

High-Voltage Dead-Tank Circuit Breakers



PB123

PB145

PB170

PB 145

FAMILY OF BREAKERS

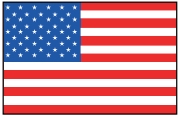


123kV – 170kV 40kA





PB145



All of PAB's operations are located in Canonsburg, Pennsylvania, USA, including all Management, R&D, Production, and Technical Support functions. Being strategically located in the USA means all directives, including management and technical decisions, are made quickly and consistently without relying on offices half a world away. Locating R&D personnel with Production ensures that equipment is built to the designers' standards.

Integrating R&D personnel with Technical Support means you have quick access to the people who know the product and its applications best—the design engineers. Headquartered within the facilities of Pennsylvania Transformer Technology, Inc. (PTTI), PAB has direct access to PTTI's 350+ employee workforce, technical expertise, and financial resources.

Dedicated Breaker Experts

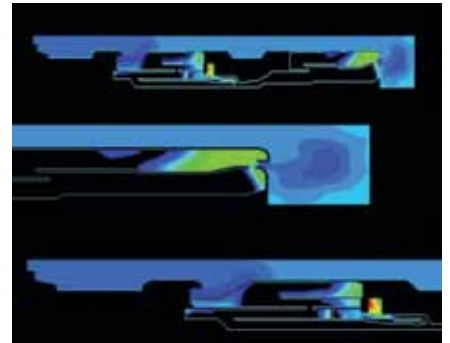
As circuit breaker experts, the employees and management of Pennsylvania Breaker (PAB) are dedicated to designing and building the industry's best high-voltage circuit breakers. Everything we do revolves around circuit breakers; our time and attention are not diluted or distracted by other products that need sold or serviced. Breakers are our name—they are who we are. You can be sure that your PAB circuit breaker was developed and is supported by a team of professionals focused solely on the advancement of high-voltage circuit breaker products.



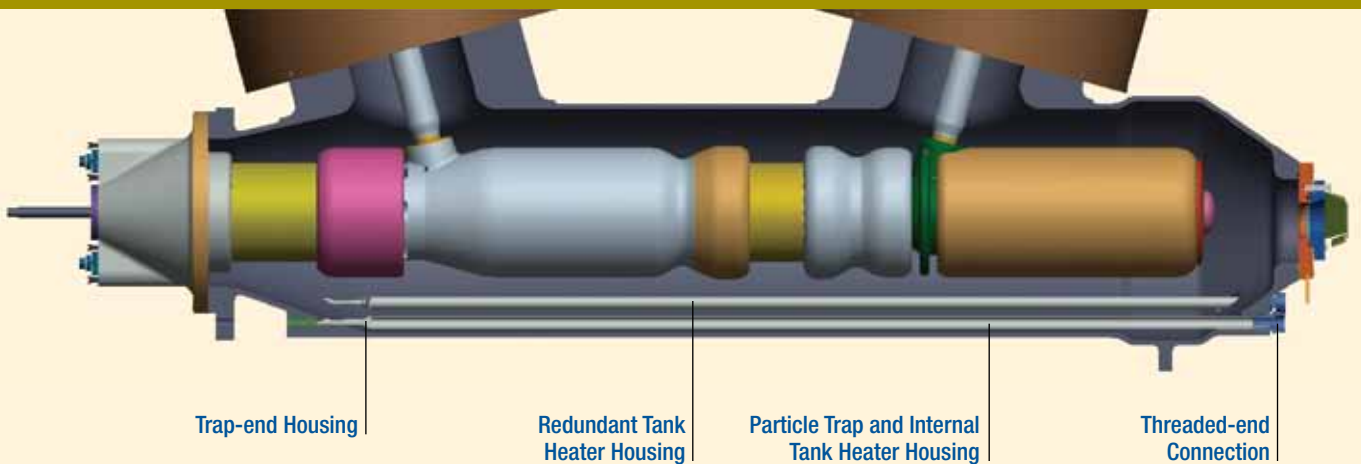
PAB's 90,000-square-foot production facility includes separate quality inspection areas, an interrupter-assembly clean room, and a high voltage test center containing a 1,000,000-volt hi-pot transformer and 2,500,000-volt impulse generator.

State-of-the-Art Technology

Pennsylvania Breaker R&D engineers have designed the industry's most modern circuit breaker configurations using the most powerful, sophisticated software design tools available. Computational fluid dynamics (CFD), finite element analysis (FEA), and 3-D CAD layout design systems have enabled PAB's R&D engineers to develop complete breaker families of ratings in significantly less time than ever before in the industry. The expert use of the latest design technologies has enabled PAB to implement the industry's fastest operating mechanisms and highest X/R ratio interrupters.



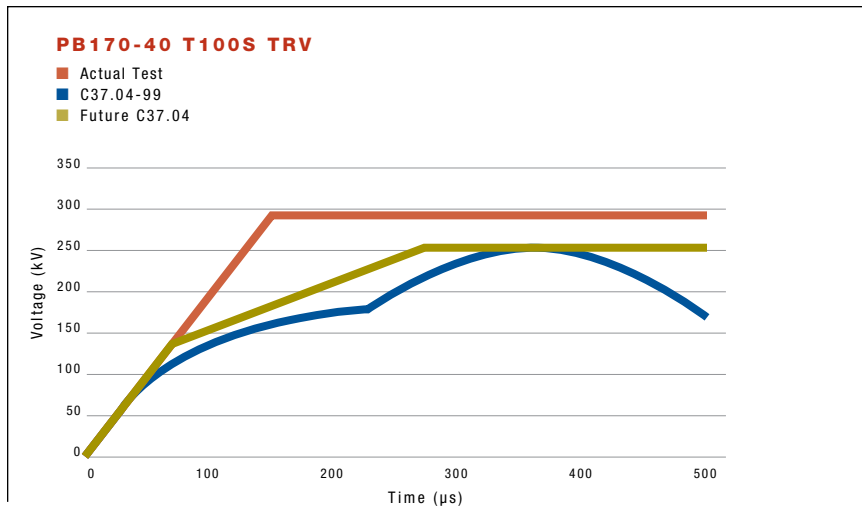
Simulated interruption modeled with CFD software.



Superior Performance

Coupling the reliable SSM-1.6 Spring-Operating Mechanism with proven self-blast interrupter technology enabled PAB engineers to design a family of breakers certified to the industry's most current standards, including the more stringent proposed drafts. The PB145 family is not grandfathered to previous, more lenient standards as are older breakers on the market. Examples of the superior performance are:

- **Tested to L30 Line Fault Duties – not required by current standards but critical for ensuring proper interruption at typical short-circuit current levels.**
- **First-Pole-to-Clear Factor of 1.5 at 170kV – allows for application on ungrounded systems and provides for improved performance on grounded systems.**
- **High Asymmetry Ratio of 33 – almost double the standard required ratio of 17.**
- **Short-time Current Carrying Test at 50kA – 25% above standard requirements, without deformation or welding of contacts.**
- **Tested for “Definite Purpose for Fast Transient Recovery Rise Times” – as specified in ANSI C37.06.1.**



Design Features

Internal Tank Heater PAB's internal tank heater design provides the most efficient means of heating the interrupter's SF₆ gas. Tank heaters are installed in the interrupter tank to directly heat the SF₆ gas instead of being mounted on the outside of the tank as typically done with inefficient conventional tank heater systems. Within a few minutes, the heater element can be easily exchanged without opening the tank or removing the SF₆ gas.

Integral Particle Trap Improved dielectric performance over the life of the circuit breaker is ensured because of PAB's patented particle trap design. Each breaker is supplied with a particle trap integral to the interrupter's enclosure. The trap ensures that any particles or arc by-products generated during breaker operation are electrically shielded at the enclosure's lowest point.

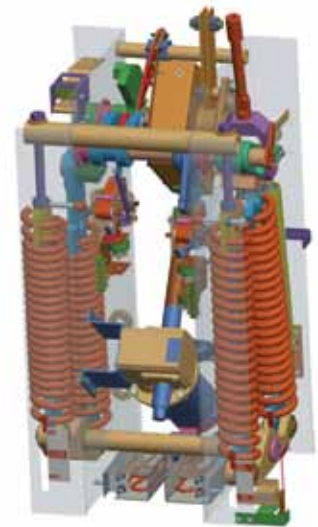
Configuration

The mechanism's spring-opening and spring-closing action, illustrated below, is designed to provide reliable 3-cycle performance with minimal maintenance.

The mechanism's open design provides ready access to all of the mechanism's components; all adjustments are easily made and all primary components can be replaced without disassembling the mechanism.

Maintenance

Maintenance is purposely simplified. All main bearings have built-in lube fittings for ease of lubrication. Hand-charging the mechanism is done with a commercially available wrench; no special tool is required. Additionally, auxiliary switches are mounted directly on the mechanism to ensure reliability of operation; there's no need to adjust linkages between the mechanism and the auxiliary contacts.



SSM 1.6 Spring-Operating Mechanism

PB145

DIMENSIONS (INCHES)

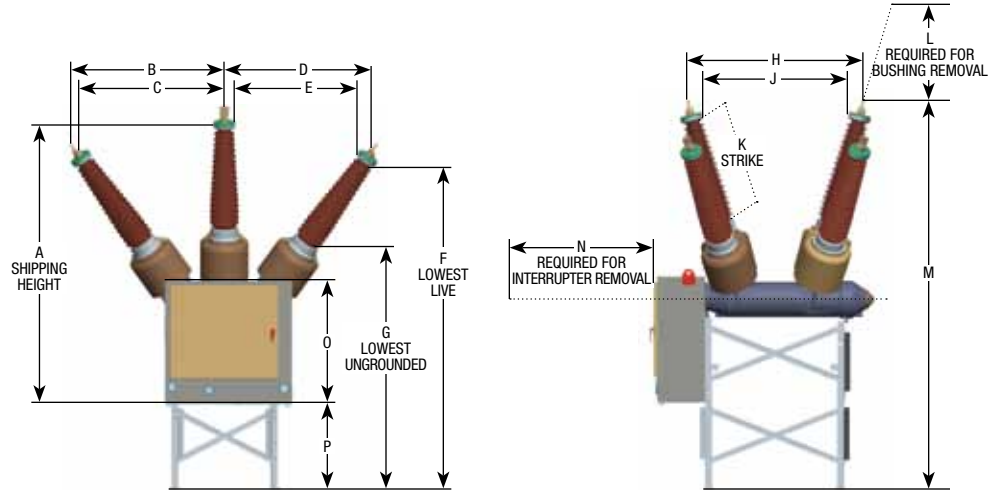
	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
PB123-40	138	74	71	71	58	153	115	82	68	48	22	181	84	58	41
PB145-40	138	74	71	71	58	153	115	82	68	48	22	181	84	58	41
PB170-40	143	77	74	74	62	158	115	85	72	56	22	188	84	58	41

Standard Features

- Integral particle trap
- Internal tank heater
- Porcelain insulators
- Galvanized support frame
- Powder-coated NEMA 3R control cabinet
- Stainless steel door handles
- Stainless steel SF6 tubing
- Ganged SF6 monitoring
- SAE hardware
- Fully assembled shipments

Optional Features

- Low-temperature performance to -55°C
- ASME Pressure Vessel Certification
- Composite insulators
- Extra-high creep/high-altitude insulators
- High seismic performance
- Individually-phased SF6 monitoring
- NEMA four-hole universal positioning terminals
- NEMA 4X mechanism/control cabinet
- Custom control package
- Extra auxiliary contacts
- Custom support structure
- Side-mounted position indicator for long-distance viewing



RATINGS	PB123-40	PB145-40	PB170-40
Standards	ANSI/IEEE	ANSI/IEEE	ANSI/IEEE
Maximum Voltage	123kV	145kV	170kV
BIL	550kV	650kV	750kV
Frequency	60Hz	60Hz	60Hz
60Hz Withstand	260kV	310kV	365kV
Short-Circuit Current	40kA	40kA	40kA
Continuous Current	2kA/3kA/4kA	2kA/3kA/4kA	2kA/3kA/4kA
Interrupting Time	3 cycles	3 cycles	3 cycles
Duty Cycle	O-0.3s-CO-15s-CO	O-0.3s-CO-15s-CO	O-0.3s-CO-15s-CO
Temperature	-55°C to +50°C	-55°C to +50°C	-55°C to +50°C
Altitude above sea level	up to 3,300ft	up to 3,300ft	up to 3,300ft
Seismic Qualification (IEEE693-2005)	High	High	High
Normal Operating Pressure	90psig @ 20°C	90psig @ 20°C	90psig @ 20°C
Minimum pressure to interrupt fault current	76psig @ 20°C	76psig @ 20°C	76psig @ 20°C
Minimum pressure to interrupt load current	76psig @ 20°C	76psig @ 20°C	76psig @ 20°C



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