ENERGOINVEST
Rasklopna Oprema a.d.

PREKIDAČI VISOKOG NAPONA U SF_6 TEHNIČI SA MOTORNO-OPRUŽNIM POGONOM

CIRCUIT BREAKERS IN SF_6 TECHNIQUE WITH MOTOR - SPRING OPERATING MECHANISM

TYPE SFEL

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TÜV MANAGEMENT SERVICE ISO 9001

ODLIKE

- Mehanička jednostavnost
- Pouzdanost
- Nizak nivo buke
- Siguran sistem gasnog zaptivanja
- Dugotrajnost kontakata
- Jednostavna montaža
- Minimalno održavanje

KARAKTERISTIKE

- Nazivni napon do 170 kV
- Prekidna moć do 31,5 (40) kA
- Nazivna struja do 2000 A
- U skladu sa svim važećim JUS, IEC BS i drugim međunarodnim standardima

U cilju snižavanja energije potrebne za pokretanje prekidača i omogućavanje primjene pouzdanih motorno – opružnih pogona, Energoinvest je pristupio razvoju novog sklopnog elementa koji, pored potisnog - PUFFER principa, koristi i pojačano djelovanje električnog luka. Dobiveni i eksperimentalno potvrđeni rezultati omogućili su izbor i adekvatno prilagođavanje motorno-opružnih pogonskih mehanizama. Rezultat ovog istraživačkog rada je familija SF6 prekidača tipa SFEL za nazivne napone do 170 kV.

KONSTRUKCIJA

Prekidači tipa SFEL za nazivne napone do 170 kV imaju jedan prekidni element po polu. Rađeni su na modularnom principu u cilju postizanja što većeg stepena unifikacije sastavnih dijelova, jednostavnijeg konstrukcionog rješenja i što veće pouzdanosti. Jedina razlika između prekidača pojedinih naponskih nivoa je u dužinama izolatora i potezne izolacione šipke, kao i rastojanje između polova, što je diktirano veličinom promjenjivog radnog napona. Za svaki naponski nivo prekidači se izrađuju u izvedbi sa jednopolnim komandovanjem. Opremljeni su motorno-opružnim pogonskim mehanizmima smještenim u vodootporne kabine koje sadrže pomoćnu elektroopremu za obezbjeđenje funkcionalnosti prekidača.
Nazivni pritisak gasa SF6 je 0,6 MPa (abs). Montaža i puštanje u rad su vrlo jedostavni i ne zahtijevaju nikakve specijalne uređaje za prvo punjenje gasom.

POGONSKI MEHANIZAM

Pokretni kontakt prekidača pogonjen je motorno-opružnim pogonskim mehanizmom preko direktne veze pogon-pol. Pogonski mehanizam je uobičajan, jednostavan u konstrukciji i radu. Operacija otvaranja prekidača je postignuta osloba|anjem akumulirane energije opruga isklopa pritiskom na dugme za isklop, čime se osloba|a poluga za blokiranje isključenja. Pritiskom na dugme za uklop, tj. osloba|anjem poluga za blokiranje , vrši se uključenje prekidača, uz istovremeno natezanje opruga isklopa prekidača. Po završetku, tj. kompletiranju operacije zatvaranja prekidača, vrši se natezanje opruga uklopa, te je pogonski mehanizam, odnosno prekidač spreman za obavljanje ciklusa 0- CO čak i u slučaju nestanka napajanja motora.
Pored mogućnosti električnog lokalnog i daljinskog komandovanja prekidačem, predviđene su mogućnosti ručnog manipulisanja prekidačem i ručnog navijanja opruge uklopa u slučaju nestanka pomoćnih napona.
Značajno je istaći da ovi prekidači sa lakoćom prekidaju struje bliskog kratkog spoja , što inače predstavlja najteži zahtijev za većinu SF6 prekidača na klasičnom potisnom principu.

SPECIAL FEATURES

- mechanical simplicity
- reliability
- low noise level
- reliable sealed gas sistem
- long contact life
- easy installation
- minimum maintenance

RATINGS

- for rated system voltages up to 170 kV
- breaking capacities up to 31,5 (40) kA
- rated normal current up to 2000 A
- according to JUS, IEC, BS and other Inernational Standards.

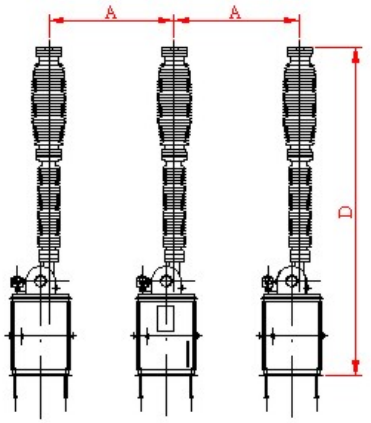
Its goal to reduce the power necessary for starting the circut breakers, thus enabling the application of reliable motor–spring operating mechanisms, has led to the development of a new interrupter design which, in addition to the PUFFER principle, uses the intensified effects of electric arc. Motor–spring operating mechanisms are the result of thorough experimentation and testing. This research has yielded a new family of SF6 circuit brakers, type SFEL, for rated voltages up to 170 kV.

CONSTRUCTION

SFEL circuit breakers for rated voltages, up to 170kV have one interrupter per pole. They are manufactured on a modular principle in order to achieve the highest possible component unity, simple desing and high reliability. The only difference among circuit breakers of particular rated voltages is in the length of the insulator, the pulling insulating rod as well as in the distance between the poles, which is determined by the value of the applied service voltage. Circuit breakers are manufactured for each voltage level with single-pole operation. They are driven by motor – spring operating mechanism enclosed in weatherproof housings which also contain the various control functions of the circuit breaker. The circuit breakers are filled with SF6 gas at a rated pressure of 0,6 MPa (abs). Installation and commissioning are easy. No special equipment is required for the initial charge of SF6 gas.

OPERATING MECHANISM

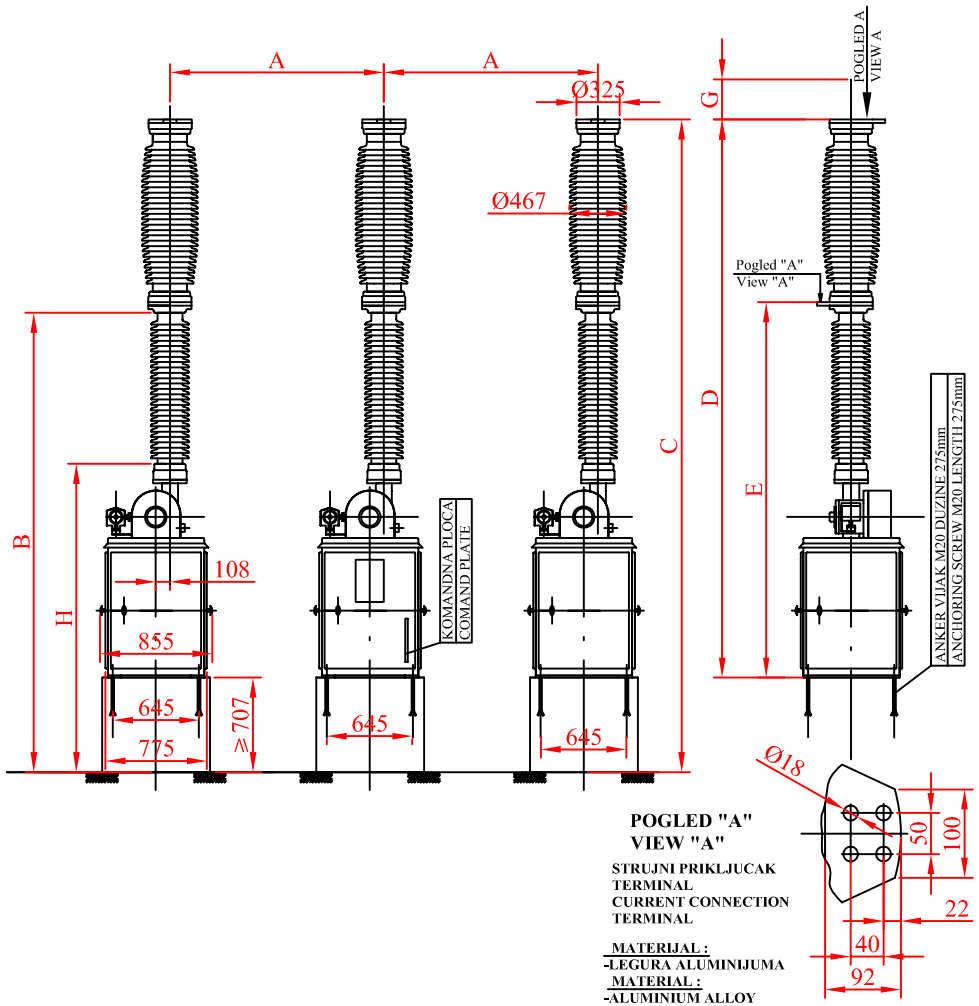
The circuit breaker's movable contact is driven by a motor-spring operating mechanism via a direct "operating mechanism – pole" connection. The design and operation of the operating mechanism is classic and simple. The circuit breaker opening operation is made possible by the release of the stored energy from the opening spring pressing the opening push – button which releases the lever for locking the opening operation. Pressing the closing push–button, i.e. releasing the locking lever, the circuit breaker is closed with a simultaneous charging of the circuit breaker closing spring. After completion of the circuit breaker closing operation, the closing spring is charged and the operating mechanism i.e. the circuit breaker is ready for the cycle O – CO even in case of motor supply failure.
Besides the possibility of electrical local and remote control there is the possibility of manual control of the circuit breaker and manual charging of the closing spring in case of failure of auxiliary voltage.
It should be pointed out that these circuit breakers easily break short – line fault currents, the most difficult task for most of the SF6 circuit breakers made on the classic puffer principle.

TEHNIČKI PODACI IZVEDBA VARIJANTE DIMENZIJE		 Tropolni prekidac sa jednopolnim pogonom Three pole circuit breaker with a three pole drive mechanism				TECHNICAL DATA CONSTRUCTION VERSIONS DIMENSIONS
NAZIVNI NAPON	kV	123	145	170	kV	RATED VOLTAGE
NAZIVNI NAIZMJENIČNI PODNOSIVI NAPON (1 min)	kV	230	275	325	kV	RATED POWER FREQUENCY WITHSTAND VOLTAGE (1 min)
NAZIVNI PODNOSIVI ATMOSFERSKI UDARNI NAPON (1,2 μ/ 50 s)	kV	550	650	750	kV	RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE (1,2μ/50 s)
TIPSKA OZNAKA	A	SFEL 11	SFEL 12	SFEL 13		TYPE DESTINATION
NAZIVNA STRUJA	kV	2000	2000	2000	A	RATED NORMAL CURRENT
NAZIVNA KRATKOTRAJNA PREKIDNA STRUJA	kV	31, 5 (40)	31,5 (40)	31,5(40)	kA	RATED SHORT CIRCUIT BREAKING CURRENT
NAZIVNA PODNOSIVA STRUJA (3s)	kV	31,5 (40)	31,5 (40)	31,5(40)	kA	RATED DURATION OF SHORT CIRCUIT (3s)
NAZIVNA UKLOPNA STRUJA	kV	80 (100)	80 (100)	80(100)	kA	RATED SHORT – CIRCUIT MAKING CURRENT
CIKLUS OPERACIJA		0- 0,3s CO - 3min - CO , CO -15 s - CO				RATED OPERATING SEQUENCE
VRIJEME PREKIDANJA	ms	50	50	50	ms	BREAK TIME
VRIJEME OTVARANJA	ms	35	35	35	ms	OPENING TIME
VRIJEME ZATVARANJA	ms	160	160	160	ms	CLOSING TIME
TEŽINA TROPOLNOG PREKIDAČA(aprox)	kg	2700	2800	3000	kg	WEIGHT, 3- POLE CIRCUIT BREAKERS
NAZIVNA FREKVANCIJA	Hz		50		Hz	RATED FREQUENCY
GLAVNE DIMENZIJE (NIJE OBAVEZNO) A	mm	1600	1750	2000	mm	PRINCIPAL DIMENSIONS (WITHOUT BINDING) A
D	mm	4088	4088	4888	mm	D
MASA GASA SF6 PO POLU	kg	3	3,5	4	kg	MASS OF SF6 GAS PER POLE

Klizna staza izolatora na zahtijev kupca
request
Druge vrijednosti na zahtijev

Creepage distance of insulator on

Other values upon request



POGLED "A"
VIEW "A"

STRUJNI PRIKLJUCAK
TERMINAL
CURRENT CONNECTION
TERMINAL

MATERIJAL :
-LEGURA ALUMINIJUMA
MATERIAL :
-ALUMINIUM ALLOY

PREKIDAC TIP / TYPE OF CIRCUIT BREAKER		SFEL 11		SFEL 12		SFEL 13	
VARIJANTA / VARIANT		1	2	3	4	5	6
NAZIVNI NAPON / RATED VOLTAGE	[kV]	123		145		170	
NAZIVNA TRAJNA STRUJA / RATED NORMAL CURRENT	[A]	2000					
NAZIVNA KRATKOSPOJNA PREKIDNA STRUJA / RATED SHORT-CIRCUIT BREAKING CURRENT	[kA]	31,5	40	31,5	40	31,5	40
KONDENZATOR / CAPACITOR			1000pF		1000pF		1000pF
NOMINALNA KLIZNA STAZA (FAZA - ZEMLJA) / NOMINAL CREEPAGE DISTANCE (PHASE - GROUND)		2842 3297 3612				3912 4542 5385	
A (min)		1600		1750		2000	
C		4795				5595	
D		4088				4888	
E		2800				3200	
NAJNIZA TACKA POD NAZIVNIM NAPONOM / THE LOWEST POINT AT RATED VOLTAGE	B [mm]	3400				3800	
MASA PREKIDACA PO POLU / MASS OF CIRCUIT- BREAKER PER POLE	[kg]	900				950	
NAZIVNI PRITISAK GASA SF 6 NA 20 °C / RATED PRESSURE OF SF 6 GAS AT 20 °C	[MPa abs]	0,6					
MASA GASA SF 6 PO POLU / MASS OF SF 6 GAS PER POLE	[kg]	2,6				3,2	
POTREBNA VISINA ZA REVIZIJU / OVERALL CLEARENCE FOR REVISION	G [mm]	300					
NAJVISA UZEMLJENA TACKA / THE HIGHEST EARTHED POINT	H [mm]	2300					
DOPUSTENA ZATEZNA SILA NA PRIKLJUCCIMA / ADMISSIBLE TENSILE STRENGHT AT TERMINALS	[N]	2000					

F					DATE	28.03.2003	
E					DESIGNED	IRCE	
D					DRAWN	Maljukan B	
C					CHECKED	Dragaš M	
B					STANDARD	Dragaš M	
A					APPROVED	Dragaš M	
	No	SERIAL	DATE	SIGN.	CHANGED WITH	1220211543	REFERENCE
REVISION		VALID FROM			CHANGED BY		

MJERNA SKICA PREKIDA ČA SFEL 11,12,13 (JEDNOPOLNI POGON)
OUTLINE DRAWING OF CIRCUIT- BREAKER SFEL 11,12,13 (SINGLE POLE DRAVE)

EPA 699341

SHEETS | SHEET