VACUUM CIRCUIT BREAKERS
7.2 kV to 36 kV

PELKA

ADVANTAGES of Vacuum Circuit Breakers TYPE PVB

✓ High performance under extreme operating conditions

PVB Type VCBs operate with high performance even under extreme climatic conditions, such as, between temperatures -25 °C and +55 °C, 90 -100 % humidity, and at 1000 m altitude above sea level.

✓ Maintenance free

PVB type VCBs are maintenance free for at least 20 years under normal operating conditions. (No lubrication, no adjustment, no change of vacuum interrupters)

✓ Powerful operating mechanism

Without any maintenance 30 000 operating cycles are guaranteed by PCRR 1000 type operating mechanisms used in PVB type VCBs.

Total energy stored for a CO (closing/opening) operation is less than 100 JL; that means minimum metal fatigue and highest mechanical endurance.

✓ Worlwide accepted vacuum interrupters

PVB Type VCB's are equipped with the most well known and well accepted vacuum interrupters from Westinghouse, USA.

The breaking capacities of the interrupters are as follows:

Under rated operation current (I_n) : 20 000 times

Under 100 % rated SC current (I_{sc}) : 100 - 125 times

✓ Compact and uniform desing

All the PVB type VCBs have uniform arrangements and compact design for all the ratings.

✓ Wide range of switching function

PVB type VCBs are capable of handling many switching applications perfectly, such as, no load transformers, cables, overhead lines, induction motors, capacitor banks, arc furnaces, etc.

✓ High operation safety- Environment friendly

PVB type VCBs are specially designed to maximize the operation safety. Additionally, PVB type VCBs are environmentally friendly because they have neither gas exhaust nor operation noise to pollute the surroundings. There is no risk of explosion or fire.

✓ Assurance of Pelka quality

To approve PELKA quality, PVB type VCBs are tested in independent Test Authorities and they have "Certificates of Conformities" to related IEC standarts from KEMA (Holland) and CESI (Italy) laboratories.

MEDIUM VOLTAGE CIRCUIT-BREAKERS ANALYSIS OF TECHNOLOGIES

CRITERIA OF CHOICE	Technologies		
	Oil	SF6	Vacuum
Reliability			
Gas exhaust during operation			
Explosion resistance			
Fire resistance			
Electrical life endurance			
Mechanical life endurance			
Tightness			
Level of noise			
Investment cost			
Maintenance cost			
Weight			
Reaction on structure (ground)			
Safety of operators			

Satisfactory	Good	Very good	Excellent

GENERAL

PELKA

As a member of Kavala Group, one of the leading trading groups of Turkey particularly in the energy sector, Pelka is giving service for design, manufacturing and installation of HV, MV and LV electrical equipments as well as realizing several projects on turn-key basis as a contractor in Turkey and the other countries.

Since its establishment in 1985, Pelka has successfully completed many projects both locally and internationally from LV up to 380 kV.

Pelka aims to keep up and improve its success in the future with the help of its high skilled personnel and most advanced technology and always considering to continue to follow Pelka principles of ***quality, customer satisfaction*** and ***after sales service.***

PRINCIPLES

The ultimate quality of electrical power supply is mainly determined by the medium voltage system. One of the most significant parts of this system is constituted by the switchgear circuit breakers.

Over breakers employing other arc-quenching principals, vacuum circuit breakers offer several advantages particularly being practically maintenance free and capable of performing switching operations even in critical circumstances.

The vacuum circuit breakers are perfectly conducting at the opening up to the precise moment of the alternating current zero point and completely insulating instantly after that point, hence vacuum breakers can be assumed to be "the ideal arc interrupting" circuit breakers.

The vacuum arc of short lenght and forms of a plasma of high conducting metal vapours sustain a very low arc voltage until extinguishing take place at natural current zero point.

Furthermore, the vacuum comprises physically the ideal insulator due to the theoretically impossible start of ionization process which causes the instant condensation of essential metal vapours on shields and contacts.

The energy level developed inside the arc-quenching chamber is minimum because of the very low arc voltage related to immediate recovery of dielectric strength.

Additionally, the energy necessary to the operating mechanism can itself be very reduced due to low strokes and minimized moving masses.

Consequently, with the combination of these advantageous energetic features, from both arc-quenching media and operating mechanism, which provide practically free maintenance and capability of performing wide range of switching operations, the PVB type vacuum circuit breakers are the ideal choice for your medium voltage system.

Description of Vacuum Circuit Breaker

PVB type vacuum circuit breaker is mainly composed of:

- Three vacuum interrupters with insulating frame (s)
- Supporting frame between main components.
- PCRR 1000 type operating mechanism

Vacuum Interrupter

Vacuum interrupters are the most critical parts of vacuum circuit breakers since the current is interrupted inside.

A standard vacuum interrupter is formed by a cylindrical vacuum containment chamber with insulating envelope sealed between two metal parts.

Due to the extremely low pressure of 10^{-3} to 10^{-7} torr inside this chamber, only a relatively small contact gap is required to achieve a high dielectric strength.

Since the breaking capacity of a vacuum interrupter depends largely on the behaviour of the arc produced between contacts, axial magnetic field concept has been applied to the vacuum interrupters used in PVB type vacuum circuit breakers to increase the breaking capacity. In this method, two main butt contacts have an axial arrangement inside the vacuum chamber; one of them is fixed and the other is an axial motion contact. When the latter moves, tightness is ensured by means of metal bellows, the ends of which are welded to the rod of this moving contact on one hand and to the bottom part of vacuum chamber on the other hand. Material and design of these contacts have been selected with the aim of ensuring the best interrupting performances within the widest conditions of use. A cylindrical shield is provided inside the vacuum chamber on which the contact metal molecules are vaporized by the condensation to prevent the reduction of its insulation ability.

Briefly, the design and production of vacuum interrupters ensure permanent maintaining of vacuum quality.

Supporting Frame

This master part of the PVB type vacuum circuit breaker is a multifunctional part intended for fixing the vacuum interrupters, the operating mechanism and their connections. It ensures both phase-to-phase and phase-to-earth insulation, the earth being formed by the metal part of the breaker.

Its lower part including the bearings for operating shafts of vacuum interrupters connects the operating mechanism to the live part of the circuit beraker. This frame is made of composite material ensuring very high mechanical and dielectric reliability.

OPERATING MECHANISM

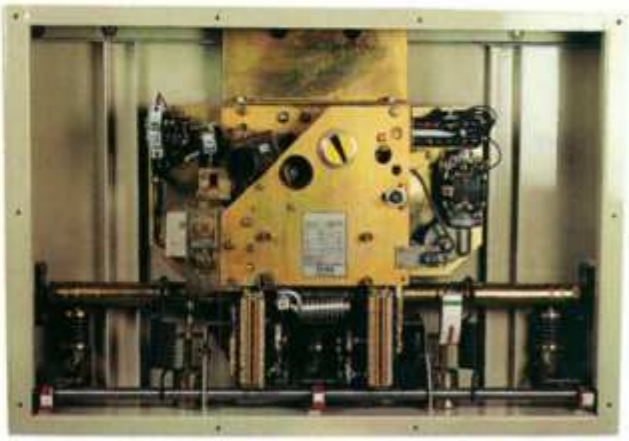
OPERATING MECHANISM

All PVB type vacuum circuit breakers are equipped with PCRR 1000 type operating mechanisms processed by using spring stored energy independent from the direct operators access and also by enabling auto-reclosing.

This operating mechanism is remote electrical control type and a manual safety operation can be carried out by means of a handle.

Moreover, PCCR-1000 type operating mechanism include the pressure springs for contacts which are kept away from live parts and easily accessible for measurement of contact stroke or erosion.

The special design of this operating mechanism has been aimed at complying with the particular performances of the PVB type vacuum circuit breakers, especially with regard to reliability and mechanical life.



TECHNICAL FEATURES

Common features	Rated frequency, for alternating current	50/60 Hz
	Power frequency withstand voltage during 1 min	2000 V
Closing spring winding motor	Rated supply voltage,	
	- for direct current only	U_n : 24/48 V
	- for direct current and for alternating current	U_n : 110/220 V
	Operating range of supply voltage	85 ... 110 % U_n
	Direct current power consumption	80 W
	Alternating current power consumption	100 VA
	Starting current (multiple of the current in continuous duty)	2.5
	Winding time	8 s
Shunt opening and closing release	Rated supply voltage,	
	- for direct current only	U_n : 24/48 V
	- for direct current and alternating current	U_n : 110/220 V
	Operating range of supply voltage	
	- shunt closing release	85 ... 110 % U_n
	- shunt opening release for alternating current	85 ... 110 % U_n
	- shunt opening release for direct current	70 ... 110 % U_n
	Direct current power consumption	170 W
	Alternating current apparent power	220 VA
	Minimum impulse time	10 ms
Under-voltage opening release	Rated supply voltage,	
	- for alternating current only	U_n : 110/220 V
	Apparent power	16 VA
	Voltage causing the circuit-breaker tripping	35 ... 65 %U_n
	Minimum voltage at closing	80 % U_n
Signalling circuits	Rated insulation voltage	300 V
	Rated normal current	16 A
	Breaking current of signalling contacts	
	- for alternating current at 220 V	16 A
	- for direct current at 220 V in an inductive circuit with time constant L/R = 20 ms	2 A

PRODUCTION RANGE

Rated Voltage	Rated Current	Rated Short Circuit Breaking Current	Rated Short Circuit Duration	Circuit Breaker Type
7.2 kV	800A	16 kA	3 sec	PVB3-16/8 (W or F)
7.2 kV	1250A	16 kA	3 sec	PVB3-16/12 (W or F)
7.2 kV	800A	20 kA	3 sec	PVB3-20/8 (W or F)
7.2 kV	1250A	20 kA	3 sec	PVB3-20/12 (W or F)
7.2 kV	1600A	20 kA	3 sec	PVB3-20/16 (W or F)
7.2 kV	2000A	20 kA	3 sec	PVB3-20/20 (W or F)
7.2 kV	800A	25 kA	3 sec	PVB3-25/8 (W or F)
7.2 kV	1250A	25 kA	3 sec	PVB3-25/12 (W or F)
7.2 kV	1600A	25 kA	3 sec	PVB3-25/16 (W or F)
7.2 kV	2000A	25 kA	3 sec	PVB3-25/20 (W or F)
7.2 kV	2500A	25 kA	3 sec	PVB3-25/25 (W or F)
7.2 kV	800A	31.5 kA	3 sec	PVB3-31/8 (W or F)
7.2 kV	1250A	31.5 kA	3 sec	PVB3-31/12 (W or F)
7.2 kV	1600A	31.5 kA	3 sec	PVB3-31/16 (W or F)
7.2 kV	2000A	31.5 kA	3 sec	PVB3-31/20 (W or F)
7.2 kV	2500A	31.5 kA	3 sec	PVB3-31/25 (W or F)
7.2 kV	3150A	31.5 kA	3 sec	PVB3-31/31 (W or F)
7.2 kV	800A	40 kA	3 sec	PVB3-40/8 (W or F)
7.2 kV	1250A	40 kA	3 sec	PVB3-40/12 (W or F)
7.2 kV	1600A	40 kA	3 sec	PVB3-40/16 (W or F)
7.2 kV	2000A	40 kA	3 sec	PVB3-40/20 (W or F)
7.2 kV	2500A	40 kA	3 sec	PVB3-40/25 (W or F)
7.2 kV	3150A	40 kA	3 sec	PVB3-40/31 (W or F)
12 kV	800A	16 kA	3 sec	PVB4-16/8 (W or F)
12 kV	1250A	16 kA	3 sec	PVB4-16/12 (W or F)
12 kV	800A	20 kA	3 sec	PVB4-20/8 (W or F)
12 kV	1250A	20 kA	3 sec	PVB4-20/12 (W or F)
12 kV	1600A	20 kA	3 sec	PVB4-20/16 (W or F)
12 kV	2000A	20 kA	3 sec	PVB4-20/20 (W or F)
12 kV	800A	25 kA	3 sec	PVB4-25/8 (W or F)
12 kV	1250A	25 kA	3 sec	PVB4-25/12 (W or F)
12 kV	1600A	25 kA	3 sec	PVB4-25/16 (W or F)
12 kV	2000A	25 kA	3 sec	PVB4-25/20 (W or F)
12 kV	2500A	25 kA	3 sec	PVB4-25/25 (W or F)
12 kV	800A	31.5 kA	3 sec	PVB4-31/8 (W or F)
12 kV	1250A	31.5 kA	3 sec	PVB4-31/12 (W or F)
12 kV	1600A	31.5 kA	3 sec	PVB4-31/16 (W or F)
12 kV	2000A	31.5 kA	3 sec	PVB4-31/20 (W or F)
12 kV	2500A	31.5 kA	3 sec	PVB4-31/25 (W or F)
12 kV	3150A	31.5 kA	3 sec	PVB4-31/31 (W or F)
12 kV	800A	40 kA	3 sec	PVB4-40/8 (W or F)
12 kV	1250A	40 kA	3 sec	PVB4-40/12 (W or F)
12 kV	1600A	40 kA	3 sec	PVB4-40/16 (W or F)
12 kV	2000A	40 kA	3 sec	PVB4-40/20 (W or F)
12 kV	2500A	40 kA	3 sec	PVB4-40/25 (W or F)
12 kV	3150A	40 kA	3 sec	PVB4-40/31 (W or F)

Rated Voltage	Rated Current	Rated Short Circuit Breaking Current	Rated Short Circuit Duration	Circuit Breaker Type
17.5 kV	800A	16 kA	3 sec	PVB5-16/8 (W or F)
17.5 kV	1250A	16 kA	3 sec	PVB5-16/12 (W or F)
17.5 kV	800A	20 kA	3 sec	PVB5-20/8 (W or F)
17.5 kV	1250A	20 kA	3 sec	PVB5-20/12 (W or F)
17.5 kV	1600A	20 kA	3 sec	PVB5-20/16 (W or F)
17.5 kV	2000A	20 kA	3 sec	PVB5-20/20 (W or F)
17.5 kV	800A	25 kA	3 sec	PVB5-25/8 (W or F)
17.5 kV	1250A	25 kA	3 sec	PVB5-25/12 (W or F)
17.5 kV	1600A	25 kA	3 sec	PVB5-25/16 (W or F)
17.5 kV	2000A	25 kA	3 sec	PVB5-25/20 (W or F)
17.5 kV	2500A	25 kA	3 sec	PVB5-25/25 (W or F)
17.5 kV	800A	31.5 kA	3 sec	PVB5-31/8 (W or F)
17.5 kV	1250A	31.5 kA	3 sec	PVB5-31/12 (W or F)
17.5 kV	1600A	31.5 kA	3 sec	PVB5-31/16 (W or F)
17.5 kV	2000A	31.5 kA	3 sec	PVB5-31/20 (W or F)
17.5 kV	2500A	31.5 kA	3 sec	PVB5-31/25 (W or F)
17.5 kV	3150A	31.5 kA	3 sec	PVB5-31/31 (W or F)
17.5 kV	800A	40 kA	3 sec	PVB5-40/8 (W or F)
17.5 kV	1250A	40 kA	3 sec	PVB5-40/12 (W or F)
17.5 kV	1600A	40 kA	3 sec	PVB5-40/16 (W or F)
17.5 kV	2000A	40 kA	3 sec	PVB5-40/20 (W or F)
17.5 kV	2500A	40 kA	3 sec	PVB5-40/25 (W or F)
17.5 kV	3150A	40 kA	3 sec	PVB5-40/31 (W or F)
24 kV	800A	16 kA	3 sec	PVB6-16/8 (W or F)
24 kV	1250A	16 kA	3 sec	PVB6-16/12 (W or F)
24 kV	1600A	16 kA	3 sec	PVB6-16/16 (W or F)
24 kV	800A	25 kA	3 sec	PVB6-25/8 (W or F)
24 kV	1250A	25 kA	3 sec	PVB6-25/12 (W or F)
24 kV	1600A	25 kA	3 sec	PVB6-25/16 (W or F)
24 kV	2000A	25 kA	3 sec	PVB6-25/20 (W or F)
24 kV	2500A	25 kA	3 sec	PVB6-25/25 (W or F)
36 kV	800A	16 kA	3 sec	PVB7-16/8 (W or F)
36 kV	1250A	16 kA	3 sec	PVB7-16/12 (W or F)
36 kV	800A	25 kA	3 sec	PVB7-25/8 (W or F)
36 kV	1250A	25 kA	3 sec	PVB7-25/12 (W or F)
36 kV	2000A	25 kA	3 sec	PVB7-25/20 (W or F)

Type Designation:

PVB 7 - 25 / 20 (W or F)

- PVB: Pelka Vacuum Breaker
- 7: Rated Voltage
  - *7 for 36 kV*
  - *6 for 24 kV*
  - *5 for 17.5 kV*
  - *4 for 12 kV*
  - *3 for 7.2 kV*
- 25: Rated Short Circuit Breaking Current (3 sec) in kA.
- 20: Rated Nominal Current in A (x100)
- (W or F): Type of Breaker
  - *W for Withdrawable Type*
  - *F for Fixed Type*

PVB 4 - 25 /12 W

PVB 7 - 25/20 F

CERTIFICATES

We Bring You Ten Years Of Experience!!

PELKA

Office : Hoşdere Cad. No:158/3 06530 Yukarı Ayrancı Çankaya-ANKARA/TURKEY
Telefon : +90 (312) 4417185 Fax: +90 (312) 4417102

Factory : İstanbul yolu 27.km Dağyaka Cad. No:10 Sarayköy-Kazan-ANKARA/TURKEY
Telefon : +90 (312) 8154272 Fax: +90 (312) 8154277

www.pelka.com.tr
pelka@pelka.com.tr