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DISTRIBUTION SOLUTIONS

## **PowerCube type Powerbloc**

Pre-assembled modules for building  
medium voltage switchgear



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**PowerCube type Powerbloc are the ideal solution for replacing fixed circuit breakers with withdrawable circuit breakers, for retrofitting activities and for upgrading obsolete switchgear to the new standards in very high demanding plants.**

**Complete modules allow medium voltage air-insulated switchgear to be constructed with the same rated currents as those of the enclosure.**

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# Powerbloc:

its strengths, your benefits



**Productivity**



**Reliability**



**Efficiency**





# Productivity

## Maximizing your output



### Easy to install

- Choose among different technologies and apparatus keeping the same panel design
- Powerbloc enclosure fits both vacuum and SF<sub>6</sub> circuit breakers and service trucks



### Speeds up your projects

- Reduce your engineering activities relying on solutions based on ABB proven design, assembled and tested safety interlocks and internal arc proof doors
- Offer package: circuit breaker + cassette



### Services and training

- Have in-house trained personnel for installation and maintenance:
  - Operational efficiency
  - Skilled staff
- ABB offers dedicated service training for installation and maintenance

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## Reliability

### Protecting your assets



#### Safety and protection

- safety interlocks to prevent:
  - the apparatus from being switched from the racked-out to the racked-in position (and vice versa) with the door open
  - door opening when the apparatus is in service: interlock shutters-door
- Design your panel based on enclosure pretested for internal arc:
  - Internal Arc classification: IAC AFLR 31.5 kA for 1 s



#### Global availability

- Worldwide presence for any support you may need
- ABB by your side

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## Efficiency

### Optimizing your investments



#### Affordable range

- Reduce your investment relying on ABB support for a customized offer
- Supply and support based on license - SSA (Supply and Support Agreement)







# 1. General characteristics

## 1.1 General

PowerCube type Powerbloc modules can be used to make metal-clad medium voltage air-insulated switchgear with the same rated current values as the enclosure.

PowerCube type Powerbloc enclosures can house vacuum circuit breakers (VD4), SF<sub>6</sub>-gas circuit breakers (HD4) and service trucks. They are without busbar, cable and low voltage compartments.

The units are suitable for current values up to 3150 A with forced ventilation.

PowerCube type Powerbloc modules with circuit breaker unit and without disconnecter are pre-

assembled and tested in the factory and can be used to create switchgear that conforms to Standards IEC 60298 and IEC 60694.

The customer is responsible for completing and testing the remaining panel compartments and relative equipment: busbar compartment and busbar system, cable compartment with current transformers, earthing switch and low voltage compartment.

Rated voltage	(kV)	36 / 40.5
Rated current	(A)	... 3150
Rated short-time withstand current of main circuit	(kA)	... 31.5 x 3s
Frequency	(Hz)	50 / 60

## 1.2 Certifications

**Quality Assurance System**

Conforms to ISO 9001 Standards, certified by an independent third party.

**Test laboratory**

Conforms to UNI CEI EN ISO / IEC 17025 Standards, certified by an independent third party.

**Environmental Management System**

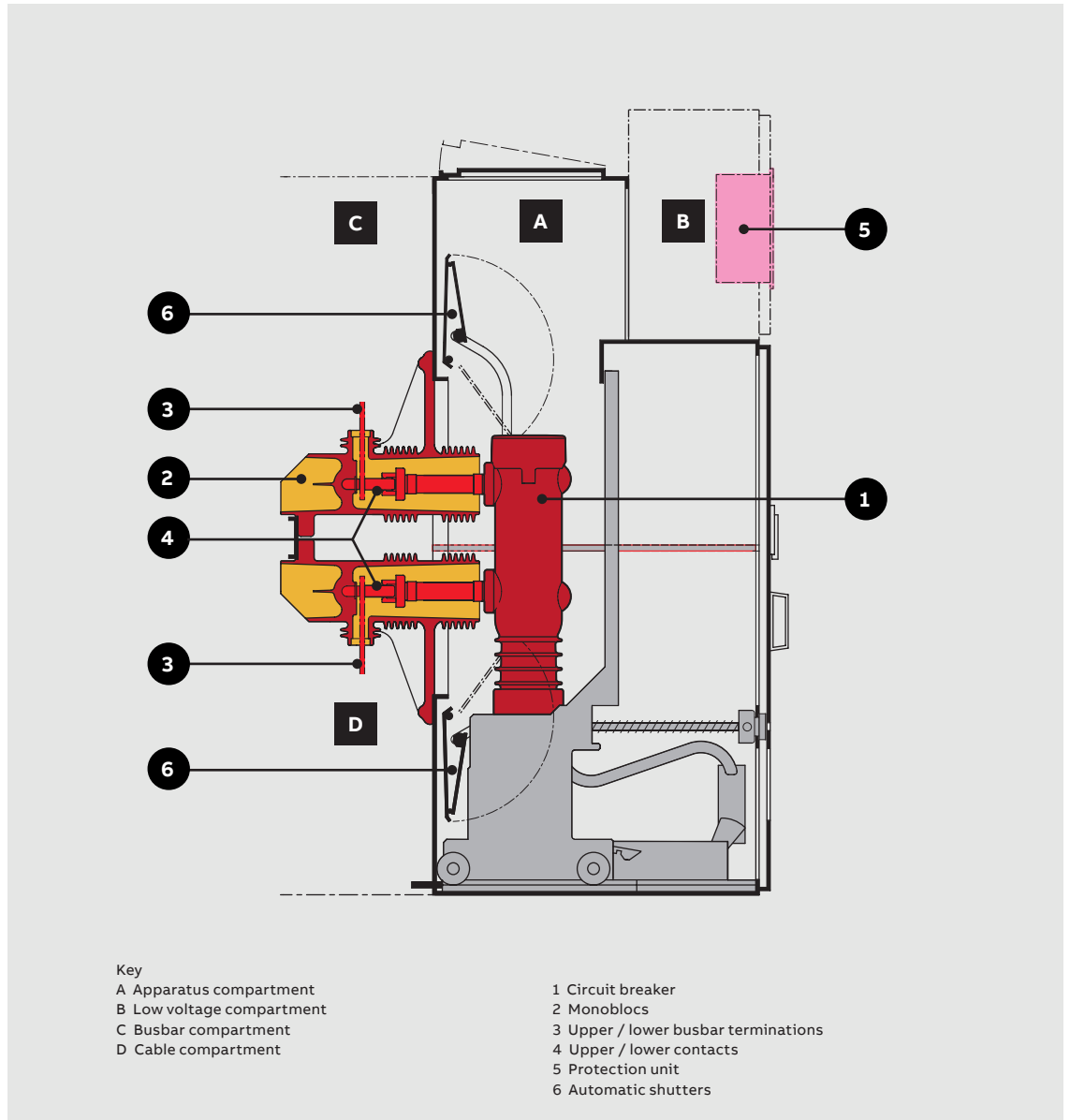
Conforms to ISO 14001 Standards, certified by an independent third party.

**Health and Safety Management System**

Conforms to OHSAS 18001 Standards, certified by an independent third party.



### 1.3 Equipment for completing PowerCube type Powerbloc units

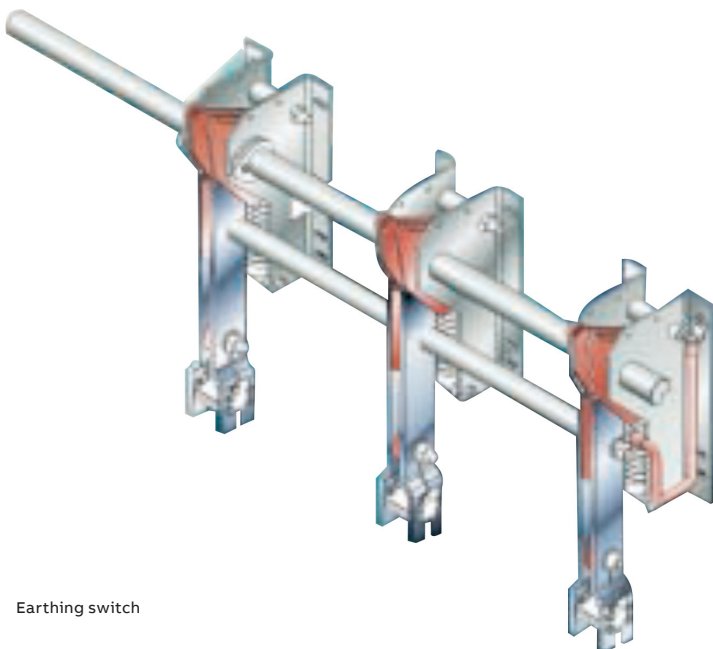


# 1. General characteristics

## 1.4 Main components

### Earthing switch

PowerCube type Powerbloc units can be equipped with an earthing switch. The earthing switch possesses short-circuit making capacity. On request, the opening and closing operations seat can be locked by means of key locks. The earthing switch is controlled from the front of the module by means of a manual operation interlocked with the circuit breaker's position.

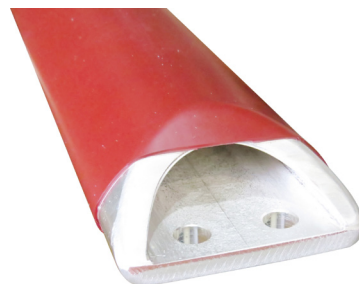


Earthing switch

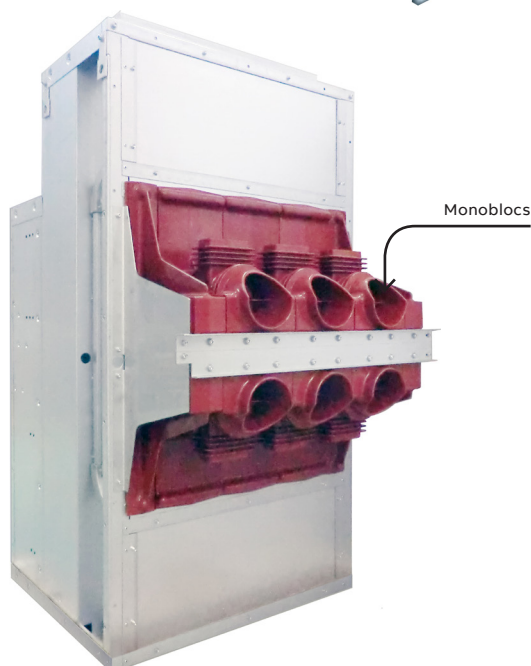
## 1.5 Monoblocs and shutters

Monoblocs consist of insulating bushings containing the upper and lower power connections of the circuit breaker compartment towards the line and busbar compartments, respectively. The shutters are the metal type and are automatically activated when the circuit breaker moves from the test/isolated position to the connected position and vice versa (see PowerCube type Powerbloc structure item 6). They are equipped with fail-safe safety device to prevent them from being opened in the manual mode when the circuit breaker has been removed. The shutters can also be fitted with a padlock if necessary.

For connecting the busbars of adjacent units, busbar junctions, terminations and D-profile busbar systems are also available on request.



D-profile busbar



Monoblocs



Insulating junction



## 1.6 Electrical specifications and dimensions

PowerCube type Powerbloc enclosures are available with or without earthing switch (EK6). The customer is responsible for completing the unit with an earthing switch.

### Electrical specifications

PowerCube type Powerbloc	Standards IEC 60298 and IEC 60694	
Rated voltage	kV	36 - 40.5
Test voltage at power-frequency	kV	95 kV
Impulse withstand voltage	kV	185 kV (rated voltage 36 kV) 185/190/200 kV (rated voltage 40.5 kV)
Rated current	A	Up to 3150 A with forced ventilation (ambient temperature 40°C) Up to 2500 A with forced ventilation (ambient temperature 55 °C)
Admissible short-time current	kA x 3 s	31.5
Power-frequency	Hz	50-60

### Dimensions

PowerCube type Powerbloc	Standards IEC 60298 and IEC 60694
Dimensions:	mm
Height	2200
Depth	1000
Depth (including terminations)	1466
Width	1200
Clearance between poles	280

### Electrical characteristics of earthing switch EK6

EK6 series earthing switches comply with IEC 62272-102 requirements.

Earthing switch EK6 closes the rated short-circuit current. The closing command allows the operating speed to be independent of the operator.

The earthing switch is supplied in kits containing pre-assembled parts, while the corresponding earthing contacts are supplied loose. Correct operation of the earthing switch depends on these parts having been correctly installed (at the customer's charge).

Routine tests according to standard IEC 62271-102 must therefore be performed on site.

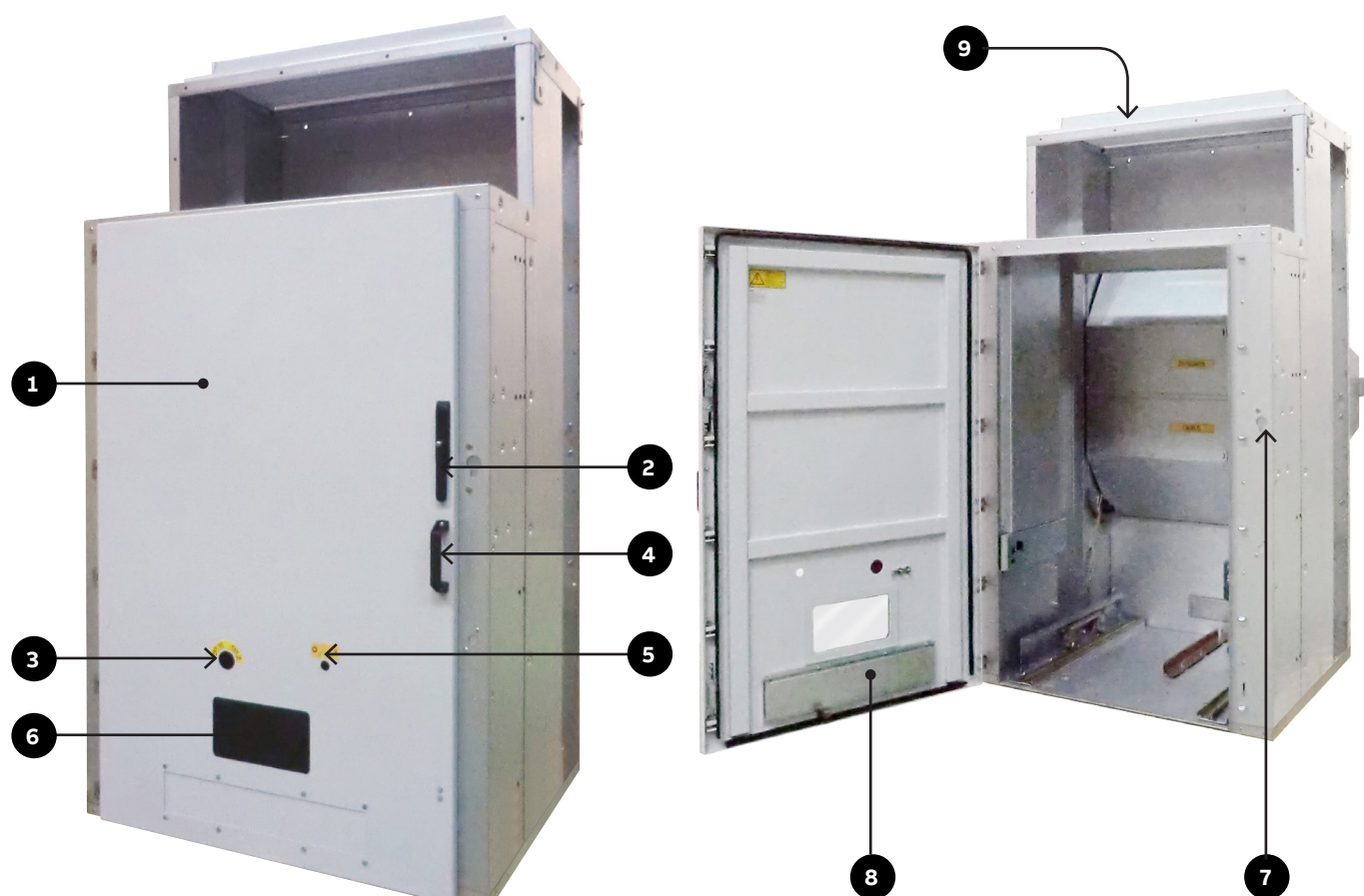
Earthing switch Standard IEC 62271-102		EK6–3608–280	EK6–4008–280
Rated voltage	kV	36	40.5
Rated impulse withstand voltage	kV	170	200
Admissible short-time current	kA	31.5	31.5
Rated short-circuit time	s	3	3
Short-circuit rated making current	kA	80	80
Weight	kg	50	55

## 2. Types of PowerCube type Powerbloc and apparatus

The following apparatus can be installed in PowerCube type Powerbloc enclosures:

- VD4 series vacuum circuit breakers
- HD4 series SF<sub>6</sub>-gas circuit breakers
- Service trucks

All switching operations are carried out from front of enclosure.



### Key

- 1 Door enclosure
- 2 Opening lever
- 3 Operating seat of circuit breaker truck
- 4 Handle
- 5 Circuit breaker state indicator (O / I)
- 6 Inspection window
- 7 Operating seat of earthing switch EK6
- 8 Pre-engineering for ventilation window (if forced ventilation is used)
- 9 Ventilation grille (if forced ventilation is used)

## 2.1 Available types

<b>PowerCube type Powerbloc</b>	<b>Rated voltage kV</b>	<b>Rated current A</b>	<b>Rated short-time current kA</b>	<b>Temperature 40 °C</b>	<b>Temperature 55 °C</b>
Circuit breaker unit	36	1250	31.5	GCE8007700R0101	GCE8007700R1101
		1600		GCE8007700R0102	GCE8007700R1102
		2000		GCE8007700R0103	GCE8007700R1103
		2500 (*)		GCE8007700R0104	GCE8007700R1104
		3150 (**)		GCE8007700R0105	
Circuit breaker unit	40.5	1250	31.5	GCE8007700R0201	GCE8007700R1201
		1600		GCE8007700R0202	GCE8007700R1202
		2000		GCE8007700R0203	GCE8007700R1203
		2500 (*)		GCE8007700R0204	GCE8007700R1204
		3150 (**)		GCE8007700R0205	

(\*) Forced ventilation at 55 °C ambient temperature

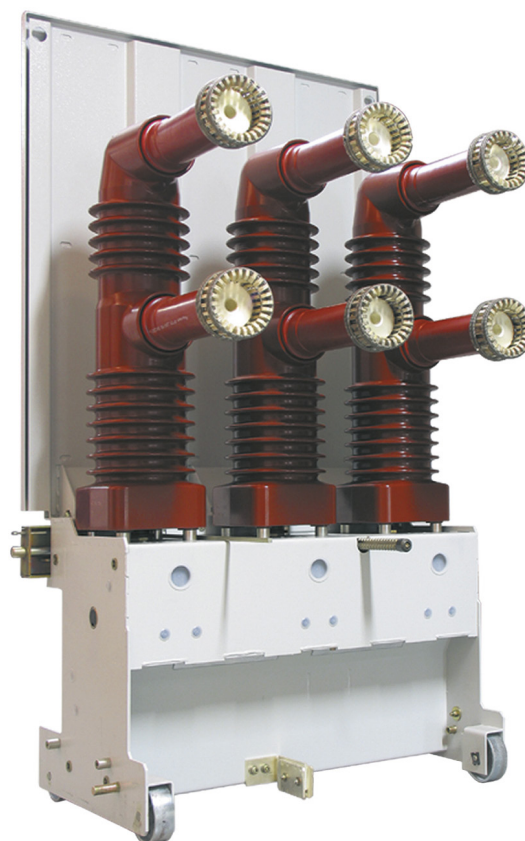
(\*\*) Forced ventilation



### 3. Devices and equipment for PowerCube type Powerbloc

#### 3.1 Devices and equipment for PowerCube type Powerbloc

##### VD4 series vacuum circuit breakers



##### Devices used in conjunction with PowerCube type Powerbloc

Rated voltage	Rated short-circuit current	Rated short-time current	Rated current	Gas circuit breaker	Vacuum circuit breaker	Ambient temperature	
kV	kA	kA x 3 s	A			40 °C	55 °C
36	31.5	31.5 kA x 3 s	1250	-	VD4/P	YES	YES
			1600	-	VD4/P	YES	YES
			2000	-	VD4/P	YES	YES
			2500 (*)	-	VD4/P-VD4/Z	VD4/P	VD4/Z forced ventilation
			3150 (*)	-	VD4/Z	Forced ventilation	-
40.5	31.5	31.5 kA 3 s	1250		VD4/P	YES	YES
			1600		VD4/P	YES	YES
			2000		VD4/P	YES	YES
			2500 (*)		VD4/P-VD4/Z	VD4/P	VD4/Z forced ventilation
			3150 (*)		VD4/Z	Forced ventilation	-
40.5	31.5	31.5 kA 3 s	1250	HD4/Z	-	YES	-
			1600	HD4/Z	-	YES	-
			2000	HD4/Z	-	YES	-
			2500	HD4/Z	-	YES	-

(\*) 3150 A / 40 °C with forced ventilation; 2500 A / 55 °C with forced ventilation.

VD4 circuit breakers use a vacuum as breaking and insulating medium. Thanks to the advanced manufacturing techniques with which they are made, vacuum circuit breakers provide high performance in all operating conditions. The vacuum interrupters are embedded in the poles. This construction protects the interrupters from shock, humidity and environmental pollution.

The circuit breaker poles, which form the interrupting part, are life-long sealed pressure devices (standard IEC 62271-100) and are maintenance-free. VD4 circuit breakers feature a trip-free mechanical operating device of the stored energy type, and allow opening and closing operations independent of the operator.

#### Vacuum circuit breakers for PowerCube type Powerbloc

Rated voltage kV	Short-circuit current kA	Rated current A	Power frequency withstand voltage kV	Lightning impulse withstand voltage kV	Vacuum circuit breaker
36	16	630	95	up to 190	VD4/P 36.06.16
36	20	630	95		VD4/P 36.06.20
36	16	1250	95		VD4/P 36.12.16
36	20	1250	95		VD4/P 36.12.20
36	25	1250	95		VD4/P 36.12.25
36	31.5	1250	95		VD4/P 36.12.32
36	25	1600	95		VD4/P 36.16.25
36	31.5	1600	95		VD4/P 36.16.32
36	25	2000	95		VD4/P 36.20.25
36	31.5	2000	95		VD4/P 36.20.32
36	25	2500 (*)	95		VD4/P 36.25.25
36	31.5	2500 (*)	95		VD4/P 36.25.32
36	25	3150 (**)	95		VD4/Z 36.25.32
36	31.5	3150 (**)	95		VD4/Z 36.32.32
40.5	16	630	95	up to 200	VD4/P 40.06.16
40.5	20	630	95		VD4/P 40.06.20
40.5	16	1250	95		VD4/P 40.12.16
40.5	20	1250	95		VD4/P 40.12.20
40.5	25	1250	95		VD4/P 40.12.25
40.5	31.5	1250	95		VD4/P 40.12.32
40.5	25	1600	95		VD4/P 40.16.25
40.5	31.5	1600	95		VD4/P 40.16.32
40.5	25	2000	95		VD4/P 40.20.25
40.5	31.5	2000	95		VD4/P 40.20.32
40.5	25	2500 (*)	95		VD4/P 40.25.25
40.5	31.5	2500 (*)	95		VD4/P 40.25.32
40.5	25	3150 (**)	95		VD4/Z 40.32.32
40.5	31.5	3150 (**)	95		VD4/Z 40.32.32

(\*) Assembled pole (VD4/Z) for 2500 A at 55 °C ambient temperature (VD4/Z). Embedded pole (VD4/P) 2500 A at 40 °C ambient temperature.

(\*\*) Assembled pole.

### 3. Devices and equipment for PowerCube type Powerbloc

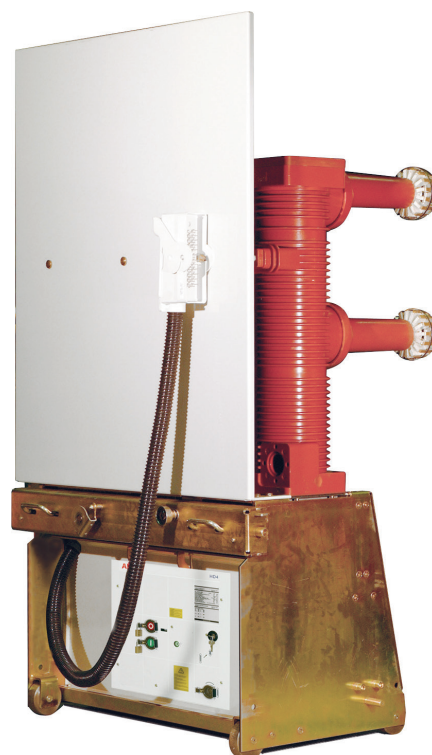
#### 3.2 HD4 series gas circuit breakers

HD4 series medium voltage circuit breakers use sulfur hexafluoride gas to quench electric arcs and as an insulating medium.

The interruption principle of HD4 circuit breakers is based on the compression and self-blasting technique, in order to obtain the best performance for all the current values used and ensure that arcs are quenched gradually, with no restrikes, switching overvoltage or chopping current.

These characteristics ensure long electrical life for the circuit breaker, with limited dynamic, dielectric and thermal stress on the installation. The circuit breaker poles, which form the interrupting part, are life-long sealed pressure devices (Standards IEC 62271-100 and CEI 17.1) and are maintenance-free.

The mechanical operating device is the trip-free stored energy type allowing opening and closing operations independent of the operator.



#### SF<sub>6</sub> circuit breakers for PowerCube type Powerbloc

Rated voltage	Short-circuit current	Rated current	Power frequency withstand voltage	Lightning impulse withstand voltage	SF <sub>6</sub> circuit breaker
kV	kA	A	kV	kV	
40.5	16	630	95	185	HD4/Z 40.06.16
40.5	20	630	95		HD4/Z 40.06.20
40.5	16	1250	95		HD4/Z 40.12.16
40.5	20	1250	95		HD4/Z 40.12.20
40.5	25	1250	95		HD4/Z 40.12.25
40.5	31.5	1250	95		HD4/Z 40.12.32
40.5	25	1600	95		HD4/Z 40.16.25
40.5	31.5	1600	95		HD4/Z 40.16.32
40.5	25	2000	95		HD4/Z 40.20.25
40.5	31.5	2000	95		HD4/Z 40.20.32
40.5	25	2500	95		HD4/Z 40.25.25
40.5	31.5	2500	95		HD4/Z 40.25.32

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### 3.3 Isolation trucks

**Basic equipment:**

- Isolation truck with auxiliary contacts -BGT1 and -BGT2.
- Locking magnet -RL2 and 58-pin plug
- 2 lifting brackets (GCE7006190P0101) and bearing rails (GCE7002646P0101)

**Isolation truck**

Rated voltage	Rated current	Rated short-time current	Power-frequency	Commercial code
kV	A	kA		
36-40.5	1250	31.5	50 Hz	1VCF337999R0103



## 4. Product definition: basic structure and accessories

### 4.1 Product definition: basic structure and accessories

The basic structure of PowerCube type Powerbloc comprises the enclosure with shutters, tracks for racking-in the apparatus, monoblocs, fixed contacts, door and socket for auxiliary connections. Earthing switch available on request.

#### 1. Door

The enclosure door is available in versions with:

- handle pre-engineered for a padlock
- handle for cylindrical key lock

#### 2. Interlock on door

Prevents the isolatable apparatus from being switched from the racked-out to the racked-in position (and vice versa) with the door open. In order to function correctly, this lock requires the matching part on the circuit breaker. Mandatory accessory item.



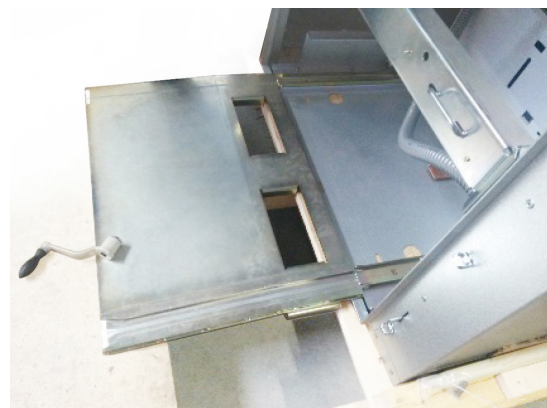
#### 3. Shutter-door interlock

This is a mechanical safety device that prevents a person from opening the shutters in the manual mode in the absence of apparatus. Mandatory accessory item.

#### 4. Guiding ramp for circuit breaker

The guiding ramp makes it easier to handle the apparatus when it is racked-in or out of the enclosure.

Optional accessory.



#### 5. Heater plate

Heater plate (240 V 100 W): useful when the enclosure is stored or for applications in critical environmental conditions.

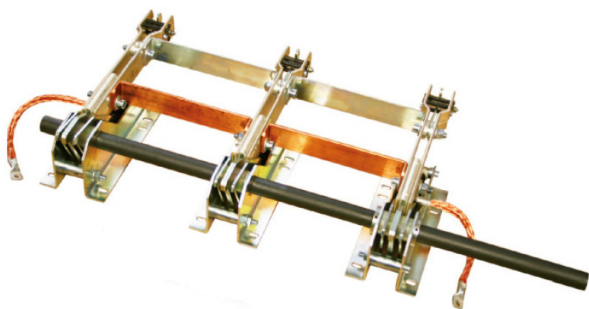
Optional accessory.

#### 6. Triple bit key

Circuit breaker accessory. Optional accessory supplied on request with PowerCube type Powerbloc.



4.2 Earthing switch



Earthing switch EK6 and the relative operating mechanism are supplied separately. Installation in units where required is at the customer's charge. Consult the EK6 dedicated manual for further details.

Earthing switch	Rated voltage	Center-distance between poles
	Type	U
kV	mm	
EK6-3608-280	36	280
EK6-4008-280	40.5	280

4.3 Earthing switch accessories

**7. Key lock**  
The key lock prevents the apparatus from being racked-in (locks in racked-out position) so that maintenance work can be performed (thus with disconnector closed).

Optional accessory.



**8. Interlock**  
**Mechanical interlock** prevents circuit breaker from being racked-in when disconnector is closed.  
**Electromechanical interlock** includes contacts that signal position of disconnector and locking magnet.  
Optional accessory.



**9. Operating lever for the earthing switch**  
Optional accessory.

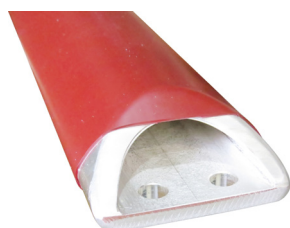


## 4. Product definition: basic structure and accessories

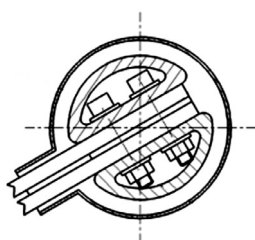
### 4.4 Accessories for completing the panel

These accessories are supplied separately and are used for completing the panel at the customer's charge. They include a set of busbars and resin joints, as indicated:

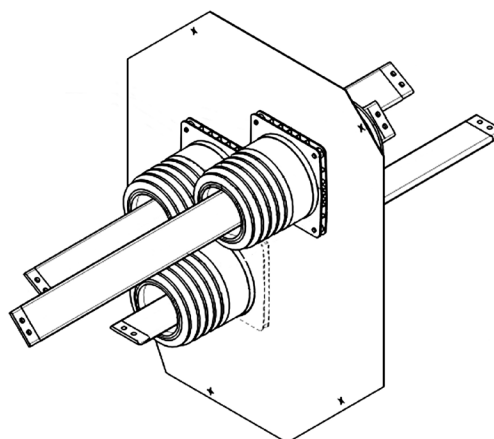
#### 10. Busbar system



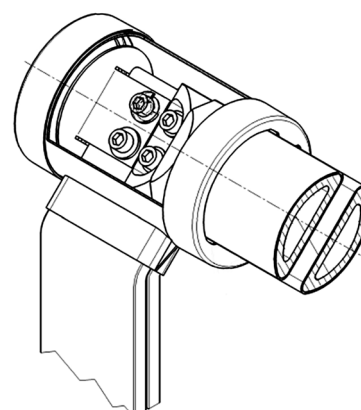
#### 11. Set of busbar connections



#### 12. Set of busbar junctions



#### 13. Set of busbar terminals







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