

# SFG

SF<sub>6</sub> -gas insulated switch disconnecter  
12, 17,5 and 24 kV 630/800 A



**ABB**

## DESCRIPTION

**General**

The SFG is a gas-insulated switch disconnecter for medium voltage switchgear. It is widely in use e.g. in secondary distribution substations, power transformers, and ring networks.

The SFG is flexible, lightweight, and compact. It can be operated manually, or with motor. It has a fuse tripping option, remote control option, and a number of other accessories and features.

**Technical characteristics**

The SFG switch disconnecter includes the switch-disconnector itself, a single- or double-spring operating device with or without the motor operating gear, and a metallic (AluZink) frame. It is also possible to equip with a bushing unit for direct busbar connection.

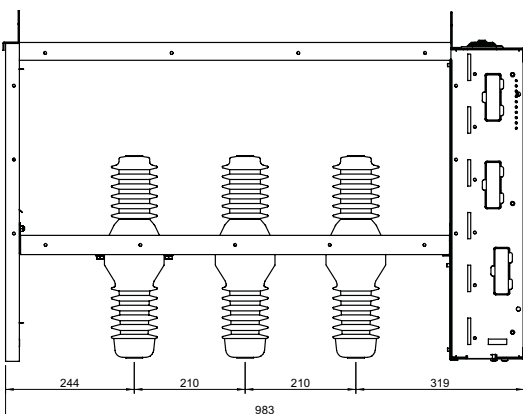
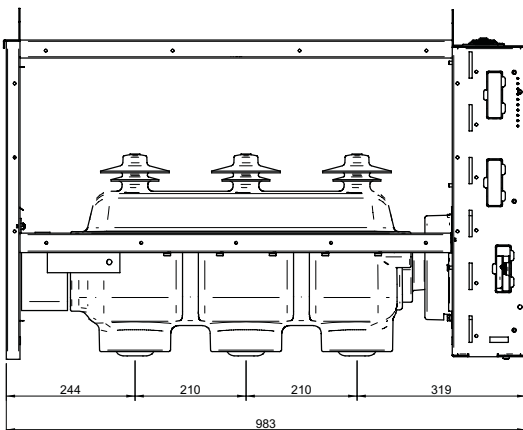
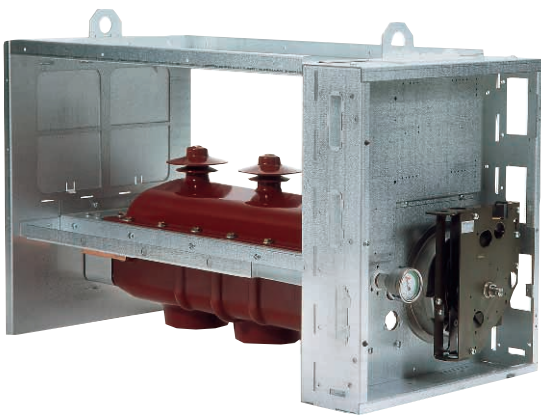
The switch disconnecter enclosure is made of epoxy resin, which gives many advantages.

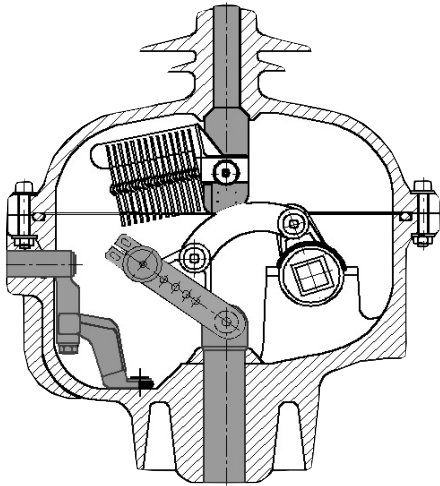
The SFG has 3 positions: Closed, Open and Earth. It utilises SF<sub>6</sub> gas as extinguishing and insulation medium. The gas pressure is 1.4 bar and each unit is sealed for life (i.e. 30 years). As an option a gas pressure-monitoring gauge is available.

The position of the contacts can be verified in three different ways in order to avoid any possibility of error. Firstly, there is a sturdy and reliable indicator mechanism in compliance with the IEC 60129 standards. In addition the switch housing also has two thermo plastic windows to allow visual inspection of the switch position. Finally, the housing also incorporates an integrated capacitive divider for voltage indication. Not only are these safety aspects highly appreciated by the personnel in field work conditions, the safety aspects also help to reduce the risk of injuries, and to save lives.

Mechanical endurance is guaranteed to 5000 closed /open, and 1000 open / earth operations. The operating device can be either: UES K3 - single spring or UES A3 - double spring (to be normally used in cubicles with fuses), motor operating device can also be added to both UES K3 and to UES A3 as an option.

The double spring device can optionally be equipped with a shunt trip coil, as well as a push-button for mechanical tripping.





### Segregation features

The epoxy resin enclosure provides an earthed segregation between the busbar compartment and the feeder compartment of the unit where the apparatus is installed in. This characteristic ensures maximum personnel safety during intervention in the feeder compartment. The enclosure also prevents any external influence on the switching process, by keeping humidity, dust, animals, etc. outside.

Furthermore the segregation provided by the switch reduces the possibility of a short circuit between the phases and between the upper and lower contacts of the same phase.

The sealed-for-life enclosure also prevents the poisonous gases and particles caused by arcs, to escape outside the switch. In such a manner the SFG helps to preserve our nature.

The SFG can optionally be equipped with a metal frame, which makes installation easier. The metal frame helps to improve safety in emergency situations as well.



### The epoxy resin enclosure

The material used in the enclosure is epoxy resin. This material is ideal for the purpose. The material is non-leaking and has good isolating capacity. It is also light in weight, non-corrosive and allows a very compact construction. In addition, a number of parts and accessories can be included in the material already in the casting process. Such are e.g. the capacitive dividers, and the thermoplastic windows for visual inspection.

The SFG enclosure consists of two moulded parts only: the top, and the body. These parts are bolted together firmly. The switch remains leak proof throughout its minimum 30-year life cycle, and complies with the highest IEC standards. Most needed parts are included in the moulded enclosure, for instance the integrated insulators. This minimises the risk of leakage at any time. However, the SFG is equipped with a pressure gauge to allow the monitoring of gas pressure. It also incorporates a gas valve for the emptying, changing, or adding of gas if that should be required. This is another important safety aspect of the SFG.

The enclosure also incorporates an explosion channel, known as the exhaust. The exhaust will direct the force of an explosion in a certain direction, should the switch be exposed to such conditions that an explosion is inevitable. This function will prevent the whole unit from exploding and thereby to further protect field personnel.

## Compliance with Standards

Switch disconnecter	<ul style="list-style-type: none"> <li>• IEC 60694</li> <li>• CEI EN 60694</li> </ul>
	<ul style="list-style-type: none"> <li>• IEC 60265-1</li> </ul> <p>Isolators and switch disconnectors for high voltage. Part 1: Isolators and switch disconnectors for rated voltages higher than 1 kV and lower than 52 kV.</p>
	<ul style="list-style-type: none"> <li>• IEC 60129</li> </ul> <p>Isolators and earthing switches, alternating current, voltage higher than 1000 V.</p>
Switch disconnecter combined with fuses	<ul style="list-style-type: none"> <li>• IEC 60420</li> <li>• CEI EN 60420</li> </ul> <p>Switch disconnectors combined with fuses, alternating current, high voltage.</p>
	<ul style="list-style-type: none"> <li>• IEC 60694</li> <li>• CEI EN 60694</li> </ul> <ul style="list-style-type: none"> <li>• IEC 60282.1</li> <li>• CEI EN 60282.1</li> </ul> <p>Fuses with voltage higher than 1000 V. Part 1: current-limiting fuses.</p>

## Electrical characteristics

Rated voltage	[kV]	12	17,5	24
Rated lightning impulse withstand voltage, common value	[kV]	75	95	125
Across the isolating distance	[kV]	85	110	145
Rated short duration power frequency withstand voltage, common value	[kV]	28 1)	38 1)	50
Across the isolating distance	[kV]	32 1)	45 1)	50/60
Rated frequency	[Hz]	50/60	50/60	50/60
Rated current I <sub>r</sub>	[A]	800	800	630
Rated short time withstand current	[kA]	25	20	20
Rated duration of short circuit	[s]	2	3	3
Rated peak withstand current	[kA]	62,5	50	50
Breaking capacity ( IEC 60265-1), mainly active load	[A]	630/800	630/800	630
Number of breaking operations	[C/O]	100	100	100
Closed-loop distribution current	[A]	630	630	630
Cable charging current	[A]	50/10	50/10	50/10
Line charging current	[A]	20	20	20
Cable and line charging current under earth faults	[A]	87	87	87
Making capacity (IEC 60265-1)	[kA]	62,5	50	50
Making and breaking capacity (IEC 60420)				
Withstanding and making the cut-off current of the fuse	[kA]	25	20	20
Breaking test with long prearcing time of fuse		ok	ok	ok
Breaking capacity at rated transfer current	[A]	1530	1260	920
Mechanical endurance of switch close / open		5000	5000	5000
Mechanical endurance of switch open / earth		1000	1000	1000
Ambient temperature, maximum value	[C]	+40	+40	+40
Maximum value of 24 h mean	[C]	+35	+35	+35
Minimum value	[C]	-5	-5	-5 3)
Altitude above sea level	[m]	≤1000 2)	≤1000 2)	≤1000 2)

- 1) Highest values in accordance with national standards
- 2) Adjustment is necessary for greater altitudes
- 3) Lower ambient temperature on request

## OPERATING MECHANISMS

### General

The SFG apparatus uses basically two different types of operating mechanisms, either a single spring device or a double spring device. Both mechanisms can be operated manually with a lever, or with a push-button motor operation.

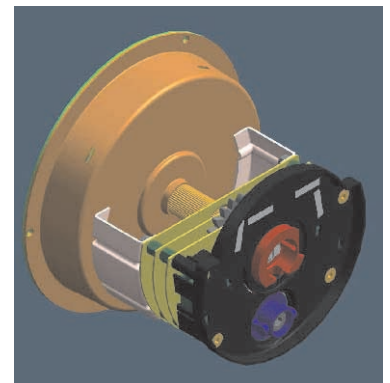
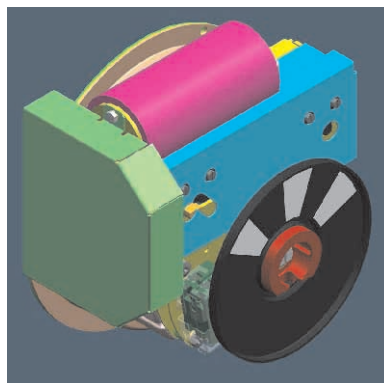
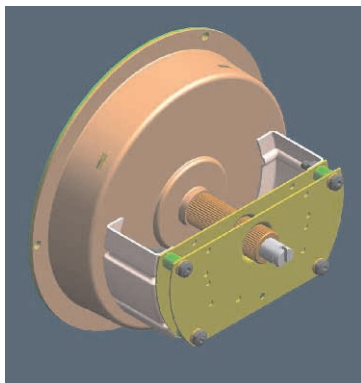
Generally the SFG follows the philosophy "one shaft for all three positions (Closed-Open-Earth). This means maximum reliability through a minimum number of moving parts. It also means minimum costs and minimum service. However, both mechanisms can also be equipped with a double-shaft operation incorporating separate operating slots for the switch-disconnector and for the earthing switch. The latter option is utilised e.g. when legal aspects regulations double-shaft operation.

The core of both operating mechanisms is the actuator. This device is used in all versions of the SFG. The extremely reliable and sturdy actuator is fitted inside a non-corrosive and sealed-for-life protective steel shell. It has a life span of minimum 30 years, no loose parts inside, and it is virtually maintenance free. Hence, it forms a good complement to the SFG.

### The single spring device

The device enables either manual or motor operated switching between the three positions of the SFG. In other words, it performs the switching between Closed-Open positions, and between Open-Earth position. The operating speed is totally independent of the operating personnel, because it is obtained by using the energy stored in the steel actuator.

The options available for the single spring device are manual- or motor-operation, with either single-shaft or double-shaft operation.



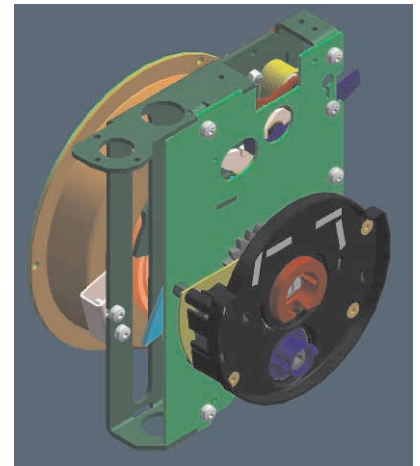
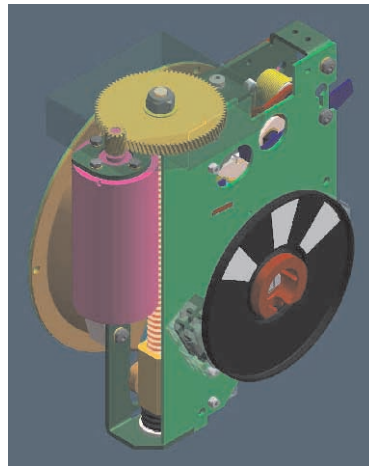
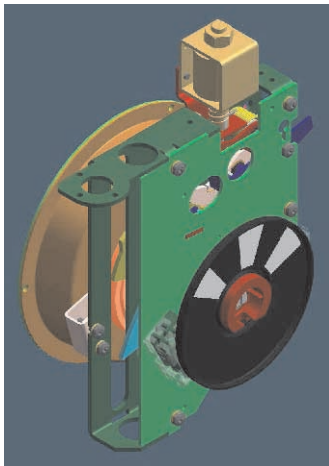
## The double spring device

The core function of the double spring device is similar to the single spring device. It enables either manual or motor operated switching between the three positions of the SFG. Again, the operating speed is totally independent of the operating personnel, because it is obtained by using the energy stored in the steel actuator.

In addition, the double spring device offers the options of manual tripping, and/or fuse tripping, and/or magnetic shunt release tripping. The name “double spring device” refers to the additional spring mechanism in this device. The additional spring stores the amount of extra energy needed for the above mentioned tripping functions. This spring is automatically charged when operating the actuator.

The options available for the double spring device are:

- manual- or motor-operation
- either single-shaft or double-shaft operation
- manual push-button tripping, and/or fuse tripping, and/or magnetic shunt release tripping



### Assessories to operating mechanisms

Type of operating mechanism	Single spring	Double spring
Auxiliary closed position contacts (2 NC + 2 NO)	■	■
Auxiliary earthing position contacts (2 NC + 2 NO)	■	■
Shunt opening release		■
Motor operation	■	■
Mechanical position indicator	■	■
Automatic release for fuse blown		■
Auxiliary contact for fuse blown (1 NC + 1NO)		■
Interlocking device (2 Ronis or Profalux)	■	■
Double shaft operation option	■	■
Single shaft operation	■	■
Manual tripping		■

For further details regarding accessories, please see page 13.

## TYPES AVAILABLE



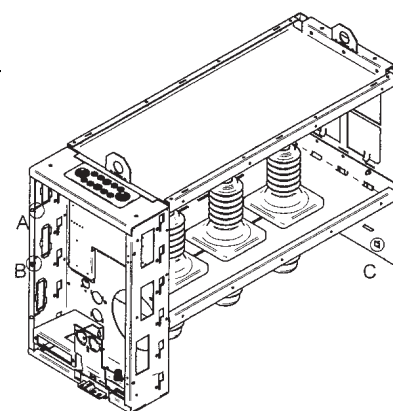
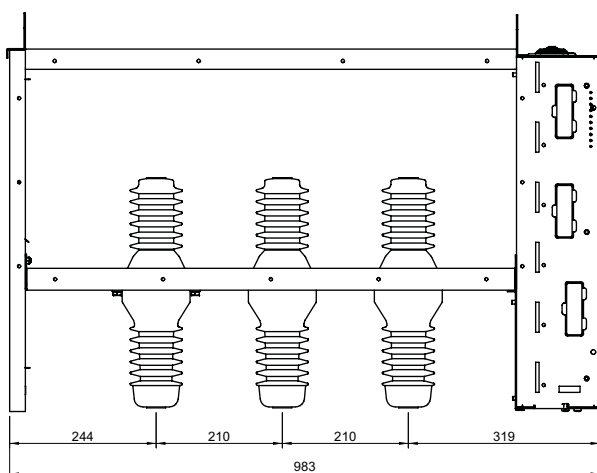
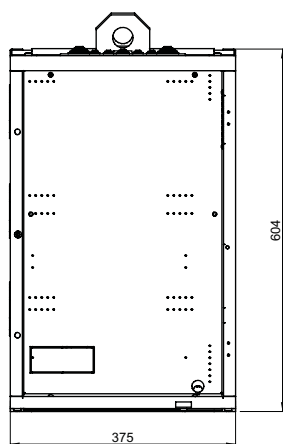
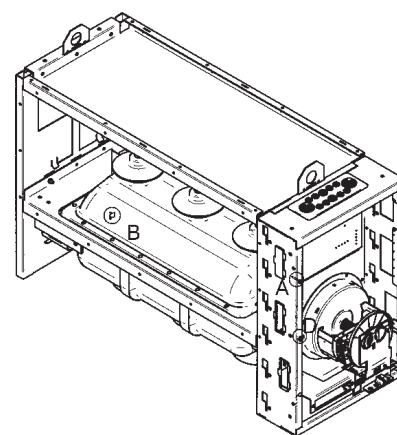
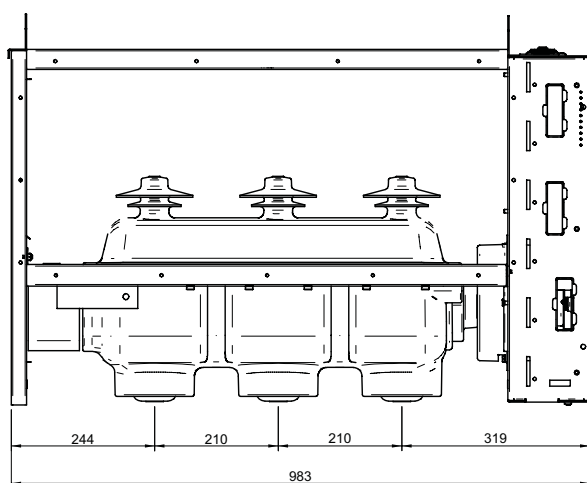
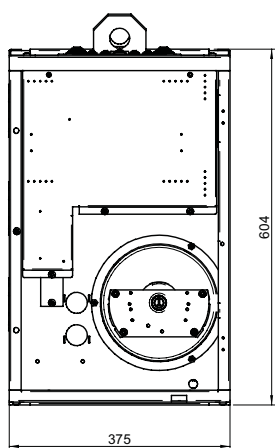
SFG and Top Units	Width (mm)	Item No.
SFG switch disconnector	375	1VFS110001R2
1-spring device		UES-K3/2
1-spring device + motor operating device		UES-K3/2 + UEMC40K8/3
2-spring device		UES-A3/2
2-spring device with motor gear UES-A3M/2		UES-A3M/2
Electrical motor set UEZM5 for 2-spring device		1VFU120003R2
Top Unit with 1-spring operating device	375	1VFM111001R2
1-spring device + motor operating device		UES-K3/2 + UEMC40K8/3
Top Unit with 1-spring operating device	500	1VFM111004R2
1-spring device + motor operating device		UES-K3/2 + UEMC40K8/3
Top Unit with 2-spring operating device	375	1VFM111002R2
Top Unit with 2-spring operating device	500	1VFM111005R2
Top Unit with 2-spring device and motor gear UES-A3M/2	375	1VFM111003R2
Electrical motor set UEZM5 for 2-spring device		1VFU120003R2
Top Unit with 2-spring device and motor gear UES-A3M/2	500	1VFM111006R2
Electrical motor set UEZM5 for 2-spring device		1VFU120003R2
Bushing unit	375	1VFM111007R2
Bushing unit	500	1VFM111008R2

## OVERALL DIMENSIONS

Length 835 mm  
Width 375 mm

Weight 40 kg

Top unit



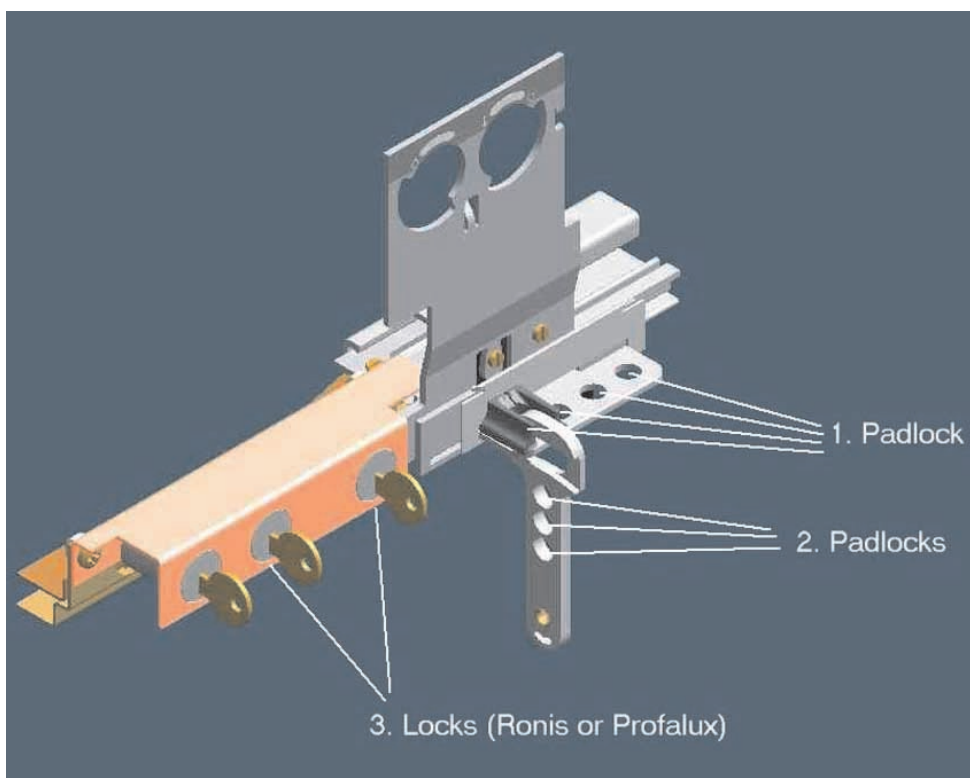
**Example of Switch disconnecter unit, arc-proof version**



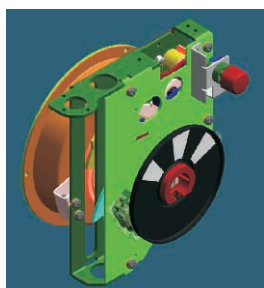
## SFG ACCESSORIES

**Central locking system**

Enables the locking of the switch disconnecter in any of the three positions. It is possible to use the locking system in connection with all operating options.

**Door lock**

The central locking system also includes a device which prevents the unit door to be opened while power is connected.

**Auxilliary contacts**

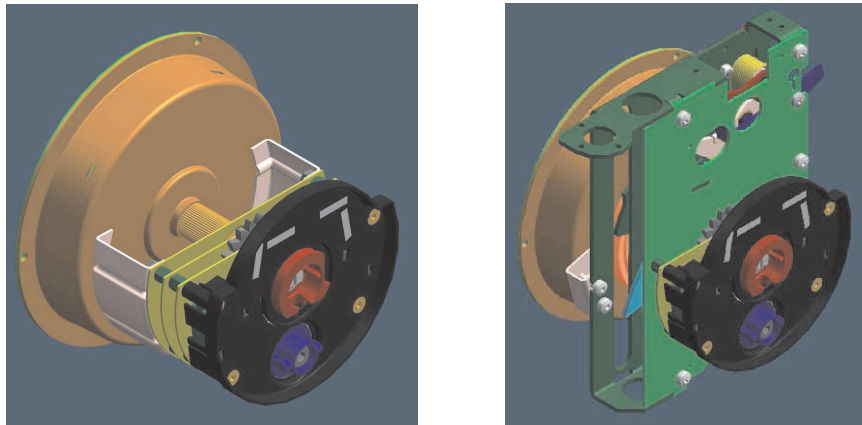
These signal the position of the apparatus. Function in all three switching positions.

**Tripping mechanisms**

The double spring device offers the options of manual push-button tripping, and/or fuse tripping, and/or magnetic shunt release tripping.

### **Double-shaft operating mechanism**

The spring mechanisms can also be equipped with a double-shaft operation, incorporating separate operating slots for the switch disconnecter and for the earthing switch. This option is utilised e.g. when legal aspects require double-shaft operation.



### **Voltage indicator**

The SFG has integrated capacitive dividers for voltage indication in each phase. The visible voltage indication is achieved through an additional led-light device.

### **Gas pressure monitoring gauge**

The SFG is leak proof throughout its minimum 30-year life cycle, and it complies with the highest IEC standards. However, as additional safety precaution the SFG can also be equipped with a pressure gauge to allow continuous monitoring of gas pressure. The SFG also incorporates a gas valve for the emptying, changing, or adding of gas if that should be required.

The valve also allows the emptying of insulation gas and contaminants caused by arcing. This emptying can be performed e.g. by the end of the life cycle, in order to prevent these substances to enter the atmosphere. This aspect is important in preserving our common environment.



**ABBOy**  
Medium Voltage Technology  
P.O.Box 613, FIN-65101 Vaasa, Finland  
Tel: +358 10 22 11  
Fax: +358 10 22 44661  
[www.abb.com](http://www.abb.com)

The data and illustrations are not binding.  
We reserve the right to make changes in the  
course of technical development of the product.

SFG 1 GB 02-04