Technical guide

AMVAC™
5/15/27 kV ANSI magnetic mechansim vacuum circuit breaker

Power and productivity
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AMVAC breaker
General overview

The AMVAC breaker is a magnetically actuated and latched breaker capable of a high number of operations due to its simplified design. Fully compliant with IEEE Standards C37.04, C37.06 and C37.09, the AMVAC breaker is a great fit for many applications.

Features
- Mechanical operations counter
- Optional roll-on-floor design
- Open, closed, ready/not ready lights and pushbuttons
- Maintenance-free magnetic actuator

Available AMVAC breaker ratings

Voltage class	Nominal voltages	Continuous current	Short circuit/withstand (2 sec)	Close and latch	BIL (lightning impulse withstand)	Low frequency withstand (Hi-Pot)
kV	kV	A	kA, rms	kA, peak	kV, crest	kV, rms
5	2.4, 4.16, 4.8	1200, 2000, 3000	25	65	60	19
			31.5	82		
			40	104		
			50	130		
8.25	4.8, 6.9, 7.2	1200, 2000, 3000	40	104	95	36
15	6.9, 7.2, 8.4, 11, 12, 12.47, 13.2, 13.8, 14.4	1200, 2000, 3000	25	65	95	36
			31.5	82		
			40	104		
			50	130		
27	20.78, 21.6, 22.86, 23, 23.9, 24.94	1200, 2000	16	42	125	60
			25	65		

AMVAC breaker
Construction

Magnetic actuator
Introduced in 1997, the bi-stable magnetic actuator is used in many ABB products, including the AMVAC breaker. Due to its simple design, no maintenance on the actuator is necessary for the lifetime of the product.

The magnetic actuator operates on the principle of shifting magnetic flux and is latched into one of the stable positions by rare-earth magnets which require no power.

Vacuum interrupters
ABB vacuum interrupters (VIs) are embedded in a solid insulation material to protect the VIs from collecting dust or moisture and from accidental bumps. The solid insulation also improves tracking resistance making ABB circuit breakers some of the lightest available in the market. Because of the embedded design, these vacuum interrupters are maintenance-free for the life of the VI.

On-board capacitors
The on-board capacitors of the AMVAC breaker deliver the current needed for creation of magnetic fields within the mechanism thereby eliminating current draw and voltage drop from the battery bank for the substation.

For more information on the maintenance of the capacitors, please see the AMVAC Installation, Operation and Maintenance Manual.

1 Magnetic actuator | 2 Vacuum interrupters | 3 On-board capacitors

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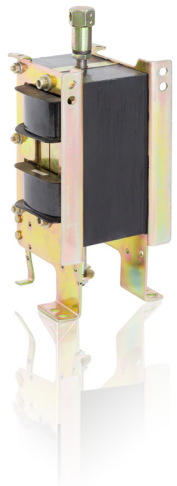

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AMVAC breaker
Construction

Electronic control board
The electronic control board technology for the AMVAC breaker provides improved reliability due to its self-monitoring functions and features. Featuring coil monitoring, sensor monitoring, optional under-voltage trip and optional energy failure trip, the AMVAC breaker is customizable for any application.

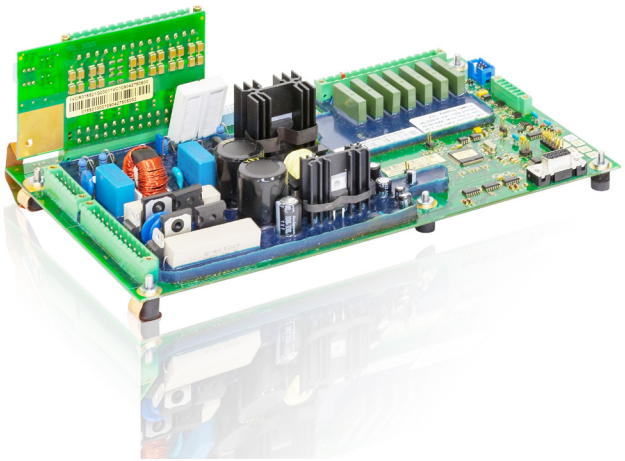
By managing the 45 ms current limited pulse delivered to the mechanism by the on-board capacitors, the electronic control board eliminates one cause of common failures in typical spring mechanism breakers – the burning of trip and close coils.

Breaker racking truck
ABB's breaker racking truck for switchgear is integral to the breaker itself in lieu of being inside the switchgear breaker cell. Rated for 180 foot-pounds of torque, the breaker racking truck exceeds the industry standard of 50-60 foot-pounds by a factor of three, greatly reducing the possibility of an over-torque condition.

The breaker racking truck is rated for 1000 rack in-rack out operations, exceeding the ANSI Standard of 500 operations.

1 Electronic control board| 2 Breaker lift truck

1



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AMVAC breaker
Capacitor bank switch ratings

Voltage class	Continuous current	Short circuit current	Capacitor switching ratings	
kV	A	kA	Type	Notes
5	1200	25	C0	25 A cable charging
		31.5	C0	25 A cable charging
		40	C0	25 A cable charging
		50	C0	630 A back to back capacitor bank
	2000	25	C0	25 A cable charging
		31.5	C0	25 A cable charging
		40	C0	630 A back to back capacitor bank
		50	C0	630 A back to back capacitor bank
	3000	25	C1	630 A back to back capacitor bank
		31.5	C1	630 A back to back capacitor bank
		40	C1	630 A back to back capacitor bank
		50	C1	630 A back to back capacitor bank
8.25	1200	40	C1	630 A back to back capacitor bank
	2000	40	C1	630 A back to back capacitor bank
	3000	40	C1	630 A back to back capacitor bank
15	1200	25	C0	25 A cable charging
		31.5		25 A cable charging
		40	C1	630 A back to back capacitor bank
		50	C1	1000 A back to back capacitor bank
	2000	25		25 A cable charging
		31.5		25 A cable charging
		40	C1	630 A back to back capacitor bank
		50	C1	1000 A back to back capacitor bank
	3000	25	C1	630 A back to back capacitor bank
		31.5	C1	630 A back to back capacitor bank
		40	C1	630 A back to back capacitor bank
		50	C1	1000 A back to back capacitor bank
27	1200	16	BTB	400 A back to back capacitor bank
		25	BTB	400 A back to back capacitor bank
	2000	16	BTB	400 A back to back capacitor bank
		25	BTB	400 A back to back capacitor bank

AMVAC breaker
Timing characteristics

Total interrupting time consists of opening time plus the time required for arc interruption. Total interrupt time is 50 ms or less for three cycle breakers and 83 ms or less for five cycle breakers.

Voltage class	Continuous current	Short circuit current	Interrupt time	Closing time
kV	A	kA	Cycles	ms
5	1200	25	3	45-60
		31.5	3	45-60
		40	5	45-60
		50	5	45-60
	2000	25	3	45-60
		31.5	3	45-60
		40	3	45-60
		50	5	45-60
	3000	25	3	45-60
		31.5	3	45-60
		40	3	45-60
		50	5	45-60
8.25	1200	40	3	45-60
	2000	40	3	45-60
	3000	40	3	45-60
15	1200	25	3	45-60
		31.5	3	45-60
		40	3	45-60
		50	3	45-60
	2000	25	3	45-60
		31.5	3	45-60
		40	3	45-60
		50	3	45-60
	3000	25	3	45-60
		31.5	3	45-60
		40	3	45-60
		50	3	45-60
27	1200	16	3	45-60
		25	3	45-60
	2000	16	3	45-60
		25	3	45-60

AMVAC breaker
Mechanical endurance ratings

Voltage class	Continuous current	Short circuit current	No load mechanical operations
kV	A	kA	
5	1200	25	10000
		31.5	10000
		40	10000
		50	10000
	2000	25	10000
		31.5	10000
		40	10000
		50	10000
	3000	25	10000
		31.5	10000
		40	10000
		50	10000
8.25	1200	40	10000
	2000	40	10000
	3000	40	10000
15	1200	25	10000
		31.5	10000
		40	10000
		50	10000
	2000	25	10000
		31.5	10000
		40	10000
		50	10000
	3000	25	10000
		31.5	10000
		40	10000
		50	10000
27	1200	16	10000
		25	10000
	2000	16	10000
			10000

AMVAC breaker
Dimensions and weight

Voltage class	Continuous current	Short circuit current	Height	Width	Depth	Weight
kV	A	kA	in	in	in	lb
5	1200	25	28	31	27	334
		31.5	28	31	27	334
		40	28	31	27	410
		50	28	31	27	410
	2000	25	28	31	27	419
		31.5	28	31	27	419
		40	28	31	27	419
		50	28	31	27	419
	3000	25	28	31	27	459
		31.5	28	31	27	459
		40	28	31	27	459
		50	28	31	27	459
8.25	1200	40	28	31	27	410
	2000	40	28	31	27	419
	3000	40	28	31	27	459
15	1200	25	28	31	27	334
		31.5	28	31	27	334
		40	28	31	27	410
		50	28	31	27	430
	2000	25	28	31	27	419
		31.5	28	31	27	419
		40	28	31	27	419
		50	28	31	27	430
	3000	25	28	31	27	459
		31.5	28	31	27	459
		40	28	31	27	459
		50	28	31	27	481
27	1200	16	30	31	27	410
		25	30	31	27	410
	2000	16	30	31	27	419
			30	31	27	419

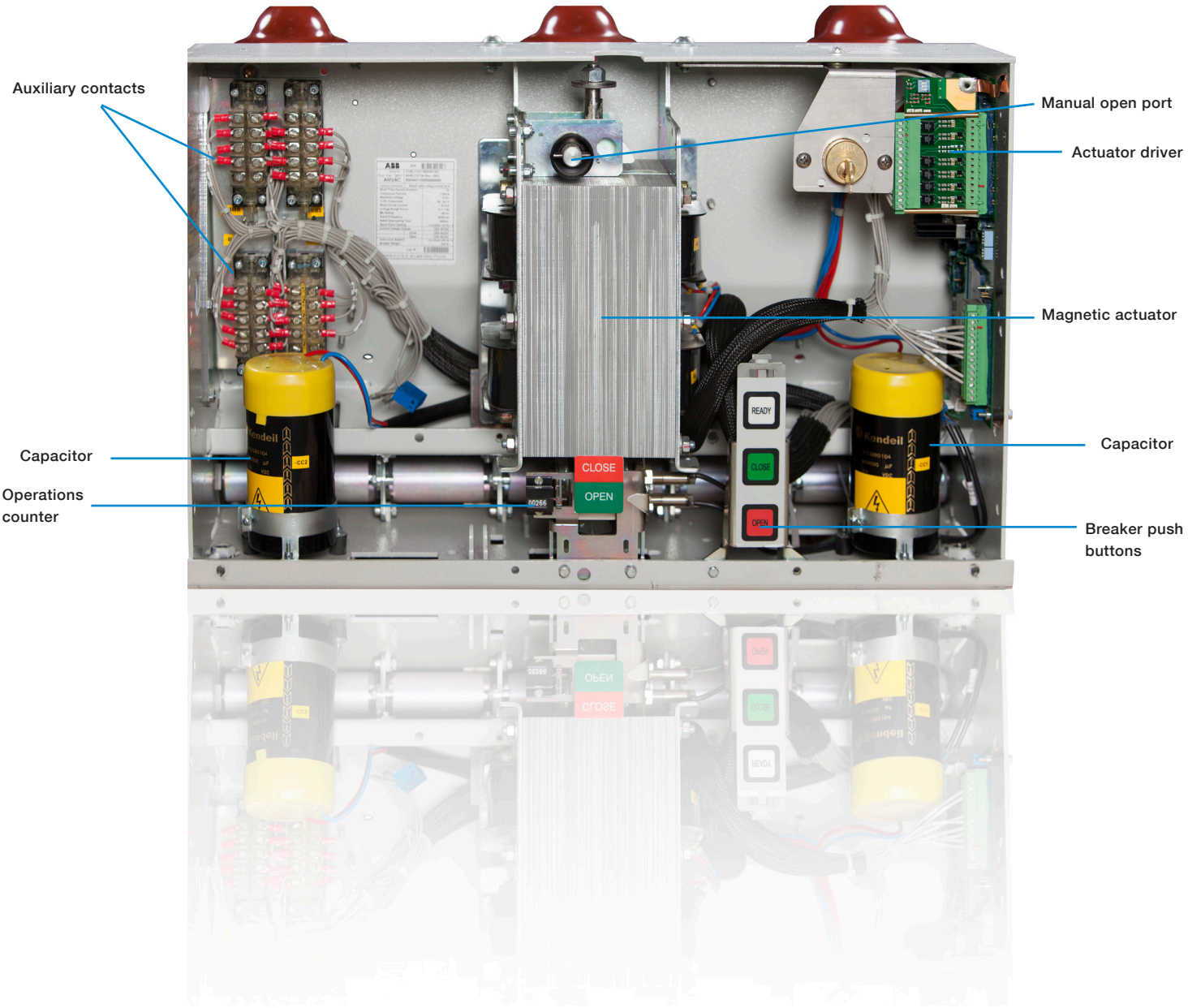
AMVAC breaker
Power requirements and auxiliary switch ratings

Power requirements

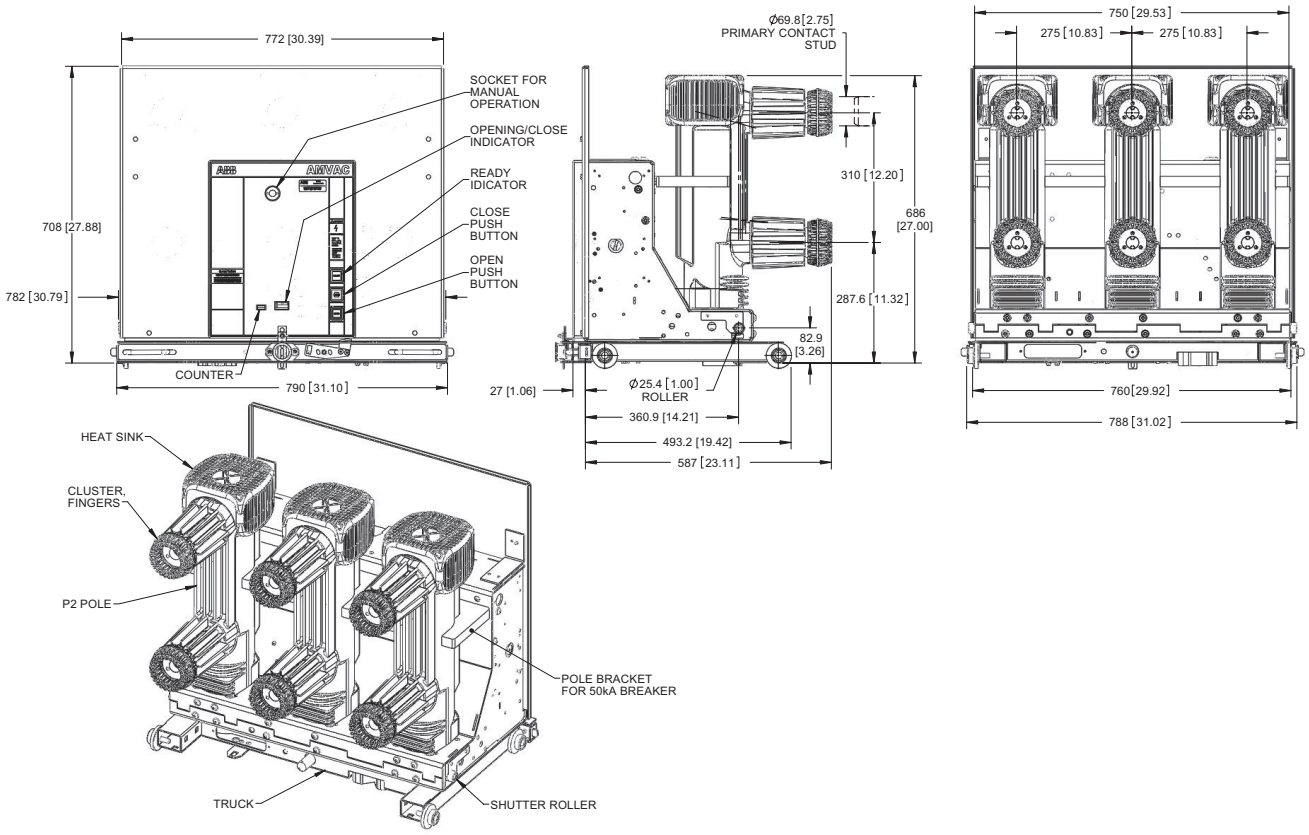
	Actuator driver
Standby	10 W
Capacitor charging	100 W
Trip/close	0.25 W

Auxilliary contacts	Nominal control power voltage					
	24 Vdc	48 Vdc	125 Vdc	250 Vdc	120 Vac	240 Vac
Rated carrying current	10 A	10 A	10 A	10 A	10 A	10 A
Rated breaking current	10 A	7.6 A	4.4 A	1.8 A	2.6 A	2.3 A
Maximum breaking current	12 A	10 A	6 A	0 A	26 A	23 A

AMVAC breaker
Internal diagram

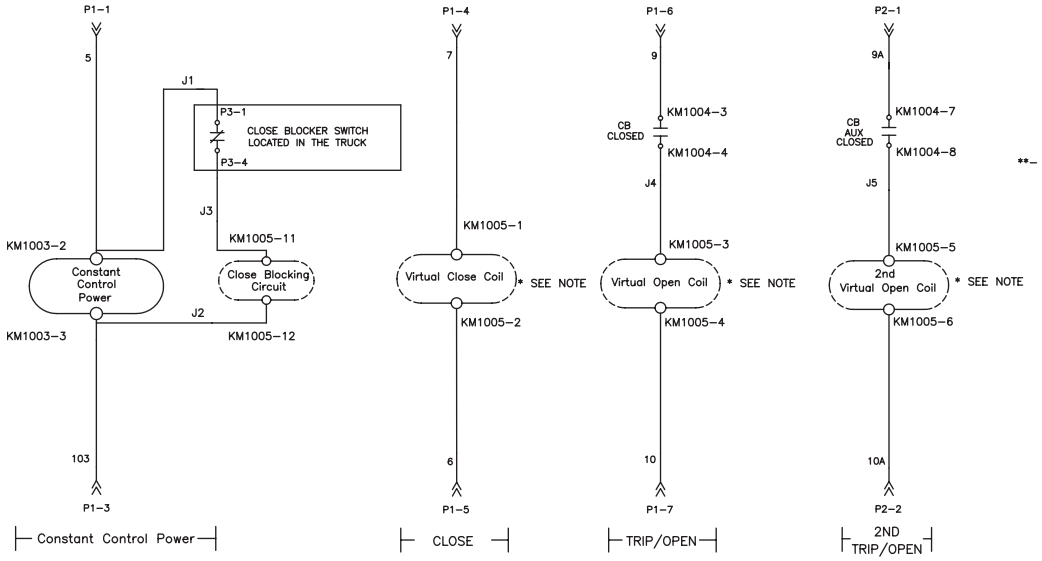


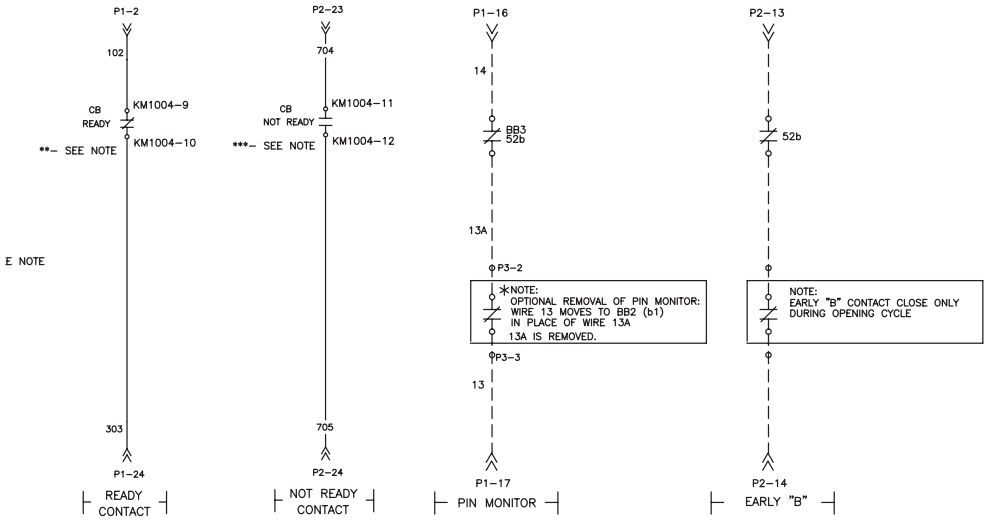
AMVAC breaker
Outline drawing



AMVAC breaker
Schematic drawing

AMVAC circuit breakers are supplied with dual secondary disconnects, which includes 9 normally open “a” contacts and 8 normally closed “b” contacts.





Notes

Notes

Contact us

ABB Inc.
305 Gregson Dr.
Cary, NC 27511
abb.com/contacts

ABB Inc.
Medium Voltage Service
2300 Mechanicsville Road
Florence, South Carolina 29501
Phone: +1 800 HELP 365 (option 7)
+1 843 665 4144

www.abb.com/mediumvoltage
www.abb.us/mvservice

1VAL050601-TG Rev B March 2021

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