SFA ELECTRIC

SFA-EVK
Vacuum Circuit Breaker

SFA.K.001 Rev.:00 Tarih:24.05.2016

BUREAU VERITAS
Certified
Company

The products and systems described in this catalog are manufactured and sold according to a certified management system (acc. to ISO 9001 and ISO 14001).

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Designed By Serkan KARADEDE

Sustainable energy For Action

SFA ELECTRIC

SFA Electric Sustainability Approach

As a responsible employer and a company which is built on values, we commit to protect environments and adhere to ISO 14001 standards. In this regards, we conduct our business to achieve better operational efficieny and enable societies to cope with energy challange in ways that are good for people and planet. We are fostering eco-friendly production and reduction of CO2 emission. We respect law, support activities to reduce global warming and reduce carbon footprint, benefit communities.

Within the philosophy of "Give-nature-back" and our corporate strategy, we donate to TEMA * and WWF® for each order we get.

(*) The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats

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01 PRESENTATION

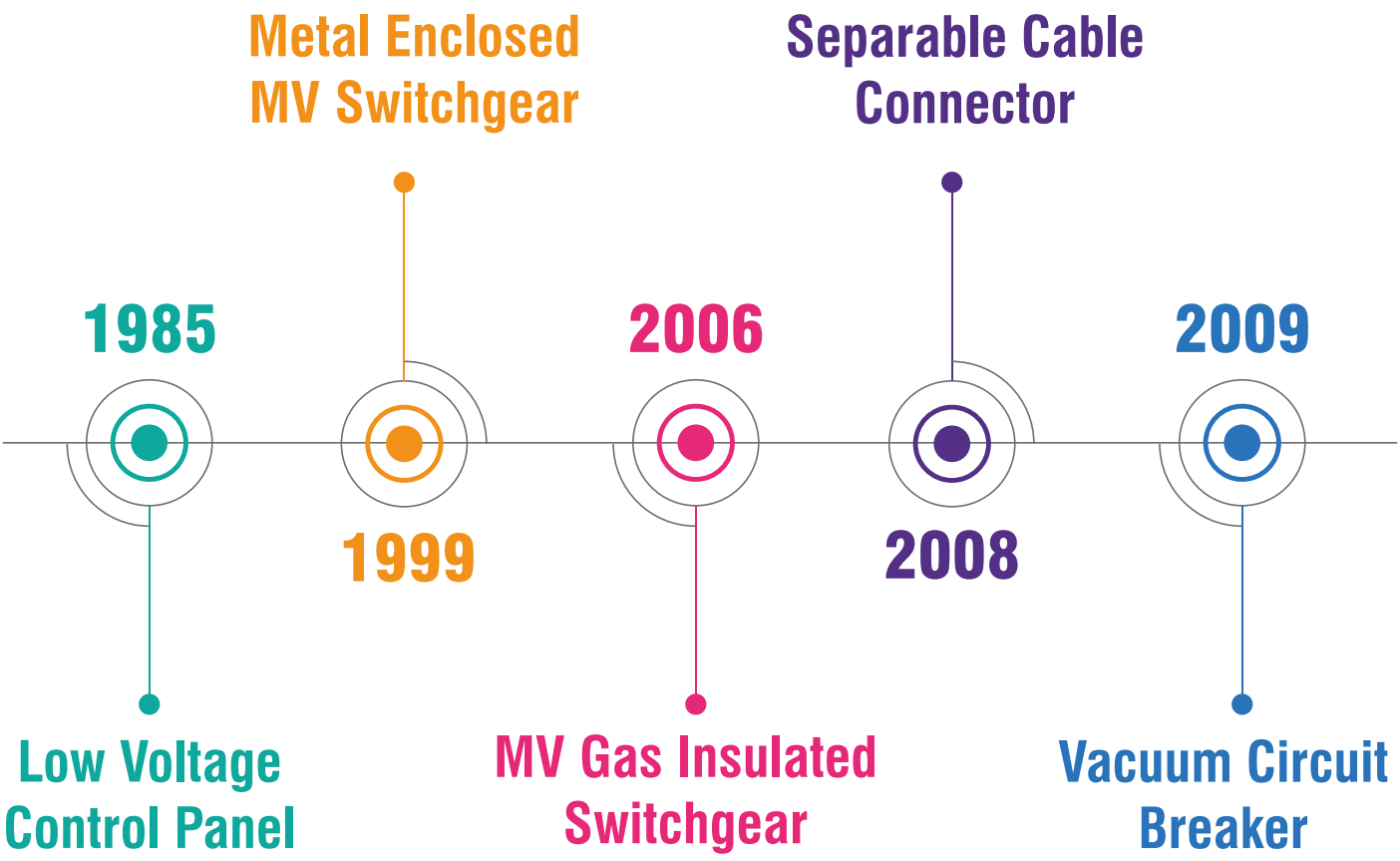
PRESENTATION

INTRODUCION OF COMPANY

SFA Electric, based in Ankara 1st Industrial Zone, began life in 2015 as a joint venture of **alfanar Group**, a $2.5 billion Saudi Arabian group of companies operating within global electrical and construction industries and Mr. Gani Köse, Turkish Investor having more than 30-years experiences of electromechanical sector.

The perfect combination of SFA R&D Team capabilities and sector experience of shareholders is enabling the company to be a dynamic, innovative and modern brand creating a difference in global electricity sector. Within a very short time, SFA Electric became a strong player in the markets where active. Hence, the endeveaur of the company is to carry company into the future by designing and manufacturing the most up-to-date MV Switchgear products with key emphasis on cost effectiveness and quality by building on our more than 30-years experience and continuous innovation for sustainable and rapid growth.

Manufacturing experience of shareholders covers a very wide range from LV, MV products to HV products. Some featured examples can be listed as manufacturing of LV Control Panels, MV Metal Enclosed Swithcgears, MV Gas Insulated Switchgears, MV Vacuum Circuit Breakers and Seperable Cable Connectors.



PRODUCT RANGE OF COMPANY

SF6 Gas Insulated Metal Enclosed Switchgear and Controlgear (RMU)

Rated Voltage (kV)	24	36
Rated Current (A)	400	630
Rated Short Time Withstand Current (kA/1 sec)	21	16
Loss of Service Continuity	LSC 2A-PM	
Internal Arc Classification	A(FL)–21kA/1sec	A(FL)–16kA/1sec
Applied Standard	IEC 62271-200	

VCB (Vacuum Circuit Breaker)

Rated Voltage (kV)	12	24	36
Rated Current (A)	1250	1250	630
Rated Short Circuit Breaking Current (kA-rms)	20	20	16
Rated Short Circuit Making Current (kA-peak)	50	50	40
Operation Cycle	O-0.3 s-CO-3 min.-CO		
Applied Standard	IEC 62271-100		

PRESENTATION

Separable Elbow Connectors (L-Type, T-Type)

	"T" Type	L" Type
Rated Voltage (kV)	36	36
Rated Current (A)	630	250;400
Interface	C	B; C
Contact Type	Bolted	Sliding
Screened / Unscreened	Screened	
Applied Standard	HD 629.1S2; HD 61442	

FOSTERING SUSTAINABLE ENERGY ALL OVER THE WORLD

02 VACUUM CIRCUIT BREAKER

GENERAL

SFA-EVK Type Circuit Breakers:

Designed for use with air insulated metal enclosed switchgear and controlgear and indoor applications. EVK CB's are suitable to rapid auto-reclosing.

The switching tests of breaker were carried out inside MME* type cubicle.

About Vacuum Technology

According to Paschen Curves, high values of dielectric strength of medium can be obtained at very low or very high pressure levels. The characteristics of insulation at very low pressure values provide very low distance between contacts. This distance varies from 10 mm to 20 mm considering the voltage level.

Current Interruption:

Vacuum circuit-breakers does not require an interrupting or insulation medium. In fact, the interrupters do not contain ionizable material.

During the separation of current-carrying contacts, contact pressure reduces, real contact surface reduces and the temperature of contacts increases to melting temperature. This produces metal vapours which initiates and supports the vacuum arc, maintaining until the next current zero. Due to the special geometry of the spiral contacts, the arc column is kept rotating by the radial magnetic field produced in order to involve a wider surface than that of a fixed contracted arc. Thus, overheating and erosion of the contacts are prevented. So the lifespan of circuit breaker is increased.

Since there is no interrupting or insulation material in the medium, there is no decomposition gases or

** MME is air insulated, metal enclosed, LSC2A-PI type switchgear produced by ELKO.*

QUALITY ASSURANCE

The type-tests of EVK type circiut breakers are performed in complience with international standard, (IEC 62271-100) The following routine tests, stated below, are performed for each circuit breaker.

Routine Tests:

- Power Frequency Withstand Test on main circuit
- Power Frequency Withstand Test on auxiliary and control circuits
- Measurement of the resistance of main circuit
- Measurement of opening and closing times
- Mechanical tests

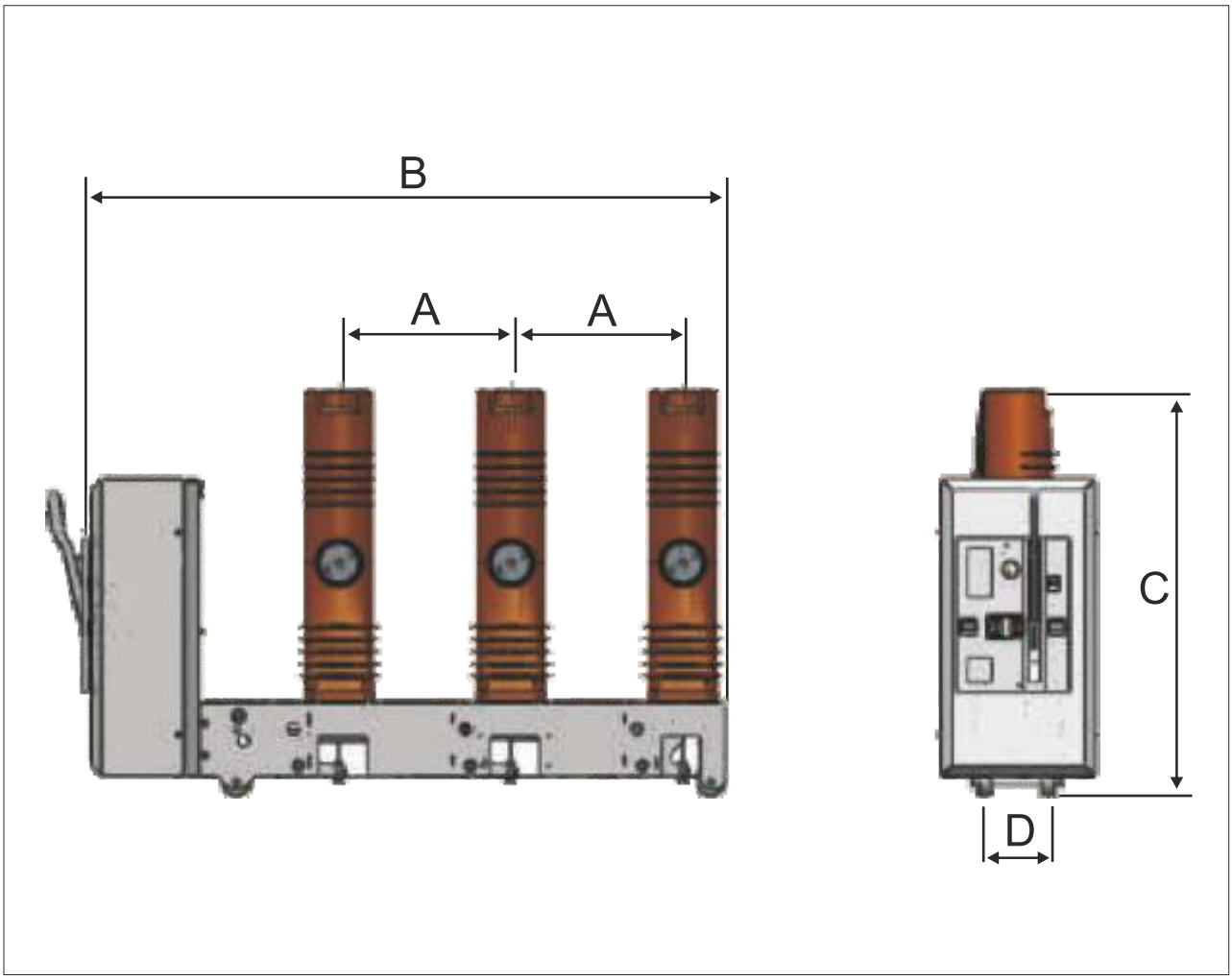
SFA-EVK type circuit breakers production

- complies with ISO 9001:2001 Quality Management System and ISO 14001 Environmental Mangement System
- complies with International Standarts (IEC) and Gost-R

TECHNICAL CHARACTERISTICS

Manufacturer	SFA ELEKTROMEKANİK ELEKTRİK SANAYİ VE TİCARET A.Ş			
Type		SFA-EVK 12-1A	SFA-EVK 24-1A	SFA-EVK 36-1A
Rated Voltage	kV	12	24	36
Temparatura Class*	°C	-5 °C/+40 °C	-5 °C/+40 °C	-5 °C/+40 °C
Operrating Altitude*	m	<1000	<1000	<1000
Rated Lightning Impulse Withstand Voltage	kV	75	125	170
Rated Power Frequency Withstand Voltage	kV	28	50	70
Rated Normal Current	A	1250	1250	630
Rated Frequency	Hz	50	50	50
Rated Short-Circuit Breaking Current	kA	20	20	16
Rated Short-Circuit Making Current	kA	50	50	40
DC Compenent of the Rated Short-Circuit Breaking Current	%	35	35	30
Duration of Short-Circuit	s	3	3	3
First-pole-to-clear Factor		1.5	1.5	1.5
Rated Operating Sequence		0-0.3 s- CO- 3 min- CO		
Rated Break Time	ms	~40-45	~40-45	~40-50
Rated Make Time	ms	~45-50	~45-50	~50-55
Rated Out of Phase Breaking Current	ms	<5	<5	<5
Classification of Electrical Endurance:				
■ Breakers Intended for Use Without Auto-reclosing Duty		E2	E2	E2
■ Breakers Intended fot Auto-reclosing Duty		E1	E1	E1
Classification of Mechanical Endurance		M1	M1	M1
Classification of Restriking		C2	C2	C2
Applied Standard		IEC 62271-100		

DIMENSIONS



	A	B	C	D
SFA-EVK 12-1A	210	900	680	100
SFA-EVK 24-1A	250	1010	680	100
SFA-EVK 36-1A	350	1310	825	100

03 COMPONENTS

GENERAL FEATURES

Interruption of High Currents:

- Arcing time is very short (about 6 msec). After the separation of contacts, current is interrupted in the vicinity of natural current zero.
- The arcing voltage is very low. The short distance between contacts leads to short arc length and the metal vapour provides lower arc resistance. Due to these, arc voltage at vacuum circuit breaker is about 50-100 V whereas it is about 300 V for SF6 CBs and 500 V for oil circuit breakers.

For these reasons, the arc energy is very low for vacuum circuit breakers in comparison with other type of circuit breakers.

Electrical Endurance:

The low arc energy provides very high electrical endurance. Besides, the mechanical lifespan of breaker, instead of how many times the current is chopped, is the characteristic that determines the lifetime of VCB.

The vacuum interrupters used in EVK type breakers can interrupt "Rated Nominal Current" for about 10000 times and can interrupt "Rated Short Circuit Current" for 100 times.

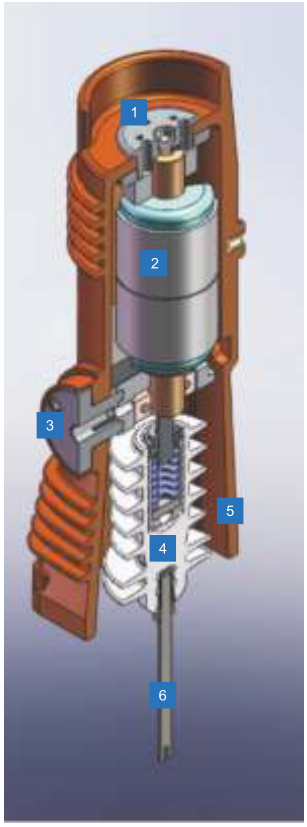
Mechanical Endurance:

In regard to the researches committed, 75 percent of the circuit breaker faults is caused from mechanical inadequacy of breaker. Thus, mechanical endurance is very important criteria. Vacuum circuit breakers have more advantages than other types of breakers. VCBs involve fewer mechanical components and require less force for open/close operations. This leads to the fact that breakers is subject to less impact, less vibration and thus, less deformation and corrosion.

Advantages of Vacuum Circuit Breakers:

- Very long lifetime of the contacts (This provides longer breaker life.)
- Less maintenance required
- Less moving parts in mechanism
- Less force needed to separate the contacts (since the distance between them is shorter.)
- Environment friendly. Since interruption takes place in vacuum medium, VCBs do not require gas or liquid addition. This reduces the possibility of leakage of gas (or any material) that can be harmful for environment.

POLE STRUCTURE AND OPERATING MECHANISM



1. Upper terminal
2. Vacuum interrupter
3. Lower terminal
4. Isolator
5. Epoxy housing
6. Connection to operating shaft

Operating Mechanism:

- Placed in a metal enclosure having IP20 protection degree.
- Trip-free.
- Suitable for "O-0.3sec - CO-3min - CO" cycle.

The operating mechanism of SFA-EVK is a mechanical system based on stored energy within a spring.

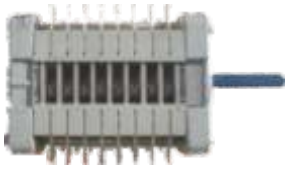
» Storing Energy:

- with geared DC motor (electrically)
- with operating handle (manually)

» Releasing Energy:

- with shunt releases (electrically)
- with open/close button placed on mechanism (manually)

ACCESSORIES



Auxiliary Contact Group:

This contact takes initial force from the drive shaft of breaker, so changes its position with open/close operations of breaker. If not specified, the default components are 6 normal open (NO) and normal close (NC) contacts. These are used in the open/close control circuit of breaker.

Anti-Pumping Device:

The anti-pumping device prevents close operation if electrical commands of open and close appear at the same time. By doing so, possibility of breaker failure is reduced. The control circuit have an anti-pumping release.

Open/Close Releases:

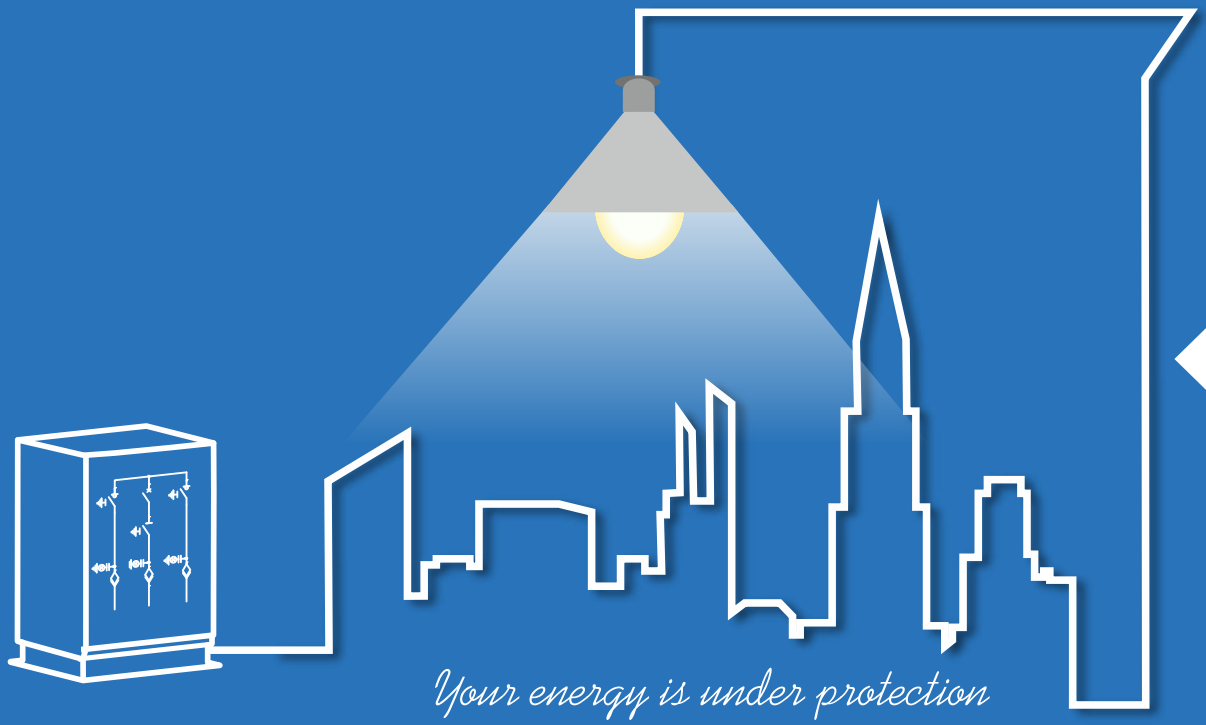
All mechanisms based on stored energy principle must have opening and closing releases. The opening/closing releases used in opening/closing circuits, respectively. The operating voltages of releases must be specified at order by client.

Spring Charging Motor:

Used to charge closing spring automatically.

Electrical Characteristics:

	Voltage	Power
Motor	■ 220 VAC ■ 24 VDC, 48 VDC 110 VDC	380 W
Coil	■ 24 VDC, 48 VDC 110 VDC	



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