

# SafeLink

## 12kV SF<sub>6</sub> Insulated Ring Main Unit Installation and Operating Instructions



For further information refer to SafeLink Manual 1YJM100001 Rev E or contact your local ABB office.

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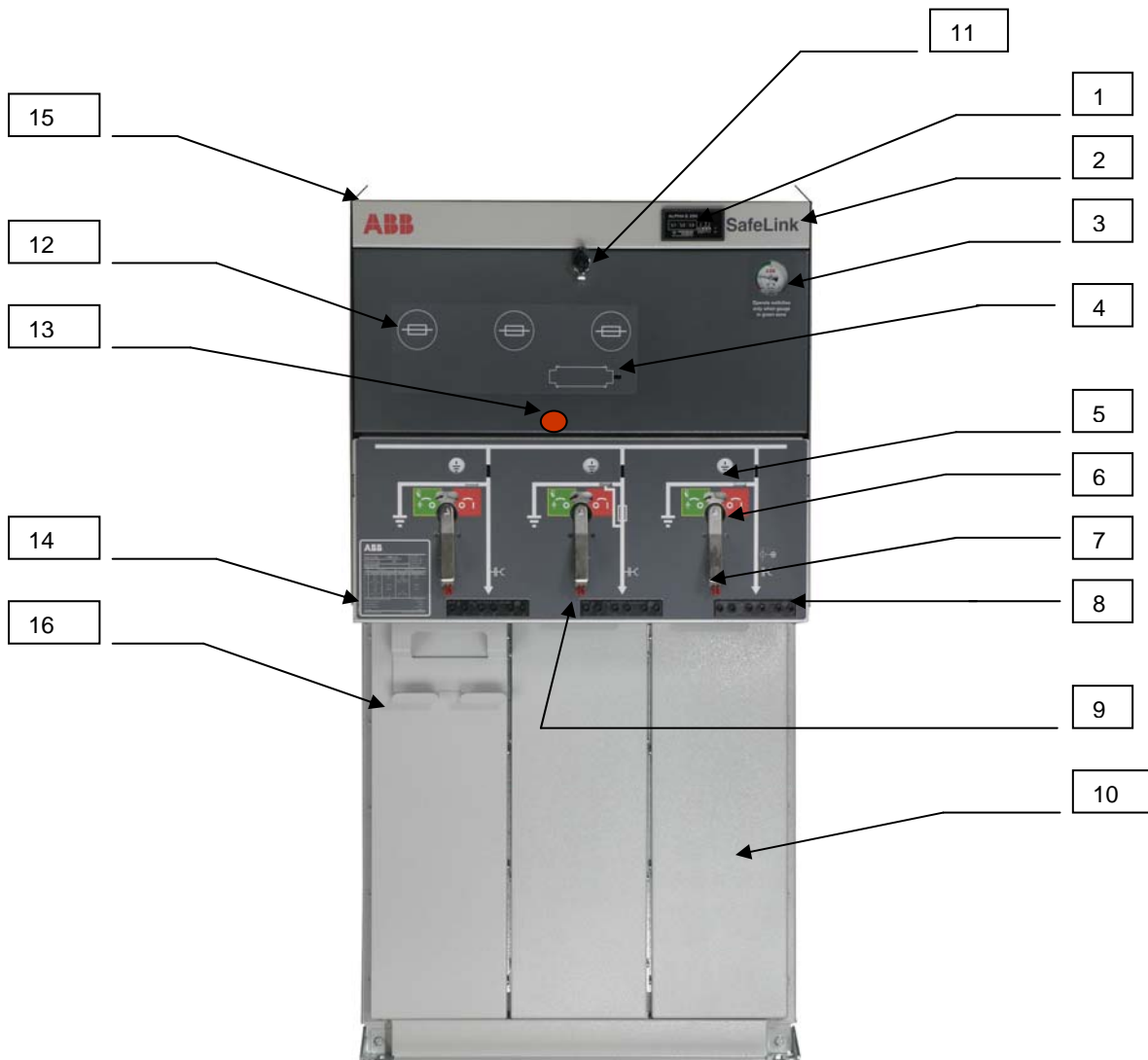
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# 1 SafeLink Features

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	Emergency trip (optional)
14	Rating plate, serial number
15	Lifting lugs
16	Cable-door handle includes door padlock facility



## 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, SF <sub>6</sub> 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 <sub>6</sub> (IEC 60376)
Filling Pressure @ 20°C:	1.2bar abs
Quantity:	0.8kg (CFC)
Minimum Operating Pressure:	1.1bar abs

### 2.2 Electrical Data

General Ratings @ 1.1bar abs SF<sub>6</sub> 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	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	U <sub>d</sub>	28 kV / 32 kV		28 kV / 32 kV	
Electrical Endurance Class	Er	E3	E2		E2

\* Refer to Section 5.4 on page 7 for the fuse selection chart.

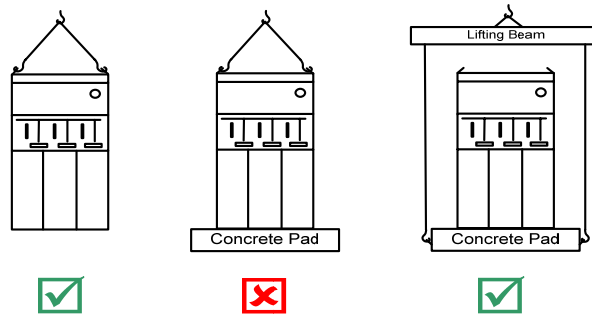
### 3 Transport & Handling

#### 3.1 Storage

SafeLink units must be stored under cover in a clean, dry and well-ventilated area.

#### 3.2 Transporting

The units are supplied packed on a wooden pallet 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 either be packed in a wooden crate or plastic wrap with carton top.  
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 local ABB sales office and provide a copy of the delivery receipt document.
4. ABB will take appropriate actions.

**Note: For purposes of making warranty and insurance claims it is 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.**

## 4 Installation

### 4.1 Foundations

The equipment shall be mounted on a 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 base should be smooth and must be installed such that it is level.

The units are fastened to the 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 circuit earths are applied. The side and division panels can then be removed to expose all the cable bushings to give maximum cable termination room.

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

### 4.3 Cable Connection

The maximum cable recommended is 300mm<sup>2</sup> three-core or 500mm<sup>2</sup> 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) Left hand cable termination completed.



**4.3.2 Cable termination boots**

The following ABB cable termination boots have been type tested with SafeLink for a voltage impulse level of 95kV BIL in accordance with IEC 60694-1996.

Manufacturer	Termination insulating boot type	Cable size
ABB Kabeldon	KAP 300	XLPE – 300 mm <sup>2</sup> max Paper insulated – 240 mm <sup>2</sup> max
ABB Kabeldon	TB-A 12	XLPE 16 – 300 mm <sup>2</sup> max

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 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 cable connection point.



Once the cable box cover is removed, the switch cannot be 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 6.**

**4.5 Voltage and phase balance test**

**It is recommended to do voltage and phase balance tests with the equipment shown below. (To IEC 61243-5 Standard)**



Voltage Indicator Type CL449



Phase Balance Tester Type MX100

## 5 Operation

The following sections describe the operating procedure for SafeLink.

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

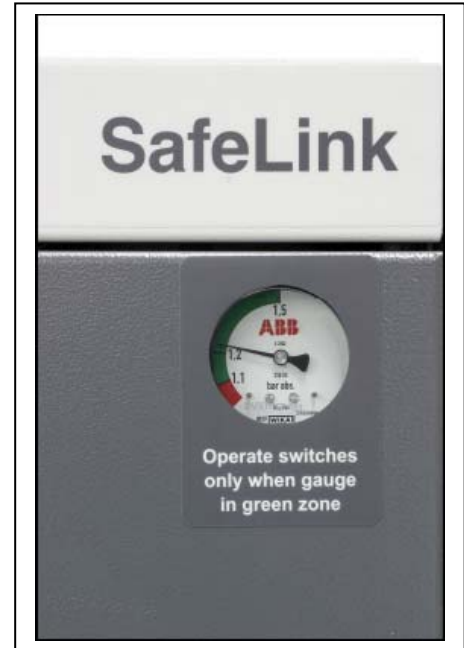
### 5.1 Gas Density Gauge

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 ± 1% at + 20°C (i.e. ± 20 mbar) and ± 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  $3 \times 10^{-6}$  mbar/s using helium).

Gas filling is through a valve at the front of the unit. (Refer to SafeLink Manual 1YJM100001 Rev E for further details)



### 5.2 General Switch Operation

**IMPORTANT! Refer to Operating Instructions, 1YJM100002 Rev A, attached to switchgear before attempting to open any cover or operate any switch. Failure to do so may damage the equipment or other property or cause personal injury and invalidate any warranties.**

### 5.3 Fuse Types and Replacement

The fuses used must comply with IEC 60282-1 (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.

Note that the switch will not remain in the closed position if a blown fuse is present.

Avoid dirt on the rubber plug; apply dry lubricant (i.e. talc), do not apply grease. 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 IEC 60282-1).

### 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 In (A)													
3.3	25	40	40	50	50	63	100	100	125	160				
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 °C + 40 °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 In (A)													
3.3	25	40	40	50	50	80	100	125	160					
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 °C + 40 °C  
 \* Maximum continuous overload 120%

**5.5 Cable Box Interlock**

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 (i.e. picture below Type B).

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.



Type A

Cable box without bolt on inner panel



Type B

Cable box with bolt on inner panel

For more details refer to SafeLink Manual 1YJM100001 Rev E.

## 6 Maintenance

### 6.1 Environmental

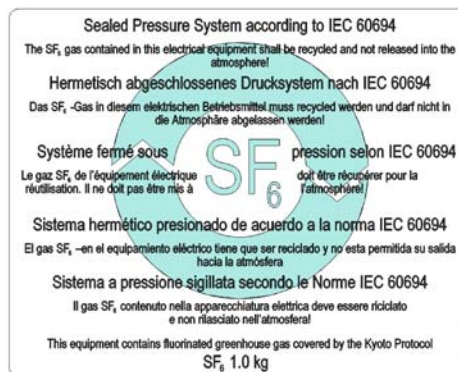
The SafeLink switching enclosure is a gas-tight welded stainless steel compartment. However, it is important that the base of the SafeLink installation be kept free of vegetation or other material to prevent corrosion of the stand and/or enclosure.

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

This equipment contains SF<sub>6</sub> gas. The equipment is a sealed pressure system according to IEC 60694. The gas in this equipment may not be vented to the atmosphere. The SF<sub>6</sub> gas contained in this electrical equipment shall be recycled. The approximate mass of SF<sub>6</sub> placed into the SafeLink equipment at the time of filling is as follows:

Configuration	Mass
3 way (and 2 way)	0.8kg
4 way	1.0kg
CFCF	1.1kg

A label identifying the equipment as containing SF<sub>6</sub> gas is placed adjacent to the filling point, and has the following format:



### 6.2 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. Moving parts are lubricated, as necessary during manufacture, for the unit's life expectancy.

Units installed in abnormal conditions will require regular inspection and maintenance depending on the nature of the environment.



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