

SF₆ - LeistungsschalterSF₆ circuit breaker

nach IEC- und VDE-Vorschriften

complying with IEC and VDE standards

Technisches Datenblatt Nr.	Technical data-sheet No.	DB 4824-10	
Projekt Nr.	Project No.	063-621-6602	
Kunde	Customer	US Steel	
Schalterttyp	Circuit breaker type	GL 311 F1	
Anzahl der Pole	Number of poles	3	
Klasse	Class	- 35°C ... + 40°C	
Maßbild Nr.	Dimension drawing No.	MB	4824-10-2010075
Stromlaufplan Nr.	Schematics No.	SR	4824-10-2010075
Zusammenfassung der Typprüfungen Nr.	Summary of type tests No.	196	
Nennspannung	Rated voltage	kV	123
Nennfrequenz	Rated frequency	Hz	50
Nenn(betriebs)strom	Rated normal current	A	3150
Nenn-Kurzschlußausschaltstrom:	Rated short-circuit breaking current:		
- Effektivwert der Wechselstromkomponente	- a.c. component, r.m.s. value	kA	40
- bezogene Gleichstromkomponente	- d.c. component, percentage value	%	45
Nenn-Kurzschlußeinschaltstrom	Rated short-circuit making current	kA	100
Nenn-Stoßstrom	Rated peak withstand current	kA	100
Nenn-Kurzzeitstrom	Rated short-time withstand current	kA	40
Nenn-Kurzschlußdauer	Rated duration of short-circuit	s	3
Nenn-Isolationspegel gegen Erde / über das offene Schaltgerät	Rated insulation level to earth / across open switching device		
Nenn-Stehwechselfspannung, 1 min	Rated power-frequency withstand voltage, 1 min	kV	230
Nenn-Stehblitzstoßspannung	Rated lightning impulse withstand voltage	kV	550
Nenn-Stehschaltstoßspannung	Rated switching impulse withstand voltage	kV	-
Nenn-Einschwingspannung bei Klemmenkurzschluß	Rated transient recovery voltage for terminal faults		
Polfaktor des erstlöschenden Poles	First-pole-to-clear factor		1.5
Scheitelwert der Nenn-Einschwingspannung	Rated transient recovery voltage (TRV), peak v	kV	211
Steilheit der Nenn-Einschwingspannung	Rated RRRV	kV/µs	2.0
Asynchronbedingungen	Out-of-phase conditions		
Netze ohne niederohmige Sternpunktterdung	Systems other than earthed neutral systems	<input checked="" type="checkbox"/>	
Netze mit niederohmiger Sternpunktterdung	Earthed neutral systems		<input checked="" type="checkbox"/>
Nenn-Ausschaltstrom	Rated breaking current	kA	10 10
Scheitelwert der Nenn-Einschwingspannung	Rated transient recovery voltage (TRV), peak v	kV	314 251
Steilheit der Nenn-Einschwingspannung	Rated RRRV	kV/µs	1.67 1.54
Abstandskurzschluß	Short-line faults		
Nenn-Wellenwiderstand der Leitung	Rated surge impedance of the line	Ω	450
Nenn-Scheitelfaktor der Leitung	Rated peak factor of the line		1.6
Scheitelwert der Nenn-Einschwingspannung	Rated transient recovery voltage (TRV), peak	kV	141
Steilheit der Nenn-Einschwingspannung	Rated RRRV	kV/µs	2.0
Abschalten kapazitiver Ströme	Breaking of capacitive currents		
Nenn-Freileitungsausschaltstrom	Rated line-charging breaking current	A	31.5
Nenn-Kabelausschaltstrom	Rated cable-charging breaking current	A	140

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Revision Level: 3

Date: 16.3.05

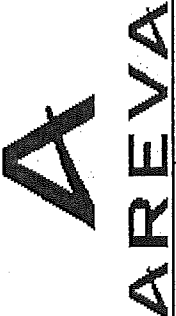
Technisches Datenblatt Nr.	Technical data-sheet No.	DB 4824-10	
Nenn-Schaltzeiten (Toleranz $\pm 10\%$)	Rated time quantities (tolerance $\pm 10\%$)		
Ausschalteigenzeit	Opening time	ms	29
Ausschaltzeit	Break time	ms	60
Einschalteigenzeit	Closing time	ms	100
Ein-Aus-Kontaktzeit	Close-open time	ms	≤ 80
Pausenzeit	Dead time	ms	300
Wiedereinschaltzeit	Re-make time (during reclosing)	ms	370
Aufbau des Schalters	Breaker construction		
Anzahl der Schaltstrecken pro Pol	Number of breaks in series per pole		1
Kriechweg über die Schaltstrecke	Creepage distance across terminals	mm	3625
Kriechweg gegen Erde	Creepage distance to earth	mm	3625
Polmittenabstand	Phase center distance	mm	1750
Zulässiger horizontaler Seilzug, statisch	Admissible horizontal terminal load, static	N	1000
Schaltergewicht (ohne Stützen)	Mass of breaker (without supports)	kg	1262
Nenn- und Druck des SF ₆ -Gases (p _e bei 20°C)	SF ₆ gas, rated pressure (p _e at 20°C)	MPa	0.55
Warn- und Druck des SF ₆ -Gases (p _e bei 20°C)	SF ₆ gas, alarm pressure (p _e at 20°C)	MPa	0.45
Sperr- und Druck des SF ₆ -Gases (p _e bei 20°C)	SF ₆ gas, lockout pressure (p _e at 20°C)	MPa	0.42
Gewicht der SF ₆ -Füllung	Mass of SF ₆ gas	kg	12
Nenn-Schaltfolge	Rated operating sequence	O-0.3s-CO-3min-CO	
Dreipolige Betätigung	Three-phase operation	<input type="checkbox"/>	
Einzelpolige Betätigung	Single-phase operation	<input checked="" type="checkbox"/>	
Ein- und Ausschaltvorrichtungen und Hilfsstromkreise	Closing and opening devices and auxiliary circuits		
Anzahl der Ein-Kreise	Number of closing systems		1
Anzahl der Aus-Kreise	Number of tripping systems		2
Nenn-Versorgungsspannung	Rated supply voltage	VDC	220 ¹⁾
Leistungsaufnahme pro Einschaltmagnet	Power consumption per closing coil	W	340
Leistungsaufnahme pro Ausschaltmagnet	Power consumption per opening coil	W	340
Federenergieantrieb	Spring operating mechanism		
Typ	Type		FK 3-2
Anzahl pro Schalter	Number per breaker		1
Nenn-Versorgungsspannung	Rated supply voltage	VDC	220 ¹⁾²⁾
Anlaufstrom	Starting current	A	≤ 10
Spannzeit der Einschaltfeder	Charging time of closing spring	s	≤ 20
Leistungsaufnahme pro Motor	Power consumption per motor	W	750
Heizung	Heating		
Nenn-Versorgungsspannung	Rated supply voltage	VAC	230 ²⁾
Leistungsaufnahme pro Einheit:	Power consumption per unit:		
- Dauerheizung	- permanent heating	W	80
- thermostatgesteuerte Zusatzheizung	- additional thermostatically controlled heating	W	≤ 80 ³⁾
Bemerkungen, Sonderzusagen	Remarks, special-warranties		
1 MPa = 10 bar = 145 PSIG	1 MPa = 10 bar = 145 PSIG		
p _e = relativer Druck (Überdruck)	p _e = relative pressure (gauge)		¹⁾ VDC 24 ... 250
³⁾ wenn vorhanden	³⁾ if any		²⁾ AC 120 ... 254
⁴⁾ variabel (siehe Maßbild)	⁴⁾ variable (see dimension drawing)		

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AGK/CSC
 Revision Level: 3
 Date: 16.3.05
 Prepared / revised by: A.Giessler
 Checked / released by: M.Kalisch

Leistungsschild		Anlieferung bei AGK bis:		27.04.05
Kunde: US Steel		Kostenstelle:	1595	
Projektnummer: 063-621-6602		Sprache:	slowakisch	
Kostenträger SAP 48 4		Id-Nr.:	2 011 992	
Stückzahl: 2		Projektleiter:	M.Kalisch	
		Bestelldatum:	16.03.05	

AGK/V6 H.Schmidt/Juni 1999

				
Typ	GL 311 F1	Men. vyp. prúd vedenia naprázdno	31.5	A
Výrobné číslo	4824-10-2010075	Men. tlak SF6 pri 20 °C	0.55	MPa
Menovité napätie	123 kV	Menovité ovládacie napätie	220	VDC
Menovité výd žné rázové napätie	550 kV			
Menovité rázové spínacie napätie	- kV	Men. nap. napätie pomocných obvodov	220	VDC
Menovitá frekvencia	50 Hz	Men. napájacie napätie motora	220	VDC
Menovitý prúd	3150 A	Hmotnosť náplne plynu SF ₆	12	kg
Doba trvania skratu	3 s	Hmotnosť vypín: ča	1262	kg
Menovitý vypínací skratový prúd	40 kA	Men. sled činnosti	O-0.3s-CO-3min-CO	
Pólový faktor	1.5	Rok výroby	2005	
Men. vypínací prúd asynchronný	10 kA	Rozsah teploty	- 35°C ... + 40°C	
Made in Germany				
SL S 2011992				

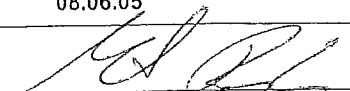

Certificate of routine test SF6 - circuit-breaker with spring operating mechanism

Main characteristics	Customer	US Steel --- Slovakia		Operating mechanism No. A-Pol		29076 0010-7/5640					
	SAP - Nr.	4824_10		Operating mechanism No. B-Pol		-					
	Serial-No.	4824_10/001		Operating mechanism No. C-Pol		-					
	Type	GL-311 F1									
	Year of manufacture	2005		Gas pressure at +20°CCharging pressure				0,55	MPa		
				Low pressure alarm				0,45	MPa		
				Function lockout				0,42	MPa		
				Rated voltage 1. Trip/2. Trip/3. Trip				220/220/-	V		
	Rated voltage			123,0	kV	Rated voltage 1. Close/2. Close				220/-	V
	Rated normal current			3150	A	Rated voltage of spring wind motor				220	V
Rated frequency			50	Hz	Frequency				-	Hz	
Rated short-circuit breaking current			40,0	kA	Rated voltage of anti condensate heater				230	V	
Operations according to IEC 62271-100 cl. 7.101											
5 * C / 5 * O			at maximum voltage		Close	242,0	Trip	242,0	V		
5 * C / 5 * O			at minimum voltage		Close	187,0	Trip	154,0	V		
5 * CO			at rated voltage		Close	220,0	Trip	220,0	V		
5 * O- 0.3s- CO			at rated voltage		Close	220,0	Trip	220,0	V		
Design and visual checks according IEC 62271-100 cl. 7.5											
Measured values at routine test					Pole A		Pole B		Pole C		
Closing time					97,2		97,3		97,9 ms		
Opening time					36,6		37,0		37,9 ms		
Contact resistance					40		39		39 µOhm		
Close - open time					<= 80				ms		
Dead time					<= 300				ms		
Resistance 1st closing circuit					145,0		-		-		Ohm
Resistance 2st closing circuit					-		-		-		Ohm
Resistance 1st tripping circuit					143,0		-		-		Ohm
Resistance 2nd tripping circuit					144,0		-		-		Ohm
Resistance 3rd tripping circuit					-		-		-		Ohm
Motor current at rated voltage					3,3		-		-		A
Charging time of closing spring					5,0		-		-		s
Heating resistor					644,0		-		-		Ohm
Voltage withstand test according IEC 62271-100 cl. 7.2, 50Hz/1 min											
Test voltage control wire, auxiliary switch										2,0	kV
SF6 tightness check											
Gas leakage					<					1,0	%/year
Power frequency voltage withstand dry test according IEC 62271-100 cl. 7.1											
Power frequency withstand voltage, 50 Hz/1 min										230	kV
with lower SF6 operating pressure +20°C										0,42	MPa

All measured values are within the tolerances given by AREVA.

AS Manufacturer:
AREVA Energietechnik GmbH

TRANSMISSION&DISTRIBUTION
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Qualitätssicherung-Endprüfung

Date	08.06.05
Tested by	
Approved	

Certificate of routine test

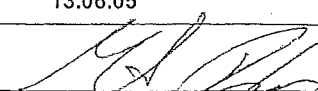
SF6 - circuit-breaker with spring operating mechanism

Main characteristics	Customer	US Steel --- Slovakia		Operating mechanism No. A-Pol		29076 0010-5/5638			
	SAP - Nr.	4824_10		Operating mechanism No. B-Pol		-			
	Serial-No.	4824_10/002		Operating mechanism No. C-Pol		-			
	Type	GL-311 F1							
	Year of manufacture	2005		Gas pressure at +20°CCharging pressure				0,55	MPa
				Low pressure alarm				0,45	MPa
				Function lockout				0,42	MPa
				Rated voltage 1. Trip/2. Trip/3. Trip				220/220/-	V
				Rated voltage 1. Close/2. Close				220/-	V
				Rated voltage of spring wind motor				220	V
Mechanical operating tests	Rated voltage	123,0	kV	Frequency				-	Hz
	Rated normal current	3150	A	Rated voltage of anti condensate heater				230	V
	Rated frequency	50	Hz						
	Rated short-circuit breaking current	40,0	kA						
	Operations according to IEC 62271-100 cl. 7.101								
	5 * C / 5 * O	at maximum voltage.		Close	242,0	Trip	242,0	V	
	5 * C / 5 * O	at minimum voltage		Close	187,0	Trip	154,0	V	
	5 * CO	at rated voltage		Close	220,0	Trip	220,0	V	
	5 * O- 0.3s- CO	at rated voltage		Close	220,0	Trip	220,0	V	
	Design and visual checks according IEC 62271-100 cl. 7.5								
Electrical tests	Measured values at routine test			Pole A	Pole B	Pole C			
	Closing time			99,8	99,9	100,0	ms		
	Opening time			36,8	37,0	37,7	ms		
	Contact resistance			40	39	39	µOhm		
	Close - open time			<= 80			ms		
	Dead time			<= 300			ms		
	Resistance 1st closing circuit			145,0	-	-	Ohm		
	Resistance 2st closing circuit			-	-	-	Ohm		
	Resistance 1st tripping circuit			143,0	-	-	Ohm		
	Resistance 2nd tripping circuit			144,0	-	-	Ohm		
Resistance 3rd tripping circuit			-	-	-	Ohm			
Motor current at rated voltage			3,5	-	-	A			
Charging time of closing spring			5,0	-	-	s			
Heating resistor			649,0	-	-	Ohm			
Voltage withstand test according IEC 62271-100 cl. 7.2, 50Hz/1 min									
Test voltage control wire,auxiliary switch						2,0	kV		
SF6 tightness check									
Gas leakage						< 1,0	%/year		
Power frequency voltage withstand dry test according IEC 62271-100 cl. 7.1									
Power frequency withstand voltage, 50 Hz/1 min						230	kV		
with lower SF6 operating pressure +20°C						0,42	MPa		

All measured values are within the tolerances given by AREVA.

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Date	13.06.05
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