

Medium-Voltage Devices Product Range

Devices for medium-voltage switchgear

With the equipment program for switchgear Siemens can deliver nearly every device which is required in the medium-voltage range between 7.2 and 36 kV. Fig. 101 gives an overview of the available devices and their main characteristics.

All components and devices conform to international and national standards, as there are:

Vacuum circuit-breakers

- IEC 60 056
- IEC 60 694
- BS5311

Vacuum switches

- IEC 60 265-1
- in combination with Siemens fuses:
- IEC 60 420

Vacuum contactors

- IEC 60 470
- UL 347

Switch disconnectors

- IEC 60 129
- IEC 60 265-1

HV HRC fuses

- IEC 60 282

Current and voltage transformers

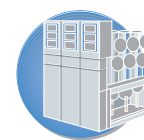
- IEC 60 185, 60 186
- BS 3938, 3941
- ANSI C57.13

For further information please contact:

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Device	Type	Rated voltage [kV]	Short-circuit current [kA]	Short-time current (3s) [kA]
Indoor vacuum circuit-breaker	3AH	7.2 ... 36	13.1 ... 80	13.1 ... 80
	NX ACT	12	25	25
Outdoor vacuum circuit-breaker	3AF	36	25	25
Components for 3AH VCB	3AY2	12 ... 36	16 ... 40	16 ... 40
Indoor vacuum switch	3CG	7.2 ... 24	–	16 ... 20
Indoor vacuum contactor	3TL	7.2 ... 24	–	8 (1s)
Vacuum interrupter	VS	7.2 ... 40.5	12.5 ... 80	12.5 ... 80
Indoor switch disconnector	3CJ	12 ... 24	–	18 ... 26 (1s)
Indoor disconnecting and grounding switch	3D	12 ... 36	–	16 ... 63 (1s)
HV HRC fuses	3GD	7.2 ... 36	31.5 ... 80	–
Fuse bases	3GH	7.2 ... 36	44 peak withstand current	–
Indoor post insulators, Bushings	3FA 3FH/3FM	3.6 ... 36	–	–
Indoor and outdoor current and voltage transformers	4M	12 ... 36	–	–
Surge arresters	3E	3.6 ... 42	–	–

Fig. 101: Equipment program for medium-voltage switchgear



Medium-Voltage Devices Product Range

Rated current [A]	Operating cycles			Applications/remarks	Page
	mechanical	with rated current	with short-circuit current		
800 ... 12,000	10,000 ... 120,000	10,000 ... 30,000	25 ... 100	All applications, e.g. overhead lines, cables, transformers, motors, generators, capacitors, filter circuits, arc furnaces	3/74
1250 ... 2500	10,000	10,000	25 ... 50		3/78
1600	10,000	10,000	50	All applications, e.g. overhead lines, cables, transformers, motors, generators, capacitors, filter circuits	3/80
1250 ... 2500	–	–	–	Original equipment manufacturer (OEM) and retrofit	3/81
800	10,000	10,000	–	All applications, e.g. overhead lines, cables, transformers, motors, capacitors; high number of operations; fuses necessary for short-circuit protection	3/82
400 ... 800	1x10 ⁶ ... 3x10 ⁶	0.25x10 ⁵ ... 2x10 ⁶	–	All applications, especially motors with very high number of operating cycles	3/84
630 ... 4000	10,000 ... 30,000	10,000 ... 30,000	25 ... 100	For circuit breakers, switches and gas-insulated switchgear	3/85
630	1000	20	–	Small number of operations, e.g. distribution transformers	3/86
630 ... 3000	–	–	–	Protection of personnel working on equipment	3/87
6.3 ... 250	–	–	–	Short-circuit protection; short-circuit current limitation	3/88
400	–	–	–	Accommodation of HV HRC fuse links	3/88
–	–	–	–	Insulation of live parts from another, carrying and supporting function	3/89
–	–	–	–	Measuring and protection	3/90
–	–	–	–	Overvoltage protection	3/90

Medium-Voltage Devices

Type 3AH

Indoor vacuum circuit-breakers type 3AH

The 3AH vacuum circuit-breakers are three-phase medium-voltage circuit-breakers for indoor installations.

The 3AH circuit-breakers are suitable for:

- Rapid load transfer, synchronization
- Automatic reclosing up to 31.5 kA
- Breaking short-circuit currents with very high initial rates of rise of the recovery voltage
- Switching motors and generators
- Switching transformers and reactors
- Switching overhead lines and cables
- Switching capacitors
- Switching arc furnaces
- Switching filter circuits

As standard circuit-breakers they are available for the entire medium-voltage range. Circuit-breakers with reduced pole center distances, circuit-breakers for very high numbers of switching cycles and single-phase versions are part of the program.

The following breaker types are available:

- **3AH1** – the maintenance-free circuit-breaker which covers the range between 7.2 kV and 24 kV. It has a lifetime of 10,000 operating cycles
- **3AH2** – the circuit-breaker for 60,000 operating cycles in the range between 7.2 kV and 24 kV
- **3AH3** – the maintenance-free circuit-breaker for high breaking capacities in the range between 7.2 kV and 36 kV. It has a lifetime of 10,000 operating cycles
- **3AH4** – the circuit-breaker for up to 120,000 operating cycles
- **3AH5** – the economical circuit-breaker in the lower range for 10,000 maintenance-free operating cycles

Properties of 3AH circuit breakers:

No relubrication

Nonwearing material pairs at the bearing points and nonaging greases make relubrication superfluous on 3AH circuit-breakers up to 10,000 operating cycles, even after long periods of standstill.

High availability

Continuous tests have proven that the 3AHs are maintenance-free up to 10,000 operating cycles: accelerated temperature/humidity change cycles between -25 and +60 °C prove that the 3AH functions reliably without maintenance.

Assured quality

Exemplary quality control with some hundred switching cycles per circuit-breaker, certified to DIN/ISO 9001.

No readjustment

Narrow tolerances in the production of the 3AH permanently prevent impermissible play: even after frequent switching the 3AH circuit-breaker does not need to be readjusted up to 10,000 operating cycles.

Electrical data and products summary

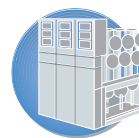
Rated voltage [kV]	Vacuum circuit-breaker (Type)											
	at Rated short-circuit breaking current ¹⁾ (Rated short-circuit making current)											
	[kA]	[kA]	[kA]	[kA]	[kA]	[kA]	[kA]	[kA]	[kA]	[kA]	[kA]	
	13.1 (32.8)	16 (40)	20 (50)		25 (63)	31.5 (80)	40 (100)		50 (125)	63 (160)	up to 80 (225)	
7.2			3AH1		3AH1	3AH1 3AH2		3AH1 3AH2	3AH3	3AH3		
12	3AH5	3AH5	3AH5 3AH1		3AH5	3AH1 3AH2		3AH1 3AH2	3AH3	3AH3		
15			3AH1			3AH1 3AH2		3AH1 3AH2	3AH3	3AH3		
17.5			3AH1		3AH5	3AH1 3AH2		3AH1 3AH2	3AH3	3AH3	3AH38 ^{*)}	
24		3AH1 3AH5		3AH1		3AH1 3AH2		3AH3 3AH4				
36		3AH5				3AH3 3AH4		3AH3 3AH4				
	800 A	800 A to 1250 A	800 A to 1250 A	800 A to 2500 A	800 A to 1250 A	800 A to 2500 A	1250 A to 2500 A ²⁾	2500 A	1250 A to 3150 A	1250 A to 3150 A	1250 A to 4000 A	8000 A to 12000 A
	Rated normal current											

¹⁾ DC component 36% (higher values on request).

²⁾ 3150 A for rated voltage 17.5 kV.

^{*)} 3 switches in parallel

Fig. 102: The complete 3AH program



Medium-Voltage Devices

Type 3AH

3AH1
24 kV, 25 kA, 1250 A



3AH2
24 kV, 25 kA, 2500 A



3AH4
24 kV, 40 kA, 2500 A



Fig. 103: Vacuum circuit-breakers type 3AH

Advantages of the vacuum switching principle

The most important advantages of the principle of arc extinction in a vacuum have made the circuit-breakers a technically superior product and the principle on which they work the most economical extinction method available:

- **Constant dielectric:**
In a vacuum there are no decomposition products and because the vacuum interrupter is hermetically sealed there are no environmental influences on it.
- **Constant contact resistance:**
The absence of oxidization in a vacuum keeps the metal contact surface clean. For this reason, contact resistance can be guaranteed to remain low over the whole life of the equipment.
- **High total current:**
Because there is little erosion of contacts, the rated normal current can be interrupted up to 30,000 times, the short-circuit breaking current an average of 50 times
- **Low chopping current:**
The chopping current in the Siemens vacuum interrupter is only 4 to 5 A due to the use of a special contact material.
- **High reliability:**
The vacuum interrupters need no sealings as conventional circuit-breakers. This and the small number of moving parts inside makes them extremely reliable.



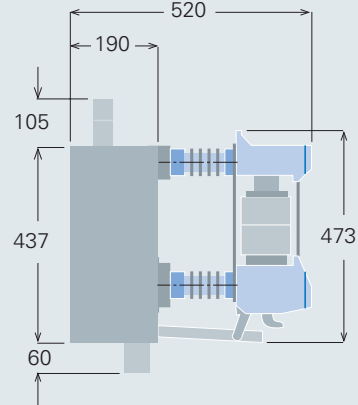
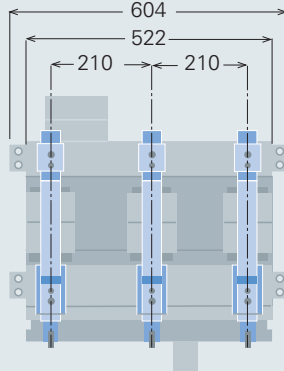
Fig. 104: Front view of vacuum circuit-breaker 3AH1

Medium-Voltage Devices

Type 3AH

3AH1, 12 kV

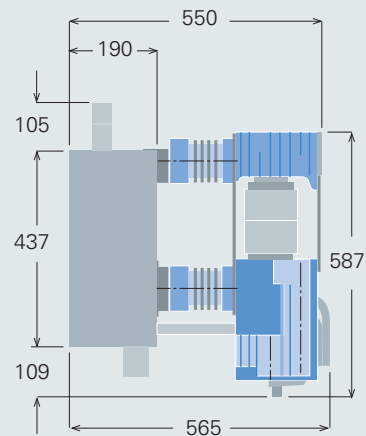
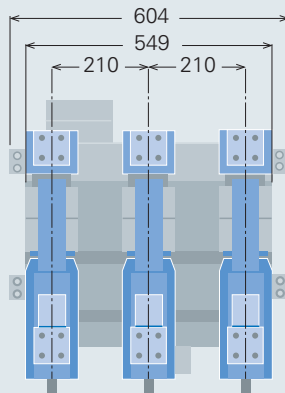
20 kA, up to 1250 A
25 kA, up to 1250 A



Dimensions in mm

3AH1, 3AH2, 12 kV

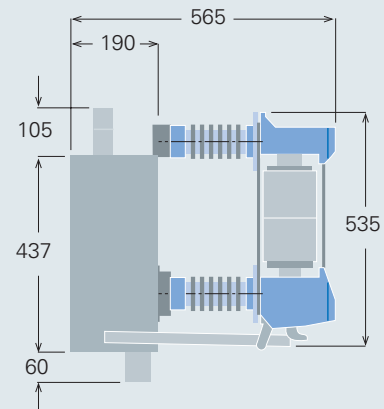
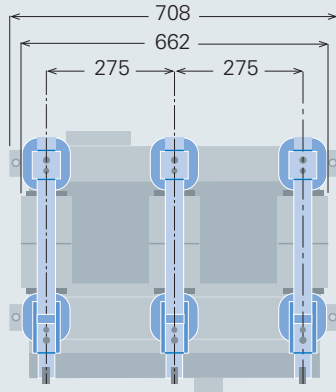
25 kA, 2500 A,
31.5 kA, 2500 A,
40 kA, 3150 A



Dimensions in mm

3AH1, 24 kV

16 kA, up to 1250 A,
20 kA, up to 1250 A,
25 kA, up to 1250 A



Dimensions in mm

Fig. 105a: Dimensions of typical vacuum circuit-breakers type 3AH (Examples)

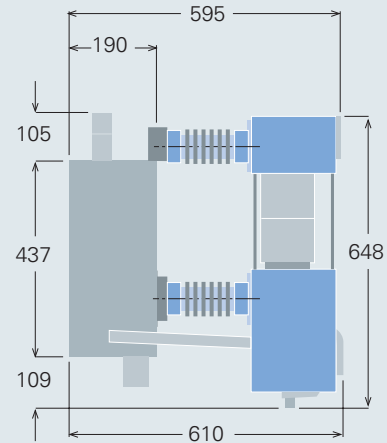
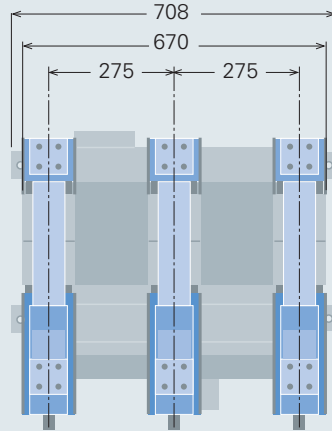


Medium-Voltage Devices

Type 3AH

3AH1, 3AH2, 24 kV

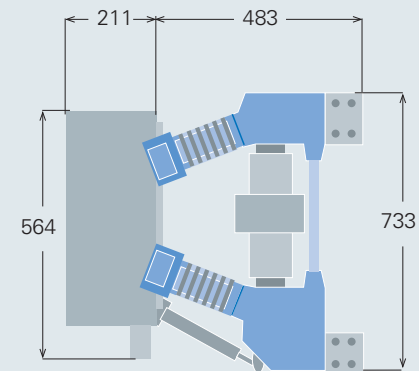
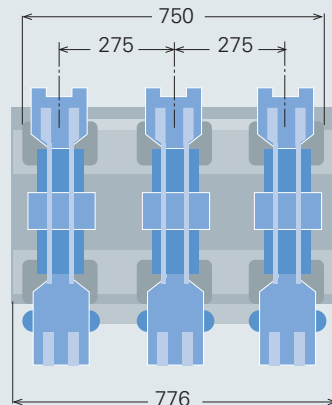
20 kA, 2500 A
25 kA, 2500 A



Dimensions in mm

3AH3, 12 kV

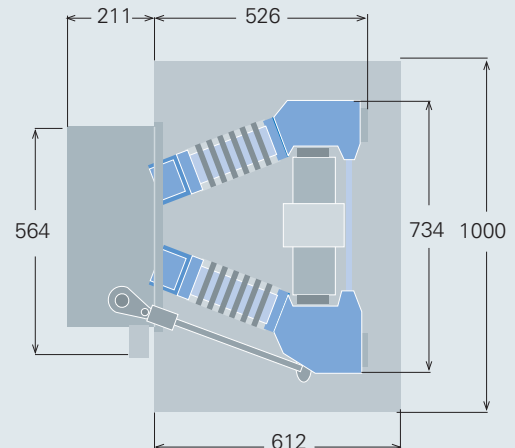
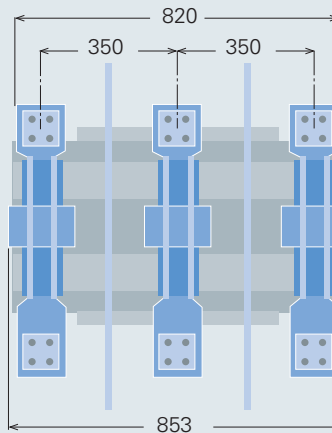
63 kA, 4000 A



Dimensions in mm

3AH3, 3AH4, 36 kV

31.5 kA, 2500 A,
40 kA, 2500 A



Dimensions in mm

Fig. 105b: Dimensions of typical vacuum circuit-breakers type 3AH (Examples)

Medium-Voltage Devices

Type **NXACT**

Indoor vacuum circuit-breaker module type **NXACT**

General

NXACT combines the advantages of vacuum circuit-breakers with additional integrated functions.

More functions

Disconnecter, earthing switch, operator panel and interlock are integrated in a single breaker module. The module is supplied pretested and ready for installation.

Ease of integration ...

For the system builder, this means minimum project planning, ease of installation even with subsequent retrofitting, no more testing, simplified logistics – these features mean that **NXACT** is unbeatable, even with the overall cost of the substation.

Its compact design minimizes installation and commissioning time.

In operation, **NXACT** is notable for the clear layout of its control panel, which is always accessible at the front of the switchgear.

Applications

- Universal circuit-breaker module for all common medium-voltage switchgear
- As three-pole medium-voltage circuit-breakers for all switching duties in indoor installations
- For switching all resistive, inductive and capacitive currents.

Typical uses

- Overhead transmission lines
- Cables
- Transformers
- Capacitors
- Filter circuits*
- Motors
- Reactor coils

* Filter circuits cause an increase in voltage at the series-connected switching device.

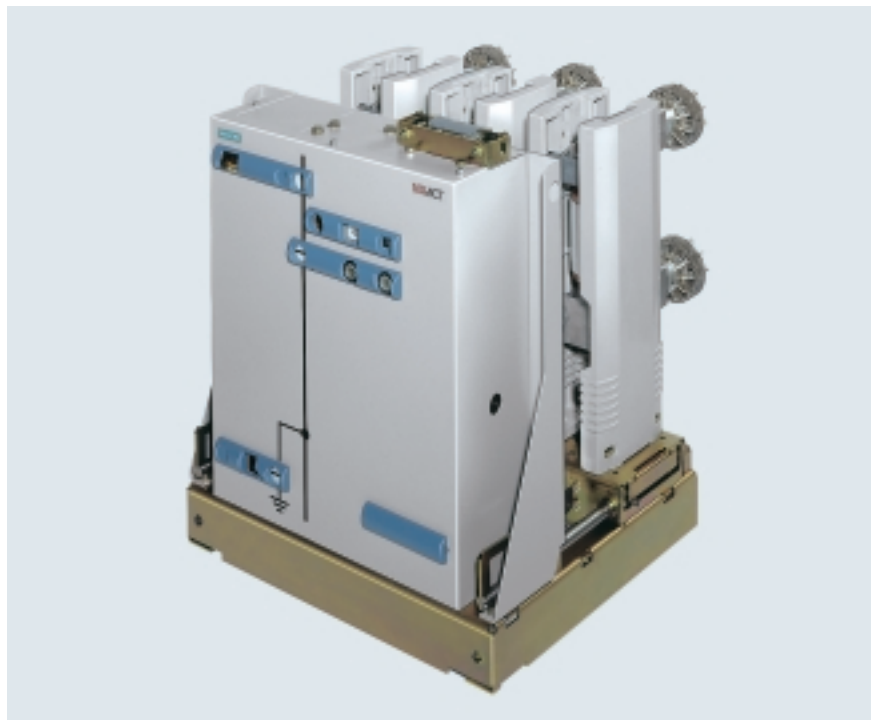
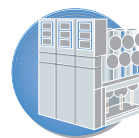


Fig. 106: **NXACT** vacuum circuit-breaker module, 12 kV

Technical data		
Rated voltage	[kV]	12
Rated power-frequency withstand voltage	[kV]	28
Rated lightning impulse withstand voltage	[kV]	75
Rated frequency	[Hz]	50/60
Rated short-circuit breaking current (max.)	[kA]	25
Rated short-circuit making current (max.)	[kA]	63
Rated short-time withstand current 3 sec. (max.)	[kA]	25
Rated normal current	[A]	1250/2500

Fig. 107



Medium-Voltage Devices

Type **NXACT**

Features

- Integrated, mechanical interlocks between operating mechanisms.
- Integrated, mechanical switch position indications for circuit-breaker, withdrawable part and earthing switch function (optional).
- Easy to withdraw, since only withdrawable part is moved.
- Fixed interlocking of circuit-breaker module with a switchpanel is possible.
- Manual or motor operating mechanism (optional for the operating mechanisms).
- Enforced connection of low-voltage plug with the switchpanel, as soon as the module is installed in a panel.
- Maintenance-free operating mechanisms within scope of switching cycles.

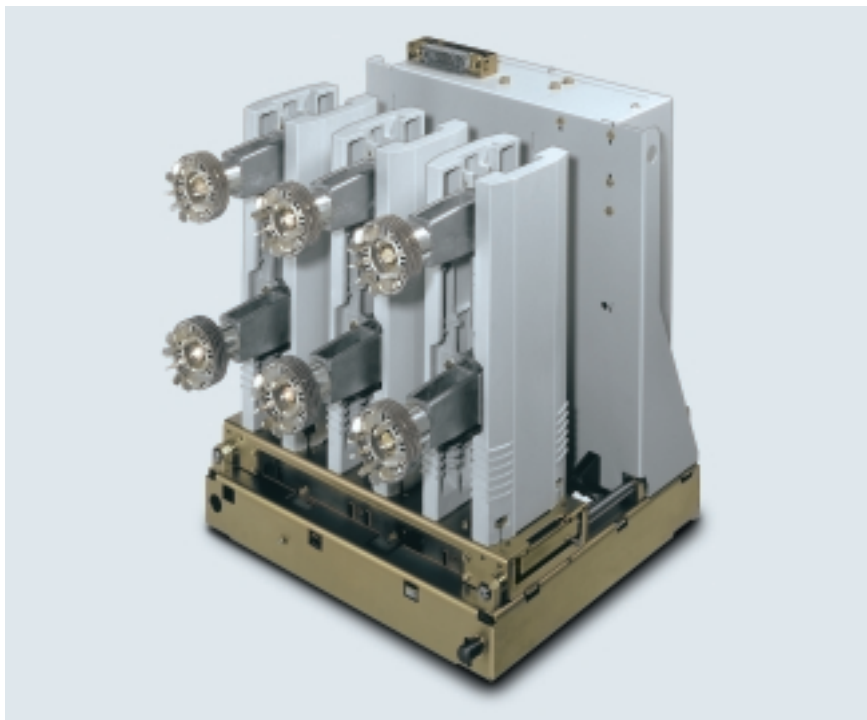


Fig. 108

NXACT vacuum circuit-breaker module

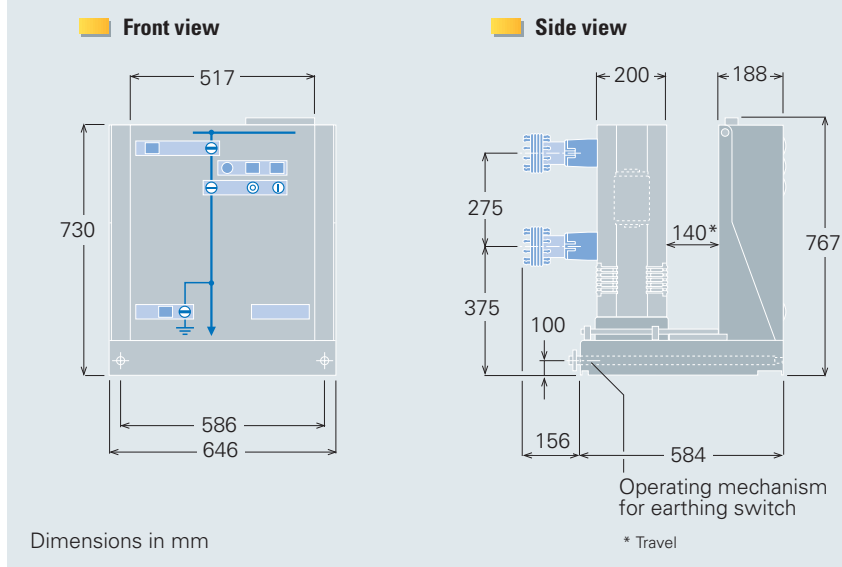


Fig. 109

Medium-Voltage Devices

Type 3AF

Outdoor vacuum circuit-breakers type 3AF

The Siemens outdoor vacuum circuit-breakers are structure-mounted, easy-to-install vacuum circuit-breakers for use in systems up to 36 kV. The pole construction is a porcelain-clad construction similar to conventional outdoor high-voltage switchgear. The triple-pole circuit-breaker is fitted with reliable and well proven vacuum interrupters. Adequate phase spacing and height have been provided to meet standards and safety requirements. It is suitable for direct connection to overhead lines.

The type design incorporates a minimum of moving parts and a simplicity of assembly assuring a long mechanical and electrical life. All the fundamental advantages of using vacuum interrupters like low operating energy, lightweight construction, virtually shock-free performance leading to ease of erection and reduction in foundation requirements, etc. have been retained.

The Siemens outdoor vacuum circuit-breakers are designed and tested to meet the requirements of IEC 60 056/IS 13118.

Advantages at a glance

- High reliability
- Negligible maintenance
- Suitable for rapid autoreclosing duty
- Long electrical and mechanical life
- Completely environmentally compatible



Fig. 110: Outdoor vacuum circuit-breaker type 3AF for 36 kV

Technical data		
Vacuum circuit-breaker type		Type 3AF
Rated voltage	[kV]	36
Rated frequency	[Hz]	50/60
Rated lightning-impulse withstand voltage	[kV]	170
Rated power-frequency withstand voltage (dry and wet)	[kV]	70
Rated short-circuit breaking current	[kA]	25
Rated short-circuit making current	[kA]	63
Rated current	[A]	1600

Fig. 111: Ratings for outdoor vacuum circuit-breakers

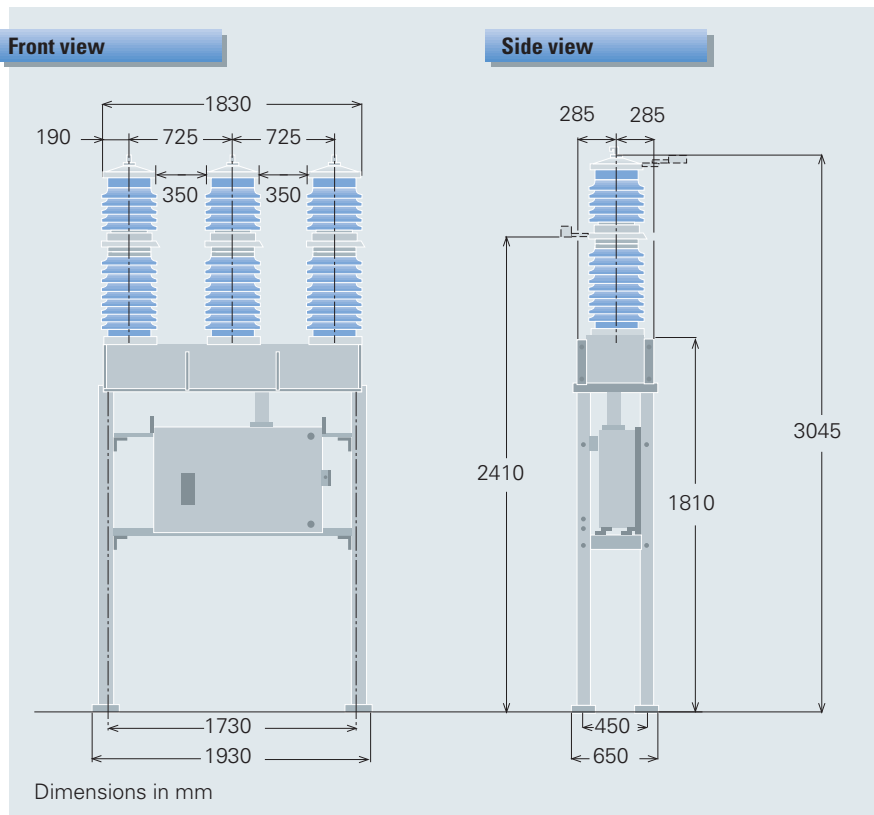
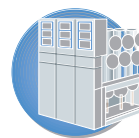


Fig. 112: Dimensions of outdoor circuit-breaker type 3AF for 36 kV



Medium-Voltage Devices Components, Type 3AY2

Components for vacuum circuit-breaker type 3AH

Vacuum circuit-breakers are available in fixed-mounted as well as withdrawable form. When they are installed in substations, isolating contacts, as well as fixed mating contacts and bushings are necessary. With the appropriate components, the 3AH vacuum circuit-breakers can be upgraded to the status of switchgear module.

Components

The following components can be ordered:

- Isolating contacts
- Cup-type bushings with fixed mating contacts
- Truck with/or without interlocks
- Switchgear module
(Dimensions as per Figs. 115 and 116)

Technical data and product range
Components for 12 kV
Up to 2500 A/to 40 kA/1 sec. For 800 mm switchgear panel width:
■ With 3AH1 – 7.2/12 kV breaker 210 mm pole centre distance
■ With 3AH5 – 12 kV breaker 210 mm pole centre distance
Components for 24 kV
To 2500 A/to 25 kA/1 sec. For 1000 mm switchgear panel width:
■ With 3AH1 – 24 kV breaker 275 mm pole centre distance
■ With 3AH5 – 24 kV breaker 275 mm pole centre distance
On request: components for 15 kV
To 2500 A/to 40 kA/1 sec. For 800 mm switchgear panel width:
■ With 3AH1 – 15 kV breaker 210 mm pole centre distance
■ With 3AH5 – 17.5 kV breaker 210 mm pole centre distance
Components for 36 kV
To 1250 A/to 16 kA/1 sec. For 1200 mm switchgear panel width:
■ With 3AH5 – 36 kV breaker 350 mm pole centre distance

Fig. 113

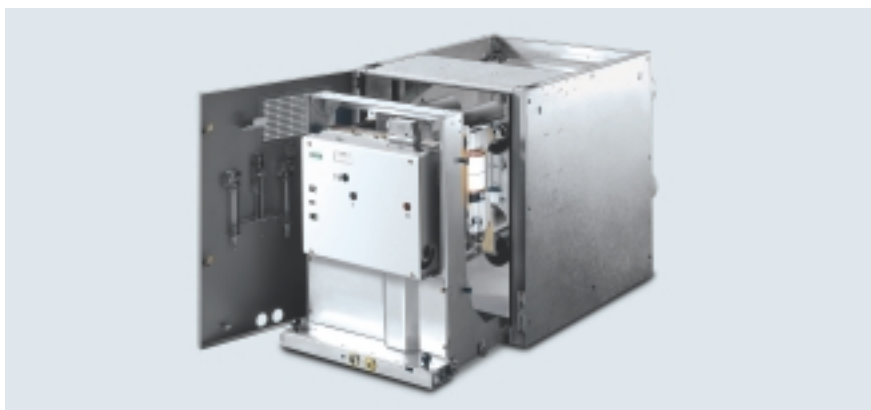


Fig. 114: Switchgear module 12 kV, 25 kA, 1250 A

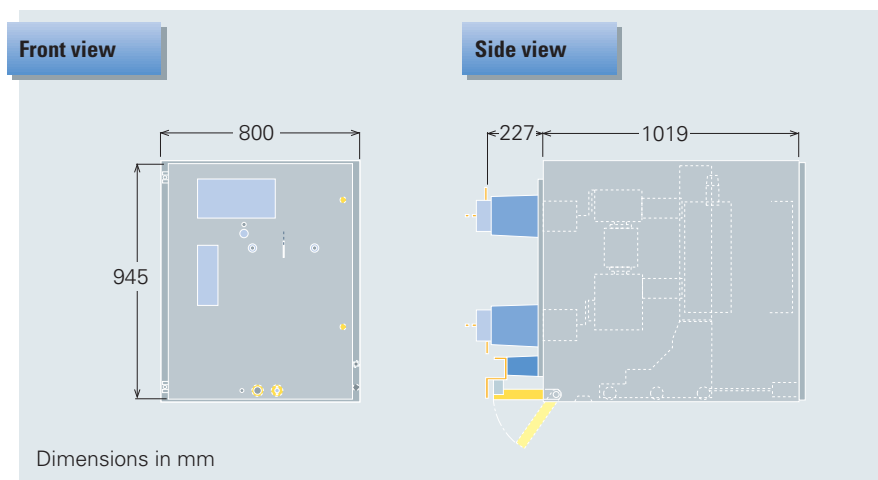


Fig. 115: 12 kV switchgear module

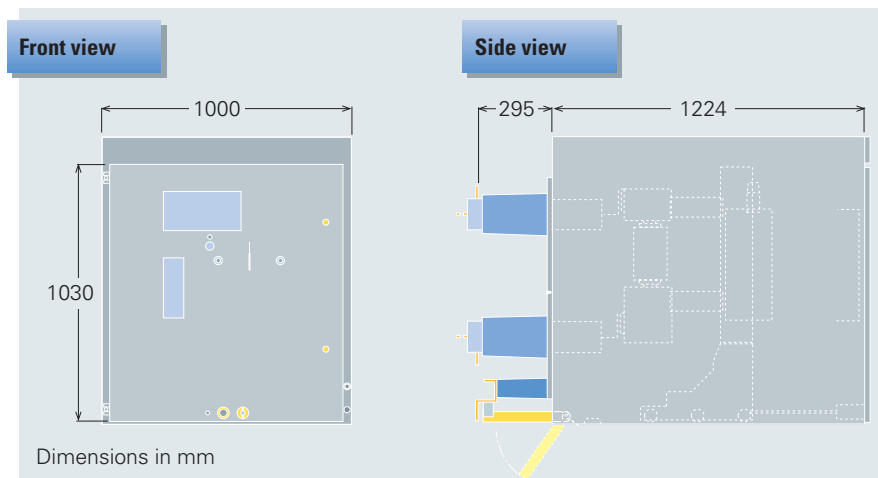


Fig. 116: 24 kV switchgear module

Medium-Voltage Devices

Type 3CG

Indoor vacuum switches type 3CG

The 3CG vacuum switches are multipurpose switches conforming to IEC 60 265-1 and DIN VDE 0670 Part 301.

With these, all loads can be switched without any restriction and with a high degree of reliability. The electrical and mechanical data are greater than for conventional switches. Moreover, the 3CG are maintenance free.

The vacuum switch is therefore extremely economical.

Vacuum switches are suitable for the following switching duties:

- Overhead lines
- Cables
- Transformers
- Motors
- Capacitors
- Switching under ground-fault conditions

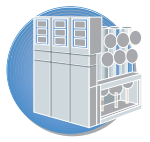
3CG switches can be combined with HV HRC fuses up to 250 A. When installed in Siemens switchgear they comply with the specifications of IEC 60 420 and VDE 0670, Part 303. Maximum ratings of fuses on request.

Technical data					
Rated voltage U	[kV]	7.2	12	15	24
Rated lightning-impulse withstand voltage U_l	[kV]	60	75	95	125
Rated short-circuit making current I_{ma}	[kA]	50	50	50	40
Rated short-time current I_m (3s)	[kA]	20	20	20	16
Rated normal current I_n	[A]	800	800	800	800
Rated ring-main breaking current I_{c1}	[A]	800	800	800	800
Rated transformer breaking current	[A]	10	10	10	10
Rated capacitor breaking current	[A]	800	800	800	800
Rated cable-charging breaking current I_c	[A]	63	63	63	63
Rated breaking current for stalled motors I_d	[A]	2500	1600	1250	–
Transfer current according to IEC 60 420, Inductive switching capacity ($\cos\varphi \leq 0.15$)	[A]	5000	3000	2000	2000
Switching capacity under ground fault conditions:					
– Rated ground fault breaking current I_e	[A]	630	630	630	630
– Rated cable-charging breaking current	[A]	63	63	63	63
– Rated cable charging breaking current with superimposed load current	[A]	63+800	63+800	63+800	63+800
Number of switching cycles with I_n		10,000	10,000	10,000	10,000

Fig. 117: Ratings for vacuum switches type 3CG



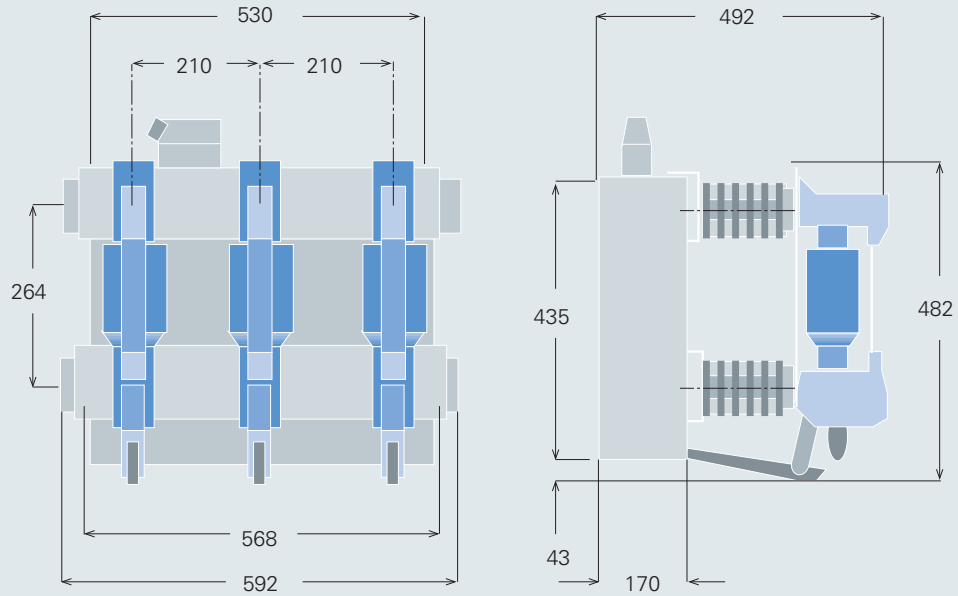
Fig. 118: Vacuum switch type 3CG for 12 kV, 800 A



Medium-Voltage Devices

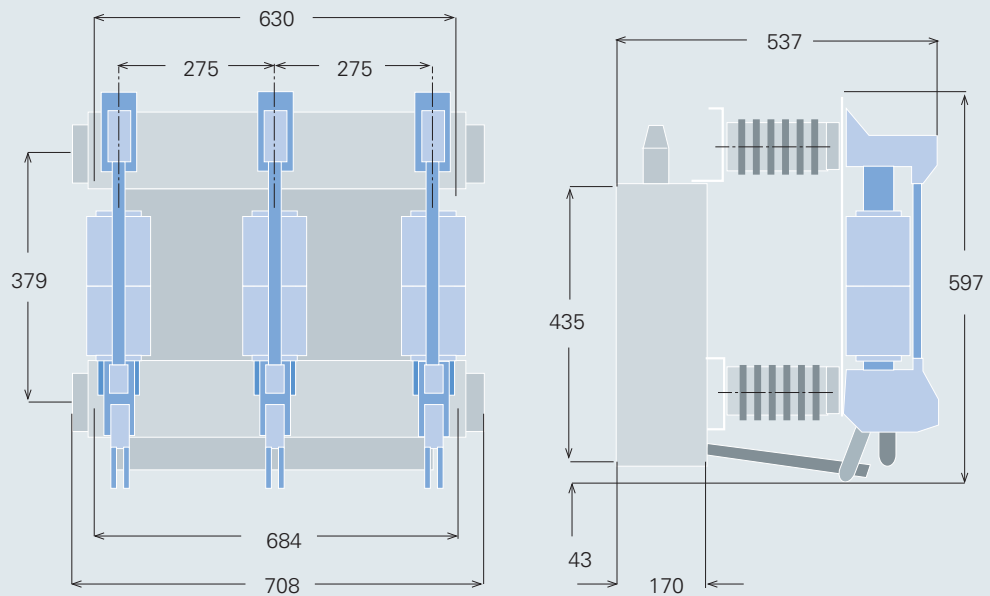
Type 3CG

**3CG,
7.2 and 12 kV**



Dimensions in mm

**3 CG,
24 kV**



Dimensions in mm

Fig. 119: Dimensions of vacuum switch type 3CG (Examples)

Medium-Voltage Devices

Type 3TL

Vacuum contactors Type 3TL

The three-pole vacuum contactors type 3TL are for medium-voltage systems between 7.2 kV and 24 kV and incorporate a solenoid-operated mechanism for high switching frequency and unlimited closing duration. They are suitable for the operational switching of AC devices in indoor systems and can perform, for example, the following switching duties:

- Switching of three-phase motors in AC-3 and AC-4 operation
- Switching of transformers
- Switching of capacitors
- Switching of ohmic loads (e.g. arc furnaces)

3TL vacuum contactors have the following features:

- Small dimensions
- Long electrical life (up to 10^6 operating cycles)
- Maintenance-free
- Vertical or horizontal mounting

The vacuum contactors comply with the standards for high-voltage AC contactors between 1 kV and 12 kV according to IEC Publication 60 470-1970 and DIN VDE 0660 Part 103.

3TL 6 and 3TL 8 contactors also comply with UL Standard 347.

The vacuum contactors are available in different designs:

- Type 3TL 6 with compact dimensions
- Type 3TL 71 and 3TL 81 with slender design



Fig. 120: Vacuum contactor type 3TL6 for fixed mounting

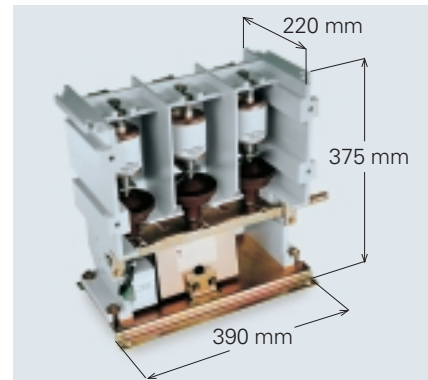
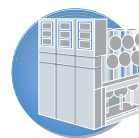


Fig. 121: Vacuum contactor type 3TL8 for fixed mounting

Technical data of the 3TL 6/7/8 vacuum contactor				
Vacuum contactor type	3TL 61	3TL 65	3TL 71	3TL 81
Rated normal voltage [kV]	7.2	12	24	7.2
Rated frequency [Hz]	50/60	50/60	50/60	50/60
Rated normal current [A]	450	450	800	400
Switching capacity according to utilization category AC-4 (cos φ = 0.35)				
Rated making current [A]	4500	4500	4500	4000
Rated breaking current [A]	3600	3600	3600	3200
Mechanical life of contactor Switching cycles	3×10^6	1×10^6	1×10^6	1×10^6
Mechanical life of vacuum interrupter Switching cycles	2×10^6	1×10^6	1×10^6	0.25×10^6
Electrical life of vacuum interrupter (Rated normal current) Switching cycles	1×10^6	0.5×10^6	1×10^6	0.25×10^6

Fig. 122: Ratings for vacuum contactors type 3TL



Medium-Voltage Devices

Type VS

Vacuum interrupters

Vacuum interrupters for the medium-voltage range are available from Siemens for all applications on the international market from 1 kV up to 40.5 kV.

Applications

- Vacuum circuit-breakers
- Vacuum switches
- Vacuum contactors
- Transformer tap changers
- Circuit breakers for railway applications
- Autoreclosers
- Special applications, e.g. in nuclear fusion

Compact designs

Siemens vacuum interrupters provide very high switching capacity in very compact dimensions: for example vacuum interrupters for 15 kV/40 kA with housing dimensions of 125 mm diameter by 161 mm length, or for 12 kV/13.1 kA with 68 mm diameter by 115 mm length.

Consistent quality assurance

Complete quality assurance (TQM and DIN/ISO 9001), rigorous material checking of every delivery and 100% tests of the interrupters for vacuum sealing assure reliable operation and the long life of Siemens vacuum interrupters.

Environmental protection

In the manufacture of our vacuum interrupters we only use environmentally compatible materials, such as copper, ceramics and high-grade steel.

The manufacturing processes do not damage the environment. For example, no CFCs are used in production (fulfilling the Montreal agreement); the components are cleaned in a ultrasonic plant.

During operation vacuum interrupters do not affect the environment and are themselves not affected by the environment.

Know-how for special applications

If necessary, Siemens is prepared to supplement the wide standard program by way of tailored, customized concepts.



Fig. 123: Vacuum interrupters from 1 kV up to 40.5 kV

Product range (extract)			
Interrupters for vacuum circuit-breakers			
Rated voltage	[kV]	7.2	to 40.5
Rated normal current	[A]	630	to 4000
Rated short-circuit breaking current	[kA]	12.5	to 80
Interrupters for vacuum contactors			
Rated voltage	[kV]	1	to 24
Rated normal current	[A]	400	to 800

Fig. 124a: Range of ratings for vacuum interrupters for CBs

Medium-Voltage Devices

Type 3CJ1

Switch disconnectors type 3CJ1

Indoor switch disconnectors type 3CJ1 are multipurpose types and meet all the relevant standards both as the basic version and in combination with (make-proof) grounding switches.

The 3CJ1 indoor switch-disconnectors have the following features:

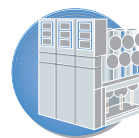
- A modular system with all important modules such as fuses, (make-proof) grounding switches, motor operating mechanism, shunt releases and auxiliary switches
- Good dielectric properties even under difficult climatic conditions because of the exclusive use of standard post insulators for insulation against ground
- No insulating partitions even with small phase spacings
- Simple maintenance and inspection



Fig. 125: Switch disconnector type 3CJ1

Technical data				
Rated voltage	[kV]	12	15	24
Rated short-time withstand current	[kA]	20	26	18
Rated short-circuit making current	[kA]	50	65	45
Rated normal current	[A]	630	630	630

Fig. 126: Ratings for switch disconnectors type 3CJ1



Medium-Voltage Devices

Type 3D

Disconnecting and grounding switches type 3D

Disconnecting and grounding switches type 3D are suitable for indoor installations from 12 kV up to 36 kV.

Disconnectors are mainly used to protect personnel working on equipment and must therefore be very reliable and safe. This is assured even under difficult climatic conditions.

Disconnecting and grounding switches type 3D are supplied with a manual or motor drive operating mechanism.

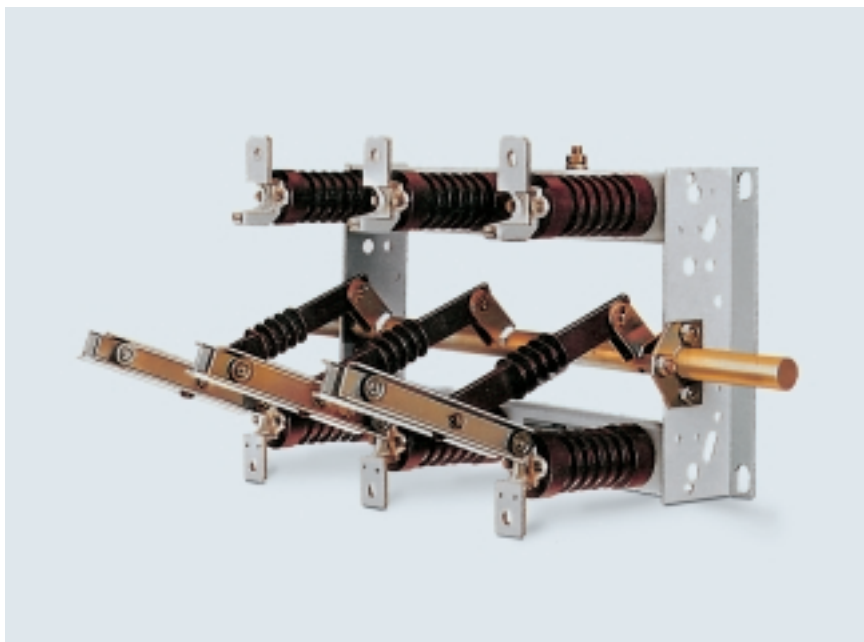


Fig. 127: Disconnecting switch type 3DC

Technical data				
Rated voltage	[kV]	12	24	36
Rated short-time withstand current (1s)	[kA]	20 to 63	20 to 31.5	20 to 31.5
Rated short-circuit making current	[kA]	50 to 160	50 to 80	50 to 80
Rated normal current	[A]	630 to 2500	630 to 2500	630 to 2500

Fig. 128: Ratings for disconnectors type 3DC

Technical data				
Rated voltage	[kV]	12	24	36
Rated short-time withstand current (1s)	[kA]	20 to 63	20 to 31.5	20 to 31.5
Rated peak withstand current	[kA]	50 to 160	50 to 80	50 to 80

Fig. 129: Ratings for grounding switches type 3DE

Medium-Voltage Devices

Type 3GD/3GH

HV HRC fuses type 3GD

HV HRC (high-voltage high-rupturing-capacity) fuses are used for short-circuit protection in high-voltage switchgear. They protect switchgear and components, such as transformers, motors, capacitors, voltage transformers and cable feeders, from the dynamic and thermal effects of high short-circuit currents by breaking them as they occur.

The HV HRC fuse links can only be used to a limited degree as overload protection because they only operate with certainty when their minimum breaking current has already been exceeded. Up to this current the integrated thermal striker prevents a thermal overload on the fuse when used in circuit breaker/fuse combinations.

Siemens HV HRC fuse links have the following features:

- Use in indoor and outdoor installations
- Nonaging because the fuse element is made of pure silver
- Thermal tripping
- Absolutely watertight
- Low power loss

With our 30 years of experience in the manufacture of HV HRC fuse links and with production and quality assurance that complies with DIN/ISO 9001, Siemens HV HRC fuse links meet the toughest demands for safety and reliability.

Fuse-bases type 3GH

3GH fuse bases are used to accommodate HV HRC fuse links in switchgear.

These fuse bases are suitable for:

- Indoor installations
- High air humidity
- Occasional condensation

3GH HV HRC fuse bases are available as single-phase and three-phase versions. On request, a switching state indicator with an auxiliary switch can be installed.



Fig. 130: HV HRC fuse type 3GD

Technical data					
Rated voltage	[kV]	7.2	12	24	36
Rated short-circuit breaking current	[kA]	63 to 80	40 to 63	31.5 to 40	31.5
Rated normal current	[A]	6.3 to 250	6.3 to 160	6.3 to 100	6.3 to 40

Fig. 131: Ratings for HV HRC fuse links type 3GD

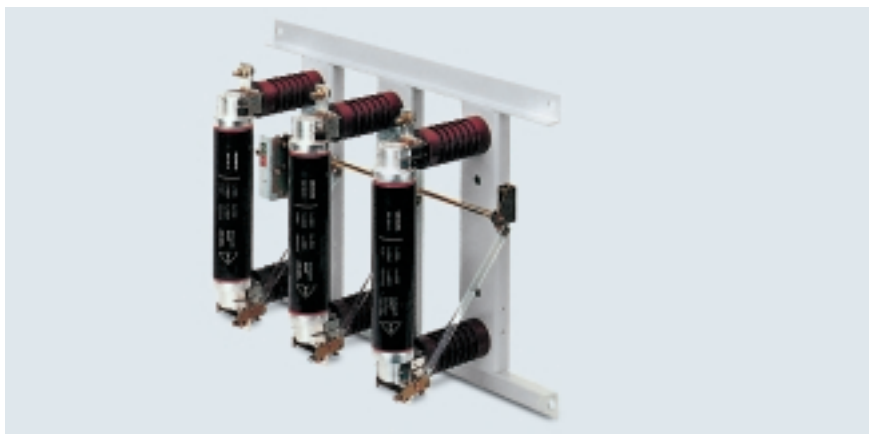
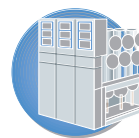


Fig. 132: Fuse bases type 3GH with HV HRC fuse links

Technical data					
Rated voltage	[kV]	3.6/7.2	12	24	36
Peak withstand current	[kA]	44	44	44	44
Rated current	[A]	400	400	400	400

Fig. 133: Ratings for fuse bases type 3GH



Medium-Voltage Devices Insulators and Bushings

Insulators:

Post insulators type 3FA and bushings type 3FH/3FM

Insulators (post insulators and bushings) are used to insulate live parts from one another and also fulfill mechanical carrying and supporting functions.

The materials for insulators are various cast resins and porcelains. The use of these materials, which have proved themselves over many years of exposure to the roughest operating and ambient conditions, and the high quality standard to DIN/ISO 9001 assure the high degree of reliability of the insulators.

Special ribbed forms ensure high electrical strength even when materials are deposited on the surface and occasional condensation is formed.

Post insulators and bushings are manufactured in various designs for indoor and outdoor use depending on the application.

Innovative solutions, such as the 3FA4 divider post insulator with an integrated expulsion-type arrester, provide optimum utility for the customer.

Special designs are possible if requested by the customer.

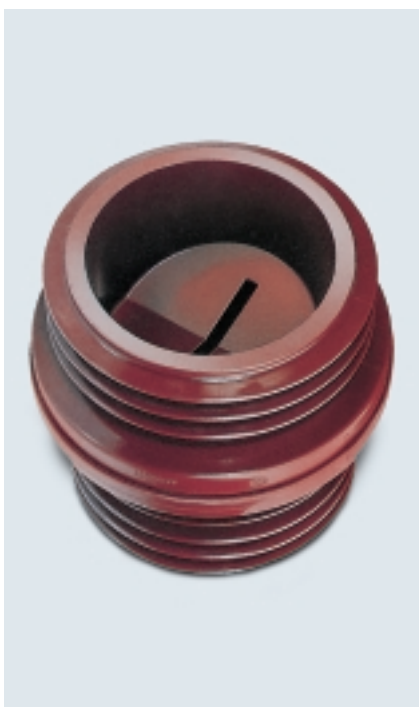


Fig. 134: Draw-lead bushing type 3FH5/6



Fig. 135: Post insulators type 3FA1/2

Technical data					
Rated voltage	[kV]	3.6	12	24	36
Lightning-impulse withstand voltage	[kV]	60 to 65	65 to 90	100 to 145	145 to 190
Rated power-frequency withstand voltage	[kV]	27 to 40	35 to 50	55 to 75	75 to 105
Minimum failing load	[kN]	3.75 to 16	3.75 to 25	3.75 to 25	3.75 to 16

Fig. 136: Ratings for post insulators type 3FA1/2

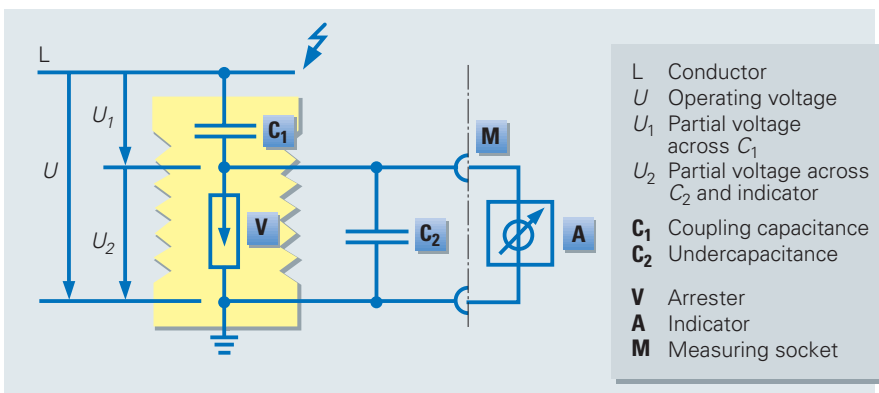


Fig. 137: The principle of capacitive voltage indication with the 3FA4 divider post insulator

Medium-Voltage Devices

Type 4M and Type 3E

Current and voltage transformers type 4M

Measuring transformers are electrical devices that transform primary electrical quantities (currents and voltages) to proportional and in-phase quantities which are safe for connected equipment and operating personnel.

The indoor post insulator current and voltage transformers of the block type have DIN-conformant dimensions and are used in air-insulated switchgear. A maximum of operational safety is assured even under difficult climatic conditions by the use of cycloaliphatic resin systems and proven cast-resin technology.

Special customized versions (e.g. up to 3 cores for current transformers, switchable windings, capacitance layer for voltage indication) can be supplied on request.

The program also includes cast-resin insulated-bushing current transformers and outdoor current and voltage transformers.

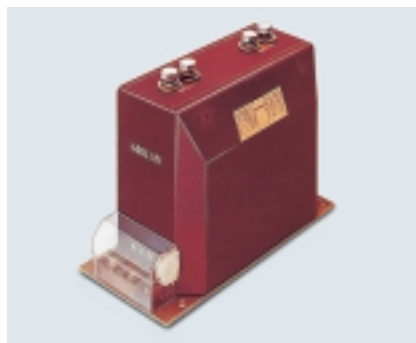


Fig. 138: Block current transformer type 4MA



Fig. 139: Outdoor voltage transformer type 4MS4

Technical data							
		Current transformers			Voltage transformers		
Rated voltage	[kV]	12	24	36	12	24	36
Primary rated current	[A]	10 to 2500	10 to 2500	10 to 2500			
Max. thermal rated short time current	[kA]	80	80	80			
Sec. thermal limit current	[A]				5 to 10	5 to 13	8 to 17

Fig. 140: Ratings for current and voltage transformers

Surge arresters type 3E

Surge arresters have the function of protecting the insulation of installations or components from impermissible strain due to voltage surges.

The product range includes:

- Surge arresters for the protection of high-voltage motors and dry-type transformers.
Range 3EF for cable networks up to 15 kV.
- Plug-in surge arresters for the protection of distribution networks.
Range 3EH2 for networks up to 42 kV.
- Special arresters for the protection of rotary machines and furnaces.
Range 3EE2 for networks up to 42 kV.



Fig. 141: Surge arrester type 3EE2

Technical data and product range				
		3EF	3EH2	3EE2
For networks of	[kV]	3.6 to 15	4.7 to 42	4.5 to 42
Rated discharge surge current	[kA]	1	10	10
Short-circuit current strength	[kA]	1 to 40	16	50 to 300

Fig. 142