



Product catalogue | 2012

# SafeLink 2

## Compact ring main solution for secondary 12 kV distribution networks



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# Introduction

SafeLink 2 is a type-tested SF<sub>6</sub> insulated ring main unit (RMU) for secondary distribution networks that utilises the latest in switchgear technology to provide a smart, safe and compact fuse protected switchgear solution.

Available in seven different configurations with automation among the many optional features. SafeLink 2 is the ideal indoor and outdoor solution for most switching applications in 12 kV networks.

The use of a hermetically sealed steel tank containing all live switching mechanisms within constant atmospheric conditions ensures a high level of reliability as well as personnel safety.

An integrated remote control and monitoring unit can be installed at the factory or, depending on the initial specification, fitted in the field at a later date through a proprietary plug and play interface.

SafeLink 2 is manufactured according to the latest environmental and quality standards. The ABB assembly plant is certified according to ISO9001 (Quality) and ISO14001 (Environmental). SafeLink 2 conforms to all applicable IEC standards.

## SafeLink 2 includes the following standard features

- Earthing switches with fault make capacity
- Discrete three position operating mechanisms
- Bushings for in-line cable connections
- Fuse blown indication
- Cable compartment covers interlocked with earthing switch
- Voltage presence indication system (VPIS) on all circuits
- Arc fault rated cable compartment and tank (IEC 62271-200)

## Optional accessories

- Operating handle
- Short circuit and earth fault indicators
- Cable support clamp rails
- Extra height plinth (300 mm)
- Outdoor enclosure
- Concrete pad

## Automation options

- Shunt trip on switch fuse
- Auxiliary switches for CLOSED / OPEN / EARTH / fuse blown indication
- Current and voltage measuring
- Reduced gas and low gas - from internal pressure indicator wired to terminals (one per SF<sub>6</sub> tank)
- Integrated control and monitoring unit
- Integrated battery and charger

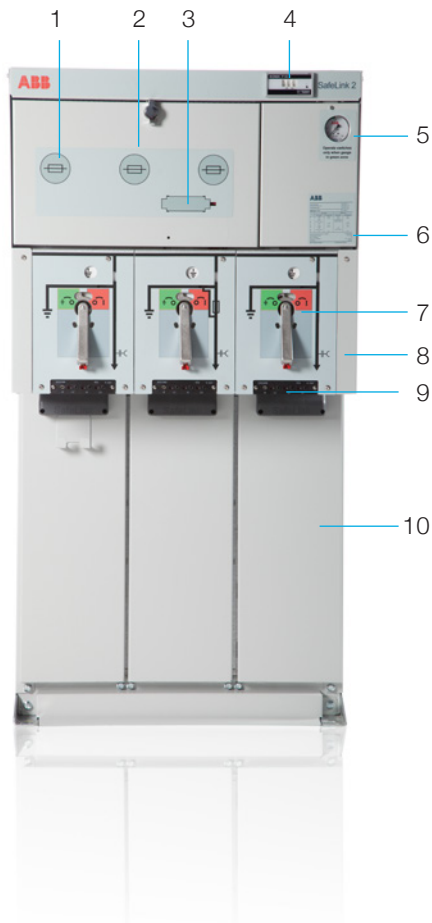
## SafeLink 2 is designed for use in the following applications

- Compact secondary substations
- Industrial applications
- Hotels, shopping centres, office buildings, business centres etc.

## SafeLink 2 circuit connections

- C Cable switch
- D Direct cable
- F Switch-fuse

# Overview



## Upper front cover

1. Fuses contained behind door
2. Interlocked fuse access door catch
3. Fuse blown indicator
4. Short circuit and earth fault indicators (optional)
5. Gas gauge / gas gauge cover
6. Rating plate / serial no.

## Lower front cover

7. Switch mode selector
8. Separate mimic panels
9. Voltage present indication system
10. Interlocked cable compartment door

The SafeLink 2 unit is certified for use on distribution systems operating at up to 12 kV. SafeLink 2 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 sides of the fuses are connected to earth.

Each switch is in the form of a three-position switch giving CLOSED, OPEN and EARTH conditions with respect to the connected cable. The status of each switch is indicated by the symbol visible in the mimic panel and confirmed by the mimic diagram. Active flags in the diagram match the circuit condition with black confirming CLOSED switches and white indicating switches that are OPEN. Access to the cable box and fuse compartment is interlocked with the switch status.

SafeLink 2 units can be supplied with direct busbar connections (D) in place of load break switches to allow SafeLink 2 units to be joined with an external cable connection.

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 OPEN and CLOSED and switch-fuse reset possible.
3. Switching between OPEN and EARTH possible.

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

## Covers



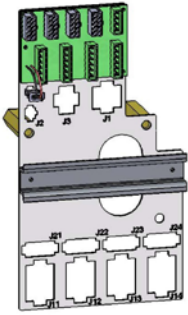

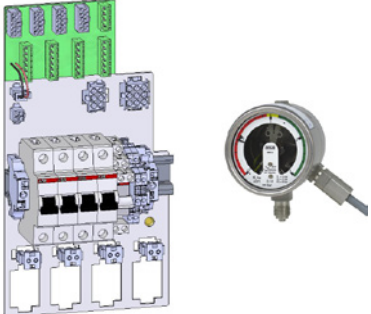

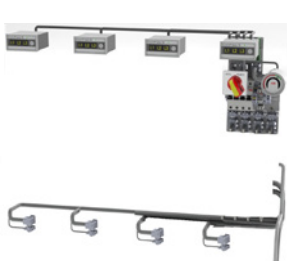
Upper and lower front covers made from Aluzink® with a light grey (RAL 7035) powder coat finish. UV stabilised polycarbonate labels contain the mimic diagram of the main circuit with the position indicators for the switching devices.

## Cable compartments

Each switch module has a separate cable compartment that is divided from the others by means of partition walls. These partition walls can easily be removed, allowing unrestricted access for connection of cables.

The cable compartment covers are individually removable and contain additional inner panels (4 - 6 mm), for arc containment. These covers are manufactured from 2 mm Aluzink® (except the arc containment panel) and are powder coated with colour RAL 7035.

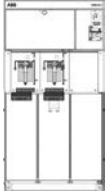
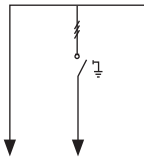
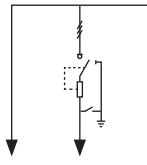
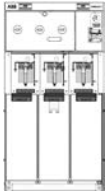
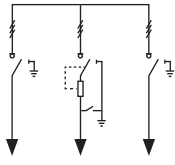
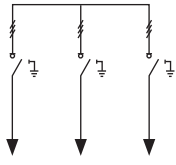
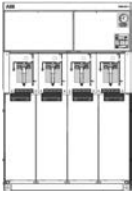
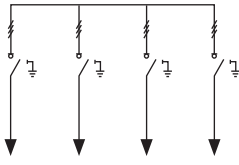
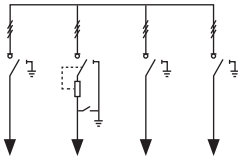
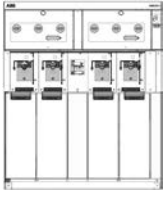
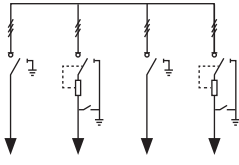
# Product configurations

	Variants	Included items
		Connectivity
<p><b>Non-automated</b> Manual switching only, with basic levels of fault indication. Ideal for low cost installations where remote monitoring or automation is not required.</p>		
<p><b>Monitoring Enabled (ME)</b> Manual switching only, with options for remote switch and fault passage indicator monitoring. Ideal where network fault information and or switch status is required.</p>		 <p>Monitoring enabled customer connection panel</p>
<p><b>Automation Enabled (AE)</b> Manual, and/or automated switch combinations with local or remote fault passage indication. Ideal where network load information and fault status is required with the ability to respond remotely.</p>		 <p>Automation enabled customer connection panel with gas density monitoring gauge</p>
<p><b>AE Plug and Play (PnP)</b> Supplied with complete plug and play capability for remote monitoring and automation and with a base level of fault passage indication, this unit offers full in the field upgrade potential.</p>		 <p>Automation enabled customer connection panel with gas density monitoring gauge and full wiring looms. Fault passage indicators shown are not included</p>

1. Options not installed at the time of manufacture will require trained service personnel to install in the field and may require downtime of the ring main unit during installation

Options <sup>1</sup>			
Fault passage indicators	Monitoring & automation	Outdoor installation	Cable accessories
 <p>Sigma F/E 3</p>  <p>DJ-3100</p>	 <p>Shunt trip</p>		
 <p>Sigma F/E 3</p>  <p>ComPass B</p>  <p>DJ-3100</p>	 <p>Motor/Auxiliary wiring looms</p>  <p>FPI wiring looms</p>  <p>Gas density monitoring gauge</p>  <p>Auxiliary switches</p>  <p>Shunt trip</p>		<p>Cable rails</p> <p>Cable cover plates</p> <p>Cable clamps</p>
 <p>Sigma F/E 3</p>  <p>ComPass B</p>	 <p>Motor/Auxiliary wiring looms</p>  <p>FPI wiring looms</p>  <p>ABB Automation Solution</p>  <p>Shunt trip</p>  <p>Motors</p>  <p>Auxiliary switches</p>  <p>RTU cable</p>		
 <p>Sigma F/E 3</p>  <p>ComPass B</p> <p>NOTE: A Sigma F/E 3 or ComPass B on each switch is a minimum requirement for Plug and Play.</p>	 <p>ABB Automation Solution</p>  <p>Shunt trip</p>  <p>RTU cable</p>  <p>Motors</p>  <p>Auxiliary switches</p>		

# Range

Function	Configuration		Height	Width	Depth	Weight	SF <sub>6</sub>
2-Way	DC	DF	mm	mm	mm	kg	kg
			1352 / 1380 <sup>1</sup>	709 / 810 <sup>1</sup>	699 / 838 <sup>1</sup>	280 / 584 <sup>2</sup>	DC = 0.95 DF = 0.88
3-Way	CFC	CCC					
			1352 / 1380 <sup>1</sup>	709 / 810 <sup>1</sup>	699 / 838 <sup>1</sup>	285 / 589 <sup>2</sup>	CFC = 0.88 CCC = 0.95
4-Way	CCCC	CFCC					
			1352 / 1380 <sup>1</sup>	910 / 1015 <sup>1</sup>	699 / 838 <sup>1</sup>	350 / 716 <sup>2</sup>	CCCC = 1.2 CFCC = 1.1
	CFCF						
			1352 / 1380 <sup>1</sup>	1138 / 1235 <sup>1</sup>	699 / 838 <sup>1</sup>	415 / 862 <sup>2</sup>	1.3

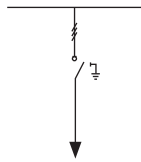
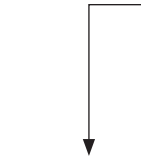
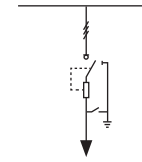
**Configuration types:**

C - Cable switch connection    D - Direct cable connection    F - Switch-fuse connection

<sup>1</sup> Outdoor enclosure  
<sup>2</sup> Weight with SafeLink, concrete pad and outdoor enclosure.



# Module technical data

Module		C – Cable switch connection	D – Direct cable connection	F – Switch fuse connection
Technical data				
Rated voltage	kV	12	12	12
Power frequency withstand voltage	kV	28 / 32	28	28 / 32
Impulse withstand voltage	kV	95 / 110	95	95 / 110
Rated normal current	A	630	630	Fuse dependent
Breaking capacities:				
- active load	A	630 (E3)	-	200 (E3)
- closed loop	A	630 (E3)	-	200 (E3)
- off load cable charging	A	10	-	10
Making capacity	kA	52.5 peak / 21 rms	-	N/A (TDisc 21 kA)
Short time current 1 sec.	kA	21	21	N/A (Transfer current 1200 A)
Short time current 3 sec.	kA	21 rms	21 rms	N/A
Number of mechanical operations	n	1000 (M1)	No switch	1000 (M1)
Earthing switch				
Rated voltage	kV	12	-	12
Power frequency withstand voltage	kV	32	-	32
Impulse withstand voltage	kV	110	-	110
Making capacity	kA	52.5 peak / 21 rms	-	7.9 peak / 3.2 rms
Short time current 1 sec.	kA	21	-	21
Short time current 3 sec.	kA	21 rms	-	7.9 peak / 3.2 rms
Number of mechanical operations	n	1000 (M0)	-	1000 (M0)
Standard features		<ul style="list-style-type: none"> <li>- Three position load break switch with CLOSED/OPEN/EARTH positions</li> <li>- Capacitive voltage indicator, VPIS to IEC 62271-206 with integrated indicator lamps (LED)</li> <li>- Vertical cable bushings - from rear to front, L1 at the rear</li> <li>- Earthing bar</li> <li>- Arc fault rated cable compartment</li> <li>- Cable compartment front covers interlocked with earth switch</li> </ul>	<ul style="list-style-type: none"> <li>- Capacitive voltage indicator, VPIS to IEC 62271-206 with integrated indicator lamps (LED)</li> <li>- Vertical cable bushings - from rear to front, L1 at the rear</li> <li>- Earthing bar</li> <li>- Arc fault rated cable compartment</li> <li>- Cable compartment front covers interlocked with earth switch</li> </ul>	<ul style="list-style-type: none"> <li>- Three position load break switch with CLOSED/OPEN/EARTH positions</li> <li>- Capacitive voltage indicator, VPIS to IEC 62271-206 with integrated indicator lamps (LED)</li> <li>- Vertical cable bushings - from rear to front, L1 at the rear</li> <li>- Earthing bar</li> <li>- Arc fault rated cable compartment</li> <li>- Cable compartment front covers interlocked with earth switch</li> <li>- Fuse access interlocked with earth switch</li> </ul>

# Module technical data

Module	C – Cable switch connection	D – Direct cable connection	F – Switch fuse connection
Optional features also available as retrofit	<ul style="list-style-type: none"> <li>– Auxiliary switches on main and earth switches</li> <li>– Fault passage indicators</li> <li>– Motor operation for load break switch</li> </ul>		<ul style="list-style-type: none"> <li>– Auxiliary switches on main and earth switches</li> <li>– Fuse blown auxiliary switch</li> <li>– Trip coil for switch-fuse</li> <li>– Fault passage indicators</li> </ul>
Switch module operation	<p>The cable switch is a three position switch disconnecter and earthing switch using SF<sub>6</sub> gas as an arc quenching medium.</p> <p>The switch positioning is CLOSED – OPEN – EARTH. In the open position the switch satisfies the disconnecter requirements.</p> <p>Interlocking prevents operation directly between CLOSED and EARTH states.</p>	No switch operation.	<p>The switch-fuse has a three position switch disconnecter and earthing switch with fuse blown indication and reset function.</p> <p>By means of the fuse tripping device it operates as a switch-fuse combination. There is a double earthing switch that when in the EARTH position connects earth to both sides of the fuse-links simultaneously. Both earthing switches are operated in one operation. Interlocking prevents operation directly between closed and earthed states. Access to associated cable box only possible when the switch is in the earthed position. Access to fuse canisters is possible only when the switch is earthed and the selector lever is in the blocked position preventing further operation.</p>

## Mechanisms and interlocks

All operating mechanisms are situated outside the SF<sub>6</sub> tank behind the front covers in separate housings. This gives the opportunity of easy access to all operating mechanisms if retrofit or service should be required. The speed of operation of the mechanisms is independent of the operator.

All mechanisms are supplied with mechanical interlocks that prevent the removal of cable compartment covers unless the associated switch is in the EARTH position and the selector lever is in the blocked position.

The interlock also prevents operation of the load break / disconnecter switch to CLOSE position if the cable compartment cover is not in place. Each mechanism can be padlocked to prevent access to operate the mechanism.

All operating mechanisms are equipped with position indicators for each switch state. In order to achieve true indication, indicators are directly driven by the operating shafts of the switches inside the SF<sub>6</sub> tank.

The operating handle has an anti-reflex system that prevents an immediate re-operation of the switch.

# Common technical data

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, SF <sub>6</sub> tank	IP 67
Front cover	IP 2X
Cable covers	IP 3X
Protection class of fuse compartment	IP 65
Protection when mounted in outdoor enclosure	IP 55W

Insulating Gas	
Type	SF <sub>6</sub> (IEC 60376)
Filling pressure @ 20°C	1.2 bar abs.
Quantity	0.88 kg (CFC)
Minimum operating pressure	1.1 bar abs.

Electrical Data <sup>1</sup>		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		200 A <sup>2</sup>	
Lightning impulse withstand voltage	Up	95 kV / 110 kV <sup>3</sup>		95 kV / 110 kV	
Short-time withstand current	Ik	21 kA	21 kA	21 kA rms <sup>4</sup>	3.15 kA
Duration of short circuit	tk	3 s	3 s		3 s
Short circuit making current	I <sub>ma</sub>	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 <sup>3</sup>		28 kV / 32 kV	
Electrical endurance class	Er	E3	E2		E2
Internal arc fault rating	IAC	AF 20 kA 1 s (IEC 62271-200)			

1. General ratings @ 1.1 bar absolute SF<sub>6</sub> pressure.    2. Refer to the fuse selection tables on page 12.    3. Measured across isolation gap.    4. Prospective fault withstand.

Bushings	
Series 400 (DIN 47632) with adapted in-line bolted connection	
Rated Current	630 A
Bushing stem width	25 mm
Cable lug connection	M12 bolt (M12 x 35 mm recommended)
Maximum cable size	300 mm <sup>2</sup> three core or 500 mm <sup>2</sup> single core

Fuses <sup>1</sup>	
IEC 60282-1, DIN 43625	
Maximum barrel length	292 mm
Maximum diameter	87 mm
Maximum fuse current rating	160 A <sup>1</sup>
Striker energy	Medium

1. Refer to fuse selection table on page 12

# Fuse selection tables

ABB fuses comply with IEC 60282-1:2009 (High-voltage fuses - Part 1: Current-limiting fuses) having medium striker energy of  $1J \pm \frac{1}{2}J$ .

The fuse canister is sealed to IP65. Fuse links must have a barrel length of 292mm and dimensional compliance to DIN 43625.

The switch will not remain in the closed position if a blown fuse is present. An auxiliary switch can be fitted to give an additional indication of the fuse trip status. All three fuses must be discarded and replaced when any fuse has operated.

100% 630A		Transformer rating (kVA)													
		50	100	125 <sup>1</sup>	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 <sup>1</sup>	-	-	
10	10	16	16	25	25	25	40	40	50	50	80	100	125 <sup>1</sup>	-	
11	6	16	16	25	25	25	25	40	50	50	63	80	100	-	
12	6	16	16	16	25	25	25	40	40	50	63	80	100	125 <sup>1</sup>	

130% 630A		Transformer rating (kVA)												
		50	100	125 <sup>1</sup>	160 <sup>1</sup>	200	250	315	400	500	630	800	1000	1250
Un (kV)	Fuse Link Rating (A)													
6.6	16	25	25	25	40	40	50	63	80	100	125 <sup>1</sup>	160 <sup>1</sup> (115%) <sup>2</sup>	-	
10	10	16	16	25	25	25	40	50	50	80	100	125 <sup>1</sup>	-	
11	6	16	16	25	25	25	25	50	50	63	80	100	125 <sup>1</sup> (115%) <sup>2</sup>	
12	6	16	16	16	25	25	25	40	50	63	80	100	125 <sup>1</sup> (125%)	

The table is based on using fuse types ABB CEF- TCU  
 Fuse barrel length = 292mm  
 Normal operating conditions with 30% transformer overload  
 Ambient temperature -25 C + 40 C

1. Transfer current rating is 1200 A ( $TDI_{transfer}$  to IEC 62271-105). Determine required transfer current for switchgear application which is dependant on network parameters in addition to fuse and switchgear characteristics.
2. The % overload limits in parenthesis are exceptions

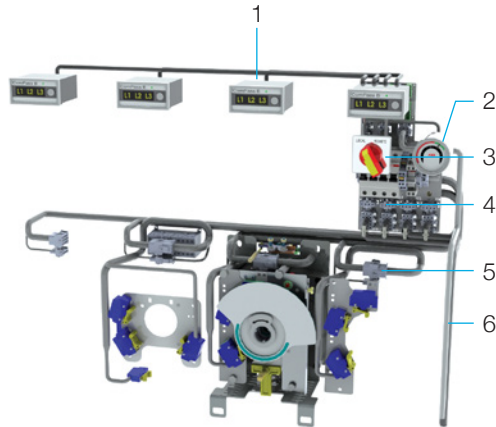
## Transformer protection

The switch fuse offers optimal protection against short-circuit currents. Fault currents are detected in an early stage by selection of fuse-links for the protection of a transformer. It is important that requirements in IEC 62271-105 and in IEC 69787 are fulfilled. In particular annex A in IEC 62271-105 gives a good example of the coordination of fuse-links, switch and transformer.

Correct selection of fuse-links for the protection of the transformer will give:

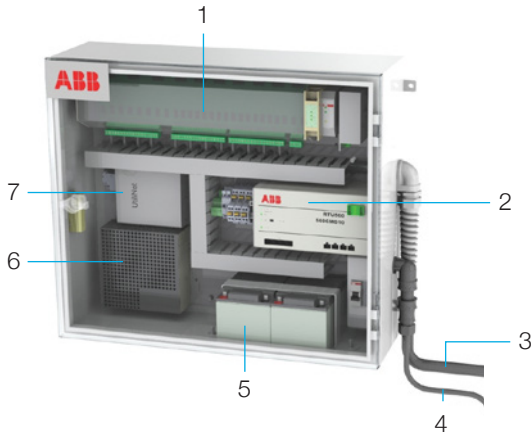
- Optimal protection of the transformer
- No damage on the fuse-link's fuse-elements due to the magnetizing inrush current of the transformer
- No overheating of the fuse-links, the switch-fuse combination or the switchgear due to the full load current or the permissible periodic overload current of the transformer
- A transfer current of the combination which is as low as possible, and less than the rated transfer current of the switch-fuse combination
- Fuse-links that discriminate with the low-voltage fuse-links in the event of phase-to-phase faults occurring downstream the low-voltage fuse-links.

# Automation



## SafeLink 2 wiring loom connections (internal)

1. Fault passage indicator with dedicated wiring loom
2. Gas density gauge with monitoring contacts
3. Local / Remote control selector switch
4. Customer interconnection panel - specification dependent
5. Auxiliary and motor drive connections with dedicated wiring loom
6. Customer connection loom/ABB automation control box loom



## Automation control box

1. I/O module
2. Remote terminal unit ABB type (RTU)
3. Connection to SafeLink 2
4. AC supply
5. Batteries for backup power supply
6. Power supply unit (PSU)
7. Communications radio (Not supplied)

## Remote terminal unit transmission equipment

Provision has been made in the enclosure for customer transmission equipment within the following dimensions

Width:	180mm
Height:	110mm
Depth:	140mm

Four fixing points are available to suit Landis + Gyr Series 3000 UtiliNet radios. A non-isolated 1 A 24 Vdc supply for transmission equipment is available.

SafeLink 2 Automation is an optional system designed for controlling and monitoring the switchgear.

## Key functions of SafeLink 2 Automation

- Remote switch position indication for both ring and fuse switches
- Remote control for ring switches when motor drive units are fitted
- Real time ring current and voltage measurement on all three phases
- Directional earth fault and phase to phase fault detection

SafeLink 2 Automation is powered by a 24 Vdc battery backed power supply. AC supply, DC output, current flow, battery condition testing and system failure alarms are some of the many points controlled and monitored via Modbus from the RTU.

SafeLink 2 Automation requires a 230Vac, 50 Hz supply. An IP 66 rated 3 pin plug and connector are provided to connect mains power to the automation control box.

Connections	Connector
Serial connection to RTU	RJ45
LAN connection to RTU	RJ45

## Servicing

With a service life of 30 years for the main circuit without maintenance, SafeLink 2 delivers simple and reliable use.

## Automation operating temperature range

SafeLink 2 Automation is designed to operate between -10°C and +50°C<sup>1</sup>. If SafeLink 2 Automation is required to operate below the minimum temperature specified a heating element may be installed in accordance with IEC 62271-1, Section 5.4.4.5.8.

1. The recommended operating temperature range for SafeLink 2 is between -25 °C and +40 °C.

# Optional features



## Outdoor enclosure

The outdoor enclosure to suit the Safelink 2 attaches to the ring main unit. It is padlockable and no special tools are required for its installation. Once installed all critical fixings are hidden. For access to the Safelink 2 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				
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

## Concrete pad

Safelink should 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 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 section to improve access for connecting cables. The pad is designed for seismic loads up to 1g.



Dimensions				
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

# Optional features



## SIGMA F+E 3 short-circuit and earth fault indicator

The SIGMA F+E 3 provides short-circuit and earth fault indication with relay outputs for remote monitoring. Includes three cable bushing mounted current transformers for short circuit and earth fault detection.

Trip currents ( $I_k$ )	adjustable to 200, 300, 400, 600, 800, 1000 or 2000A, or self-adjusting
Trip currents ( $I_o$ )	adjustable to 20, 40, 60, 80, 100, 120 or 400 A
Response delay ( $I_k/I_o$ )	40, 80, 200, 300 ms/ 80, 160, 200, 300 ms
Timed reset	after passage of 1, 2, 4 or 8 h
Remote test/remote reset	via external potential-free momentary contact
Energy supply	Long-life lithium cell, life expectancy 20 years, total flashing time >1000h
Relay contact	permanent or momentary contact (1s), adjustable

**Note:** The Sigma F+E 3 is a minimum fault passage indication requirement for plug and play capability on automation enabled (AE) units.



## ComPass B directional short-circuit and directional earth fault indicator

The ComPass B provides directional detection of short-circuits and directional detection of earth faults, indication of load flow direction, and neutral earth connections. Connection to automation is available through Modbus. Includes three cable bushing mounted current transformers.

Trip currents ( $I_k/I_o$ )	50 A - 2000 A / 20 A - 1000 A
Delay time ( $I_k/I_o$ )	40 ms < t < 60 ms
Timed reset	after passage of 1, 2, 4 or 8 h
Remote test/remote reset	via external potential-free momentary contact
Energy supply	External: by 24 - 230V AC/DC; internal: by back-up supply
Relay contact	permanent or momentary contact (1s), selectable

**Note:** A voltage indication cable connecting to the VPIS is supplied for directional fault indication.



## DJ-3100 short-circuit and earth fault indicator

The DJ-3100 provides detection of short-circuits and earth fault indications. Includes three cable bushing mounted current transformers for short circuit detection and one cable mounted current transformer for earth fault protection.

Trip currents ( $I_k$ )	150 A - 2000 A
Earth fault currents ( $I_o$ )	10A - 60 A $\pm$ 1 A
Delay time ( $I_k/I_o$ )	40 ms < t < 60 ms
Timed reset	after passage of 7 s, 1, 2, or 4 h
Test/reset	reset via external potential-free momentary contact
Energy supply	Internal: by long life lithium cell 3.6 V / 2.45 Ah

# Optional features



## Phase comparator type PCM

The PCM-phase comparator indicates phase balance / unbalance between two modules. To be used in capacitive coupling systems, acc. to IEC 61243-5 and/or IEC 62271-206.

Before closing a new incoming feeder or ring current to a live SafeLink 2 ring main unit, check phase balance with the phase comparator.

## Special features

No external power supply required.

Voltage indication by flashing LED.

Fully insulated system (IP 68) with cast resin.

Technical data VIM 3	
Rated frequency	50 / 60 Hz
Threshold voltage U	70 - 90V
Threshold current I	1,62 - 2,5 $\mu$ A
Capacity to coupling system	74 - 88 pF
Input impedance of indicator	36 - 43,2 MOhm
Enclosure protection	IP 68
Dimensions VIM 3, w x h x d, excl. connectors	144 x 28 x 30 mm



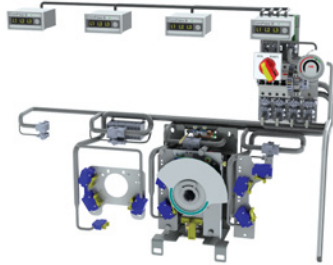
## Remote LED indicator

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.



# Optional features



## Automation

Configurable solutions determined by customer choice of components and looms

- Customer interface panel choice for required level of monitoring or automation
- 1 common wiring loom for each monitoring device
- 1 common wiring loom for each auxiliary switch or motor drive
- Local/Remote selector located on low voltage compartment door
- One common automation system for both 3 and 4 way RMUs with common looms



## Automation control box

- 1 common wiring loom connection to control box and RTU for power supply, SF6 monitoring, local/remote indication and Modbus signals
- Plug-in control box that houses battery and automation control box can be supplied to fit within the outdoor enclosure space

For more information see page 13.



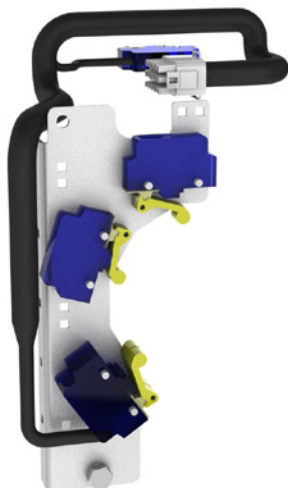
## Motor drive

- Demountable modular assembly able to be fitted to any ring switch
- Fitted behind mimic panel
- Two auxiliary switches per switch position
- Integral contactor control, wiring loom and plug connection
- 24Vdc operation
- Manual override is standard

## 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.
- Auxiliary switch can be fitted to ring switches and switch fuses.



**Note:** Motor drives have their own switch position switches fitted. Auxiliary switches for fuse trip indication are available.

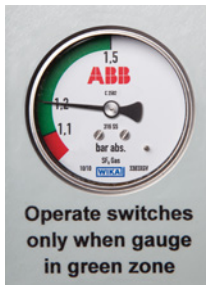
Ratings		
Ith	A	10
Vac	V	380
Vdc	V	450
V withstand	V	2500

# Optional features



## Shunt trip

- Available in 24Vdc and 230 Vac
- The shunt trip can be retrofitted to any fuse switch combination



## SF<sub>6</sub> gas pressure monitor with auxiliary contacts

This monitor is a direct replacement for the standard gauge.

There are two sets of contacts built into the gauge.

The first stage contact opens when the pressure drops to 1.15 bar indicating reduced gas. The second stage contact opens when the pressure drops to 1.1 bar or below and provides a signal that can be used for remote operation lockout.



## Gas filling/sampling adaptor kit

The gas filling/sampling adaptor kit allows access to the SF<sub>6</sub> gas tank via the density gauge shut-off connecting valve.

Fitted with ¼ NPT nipple for connection to bottle regulator set (not supplied).



## Extended height plinth

Extends the height by 300mm

Fits to the base of the RMU

Available in three sizes to suit width of the RMU

## Additional tank protection

A SafeLink 2 is available upon request where the 304L stainless steel tank has a protective coating to provide additional protection in corrosive environments.

A top cover is also fitted to the top of the tank yet does not affect the overall dimensions.

## Optional features



### Cable clamps

– ABB UKR-90 Cable clamp for cable diameters 20 – 90mm

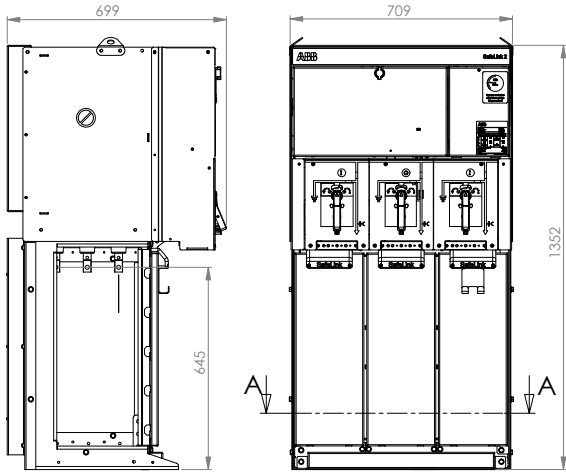


### TB-A 12 Kabeldon® termination boot

– 12kV, for cable sizes 16 – 300mm<sup>2</sup>

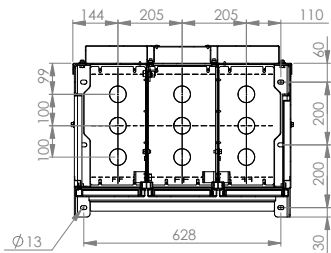
# Dimensions – 2-way / 3-way

CFC, CCC, DF, DC



Left Hand View  
(end panel removed)

Front View



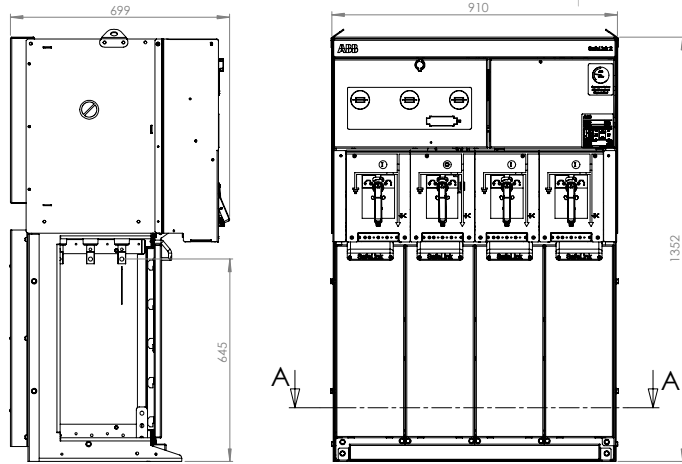
Foundation View (Section AA)

Configuration		CFC, CCC / DF, DC
Height <sup>1</sup>	mm	1352
Width	mm	709
Depth	mm	699
Weight	kg	285

<sup>1</sup> Extended height plinths are available to increase standard height to 1650mm

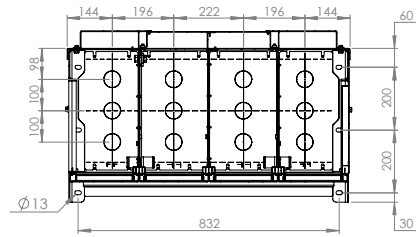
# Dimensions – 4-way / CFCF

## CFCC, CCCC, CFCF



Left Hand View  
(end panel removed)

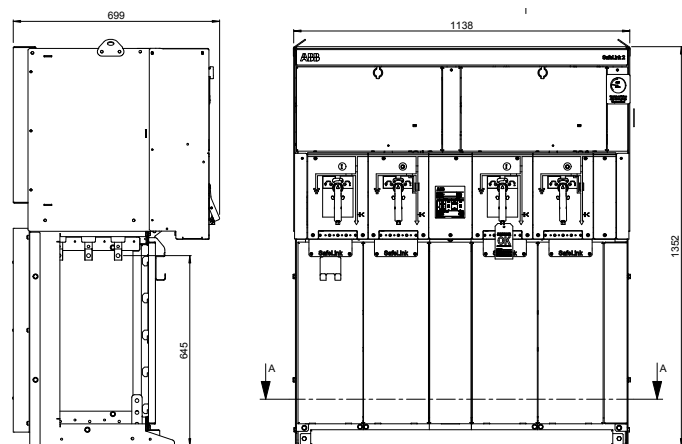
Front View



Foundation View (Section AA)

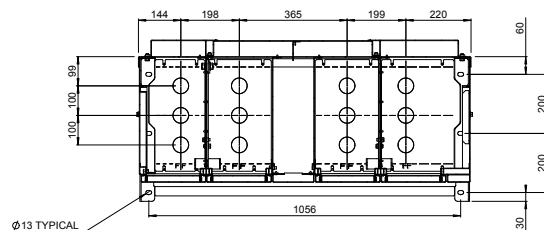
Configuration		CFCC, CCCC
Height	mm	1352
Width	mm	910
Depth	mm	699
Weight	kg	350

## CFCF



Left Hand View  
(end panel removed)

Front View



Configuration		CFCF
Height	mm	1352
Width	mm	1138
Depth	mm	699
Weight	kg	415

# Standards

## Codes and standards

SafeLink 2 is manufactured and tested in accordance with the latest version of the following IEC standards.

IEC 62271-1	High – voltage switchgear and control gear, 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 control gear for rated voltages above 1kV and up to and including 52 kV
IEC 60265-1 (1998-01)	High-voltage switches - Part 1: Switches for rated voltages above 1kV and less than 52 kV
IEC 60137 (1995-12)	Insulating bushings for alternating voltages above 1000 V
IEC 60529 (1989-11)	Degrees of protection provided by enclosures (IP Code)
62271-206	Voltage presence indicating systems for rated voltages above 1 kV and up to and including 52 kV

<b>ABB</b>				
<b>Serial Number</b>		IEC 62271-1		
<b>Production year</b>		IEC 62271-102		
<b>SafeLink 2 CFC</b>		IEC 62271-103		
		IEC 62271-105		
		IEC 62271-200		
	<b>Ring Switch</b>		<b>Switch Fuse</b>	
	<b>Main Switch</b>	<b>Earthing Switch</b>	<b>Main Switch</b>	<b>Earthing Switch</b>
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
<b>Minimum functional pressure for insulation</b>			110 kPa @ 20°C	
<b>Insulating fluid and mass</b>			SF6, 0.88 kg	
<b>Mass of switchgear</b>			285 kg	
<b>Internal arc classification</b>			AF, 20 kA(1 s)	
<b>Fuse striker</b>			Medium	
<b>Made by ABB, New Zealand</b>		<b>Product manual reference: 1YJM100028</b>		

## Rating label

The rating label is attached to the front of the unit and is a 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 used to identify each unit throughout its production.

# Maintenance

## Environment

The SafeLink 2 tank is a gas-tight welded stainless steel compartment. The tank is mounted on a hot dipped galvanized 4mm steel frame. The unit should be kept free of vegetation or other material to prevent corrosion of the stand and/or enclosure.

Additional protection against tank corrosion is available, see page 18.

The mass of SF<sub>6</sub> placed into the SafeLink 2 equipment at the time of filling is approximately as follows:

Configuration		Mass
CFC, CCC	kg	0.88, 0.95
CFCC, CCCC	kg	1.1, 1.2
CFCF	kg	1.3

## SF<sub>6</sub> Gas

ABB has SF<sub>6</sub> recycling facilities available. For more information on SF<sub>6</sub>, visit <http://www.abb.com/sf6>

## Maintenance

All components within the SF<sub>6</sub> insulated tank are maintenance free for the life expectancy of the unit.

Scratches or other damage to panels must be repaired.

Mechanical parts located outside the sealed tank are surface treated or made of corrosion resistant materials.

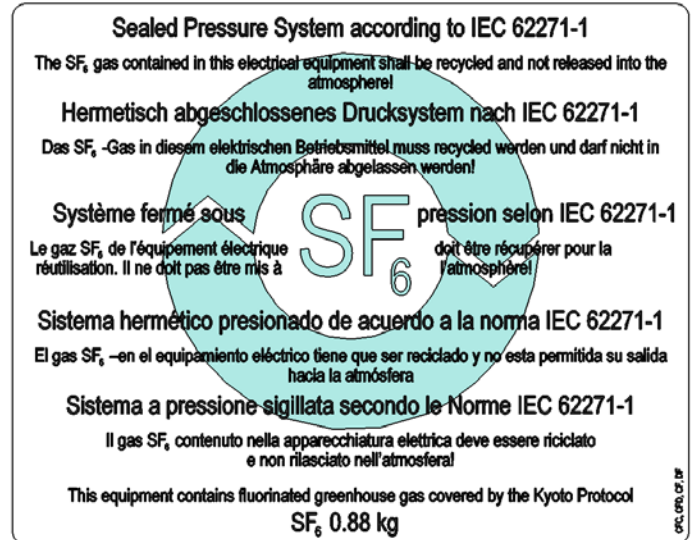
Units installed in harsh environments will require regular operation and maintenance. Maintenance includes cleaning the unit and inspection for and repair of corrosion.

The maintenance interval is dependent on the atmospheric corrosivity category specified in EN ISO 12944 part 2.

For the correct maintenance intervals contact ABB.

For added tank protection in harsh environments see page 18.

The outdoor enclosure is fabricated from marine grade aluminium with a powder coated finish. The base of the stand must be kept clear of vegetation and other materials.



A label identifying the equipment as containing SF<sub>6</sub> gas is placed adjacent to the filling point.

## Gas Filling

The gas density gauge on the front of the SafeLink 2 is temperature compensated and shows the pressure of SF<sub>6</sub> gas in the unit. All units are tested to ensure a thirty-year service life. A molecular sieve is fitted inside the switching enclosure to absorb any decomposition products and keeps the gas dry.

Gas filling is performed through the gas pressure gauge fitting on the front of the unit. The ABB filling adaptor should be used as 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.

# Environmental declaration

The product complies with the requirements denoted by IEC 62271-200.

Raw Material	Weight (kg)	% of total weight	Recycle	Environmental effects & recycle/reuse processes
Steel (incl. Stainless)	195	77%	Yes	Separate and (re)melt
Copper	27	10%	Yes	Separate and (re)melt
Zinc	6	2%	Yes	Separate and (re)melt
Brass	2	1%	Yes	Separate and (re)melt
Silver	0.1	0.03%	Yes	Separate and (re)melt
Thermoplastic	4	1%	Yes	Separate and make pellets or burn for energy
Rubber	1.5	1%	Yes	Burn for energy
SF6 gas	0.88	0.3%	Yes	ABB reclaims and recycles used SF6 gas
Total for recycling	235	93%		
Epoxy	18	7%	Returns	Returns 60% silicon ash if burned for energy
Epoxy Resin Fibre	0.2	0.1%	Landfill	
Total Weight <sup>1</sup>	253	100		

1. Based a CFC configuration

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 SF<sub>6</sub> gas from discarded switchgears for recycling.

There are no explicit requirements for how to handle discarded switchgears at end-of-life. ABB's recycling service is according to IEC 62271-303:2008 section 10: {End of life SF<sub>6</sub> filled equipment}. No special action is required; non-recoverable parts can be disposed of normally according to local regulations

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). The designed life span under indoor service condition exceeds 30 years.









# Contact Us

**ABB Limited**  
**Power Products Division**  
**Medium Voltage Products**  
PO Box 83203  
Edmonton  
Auckland 0652  
New Zealand  
Tel: +64 9 837 1234  
Fax: +64 9 837 2950  
[www.abb.co.nz/mediumvoltage](http://www.abb.co.nz/mediumvoltage)

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1YJM100027 EN – 09.2012