Medium voltage products

Vmax
Medium voltage vacuum circuit-breakers

IEC: ... 17.5 kV; ... 1250 A; ... 31.5 kA
ANSI: ... 15 kV; ... 1200 A; ... 31.5 kA

The new Vmax circuit-breakers are the synthesis of ABB's affirmed technology in designing and constructing vacuum interrupters and their excellence in the production of circuit-breakers.
The Vmax medium voltage circuit-breakers consist of an insulating monobloc in which three vacuum interrupters are housed.
The monobloc and operating mechanism are fixed to a frame.
The vacuum interrupter houses the contacts and makes up the interrupting chamber.

Main characteristics

- Vacuum interruption technique
- Contacts in vacuum protected against oxidation and contamination
- Operation under different climatic conditions
- Limited switching energy
- Stored energy operating mechanism with anti-pumping device supplied as standard
- Simple customisation with a complete range of accessories
- Fixed and withdrawable version
- Compact dimensions
- Sealed-for-life vacuum interrupters
- Sturdiness and reliability
- 10,000 operations with regular maintenance
- Circuit-breaker racking in and racking out with the door closed
- Incorrect and hazardous operations prevented thanks to special locks in the operating mechanism and in the truck

Vmax vacuum circuit-breakers

EL type operating mechanism

The operating mechanism of Vmax circuit-breakers is of simple concept and use and can be customised with a wide range of easily and rapidly installed accessories. This simplicity translates into greater reliability of the apparatus. The operating mechanism is of the stored energy type with the anti-pumping device mounted as standard and it is fitted with suitable locks to prevent incorrect operations.

Each operation sequence is only enabled if all the conditions ensuring it being carried out correctly are respected.
The accessories are the same for all the types of Vmax circuit-breakers. To facilitate assembly and replacement of accessories, assembly seats with special fixed references are provided.

Circuit-breaker operating mechanism (push-button and mechanical indicators according to IEC STDs)

A Open/closed auxiliary contacts
B Geared motor for closing spring charging
C Built-in closing spring charging lever
D Mechanical signalling device for circuit-breaker open/closed
E Mechanical operation counter
F Plug-socket connectors of electrical accessories
G Signalling device for closing springs charged/discharged
H Service releases (shunt opening release, shunt closing release, undervoltage release)
I Closing pushbutton
L Opening pushbutton
M Additional shunt opening release
N Locking magnet on the operating mechanism
O Contact for signalling closing spring charged/discharged

The structure

The operating mechanism, the monobloc and the interrupters are fixed to a metal frame which is also the support for the fixed version of the circuit-breaker.
The compact structure ensures sturdiness and mechanical reliability.
Apart from the isolating contacts and the cord with plug for connection of the auxiliary circuits, the withdrawable version is completed with the truck for racking it into and out of the switchgear with the door closed.

Fields of application

Vmax circuit-breakers are used in electrical distribution for protection of cables, transformer and distribution substations, motors, transformers, generators and capacitor banks.

Standards and approvals

Vmax circuit-breakers comply with the IEC 62271-100, CEI-EN 62271 (file 7642), ANSI/IEEE C37.54-C37.09-C37.04-C37.55 and with those of the major industrialised countries. The Vmax circuit-breakers have undergone the tests indicated below and guarantee the safety and reliability of the apparatus in service in any installation.

- **Type tests:** heating, withstand insulation at industrial frequency, withstand insulation at atmospheric impulse, short-time and peak withstand current, mechanical life, making and breaking capacity.

- **Individual tests:** insulation of the main circuits with voltage at power frequency, auxiliary and control circuit insulation, measurement of the main circuit resistance, mechanical and electrical operation.

Versions available

Vmax circuit-breakers are available in the fixed and withdrawable version with front operating mechanism.
The withdrawable version is available for UniGear ZS1 switchgear with width 550 mm, and for PowerCube modules with width 600 mm. A specific fixed version is available for UniGear 500R switchgear.
Remark: all the above mentioned switchgears are according to IEC Standards only.

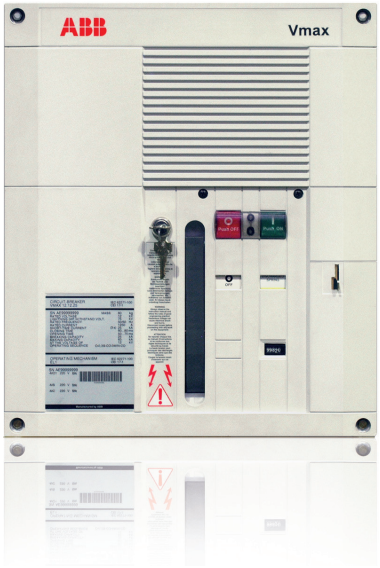
Accessories

The Vmax circuit-breakers have a complete range of accessories to satisfy all installation requirements.
The operating mechanism has a standardised range of accessories and spare parts which are easy to identify and order. The accessories are installed conveniently from the front of the circuit-breaker. Electrical connection is carried out with plug-socket connectors.
Use, maintenance and service of the apparatus are simple and require limited use of resources.

Service safety

Thanks to the complete range of mechanical and electrical locks (available on request), it is possible to construct safe distribution switchgear with the Vmax circuit-breakers.
The locking devices have been studied to prevent incorrect operations and to inspect the installations guaranteeing maximum operator safety. Key locks or padlock devices enable opening and closing operations and/or racking in and racking out.
The racking-out device with the door closed allows the circuit-breaker to be racked into or out of the switchgear only with the door closed.
Anti-racking-in locks prevent circuit-breakers with different rated currents from being racked in, and the racking-in operation with the circuit-breaker closed.

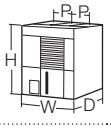
General characteristics of fixed circuit-breakers



Standard fittings for fixed circuit-breaker series (1)

The basic versions of the fixed circuit-breakers are three-pole and fitted with:

- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts (2)
- lever for manually charging the closing springs
- auxiliary circuit support terminal board.

Circuit-breaker		
Fixed version		
Fixed version for ABB UniGear 500R panel		
Standards		IEC 62271-100
		CEI EN62271-100 (file 7642)
		C37.54 - C37.09 - C37.04 - C37.55
		UL Recognized Component Mark
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C)		Ir [A]
Rated breaking capacity (rated symmetrical short-circuit current)		Isc [kA]
Rated-short time withstand current (3s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O - 0.3" - CO - 15" - CO]
		[O - 0.3" - CO - 3' - CO]
Opening time		[ms]
Arc duration		[ms]
Total interruption time		[ms]
Closing time		[ms]
Maximum overall dimensions		H [mm/in]
		W [mm/in]
		D [mm/in]
		Pole centre P [mm/in]
Weight		[kg/lb]
Standardized table of dimensions		1VCD
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 60721-2-1
Electromagnetic compatibility		IEC 62271-1

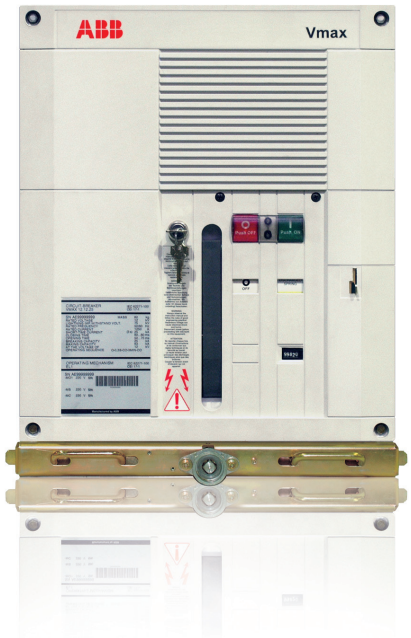
(*) This version cannot be sold loose; this version can only be supplied together ABB UniGear 500R switchgear

(1) Refer to the UniGear 500R catalogue for the standard equipment of the Vmax/F circuit-breaker.

(2) Application of the shunt opening release and/or the supplementary shunt opening release foresees the use of one and/or two auxiliary make contacts (normally open), thereby reducing the number of available auxiliary contacts.

	Vmax 12		Vmax 17		Vmax/F 12 (*)			Vmax/F 17 (*)			Vmax 15
	•		•		-			-			•
	-		-		•			•			-
	•		•		•			•			-
	•		•		•			•			-
	-		-		-			-			•
	-		-		-			-			•
	12		17.5		12			17.5			15
	12		17.5		12			17.5			15
	28		38		28			38			36 (at 60 Hz)
	75		95		75			95			95
	50-60		50-60		50-60			50-60			60
	630	1250	630	1250	630	1250	2000	630	1250	2000	1200
	16	16	16	16	-	-	-	-	-	-	-
	20	20	20	20	-	-	-	-	-	-	-
	25	25	25	25	25	25	25	25	25	25	25 (3 cycles)
	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5 (3 cycles)
	16	16	16	16	-	-	-	-	-	-	-
	20	20	20	20	-	-	-	-	-	-	-
	25	25	25	25	25	25	25	25	25	25	25 (2s)
	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5 (2s)
	40	40	40	40	-	-	-	-	-	-	-
	50	50	50	50	-	-	-	-	-	-	-
	63	63	63	63	63	63	63	63	63	63	65
	80	80	80	80	80	80	80	80	80	80	82
	•		•		•			•			-
	-		-		-			-			•
	33.5 ... 60		33.5 ... 60		33.5 ... 60			33.5 ... 60			27 ... 32.5
	10 ... 15		10 ... 15		10 ... 15			10 ... 15			10 ... 17.5
	43.5 ... 75		43.5 ... 75		43.5 ... 75			43.5 ... 75			<50
	45 ... 80		45 ... 80		45 ... 80			45 ... 80			45 ... 80
	496		534		543		543	543		543	534/21.02
	416		416		416		516	416		516	416/16.38
	421		456		461		562	461		562	456/17.95
	133		133		133		133	133		133	133/5.24
	77		77		77		80	77		80	77/169.40
	003279		003279		003516		003558	003516		003558	003279
	-5 ... +40		-5 ... +40		-5 ... +40			-5 ... +40			-30 ... +40
	•		•		•			•			-
	•		•		•			•			-

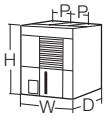
General characteristics of withdrawable circuit-breakers



Standard fittings for withdrawable circuit-breaker series

The basic versions of the withdrawable circuit-breakers are three-pole and fitted with:

- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- set of ten circuit-breaker open/closed auxiliary contacts (1)
- lever for manually charging the closing springs
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck (-RL2). This prevents the circuit-breaker being racked into the panel with the auxiliary circuits disconnected (plug not inserted in the socket).

Circuit-breaker		
Use in switchgear/enclosure		
Standards		IEC 62271-100
		CEI EN62271-100 (file 7642)
		C37.54 - C37.09 - C37.04 - C37.55
		UL Listed
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C)		Ir [A]
Rated breaking capacity (rated symmetrical short-circuit current)		Isc [kA]
Rated-short time withstand current (3s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O - 0.3" - CO - 15" - CO]
		[O - 0.3" - CO - 3' - CO]
Opening time		[ms]
Arc duration		[ms]
Total interruption time		[ms]
Closing time		[ms]
Maximum overall dimensions		H [mm/in]
		W [mm/in]
		D [mm/in]
		Pole centre P [mm/in]
Weight		[kg/lb]
Standardized table of dimensions		1VCD
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 60721-2-1
Electromagnetic compatibility		IEC 62271-1

(1) Application of the shunt opening release and/or the supplementary shunt opening release foresees the use of one and/or two auxiliary make contacts (normally open), thereby reducing the number of available auxiliary contacts.

	Vmax/L 12		Vmax/L 17		Vmax/W 12		Vmax/W 17		Vmax/W 15
	UniGear 550		UniGear 550		PowerCube		PowerCube		PowerCube
	•		•		•		•		-
	•		•		•		•		-
	-		-		-		-		•
	-		-		-		-		(on request)
	12		17.5		12		17.5		15
	12		17.5		12		17.5		15
	28		38		28		38		36 (at 60 Hz)
	75		95		75		95		95
	50-60		50-60		50-60		50-60		60
	630	1250	630	1250	630	1250	630	1250	1200
	16	16	16	16	16	16	16	16	-
	20	20	20	20	20	20	20	20	-
	25	25	25	25	25	25	25	25	25 (3 cycles)
	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5 (3 cycles)
	16	16	16	16	16	16	16	16	-
	20	20	20	20	20	20	20	20	-
	25	25	25	25	25	25	25	25	25 (2s)
	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5 (2s)
	40	40	40	40	40	40	40	40	-
	50	50	50	50	50	50	50	50	-
	63	63	63	63	63	63	63	63	65
	80	80	80	80	80	80	80	80	82
	•		•		•		•		-
	-		-		-		-		•
	33.5 ... 60		33.5 ... 60		33.5 ... 60		33.5 ... 60		27 ... 32.5
	10 ... 15		10 ... 15		10 ... 15		10 ... 15		10 ... 17.5
	43.5 ... 75		43.5 ... 75		10 ... 17.5		43.5 ... 75		<50
	45 ... 80		45 ... 80		45 ... 80		45 ... 80		45 ... 80
	665	665	665	665	665	665	665	665	665/26.18
	461	461	461	461	503	503	503	503	503/19.80
	665	665	665	665	662	662	662	662	662/26.06
	150	150	150	150	150	150	150	150	150/5.91
	98	98	98	98	98	98	98	98	98/215.60
	003334		003334		003280		003280		003280
	-5 ... +40		-5 ... +40		-5 ... +40		-5 ... +40		-30 ... +40
	•		•		•		•		-
	•		•		•		•		-

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