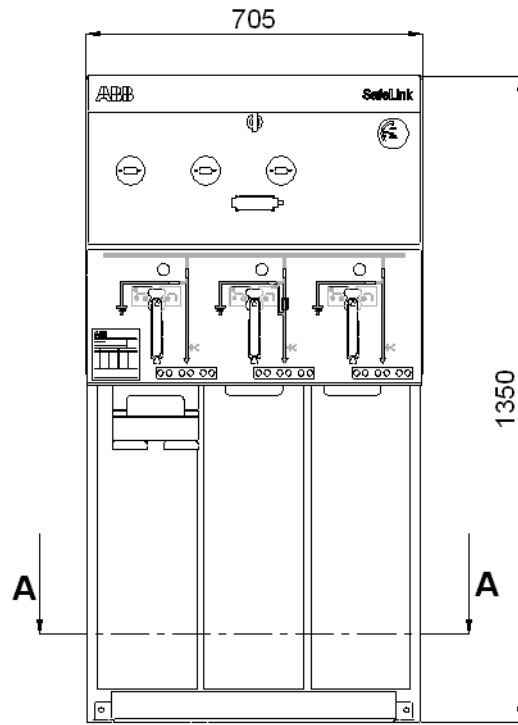
Item No.	Description
1	Short circuit indicator (optional)
2	Lift up lid
3	Gas density indicator
4	Fuse blown indicator
5	Switch position symbol
6	Switch handle socket
7	Switch mode selector (on/off, blocked, off/earth)
8	Capacitive voltage indicator
9	Padlocking device
10	Interlocked cable compartment door
11	Interlocked fuse access door catch
12	Fuses contained behind door
13	Rating plate, serial number
14	Lifting lugs
15	Cable-door handle bracket includes door padlock facility



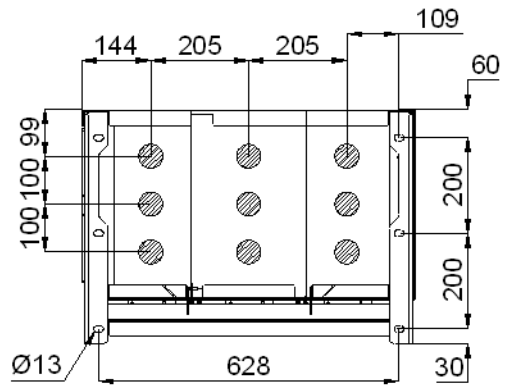
1.1.1 CFC, CCC, DF, DC



Left Hand View
(end panel removed)

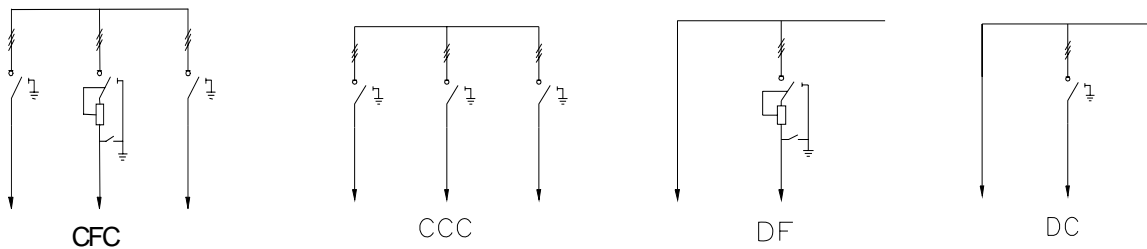


Front View



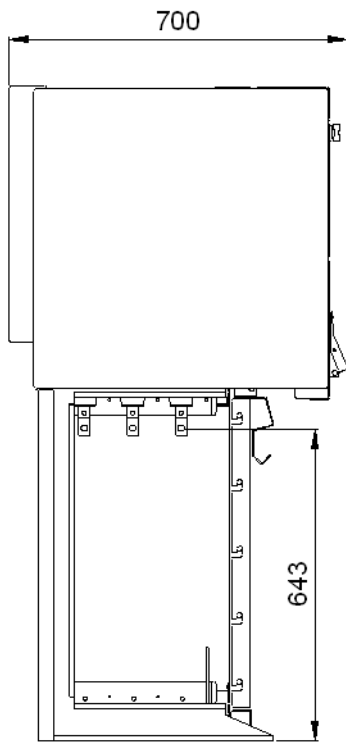
Foundation View
(Section AA)

Single line diagrams

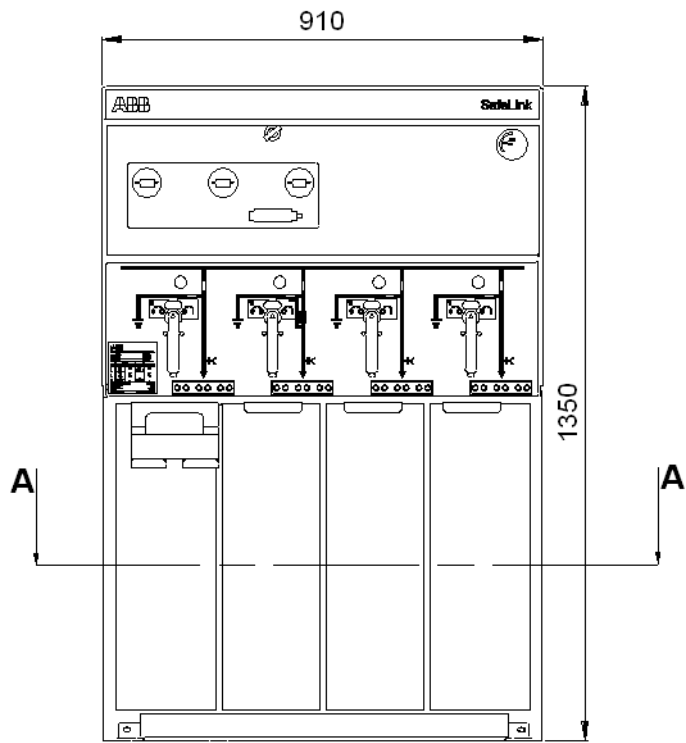


Mass: 300 kg

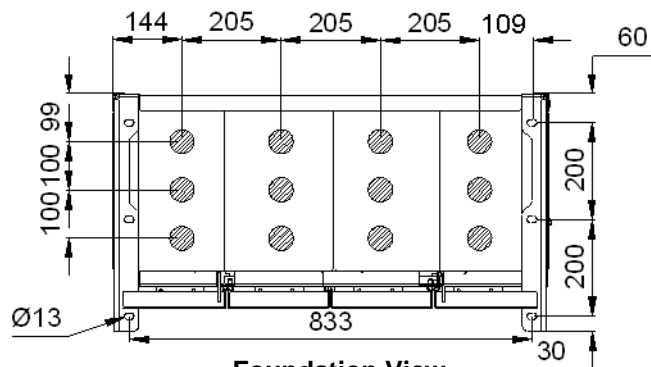
1.1.2 CFCC, CCCC, CFCD



Left Hand View
(end panel removed)

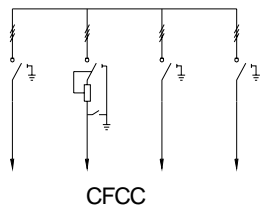


Front View

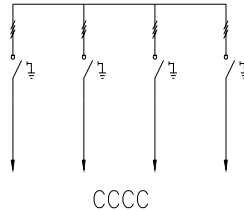


Foundation View
(Section AA)

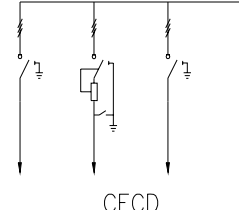
Single line diagrams



CFCC



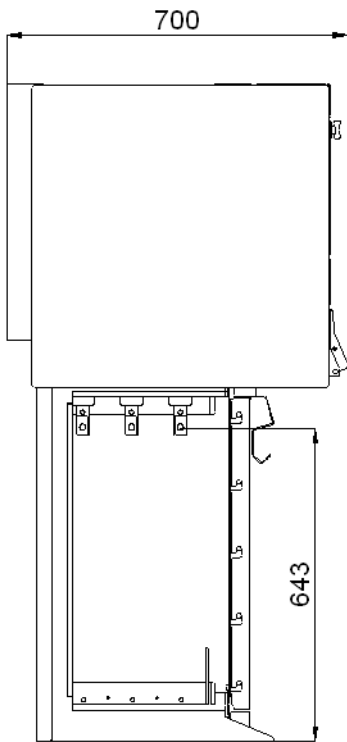
CCCC



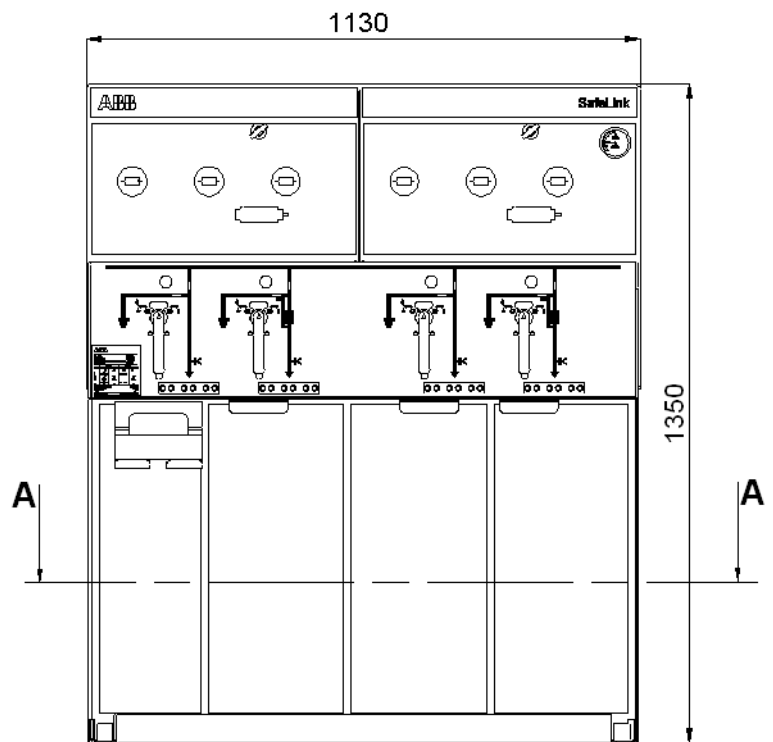
CFCD

Mass: 320 kg

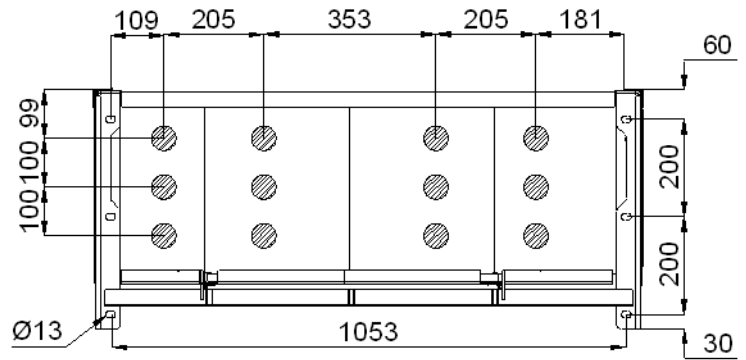
1.1.3 CFCF



Left Hand View
(end panel removed)

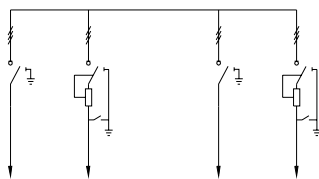


Front View



Foundation View
(Section AA)

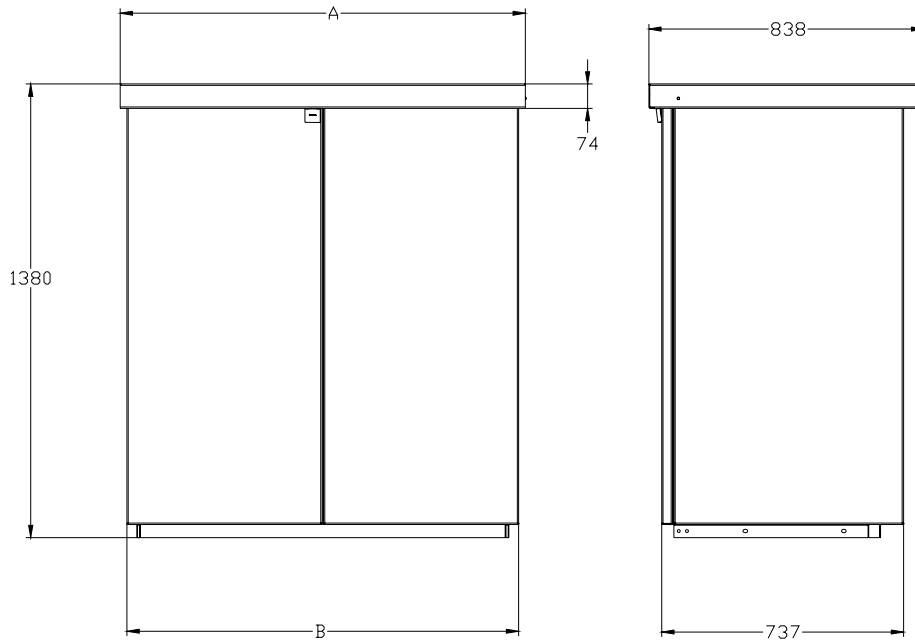
Single Line Diagram



CFCF

Mass: 400 kg

1.1.4 Outdoor Enclosure



	CFC, CCC DF, DC	CFCC, CCCC CFCD	CFCF
Dim "A"	810	1015	1235
Dim "B"	775	980	1200

2 Technical Data

2.1 Operating Conditions

Normal Ambient Temperature:	-25°C to +40°C
Altitude:	Up to 1000m above sea level
Installation:	Indoor or outdoor with an enclosure
Degree of protection:	
High Voltage live parts, SF6 tank	IP 67
Front cover mechanism	IP 2X
Cable covers	IP 3X
Protection class of fuse compartment	IP 67
Mounted in Outdoor Enclosure	IP55W

Insulating Gas	
Type:	SF ₆ (IEC 60376)
Filling Pressure @ 20°C:	1.2bar abs
Quantity:	0.8kg approximately (CFC)
Minimum Operating Pressure:	1.1bar abs

2.2 Electrical Data

General Ratings @ 1.1bar abs SF₆ Pressure

		Ring Switch		Switch Fuse	
		Main Switch	Earthing Switch	Main Switch	Earthing Switch
Rated Voltage	Ur	12 kV	12 kV	12 kV	12 kV
Frequency	Fr	50 Hz	50 Hz	50 Hz	50 Hz
Rated Current	Ir	630 A		* See reference list	
Lightning Impulse Withstand Voltage	Up	95 kV / 110 kV		95 kV / 110 kV	
Short-Time Withstand current	Ik	21 kA	21 kA		3.15 kA
Duration of Short Circuit	tk	3 s	3 s		3 s
Short Circuit Making Current	Ima	52.5 kA	52.5 kA		7.9 kA
Number of Load Break operations	n	100		100	
Power Frequency Withstand Voltage	Ud	28 kV / 32 kV		28 kV / 32 kV	
Electrical Endurance Class	Er	E3	E2		E2

Switch-Fuse

Rated Current:	200A
Prospective Fault Withstand:	21kA rms

Bushings

Series 400 (DIN 47632) with adapted in-line bolted connection	
Rated Current:	630A

Fuses

DIN 43625	
Maximum. Barrel Length:	292mm
Maximum. Diameter:	87mm
Maximum. Fuse Current Rating:	160A

* Refer to Section 5.4 on page 21 for the fuse selection chart.

2.3 Rating Label

The rating label is integrated into the main mimic panel. This panel is UV stabilized weather resistant polycarbonate. The label information satisfies the requirements of IEC 62271-200 and includes RMU configuration. The rating label includes a serial number, which matches the serial number on the label used to identify each tank throughout its production.

ABB				
Serial Number	1YJN116351		IEC 62271-1 IEC 62271-102 IEC 62271-105 IEC 62271-200 IEC 60265-1	
Production year	2008			
SafeLink CFC				
	Ring Switch		Switch Fuse	
	Main Switch	Earthing Switch	Main Switch	Earthing Switch
Ur	12 kV	12 kV	12 kV	12 kV
fr	50 Hz	50 Hz	50 Hz	50 Hz
Ir	630 A		See reference list	
Up	95 kV / 110 kV		95 kV / 110 kV	
Ik	21 kA	21 kA		3.15 kA
tk	3 s	3 s		3 s
Ima	52.5 kA	52.5 kA		7.9 kA
n	100		100	
Ud	28 kV / 32 kV		28 kV / 32 kV	
Er	E3	E2		E2
Minimum functional pressure for insulation			110 kPa @ 20°C	
Insulating fluid and mass			SF6, 0.8 kg	
Mass of switchgear			280 kg	
Fuse striker			Medium	
Made by ABB, New Zealand			Instruction book reference: 1YJM100001	

2.4 Standards Compliance

- IEC 62271-1
High – voltage switchgear and controlgear, common specifications.
- IEC 62271-102
Alternating current disconnectors and earthing switches.
- IEC 62271-105
Alternating current switch-fuse combinations.
- IEC 62271-200
A.C. metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52kV.
- IEC 60265-1 (1998-01)
High-voltage switches - Part 1: Switches for rated voltages above 1kV and less than 52kV.
- IEC 60137 (1995-12)
Insulating bushings for alternating voltages above 1000V.
- IEC 60529 (1989-11)
Degrees of protection provided by enclosures (IP Code).
- IEC 61243-5 (1997-06)
Voltage Detecting Systems

3 Transport & Handling

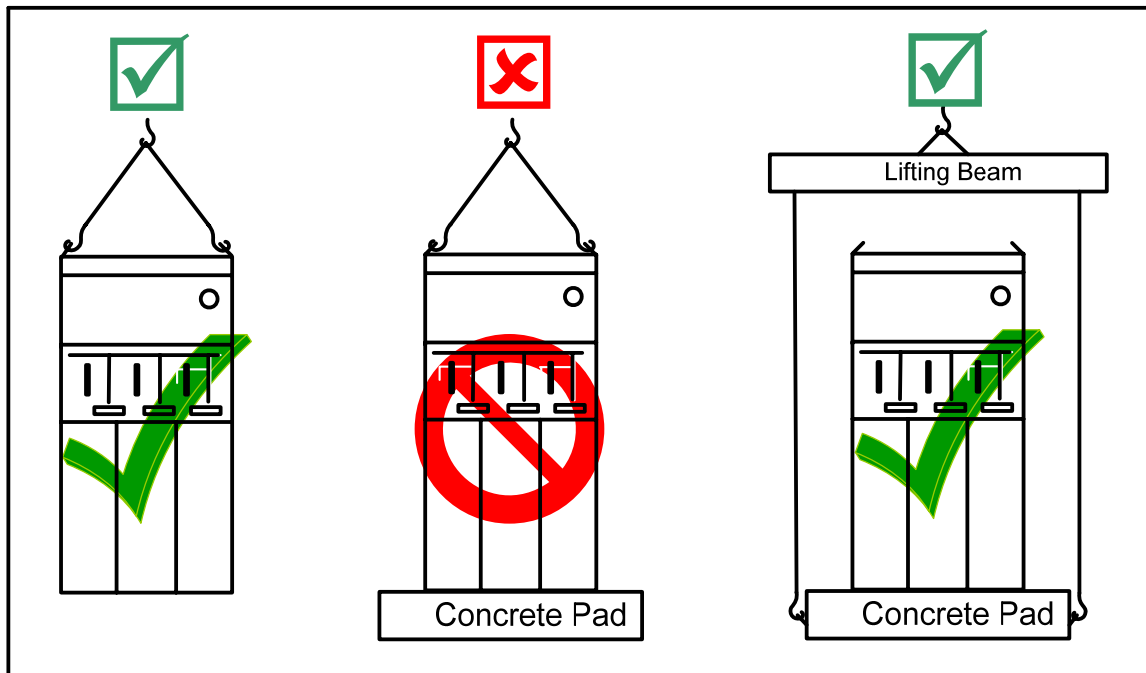
3.1 Storage

SafeLink units must be stored under cover in a dry and well-ventilated area. Product will either be packed in a wooden crate or plastic wrap with carton top.

3.2 Transporting

The units are supplied packed on a wooden pallet or concrete pad to allow fork hoist movement. Lifting eyes are also provided for lifting the RMU only. (They are not to be used for lifting units pre-fitted with concrete pads).

Lifting beams are available where SafeLink RMU's are transported to site pre-fitted to concrete plinth and/or with outdoor enclosure. This allows direct positioning of the unit by crane or hiab truck.



3.3 Shock Monitored Shipment Instruction for Switchgear:

This product is fitted with an impact detector type Shockwatch. This device senses and indicates a magnitude of shock. It features a small liquid filled glass tube housed in a self adhesive label. If the product or packaging bearing a Shockwatch label is dropped or roughly handled the Shockwatch reacts instantly. The liquid in the tube changes from clear to bright red providing evidence that excessive impact has occurred. Normal movement or road shock will not activate Shockwatch – only the specific 25g impact for which it was designed.

Product will have a Shockwatch attached to the side of the switchgear tank.



3.4 Instructions for Customer Inward Goods Personnel:

If the Shockwatch indicator is RED upon initial receipt of goods:

1. Do not immediately refuse shipment.
2. Make a notation on delivery receipt document that Shockwatch Indicator is RED and if packing is damaged. Clearly write your contact name, signature and obtain the same from the carrier who delivered the goods.
3. Contact your ABB sales office where order was placed and provide a copy of the delivery receipt document.
4. ABB will make contact advising appropriate actions and arrange return of goods.

Note: For purposes of making warranty and insurance claims it is very important to ensure that an appropriate goods inspection is made upon first receipt of the product from the carrier. During this inspection the necessary documentation needs to be completed and signed by all parties.

3.5 Dimensions & Weights

SafeLink with ABB stand:

Configuration	CFC, CCC, DF, DC	CFCC, CCCC, CFCD	CFCF
Height (mm):*	1350	1350	1350
Width (mm):	705	910	1130
Depth (mm):	700	700	700
Weight (kg):	300	320	400

* Note that extended height plinths are available to increase standard height to 1650mm

Optional outdoor enclosure:

Configuration	CFC, CCC, DF, DC	CFCC, CCCC, CFCD	CFCF
Height (mm):	1380	1380	1380
Width (mm):	810	1015	1235
Depth (mm):	838	838	838
Weight (kg):	94	106	122

Optional concrete mounting pad:

Configuration	CFC, CCC, DF, DC	CFCC, CCCC, CFCD	CFCF
Height (mm):	150	150	150
Width (mm):	945	1155	1375
Depth (mm):	850	850	850
Weight (kg):	210	260	325

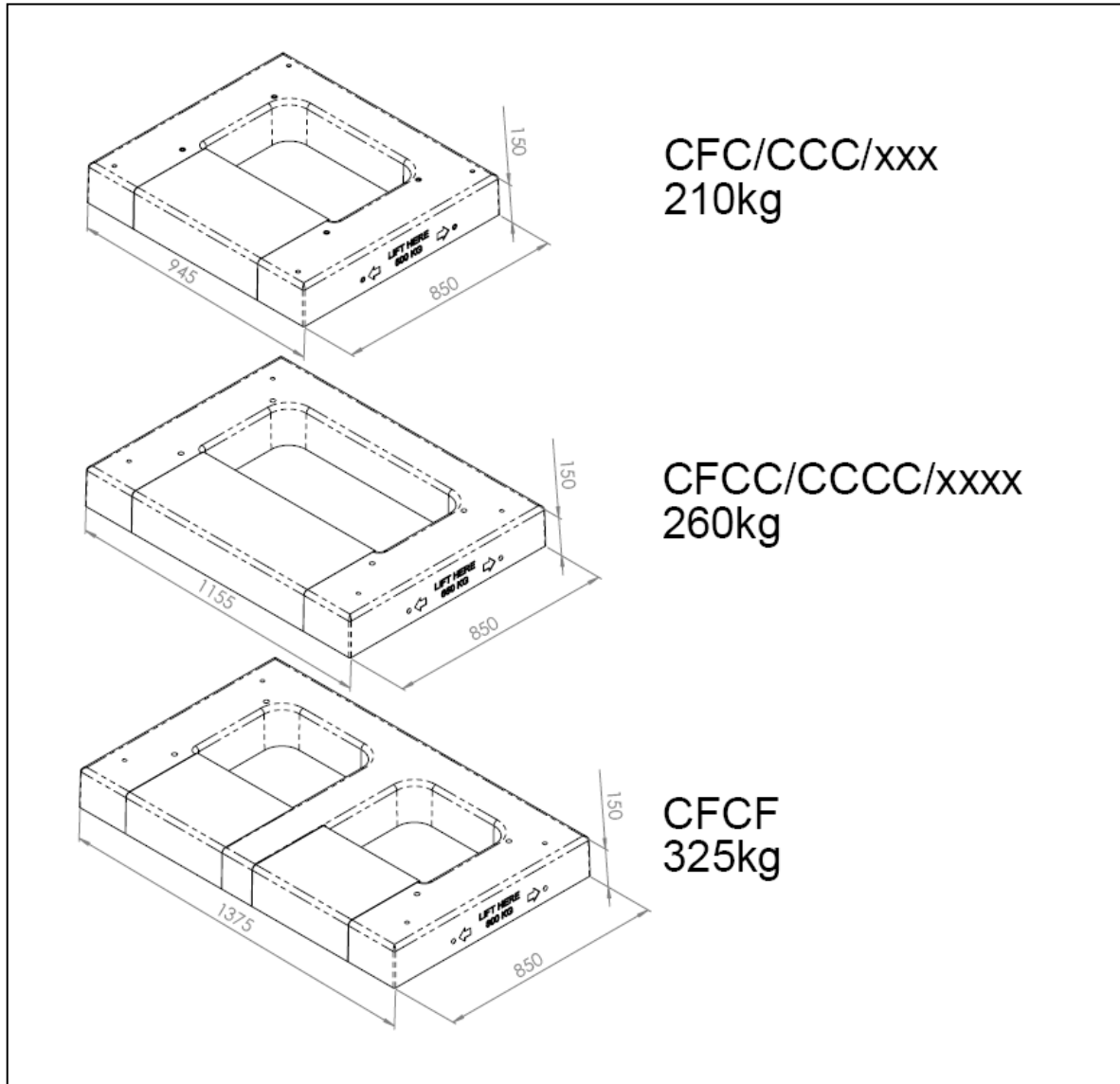
4 Installation

4.1 Foundations

The equipment shall be mounted on a concrete base designed to support the equipment weight of the switchgear and for the outdoor enclosure if used. The base pad shall be mounted on a prepared and compacted base. The concrete base should be smooth and must be installed such that it is level.

The units are fastened to the concrete base by four M10 bolts. Ensure that there is free air movement around the stand and prevent build up of material (vegetation, bark, etc.) around the base of the stand.

ABB is able to supply a suitable concrete base as an optional item. The concrete pads have a removable step to improve access for laying cables. The pad is designed for seismic load and is suitable for seismic loads up to 1g.



4.2 Main Cable Boxes

The front cable box compartment covers can be removed provided the circuit earth is applied. Side and division panels can then be removed to expose all the cable bushings to give maximum cable termination room.

Stands available include optional bolt on cable box inner panels, gland plates, cable support brackets.

4.3 Cable Connection

The maximum cable recommended is 300mm² three-core or 500mm² for single-core cables. The bushings for each switch are arranged front to rear. The cable should be prepared for jointing with L1 to the rear.

The cable-bushing stem is 25mm wide and lugs should be fitted using high tensile M12 bolts tightened to a maximum of 72Nm (max. bolt length recommended M12 x 35mm).

Unused switches should be appropriately terminated with a blank termination.

4.3.1 Steps for Cable Connection

Ensure that the switch is in the earth position to allow the front cover to be removed. Segregated cable boxes are provided. When the extreme left and right switches are earthed the outside cable box plates can be removed.

Where the centre switch and one of the outside switches are turned to the earth position (for example during commissioning) the side plate between the two cable boxes can be removed to give more working space.

Steps to install cabling:

(a) Bolting lugs to the cable bushings

(b) Right hand cable termination completed.



4.3.2 Cable termination boots

The following cable termination boots have been type tested with SafeLink for a voltage impulse level of 95kV BIL in accordance with IEC 62271-1.

Manufacturer	Termination insulating boot type	Cable size
ABB Kabeldon	KAP 300	XLPE – 300 mm ² Paper insulated – 240 mm ²
ABB Kabeldon	TB-A 12 U	XLPE 16 – 300 mm ²
Raychem	RCAB-4120	XLPE 35 - 400 mm ²
Euromold	15TS/NSS (cold shrink)	XLPE 50 – 300 mm ²

The SafeLink product is not designed to have heat shrink termination boots. The manufacturer's installation instructions are supplied with each kit and must be followed. For special situations (i.e. earth screen terminations) please seek further advice from your local ABB agent.

4.4 Outdoor Enclosure

The outdoor enclosure to suit the SafeLink attaches to the ring main unit. It is padlockable and no special tools are required for its installation—only an M8 socket and 4mm allen key are needed. Once installed all critical fixings are hidden. For access to the SafeLink unit, the top lifts up, and the door is hinged.

The enclosure can be supplied in a flat-pack form for retrofitting or fully assembled. Full instructions for assembly and mounting are supplied with each enclosure.



Dimensions and weights are detailed in section 3.5 on page 14.

5 Operation

The following sections describe the operating procedure for SafeLink. There are no parts within the SafeLink unit that require user attention other than the fuses and the gas density gauge.

Equipment suffering faults or damage must be returned to your supplier for servicing.
Ensure the gauge reads in the green area before switching.

5.1 Gas Density Gauge

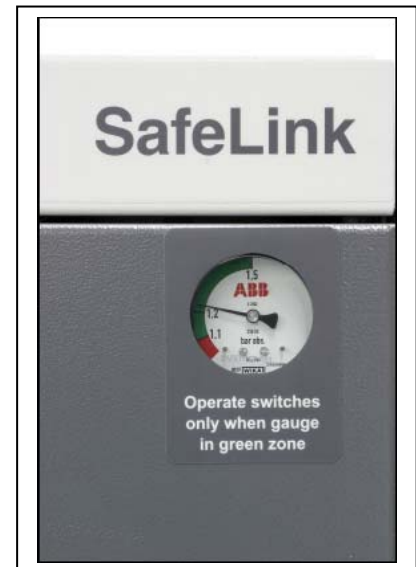
During operation, the gas density of the SafeLink unit should be in the green region. The gas pressure has been factory set to 1.2bar absolute (at 20°C).

The gas density gauge differs from a simple pressure indicator in that it is temperature compensated

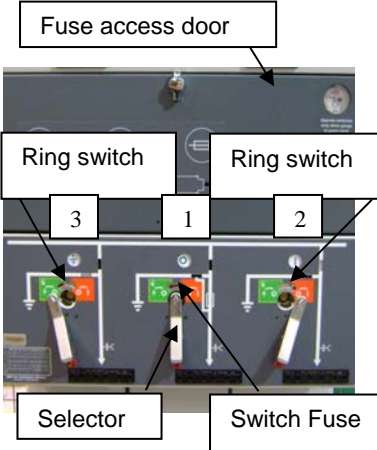
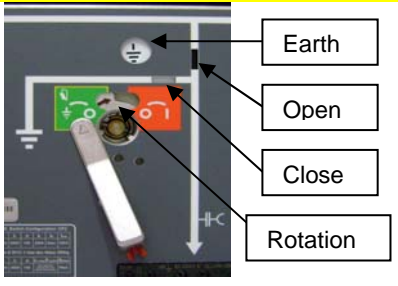
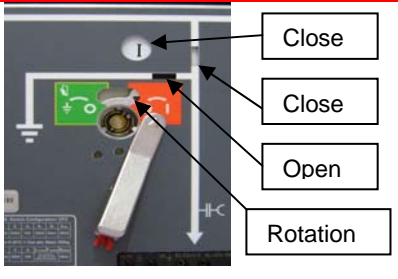
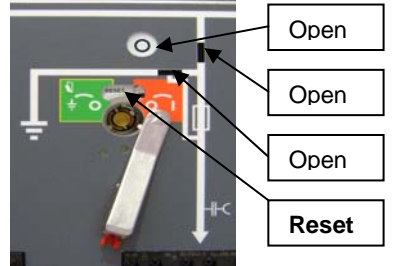
The accuracy of the gas density gauge varies slightly with temperature; it is $\pm 1\%$ at + 20°C (i.e. ± 20 mbar) and $\pm 2.5\%$ (i.e. ± 50 mbar) at the working limits of the gauge - 20°C/+60°C.

All units are tested for gas tightness during production to ensure any gas leakage rate is less than 0.1% per annum (maximum 3×10^{-6} mbar/s using helium).

Gas filling is through a valve at the front of the unit. See section 6.3 on page 27 for further details.



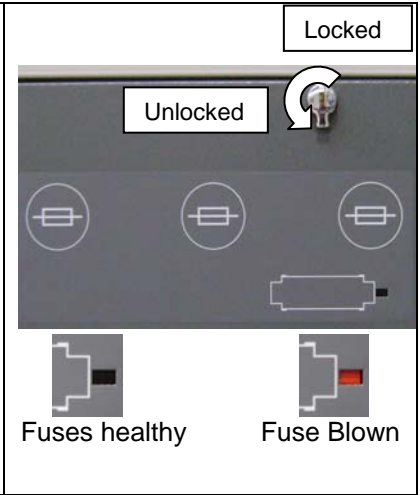
5.2 General Switch Operation

SafeLink Operating Instructions (Check gauge pressure before operating)	Configuration CFC
<p>General:</p> <p>Insertion of the operating handle is controlled by a rotary “selector”, which has one of three possible states:</p> <ol style="list-style-type: none"> 1. Handle access BLOCKED & switch is padlockable in all states. 2. Switching between OFF & ON possible. 3. Switching between OFF & EARTH possible. <p>Cable access cover can only be removed when the associated switch is in EARTH, the operating handle removed and the “selector” in the middle, BLOCKED, position.</p> <p>Fuse access door can only be opened when the “switch fuse” is in EARTH and the “selector” in the middle, BLOCKED, position.</p>	
<p>SWITCHING – RING SWITCHES & SWITCH FUSE</p>	
<p>OFF to EARTH: Move “selector” to the LEFT Insert operating handle Rotate handle ANTI-CLOCKWISE</p> <p>EARTH to OFF: Move “selector” to the LEFT Insert operating handle Rotate handle CLOCKWISE Check mimic panel and switch position indicators as shown</p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Earthing switch</p> 
<p>OFF to ON: Move “selector” to the RIGHT Insert operating handle Rotate handle CLOCKWISE</p> <p>ON to OFF Move “selector” to the RIGHT Insert operating handle Rotate handle ANTI-CLOCKWISE Check mimic panel and switch position indicators as shown</p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Circuit switch</p> 
<p>SWITCH FUSE RESET</p>	
<p>RESET (after fuse initiated TRIP) Switch will automatically TRIP to OFF. “RESET” appears above the handle socket. Switch must be RESET to allow further operation. Move “selector” to the right. Insert operating handle. Rotate handle ANTI-CLOCKWISE to end of travel. Once RESET the “selector” will operate as normal. Check mimic panel and switch position indicators as shown</p>	

FUSE ACCESS (Switch fuse must be in EARTH & Selector in middle Blocked position)

When a fuse is blown, there is indication via the striker mimic on the fuse door. This indicator is BLACK when all fuses are healthy and the door is closed, and turns RED if there is a blown fuse.

To gain access to the fuse compartment the “switch fuse” must be in the earth position and the “selector” in blocked position before the door can be opened. The door knob will not fully rotate and release the door unless these conditions are met. This ensures that the internal earthing of both ends of the fuse is in place before access is available. Rotate the fuse access door knob anti-clockwise to open. Ensure knob is rotated fully to lock or unlock.



Once the door is opened, the fuse canisters are visible. The blown fuse(s) will be indicated by the canister(s) with the extended white plastic pin(s). All three fuses should be replaced as a set.

With the fuse door open, the roof section can be hinged up to allow improved access to the fuse handles.

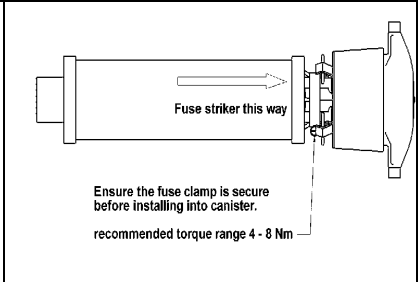


Pull the red handle on the front of the canister fully downwards. This will allow the fuse assembly to be removed.

Central fuse assembly and fuse being withdrawn.



Release the fuse from the fuse assembly clamp with a screwdriver. Fit the new fuse into fuse assembly and tighten clamp. Do not over tighten the clamp screw. Make sure that the striker is in the direction of the fuse sealing cap. Carefully refit the fuse and fuse assembly into the canister. The cap must be clean of grease or dirt. Push the red handle fully upwards to lock the fuse and fuse sealing cap into position.



When the fuse door is closed ensure that nothing obstructs the fuse striker mechanism slots. If these slots are blocked, fuse tripping operation may not occur.

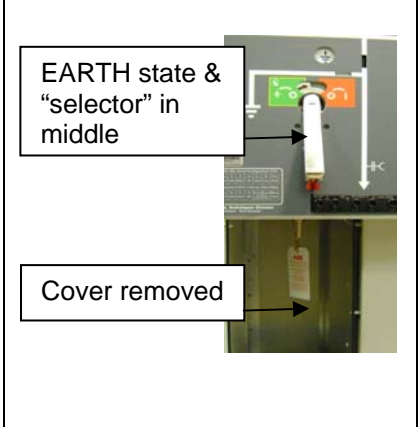


CABLE BOX ACCESS

The cable box access covers can only be removed with the corresponding switch in EARTH position and with the “selector” in the middle BLOCKED position.

For cable testing it is possible to switch from EARTH to OFF only. The switch must be returned to EARTH to replace the cover.

Once the cover is removed the switch can only be operated in the EARTH – OFF sector. The “selector” will **not** move into the ON – OFF sector, so the switch cannot be ON with a cable box cover removed.



5.3 Fuse Types and Replacement

The fuses used must comply with IEC 60282-1:1994 (High-voltage fuses - Part 1: Current-limiting fuses) having medium striker energy of $1J \pm \frac{1}{2}J$. It is important that care is taken with the fuse alignment when installing small diameter fuses (i.e. less than 87mm). The fuse canister is completely sealed to IP65. Fuse links must have a barrel length of 292mm and dimensional compliance to DIN 43625.

To replace a fuse, undertake the steps outlined above. For switch-fuse reset procedure see section 5.2 on page 19. Note that the switch will not remain in the closed position if a blown fuse is present. Auxiliary switches are available to give an additional indication of the fuse trip status.

Avoid dirt on the rubber plug; do not apply grease, apply dry lubricant (talc). The fuse canister and tripping mechanism must be kept clean and dry.

Discard and replace all three fuses when any fuse has operated (refer to fuse manufacturer's recommendations).

5.4 Fuse Tables

100% 630A	Transformer rating (kVA)													
	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1500
Un (kV)	Fuse Link Rating (A)													
6.6	16	25	25	25	40	40	50	50	63	80	100	125	160	
10	10	16	16	25	25	25	40	40	50	50	80	80	160	
11	6	16	16	25	25	25	25	40	50	50	63	80	125	160
12	6	16	16	16	25	25	25	40	40	50	63	80	125	160

The table is based on using fuse types ABB CEF (SIBA 160A)

Fuse barrel length = 292mm

Normal operating conditions with no transformer overload

Ambient temperature $-25\text{ }^{\circ}\text{C} + 40\text{ }^{\circ}\text{C}$

130% 630A	Transformer rating (kVA)													
	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1500
Un (kV)	Fuse Link Rating (A)													
6.6	16	25	25	25	40	40	50	50	80	100	125	160		
10	10	16	16	25	25	25	40	40	50	80	80	125		
11	6	16	16	25	25	25	25	40	50	63	80	100	160	*160
12	6	16	16	16	25	25	25	40	40	63	63	80	125	*160

The table is based on using fuse types ABB CEF (SIBA 160A)

Fuse barrel length = 292mm

Normal operating conditions with 30% transformer overload

Ambient temperature $-25\text{ }^{\circ}\text{C} + 40\text{ }^{\circ}\text{C}$

* Maximum continuous overload 120%

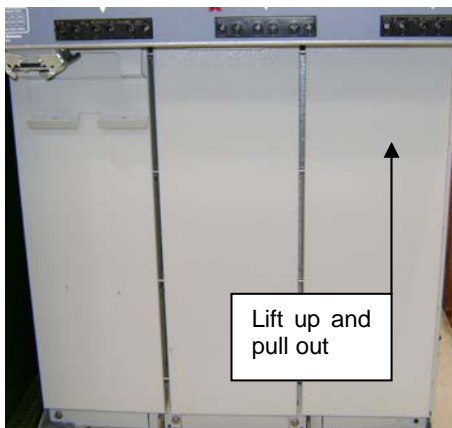
5.5 Cable Box Interlock

The cable box has been designed for arc fault containment using a double skin on the side and front panels.

To gain access to the cable box the associated switch must first be in the earth position and the selector switch in the blocked position. This action also engages an interlock to prevent the switch being closed while the cover is removed. This allows the cable box cover to be lifted off. Type B has a secondary inner bolt on type panel.

When refitting the cable box covers ensure that all bolts are in place, tightened and the cover is pushed fully down onto the locating pins.

SafeLink Cable Box Covers & Panels removal instructions - Configuration CFC Type "A" and Type "B" (with secondary inner bolt on type panels)



All Switches to be in the EARTH position & Selectors in middle Blocked position)

Lift cable box covers upwards and pull out from the bottom section (same procedure for type A & B)



Cable box covers removed



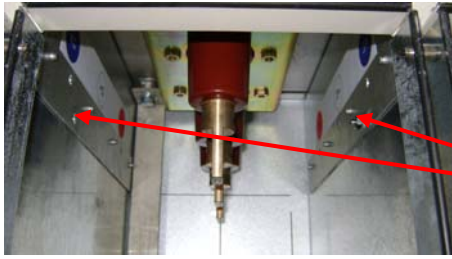
Type B has secondary inner bolt on type panels.
Remove the bolts on the inside to remove inner panel.



To remove the two side panels, remove the two top and bottom mounting bolts.
(same procedure for type A & B)



Pull right hand side panel forward to remove
(same procedure for type A & B)

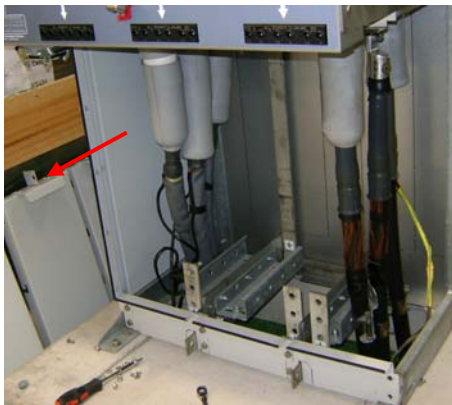


Removing inner partitions

Remove top and bottom bolts
(same procedure for type A & B)




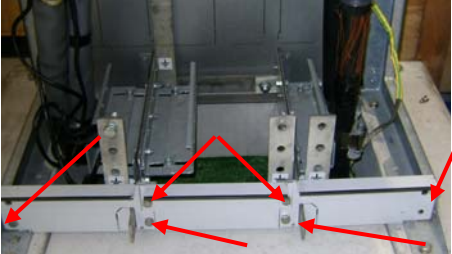

Pull forward to remove right and left hand centre partitions
(same procedure for type A & B)



Pull left hand side panel forward to remove.
(same procedure for type A & B)



All side panels and inner partitions removed

	<p>Remove kick plate cover (type B only) Remove the 2 bolts and the kick plate cover. Then remove the kick plates – same as type A below.</p>
	<p>Remove kick plates Remove bolts as shown and remove kick plates (type A & B) When re assembling, the bolts holding the kick plates are to be left loose to allow proper alignment prior to tightening securely.</p>
	<p>Cable box ready for cables to be terminated. Note: All bolts have to be replaced during assembly. If this is not done it could affect the proper operation of the interlocking and compromise safety.</p>

5.6 Cable Testing

Cable testing first requires that the cable box cover be removed as described above. The switch can then be taken out of the earth position to the off position. To allow test connections to be made to the cable, the termination boots must be slid down to reveal the bushing stems and the terminations.



Once the cable box cover is removed a **mechanical interlock prevents the switch being turned to the on position**. The switch must be returned to the earth position before the cover is refitted. The cover catch locks automatically once the switch is taken out of the earth position.

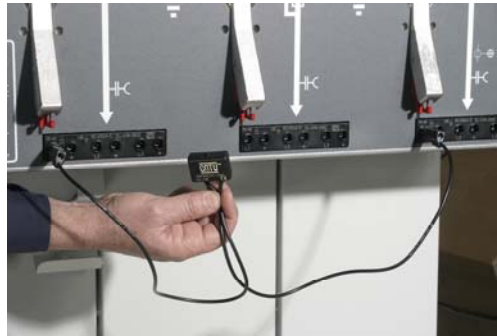
Cable testing should be carried out in accordance with the cable manufacturer's recommended practice. It is important that the terminations be done in the manner outlined in section 4.3 on page 16

5.7 Voltage and phase balance test

It is recommended to conduct voltage and phase balance tests with the equipment shown below



Voltage Indicator



Phase balance tester

Gas filling is performed through the gas density gauge fitting on the front of the unit. The ABB filling adaptor should be used and this allows the pressure inside the switch to be monitored during filling. This will ensure that any gas escaping during the filling process is minimised. Full details are included with the filling adaptor kit.

6.4 Environmental Certification

Environmental Declaration for SafeLink SF₆ Insulated Ring Main Unit

6.4.1 Life Expectancy of Product

The product complies with the requirements denoted by (IEC 62271-200). The designed life span under indoor service condition exceeds 30 years.

The switchgear is gas-tight with an expected diffusion rate of less than 0.1% per annum. Referring to the reference-pressure of 1.2 bar, the switchgear will maintain gas-tightness and a gas-pressure better than 1.1 bar* throughout its designed life span. (* at 20°C)

6.5 Recycling Capability

Raw Material	Amount (kg)	% of total weight –	Recycle	Environmental effects & recycle/reuse processes
Iron	120.10	49.28%	Yes	Separate and (re)melt
Stainless Steel	66.39	27.24%	Yes	Separate and (re)melt
Copper	26.44	10.85%	Yes	Separate and (re)melt
Zinc	5.63	2.31%	Yes	Separate and (re)melt
Brass	1.80	0.74%	Yes	Separate and (re)melt
Silver	0.08	0.03%	Yes	Separate and (re)melt
Thermoplastic	3.25	1.33%	Yes	Separate and make pellets or burn for energy
Rubber	1.53	0.63%	Yes	Burn for energy
SF ₆ gas	0.8	0.41%	Yes	ABB reclaims used SF ₆ gas
Total for recycling	226.22	92.82%		
Epoxy	17.49	7.11%		Returns 60% silicon ash if burned for energy
Epoxy Resin Fibre	0.17	0.07%		Landfill
Total Weight **	243.70			
Wood (packing)	15.50		Yes	Reuse or burn for energy


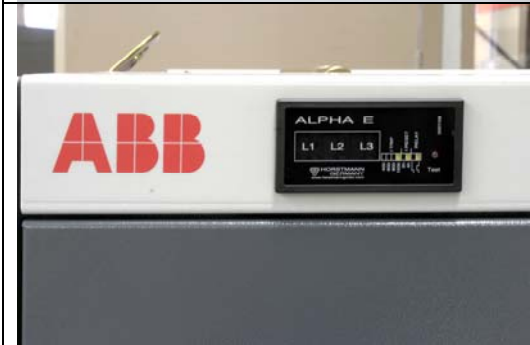


** All figures were collected from first generation CFC 3-way ring main unit

6.5.1 End-Of-Life

ABB is committed to the protection of the environment and adheres to ISO 14001 standards. It is our obligation to facilitate end-of-life recycling for our products. ABB can arrange to reclaim SF₆ gas from discarded switchgears.

There are no explicit requirements for how to handle discarded switchgears at end-of-life. ABB's recycling service is according to IEC 61634 edition 1995 section 6: {End of life SF₆ filled equipment} and in particular 6.5.2.a: {Low decomposition}: No special action is required; non-recoverable parts can be disposed of normally according to local regulations.

7 Accessories

 	<p>7.1 Fault Passage Indicators Earth Fault and/or Short Circuit Indicator</p> <ul style="list-style-type: none"> To DIN standard
	<p>7.2 Remote LED indicator</p> <p>This module gives a bright red LED indication if there is a fault. The module is mounted on the inside of the enclosure door in such a way that it is visible externally.</p>
	<p>7.3 Voltage Indicator</p> <p>This device plugs into the panel mounted voltage detector system interface and monitors the voltage on the cable bushings. Each cable bushing has a built in capacitive screen, which is wired to 4mm plugs on the front panel. Each switch has a plug-set to accept the display module. This gives a flashing LED indication when voltage is present.</p>



7.4 Phase Comparator

Before closing a new incoming feeder or ring current to a live SafeLink ring main unit, check phase balance with the phase comparator.



7.5 Auxiliary Switch

Snap action double-break switch with forced contact opening and self-cleaning contacts.

1 x Normally Open contact and 1 x Normally Closed contact per block.

It is possible to fit two blocks per Main switch and two blocks per Earth switch including the switch-fuse module. One block can also be fitted to indicate fuse blown.

Ratings:

I_{th}	10A
Vac	380
Vdc	450
V withstand	2500V



7.6 Motor Operator

- Available to be fitted to any main ring switch
- Fitted behind mimic panel
- Available in 24Vdc and 230Vac, other voltages on request
- Manual override is standard
- Plug-in control box that houses battery and remotes can be supplied to fit within the outdoor enclosure space.



7.7 Gas Density Monitor

Pressure indicator is supplied as standard on all SafeLink Ring Main Units. Remote indication can also be provided as an option providing 1 or 2 micro switches 5A / 250 Vac, 50 Hz.

The gas density monitor must be specified with order.



7.8 Shunt Trip

- Available in 24Vdc and 230Vac, other voltages on request
- The shunt trip can be retrofitted to any SafeLink RMU.

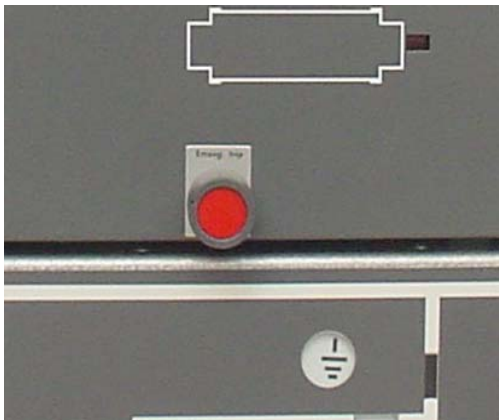


7.9 Cable Clamp Rail

- Adjustable for cable size
- Suitable for Unistrut K series clamps or equivalent. (Not included)
- Durable 3mm Hot Dip Galvanised construction



7.10 Bottom Cover/Gland Plates



7.11 Manual Trip

Available to be fitted to the switch-fuse transformer feed.



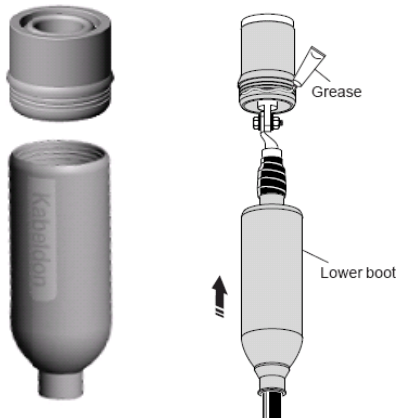
7.12 Gas Filling/Sampling Adaptor Kit

- Allows access to gas enclosure via the density gauge shut-off connecting valve
- Fitted with ¼ NPT nipple for connection to bottle regulator set (not supplied)
- See instruction sheets for connection and procedure details



7.13 Extended Height Plinth

- Extends the height by 300mm
- Fits to the base of a SafeLink RMU
- Available in three sizes to suit width of the RMU



7.14 TB-A 12 U Kabeldon Termination Boot

- 12kV 16 – 300mm²



7.15 Lifting Frame

- Suitable for lifting SafeLink RMU's fitted to standard concrete plinths.



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