

Indoor vacuum circuit breakers

three-pole design
rated voltage 12, 25, 36 and 38.5 kV
rated current 630 – 2500 A



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ISO 9001
BUREAU VERITAS
Certification



General

These three-pole indoor circuit breakers are designed for rated voltages of 12 kV to 38.5 kV and rated currents of 630 A to 2500 A.

All specified circuit breakers are delivered for front panel installation.

DRIESCHER vacuum circuit breakers correspond with circuit-breaker classes "M2" and "C2" as defined in EN 62271-100.

The type tests and also tests corresponding to the EVS thunderstorm cycle have been carried out by independent accredited testing organizations (FGH Mannheim and IPH Berlin). The circuit breakers conform with the requirements of EN 62271-100, IEC 60065 and DIN VDE 0670, parts 101-104.



Advantages of circuit breakers

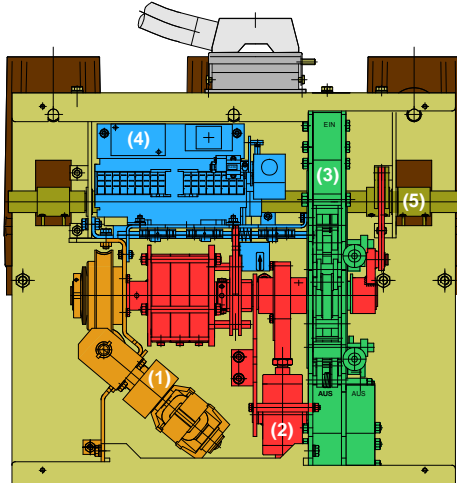
- very high mechanical service life through optimised power transmission of precision coordinated subassemblies with end position damping
- flexible application through compact design
- shorter delivery times
- fast retrofitting possible
- exceptionally high service life
- minimum amount of maintenance
- previous models can be replaced at any time

Technical data

Rated voltage U_r kV	Rated power frequency withstand voltage U_d kV	Rated impulse withstand voltage U_p kV	Rated frequency f_r Hz	Transient recovery voltage u_c kV	Rate of rise of TRV u_c/u_3 kV/ μ s	Breaking time approx. t_3 ms	Arcing time t_{arc} ms	Making time approx. ms	Direct current component %	Rated short circuit breaking current I_{sc} kA	Rated short circuit making current I_k kA	Rated short-time current I_k kA	Rated short-circuit duration t_k s	Rated peak withstand current I_p kA	Rated breaking current of no-load cable I_c A	Rated current [A]					
																I_r					
12	28	75	50	21	0,34	65	<17	60	23	20	50	20	3	50	25	•	•	•			
										25	63	25	3	63	25	•	•	•			
										31,5	80	31,5	3	80	25						•
25	50	125	50	41	0,47	65	<17	60	23	20	50	20	3	50	31,5	•	•	•			
										25	63	25	3	63	31,5	•	•	•			
										31,5	80	31,5	3	80	31,5				•	•	•
36	70	170	50	62	0,57	65	<17	60	23	20	50	20	3	50	50	•		•			
38,5	80	180	50	65	0,52	65	<17	60	23	20	50	20	3	50	50	•		•			

Design and principle of operation of the vacuum circuit breaker

This vacuum circuit breaker is made up of the following five coordinated sub-assemblies:



Via **operating mechanism (1)** the coil-spring energy storage mechanism is manually or electrically charged. Should the supply voltage fail, the coil-spring energy storage mechanism can be charged via the operating shaft using a crank.

- *an overload coupling now prevents any overloading of the energy storage mechanism.*

The coil-spring energy storage mechanism (2) comprises three coil springs and an end position damping. This stores the energy (display), precisely controls the energy transmission and permits constant operating speeds.

- *the energy is stored for 3 switching operations,*
- *the adjusted end position damping permits an optimal switching operation. The mechanism is therefore extremely low in wear, low in maintenance, and has a long service life.*

Via **the switching module (3)** it is possible to operate the circuit breaker manually by pressing the push buttons or it can be operated electrically (release mechanism). The motor of the operating mechanism immediately recharges the coil-spring energy storage mechanism after operation. In addition to the release mechanisms the switching module also includes the locking mechanisms.

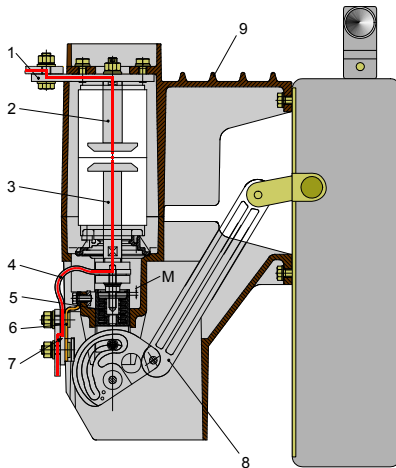
- *the last possible switching operation is always an OFF switching operation,*
- *for further electrical operations a second OFF release can be installed.*

The electrical components (4) with their displays (operations counter, switch position) operate the circuit breaker depending on the respective circuit layout (e.g. auto reclosing). The 50-pin plug connector is positioned on the top of the breaker frame.

- *fast electrical conversion is possible.*

The operating shaft (5), assembled in the breaker frame transmits the operating energy via insulating bars (8) to the vacuum interrupters.

- *compact design possible,*
- *very lightweight and stable.*



The high quality vacuum interrupters are housed in moulded parts of Duroplast insulating material (9). The current in the breaker pole flows from the upper terminal (1) to the fixed contact (2) of the vacuum interrupter. The laminated contact ribbon (4) is screwed to the moving contact (3) of the vacuum interrupter. The spring (5) provides the required contact pressure and compensates the permissible contact burn (M) during the entire service life. The burn of the contacts in the vacuum interrupter can be monitored using the "M" mark. This can be carried out without necessitating dismantling. The pressure-welded end of the contact ribbon forms the lower pole contact surface (7), which is supported by the contact arm (6).

- *small spacing between phases without additional insulation (phase separation plates),*
- *the vacuum interrupters are protected against extreme ambient conditions and damage,*
- *the entire pole can be removed as one piece.*

Optimised mechanical design also permits a minimum amount of maintenance and guarantees an extremely long service life.

Type designation

Examples:	V12-630-20 KUF
Vacuum circuit-breaker	V
Rated voltage (12 kV)	12
Rated current (630 A)	630
Rated short-circuit breaking current (20 kA)	20
With coil spring stored energy mechanism, suitable for auto-reclose (with motor actuator)	KU
For front panel mounting	F

Design types

V...KUF with coil spring stored energy mechanism and suitable for automatic reclosing, front-panel mounting		V..-20 KUF	V..-25 KUF	V..-31,5 KUF	V..-20 KUF	V..-20 KUF
Rated voltage	[kV]	12/25	12/25	12/25	36	38,5
Possible operating cycles (without maintenance)	[-]	30 000	30 000	30 000	10 000	10 000
• of the vacuum interrupter at rated current						
• of the vacuum interrupter rated short circuit breaking current	[-]	100	100	100	100	100
• drive	[-]	10 000	10 000	10 000	10 000	10 000
Maximal contact erosion	[mm]	2	2	2	3	3

Rated switching action sequence: 0 - 0.3s - CO - 15 secs - CO for motorized actuator

Motor-operated mechanisms

Motors can optionally be delivered for AC or DC systems. The max. power input is approx. 200 W. The motors operate in short-time duty (S2). The supply voltage is not to deviate from the rated supply voltage by more than -15% to +10%.

Motor voltage V	Current input A	Consumption VA (AC), W (DC)	Charging time s	Motor protection switch ..A	A
110 AC	2,2	242	8,2	2,5 – 4	2,5
230 AC	1,2	276	7,8	1 – 1,6	1,0
24 DC	8,8	211	9,3	10 – 16	9,0
48 DC	4,5	216	7,3	4 – 6,3	4,4
60 DC	4,5	270	5,7	4 – 6,3	4,6
110 DC	2,2	242	8,2	2,5 – 4	3,0
220 DC	1,3	286	8,8	1 – 1,6	1,1

Operating conditions

The breakers are designed for normal operating conditions in compliance with IEC 62271-1, class „minus 5 indoors“. A reliable operation is still guaranteed at minus temperatures of -15°. The maximum ambient temperature is 40°C; the mean value over 24 hours is max. 35°C. The values on insulation strength are - corresponding to DIN VDE 0671 Part 1 - related to sea level. For installations at altitudes of up to 1000 m any reduction in insulation

caused by the reduced insulating property of the air is insignificant and can be ignored. For installation at altitudes > 1000 m it is necessary to correct the values given for the rated power-frequency withstand voltage and the rated impulse withstand voltage (e.g. the insulating property of the clearance at an altitude of 2000 m above sea level is reduced by the factor 0,8).

Equipment

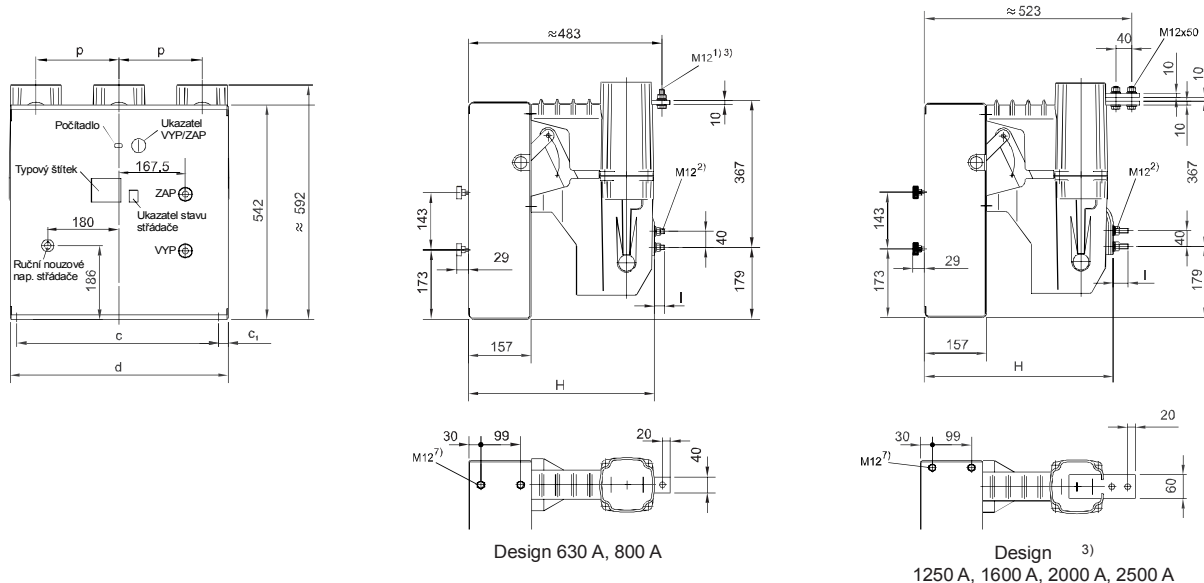
Basic equipment:

- push-button for On and Off switching on site
- display of breaker position ON/OFF
- display of charging condition of coil-spring energy storage mechanism
- operations counter

Possible equipment:

- pump suppresser
- auxiliary switch for motor, controls and locking mechanisms
- additional releases

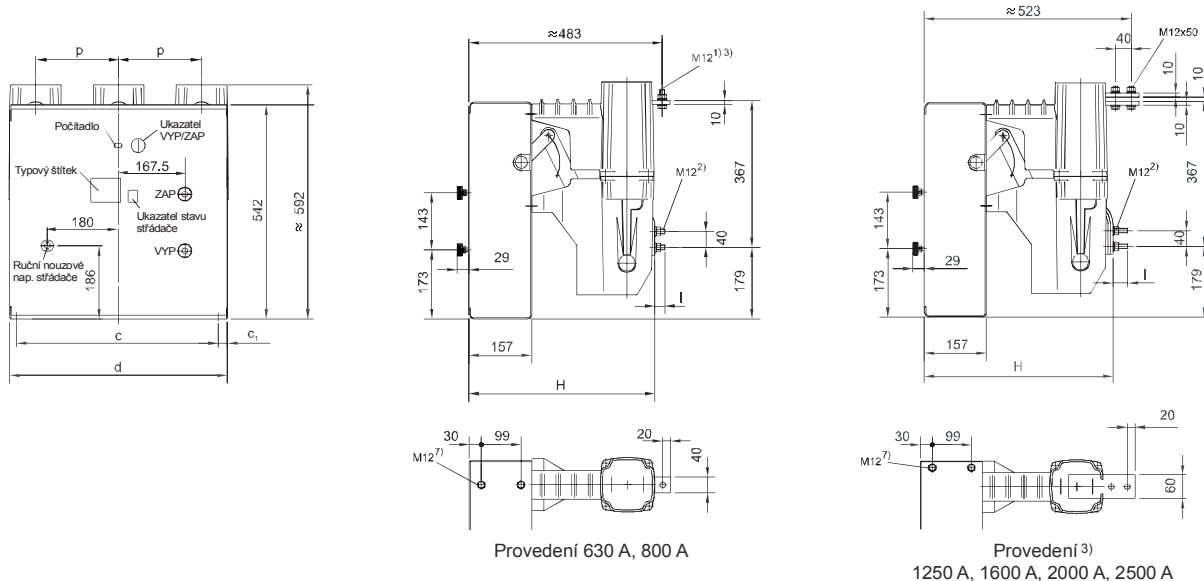
Circuit breakers for voltage of 12 kV



Rated voltage kV	Rated current A	Rated short circuit break. current kA	Pole distance p	c	c ₁	d	H	I	weight	Part nr. ⁴⁾
12	630	20	155 ⁵⁾	420	23	460	464,5	25	100	747 0400x
12	630	20	210	510	23	550	464,5	25	103	747 1400x
12	630	25	155 ⁵⁾	420	23	460	464,5	25	100	747 0401x
12	630	25	210	510	23	550	464,5	25	103	747 1401x
12	800	20	155 ⁵⁾	420	23	460	464,5	25	102	747 0410x
12	800	20	210	510	23	550	464,5	25	105	747 1410x
12	800	25	155 ⁵⁾	420	23	460	464,5	25	102	747 0411x
12	1250	20	155 ⁵⁾	420	23	460	470,5	29	105	747 0420x
12	1250	20	210	510	23	550	470,5	29	110	747 1420x
12	1250	25	155 ⁵⁾	420	23	460	470,5	29	105	747 0421x
12	1250	25	210	510	23	550	470,5	29	110	747 1421x
12	2500 ³⁾	31,5	250 ⁵⁾	500	60	620	482,5	38	112	747 9152x

- 1) hexagon bolt M12x40 (from 1600 A; M12x50) with nut, washer and lock washer
- 2) threaded pin (fixed) with nut, washer and lock washer
- 3) as from 1250 A two connecting bolts, 1600 A two connecting bolts and double contact connection
- 4) the last digit of the part numbers indicates the respective motor voltage:
 747 xxxx1 = 230 V AC
 747 xxxx2 = 110 V AC
 747 xxxx3 = 220 V DC
 747 xxxx4 = 110 V DC
 747 xxxx5 = 60 V DC
 747 xxxx6 = 48 V DC
 747 xxxx7 = 24 V DC
- 5) appropriate additional insulation is required
- 6) appropriate bar support is required
- 7) press-in nuts M12 at the top and bottom for mounting switchgear, refer also to c or c₁
- 8) when installing circuit breaker in enclosed switchgear is necessary to provide sufficient ventilation

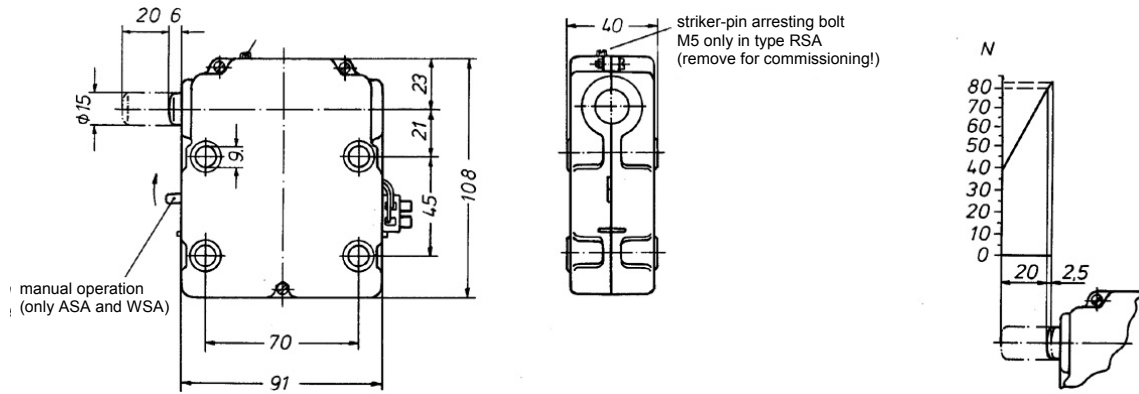
Circuit breakers for voltage of 25 kV



Rated voltage kV	Rated current A	Rated short circuit break. current kA	Pole distance p	c	c ₁	d	H	I	Weight	Part nr. ⁴⁾
25	630	20	225 ⁵⁾	540	23	580	464,5	25	107	747 3400x
25	630	20	250	500	60	620	464,5	25	110	747 4400x
25	630	20	275	640	20	680	464,5	25	113	747 5400x
25	630	25	225 ⁵⁾	540	23	580	464,5	25	107	747 3401x
25	630	25	250	500	60	620	464,5	25	110	747 4401x
25	630	25	275	640	20	680	464,5	25	113	747 5401x
25	800	20	225 ⁵⁾	640	23	580	470,5	29	109	747 3410x
25	800	20	250	540	60	620	476,5	38	112	747 4410x
25	800	25	225 ⁵⁾	640	23	580	476,5	38	109	747 3411x
25	800	25	250	540	60	620	476,5	38	112	747 4411x
25	1250	20	225 ⁵⁾	540	23	580	470,5	29	113	747 3420x
25	1250	20	250	500	60	620	470,5	29	118	747 4420x
25	1250	20	275	640	20	680	470,5	29	123	747 5420x
25	1250	25	225 ⁵⁾	540	23	580	470,5	29	113	747 3421x
25	1250	25	250	500	60	620	470,5	29	118	747 4421x
25	1250	25	275	640	20	680	470,5	29	123	747 5421x
25	1600	31,5	250	500	60	620	470,5	29	120	747 4432x
25	1600	31,5	275	640	20	680	476,5	23	125	747 5432x
25	2000 ¹⁰⁾	31,5	250	500	60	620	470,5	38	122	747 4442x
25	2000 ¹⁰⁾	31,5	275	640	20	680	476,5	38	127	747 5442x
25	2500 ¹⁰⁾	31,5	250	500	60	620	482,5	38	124	747 4452x
25	2500 ¹⁰⁾	31,5	275	640	20	680	470,5	38	129	747 5452x

- 1) hexagon bolt M12x40 (from 1600 A; M12x50) with nut, washer and lock washer
- 2) threaded pin (fixed) with nut, washer and lock washer
- 3) as from 1250 A two connecting bolts, 1600 A two connecting bolts and double contact connection
- 4) the last digit of the part numbers indicates the respective motor voltage:
 - 747 xxxx1 = 230 V AC
 - 747 xxxx2 = 110 V AC
 - 747 xxxx3 = 220 V DC
 - 747 xxxx4 = 110 V DC
 - 747 xxxx5 = 60 V DC
 - 747 xxxx6 = 48 V DC
 - 747 xxxx7 = 24 V DC
- 5) appropriate additional insulation is required
- 6) appropriate bar support is required
- 7) press-in nuts M12 at the top and bottom for mounting switchgear, refer also to c or c₁
- 8) at phase spacing of p=275; 172.5 mm
- 9) at phase spacing of p=275; 160 mm
- 10) when installing circuit breaker in enclosed switchgear is necessary to provide sufficient ventilation

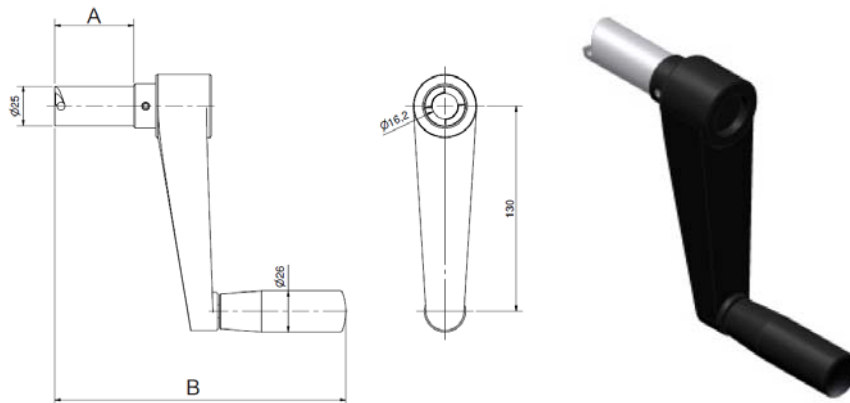
Schematic diagram of release mechanisms



Type	Rated current (A)	Rated voltage (V)	AC operation Consumption (VA)	Part nr.	Rated voltage (V)	DC operation Consumption (W)	Part nr.
Shunt release							
ASA	-	-	-	-	12	56	772 04012
ASA	-	-	-	-	24	56	772 04024
ASA	-	-	-	-	48	88	772 04048
ASA	-	-	-	-	60	56	772 04060
ASA	-	100/110	105	772 03110	110	57	772 04110
ASA	-	230	110	772 03220	220	50	772 04220
Under-voltage release							
RSA	-	-	-	-	24	10	772 05024
RSA	-	-	-	-	48	10	772 05048
RSA	-	100/110	19,5	772 05110	60	10	772 05060
RSA	-	-	-	-	110	10	772 05115
RSA	-	230	19,5	772 05220	220	10	772 05225
Indirect release							
WSA	0,5	-	18	772 06005	-	-	-
WSA	1,0	-	18	772 06010	-	-	-
WSA	5,0	-	18	772 06050	-	-	-

Accessories

Manual emergency handle for energy storage mechanism of KUF circuit breakers



A	B	type of the circuit breaker assembly	Part nr.
50	184	fixed assembly on a base or a cart	770 60113
210	344	fixed assembly on a base or a cart	770 60114
410	544	cassette assembly, path of the cart 300 mm	770 60115
310	444	cassette assembly, path of the cart 200 mm	770 60116
100	234	fixed assembly in the switchgear, with service cart	770 60117

Bases and carts for the KUF circuit breakers

See bases and carts catalogue.