



Vacuum interrupters

Vacuum interrupters

Over 30 years of experience in vacuum technology

Worldwide more than 5 million ABB vacuum interrupters in service

Latest technologies for high quality mass-production

Process management according to Shop Floor Control (SFC)

Compact and robust design

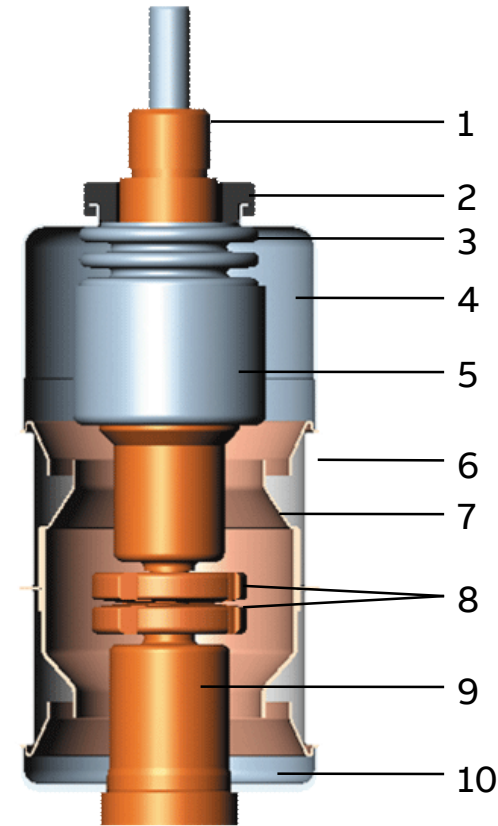
High reliability and electrical life time



Vacuum interrupters

Principle structure

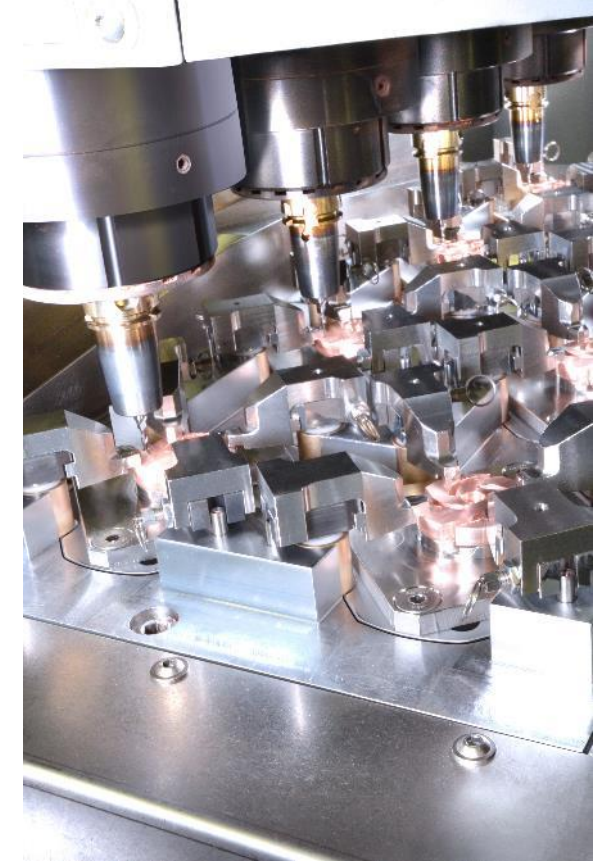
- 1 Stem / Terminal
- 2 Twist protection
- 3 Metal bellows
- 4 Interrupter lid
- 5 Shield
- 6 Ceramic insulator
- 7 Shield
- 8 Contacts
- 9 Stem / Terminal
- 10 Interrupter lid



Vacuum interrupters

Manufacturing procedures

- Fully automatic cleaning operation of assembly parts
- Automatic transport of assembly parts directly into the clean room
- Environmental friendly process water treatment system
- Manufacturing of switching contacts by dry machine



Vacuum interrupters

Vacuum furnace

Batching of pre-assembled vacuum interrupters

Clean room conditions to US standard class 1000

Vacuum furnaces – evacuate and seals the vacuum interrupter in a single operation

Monitoring of all important process parameters

Pressure < 10⁻⁸ hPa (mbar)

Temperatures > 800°C / 1472°F



Vacuum interrupters

Quality Control

Essential part of vacuum interrupter manufacturing process

All data is collected and stored

Automatic high voltage conditioning to achieve and prove dielectric strength

Double internal pressure measurement for the vacuum interrupters (magnetron method)

Quarantine storage in pressure chambers filled with inert gas

Automatic X-Ray examination of complete vacuum interrupters



Vacuum interrupters

Vacuum interrupter family VG and VS



Vacuum interrupters

for circuit-breaker application – low / mid duty

VG5



12 kV

...1250 A

...20 kA

17,5 kV ¹⁾

...1250 A

...20 kA

24 kV ¹⁾

...1250 A

...16 kA

...125/50 kV ^{1) 2)}

30.000 ³⁾

VGE4



12 kV

...1250 A

...25 kA

17,5 kV ¹⁾

...1250 A

...25 kA

...95/42 kV ^{1) 2)}

30.000 ³⁾

VG4



12 kV

...2500 A

...25 kA

17,5 kV ¹⁾

...2500 A

...25 kA

24 kV ¹⁾

...2500 A

...20 kA

...125/50 kV ^{1) 2)}

30.000 ³⁾

VGE4-S



12 kV

...2500 A

...31,5 kA

17,5 kV ¹⁾

...2500 A

...31,5 kA

...95/42 kV ^{1) 2)}

30.000 ³⁾

VG4-S



12 kV

...2500 A

...31,5 kA

17,5 kV ¹⁾

...2500 A

...31,5 kA

24 kV ¹⁾

...2500 A







...25 kA

...125/50 kV ^{1) 2)}

30.000 ³⁾

Vacuum interrupters



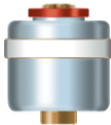
for circuit-breaker application – high duty

VG10	VGE6	VG6	VG6-S ⁴⁾	VG8	VG8-S
					
36/40.5 kV ¹⁾	12/17.5 kV	12/17.5 kV	36/40,5 kV ¹⁾	36/40.5 kV ¹⁾	36/40.5 kV ¹⁾
...2000 A	...3150 A	...3150 A	...3150 A	...3150 A	...3150 A
...20 kA	...40 kA	...40 kA	...31.5 kA	...31.5 kA	...40 kA
		24 kV ¹⁾			
		...3150 A			
		...31.5 kA			
		36/40,5 kV ¹⁾			
		...3150 A			
		...31.5 kA			
...185/95 kV ^{1) 2)}	...95/42 kV ^{1) 2)}	...185/95 kV ^{1) 2)}	...185/95 kV ^{1) 2)}	...200/95 kV ^{1) 2)}	...200/95 kV ^{1) 2)}
30,000 ³⁾	30,000 ³⁾	30,000 ³⁾	30,000 ³⁾	30,000 ³⁾	30,000 ³⁾



Vacuum interrupters

for circuit-breaker application – high duty

VG7	VG11	VGHC2
		
12/17.5 kV	12/17.5 kV	1.2 kV
...3150 A	...3150 A	...3200 A
...50 kA	...63 kA	...65 kA
...95/42 kV ²⁾	...95/42 kV ²⁾	
30,000 ³⁾	10,000 ³⁾	100,000 ³⁾

Vacuum interrupters

in silicone embedding technique

With Silicone embedding

By embedding in silicone, VIs are suitable for the application in air with higher rated voltage levels

Example (in air):

VG4

12 kV ...2500 A ...25 kA ...30,000 CO

Ceramic diameter: 90 mm

VG4 silicone

24 kV ...2500 A ...20 kA ...30,000 CO

Silicone diameter: 100 mm



Vacuum interrupters

in silicone embedding technique





VG5 Silicone	VGE4 Silicone	VG4 Silicone	VGE4-S Silicone	VG4-S Silicone
				
24 kV	17.5 kV	24 kV	17.5 kV	24 kV
...1250 A	...1250 A	...2500 A	...2500 A	...2500 A
...16 kA	...25 kA	...20 kA	...31.5 kA	...25 kA
...30,000 CO ³⁾	...30,000 CO ³⁾	...30,000 CO ³⁾	...30,000 CO ³⁾	...30,000 CO ³⁾

1) Only with additional external insulation
 3) Mechanical operating cycles

2) Rated lightning impulse withstand voltage / rated power frequency withstand voltage
 4) Increased number of short-circuit operations

Vacuum interrupters

in silicone embedding technique







VG10 Silicone	VG6 Silicone	VG6-S Silicone ⁴⁾	VG8 Silicone	VG8-S Silicone
				
36/40.5 kV	36/40.5 kV	36/40.5 kV	36/40.5 kV	36/40.5 kV
...2500 A	...3150 A	...3150 A	...3150 A	...3150 A
...20 kA	...31.5 kA	...31.5 kA	...31.5 kA	...40 kA
...30,000 CO ³⁾	...30,000 CO ³⁾	...30,000 CO ³⁾	...30,000 CO ³⁾	...30,000 CO ³⁾

¹⁾ Only with additional external insulation
³⁾ Mechanical operating cycles

²⁾ Rated lightning impulse withstand voltage / rated power frequency withstand voltage
⁴⁾ Increased number of short-circuit operations

Vacuum interrupters

for switch application

VAC1	VS2	VAS2	VS4	VS5 ¹⁾	VG5-L
					
7.2 kV	12 kV	12 kV	24 kV ²⁾	27 kV ²⁾	27 kV ²⁾
...400 A	...400 A	...800 A	...630 A	...800 A	...1250A
...4 kA	...4 kA	(4 kA)	(4 kA)	(4 kA)	(4 kA)
...60/20 kV ³⁾	...75/42 kV ³⁾	...85/48 kV ³⁾	...125/50 kV ^{2) 3)}	...150/70 kV ^{2) 3)}	...150/60 kV ^{2) 3)}
...1,000,000 CO ⁴⁾	...1,000,000 CO ⁴⁾	...10,000 CO ⁴⁾	...30,000 CO ⁴⁾	...30,000 CO ⁴⁾	...30,000 CO ⁴⁾

Vacuum interrupters

Conclusion

Compact and robust design for highest demands

Latest production processes for high reliability and long life

Silicone casting for out-standing external dielectric properties

High quality management according to DIN EN ISO 9001

Worldwide dominant switching technology in the medium voltage range

Environmental friendly and maintenance-free for life



Vacuum Interrupters and Embedded Poles from ABB

Our values for the customer

Quality & Support



- Individual customer solutions and support (e.g. short leadtimes)
- Full access to technical competence and test labs (e.g. type test support)
- Dedicated customer support for day-to-day issues

Reliability & Performance



- Latest production and extended quality methods with high degree of automation (e.g. series X-ray check)
- Benefit from the large production volume (global supplier base with full risk management)
- Proven in all ABB vacuum products

Innovation



- Innovations on ABB components give competitive advantages for our partners
- Full in-house contact production and material control (z.B. batch-wise real-life making/breaking tests)
- Full access to latest embedding technologies

**The right core
component for your
apparatus**

ABB