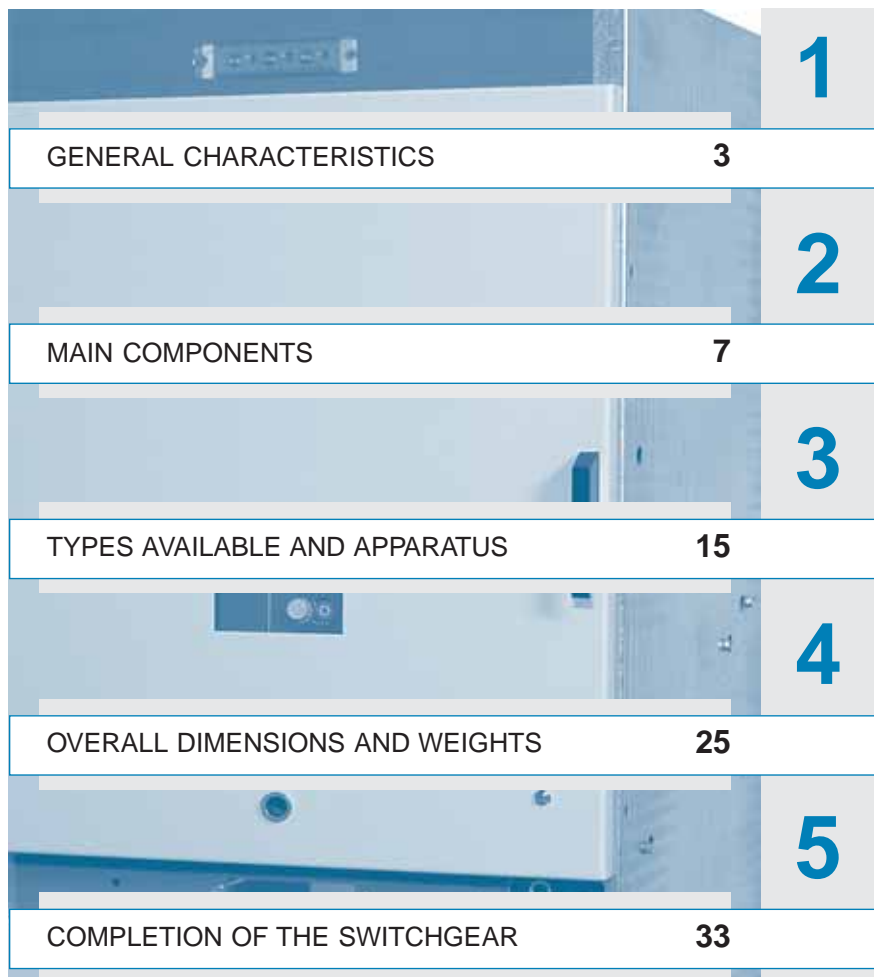


PowerCube

Pre-assembled modules for constructing medium voltage switchgear



ABB



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GENERAL CHARACTERISTICS



General

The PowerCube modules allow construction of medium voltage air-insulated switchgear with the same rated currents as those of the enclosure. In fact, the rated currents of the enclosures refer to version tested in ABB UniSafe type switchgear. In particular, the 4000 A PB3 enclosure means it is possible to construct switchgear with the same rated current as long as a suitable fan is applied in the back of the switchgear (for further information, please ask ABB).

The PowerCube modules are pre-assembled and tested in the factory and comply with IEC 62271-100, CEI 17-1, IEC 60298 and CEI 17-6 Standards.

They are available with the following characteristics:

Rated voltage (kV)	...17,5	24
Rated current (A)	...4000	...2500
Rated short-time main circuit withstand current (kA)	...40x3s	...25x3s
	...50x1s	

The following apparatus can be installed in the PowerCube modules:

- VD4 and VM1 series vacuum circuit-breakers
- HD4 series gas circuit-breakers
- V-Contact series vacuum contactors
- service trucks.

All the operations of the apparatus are carried out from the front of the module.

Degrees of protection

The degrees of protection of the PowerCube modules comply with the IEC 60529 Standards. The following standard degrees of protection are guaranteed on the front:

- external housing: IP4X
- inside the units: IP2X.

Interlocks

The PowerCube module is fitted with the interlocks needed to prevent incorrect operations which might jeopardise safety of the personnel in charge of running the installation, as well as the efficiency and reliability of the apparatus.

In particular, locking devices to prevent the following operations are provided:

- circuit-breaker closing in the intermediate position
- racking-out of closed circuit-breaker
- racking-in of closed circuit-breaker
- circuit-breaker compartment door opening in the connected or intermediate position
- circuit-breaker racking-in with compartment door open.

And, if the unit is fitted with an earthing switch:

- earthing switch closing with the circuit-breaker in the connected or intermediate position
- racking-in the circuit-breaker with the earthing switch closed
- feeder compartment door opening with the earthing switch open
- earthing switch opening with the feeder compartment door open.

Note: some of the interlocks listed above are supplied on request.

Quality System

Complies with ISO 9001 Standards, certified by an independent external organisation.

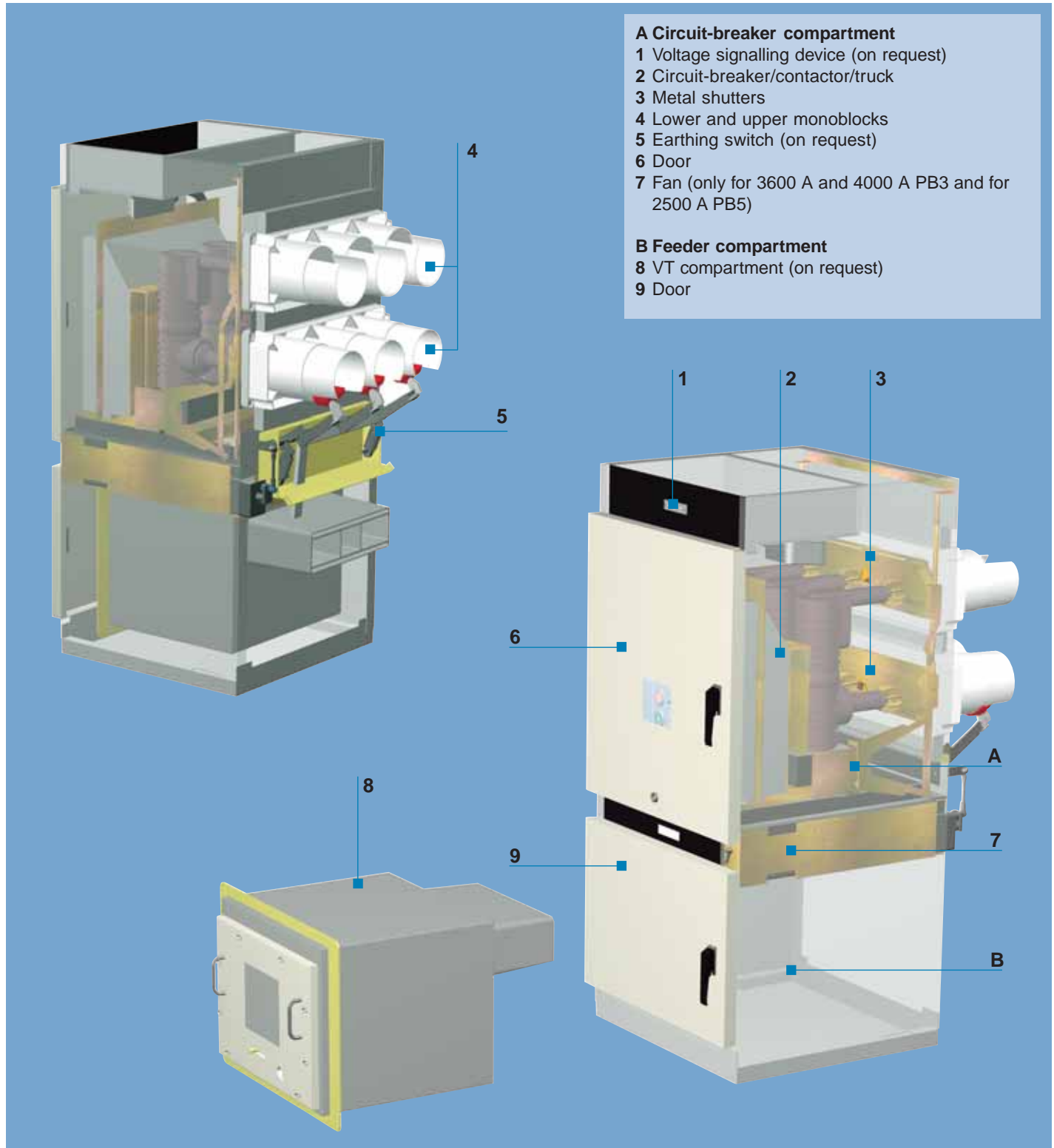
Environmental Management System

Complies with ISO 14001 Standards, certified by an independent external organisation.

Test laboratory

Complies with ISO 45001 Standards, accredited by an independent external organisation.





GENERAL CHARACTERISTICS

Electrical characteristics of PowerCube modules

PowerCube Module		PB 1	PB 2	PB 3	PB 4	PB 5	PR 1	PR 2	PR 3	PR 4	PR 5
Module width	mm	600	750	1000	750	1000	600	750	1000	750	1000
Rated voltage	12 kV	■	■	■			■	■	■		
	17,5 kV	■	■	■			■	■	■		
	24 kV				■	■				■	■
Test voltage at industrial frequency	28 kV	■	■	■			■	■	■		
	38 kV	■	■	■			■	■	■		
	50 kV				■	■				■	■
Impulse withstand voltage	75 kV	■	■	■			■	■	■		
	95 kV	■	■	■			■	■	■		
	125 kV				■	■				■	■
Short-time withstand current	25 kA (3s)	■	■	■	■	■	■	■	■		■
	31,5 kA (3s)	■	■	■			■	■	■		■
	40 kA (3s)		■	■				■	■		
	50 kA (1s)		■	■				■	■		
Peak current	63 kA	■	■	■	■	■	■	■	■	■	■
	79 kA	■	■	■			■	■	■	■	■
	100 kA		■	■				■	■	■	■
	125 kA		■	■				■	■	■	■
Rated currents	630 A	■	■		■		■	■		■	
	1250 A	■	■		■		■	■		■	
	1600 A		■			■		■			■
	2000 A		■			■		■			■
	2500 A			■		■(1)			■		■
	3150 A			■					■		
	3600 A			■(1)					■		
	4000 A			■(1)					■		

Electrical characteristics of earthing switch (on request)

PowerCube Module		PB 1	PB 2	PB 3	PB 4	PB 5	PR 1	PR 2	PR 3	PR 4	PR 5
Module width	mm	600	750	1000	750	1000	600	750	1000	750	1000
Short-time withstand current / Making capacity	25 kA (3s)	■	■	■	■	■	■	■	■	■	■
	31,5 kA (3s)	■	■	■			■	■	■	■	■
under short-circuit	40 kA (1s)		■	■				■	■		
	50 kA (1s)		■	■				■	■		
Peak current	63 kA	■	■	■	■	■	■	■	■	■	■
	79 kA	■	■	■			■	■	■	■	■
	100 kA		■	■				■	■	■	■
	125 kA		■	■				■	■		

(1) With forced ventilation of the circuit-breaker compartment: for 4000 A, an additional fan is required in the back of the switchgear.

MAIN COMPONENTS

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MAIN COMPONENTS

Circuit-breakers

The PowerCube modules can be fitted with HD4 series SF6 withdrawable and VD4 and VM1 series vacuum circuit-breakers.

The circuit-breakers are fitted with a truck which allows their racking-in and out in the switchboard with the door closed.

Both types have a compact and light structure which ensures great sturdiness and excellent mechanical reliability.

The operating mechanism and poles are fixed to the metal structure which also acts as a support for the moving contact actuation kinematics.

HD4 series SF6 Circuit-breakers

The HD4 series of medium voltage circuit-breakers use sulphur hexafluoride gas (SF6) to extinguish the electric arc and as insulating medium.

The breaking principle of HD4 circuit-breakers is based on compression and self-blast techniques to obtain top performances at all service current values, with gradual arc extinction, without any restriking, operating overvoltages and chopped currents.

These characteristics guarantee long electrical life for the circuit-breaker and limited dynamic, dielectric and thermal stresses on the installation.

The circuit-breaker poles, which make up the interruption part, are sealed for life pressure systems (IEC 62271-100 and CEI 17.1 Standards) and are maintenance-free.

The stored energy mechanical operating mechanism has free release and allows opening and closing operations independent of the operator.

VD4 and VM1 series vacuum circuit-breakers

The VD4 and VM1 circuit-breakers use vacuum as the interruption and insulating medium.

Thanks to the advanced techniques used for their construction, the VD4 and VM1 circuit-breakers ensure high performances under all service conditions.

The vacuum interrupters are embedded in the poles made of epoxy resin. This construction means the interrupters are unaffected by shocks, humidity and environmental pollution.

The circuit-breaker poles, making up the interruption part, are sealed for life pressure systems (IEC 62271-100 and CEI 17.1 Standards) and are maintenance-free.

The VD4 circuit-breakers use a mechanical type of operating mechanism, the VM1 circuit-breakers use an operating mechanism with a magnetic actuator.



VD4 series vacuum circuit-breaker.



HD4 series SF6 gas circuit-breaker.

They are both stored energy operating mechanisms with free release and allow opening and closing operations independent of the operator's actions.

V-Contact series vacuum contactors

Use of V-Contact series withdrawable contactors is foreseen in the PB1 PowerCube modules up to 12 kV.

The contactors are suitable for controlling alternating current users which require a high number of operations.

They consist of a resin monoblock where the vacuum interrupters, the moving equipment, the control electromagnet, the multivoltage feeder and auxiliary accessories are housed.

The monoblock is also the support for installation of the fuses.

Fuses according to DIN or BS Standards of different dimensions can be used thanks to special adapters.

The fuses support (BS or DIN type) must be specified when ordering.

Closing of the contactor is obtained by means of the control electromagnet. Opening takes place thanks to the action of a counter spring.

The contactors are available in the version with electrical or mechanical latching.

Their Construction is compact and sturdy and guarantees very long electrical and mechanical life.



V-Contact series vacuum contactor.

Service trucks

The PowerCube range is equipped with all the service trucks needed to complete the switchboard and required for service operations and during maintenance work.

The trucks are divided into four different types:

- Earthing without making capacity.
- Earthing with making capacity.
- Cable testing.
- Isolation.

Note: the earthing trucks with making and isolation capacity are available derived from the HD4 series only.



MAIN COMPONENTS

- **Earthing truck without making capacity “E”**

These trucks carry out the same function as the earthing switches without making capacity.

They therefore have no capacity to earth live circuits in fault conditions.

They are used to ensure an additional fixed earth, as is required by the installation service and maintenance procedures, as a further guarantee for personnel.

The use of these trucks foresees removal of the switching apparatus from the switchboard (circuit-breaker or contactor) and its replacement with the truck. The units preset for use of the earthing trucks are provided with a key lock which, when activated, prevents their racking-in.

This truck is available in two versions:

- earthing of the main busbar system (E/U series).
- earthing of the power cables (E/L series).

During the racking-in phase, the main busbar earthing truck only actuates the top shutter and earths the contacts connected to the top branch connections (and therefore to the main busbar system) by means of the switchgear structure.

During the racking-in phase, the power cable earthing truck only actuates the bottom shutter and earths the contacts connected to the bottom branch connections (and therefore to the power cables) by means of the switchgear structure. These trucks can be used in incoming or outgoing units or in dedicated units.

They can also be used in the bus-tie units. In this case, they earth one of the two sides of the main busbar system.

- **Earthing truck with making capacity “EM”**

These trucks carry out the same function as the earthing switches with making capacity.

They consist of circuit-breakers only fitted with top (main busbar earthing) or bottom (power cable earthing) terminals. The contacts without terminals are short-circuited by means of a copper bar and connected to earth by means of the apparatus truck.

They keep all the characteristics of the circuit-breakers, such as full making capacity on live circuits under fault conditions.

They allow closing operations to be carried out rapidly with remote electric control.

The use of these trucks foresees removal of the switching apparatus from the switchboard (circuit-breaker or contactor) and its replacement with the truck. The units preset for use of the earthing trucks are provided with a key lock which, when activated, prevents their racking-in.

This truck is available in two versions:

- main busbar system earthing (EM/U series)
- power cable earthing (EM/L series).

During the racking-in phase, the main busbar earthing truck only lifts the top shutter and prepares the contacts connected to the top branch connections (and therefore to the main busbar system) to close to earth by means of a control.

During the racking-in phase, the power cable earthing truck only lifts the bottom shutter and prepares the contacts connected to the top branch connections (and therefore to the main busbar system) to close to earth by means of a control.

These trucks can be used in incoming or outgoing units or in dedicated units.

They can also be used in bus-tie units. In this case, they earth one of the two sides of the main busbar system.

- **Power cable testing truck “T”**

These trucks allow the insulation tests on the power cables to be carried out without accessing the feeder compartment or disconnecting the cables from the switchgear.

The use of these trucks foresees removal of the switching apparatus from the switchboard (circuit-breaker or contactor) and its replacement with the truck.

During the racking-in phase, the truck only lifts the bottom shutter and, by means of the connectors it is fitted with, allows connection of the test apparatus cables by means of a special insulating rod (testing apparatus and insulating rod must be provided by the customer).

This truck can only be used in incoming/outgoing units.

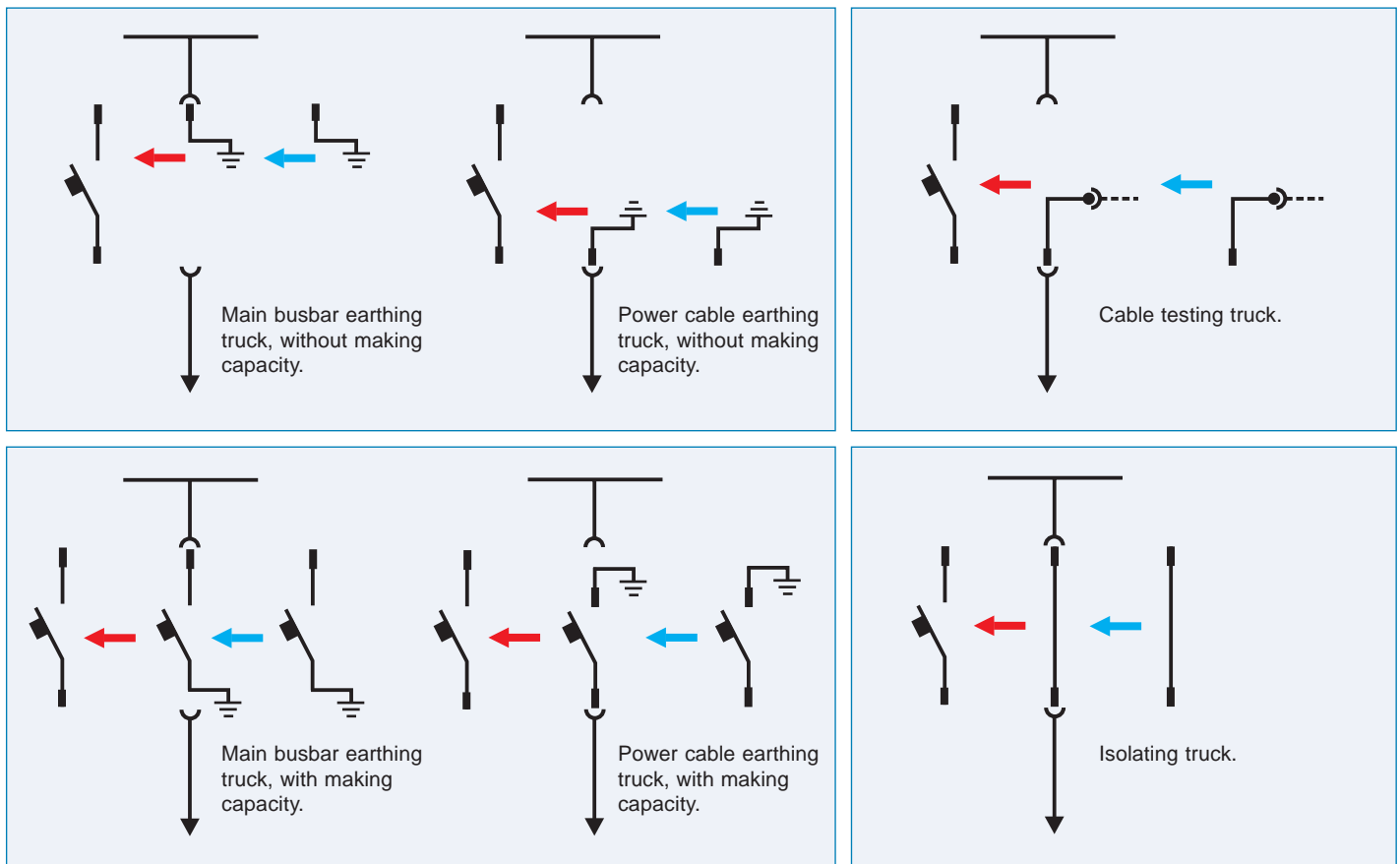
- **Isolating truck “S”**

The isolating truck allows the top switchgear contacts to be connected directly to the bottom ones. Connection is made extremely safe by using the poles of the circuit-breakers to insulate the connection busbars from the external environment.

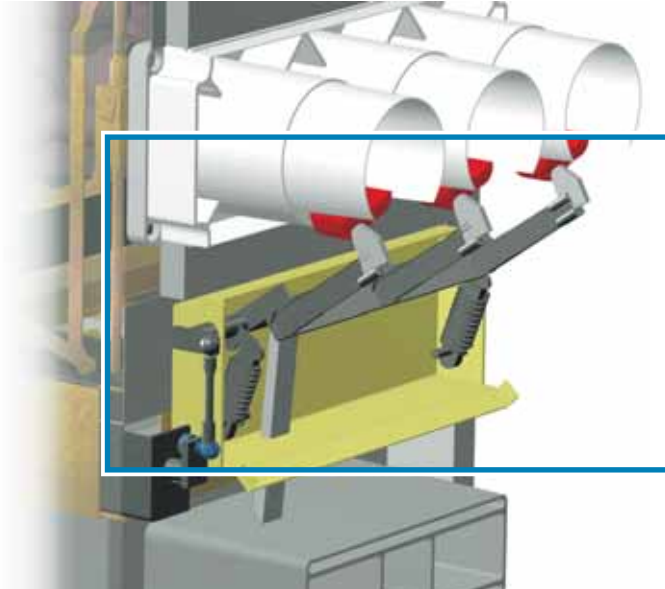
In the incoming/outgoing units, the isolating truck connects the main busbar system to the power cables, whereas in the bus-tie units, it connects the two sides of the busbar system.

This truck has its application in switchgear for making incoming/outgoing units without a circuit-breaker in radial networks, for making cable connections between two switchgear placed in front of each other, in making interconnection units and in creating bus-tie-riser units with double isolation (in this case, both units are made up of bus-ties, the former fitted with a circuit-breaker and the latter with an isolating truck).

The units preset for using isolating trucks are fitted with a key lock which, when activated, prevents their being racked-in.



MAIN COMPONENTS



Earthing switches

The PowerCube modules can be fitted with an earthing switch. The earthing switch is fitted with making capacity on short-circuit. The opening and closing operations can be locked, on request, by means of key locks.

Earthing switch control is carried out from the front of the module with manual operation suitably interlocked with the position of the circuit-breaker. For availability of the accessories, please see the table on page 24.



Earthing switch open.

Earthing switch closed.

Certain signalling of the earthing switch position (open/closed) visible from the front of the enclosure.

Monoblocs and shutters

The monoblocs consist of insulating bushings containing the power connections - top and bottom - of the circuit-breaker compartment, towards the feeder and busbar compartments respectively.

The shutter are of the metal type and are activated automatically during movement of the circuit-breaker from the test/isolated position to the connected position and vice versa.

They can be fitted with a fail-safe safety device (optional) to prevent their manual opening with the circuit-breaker removed.

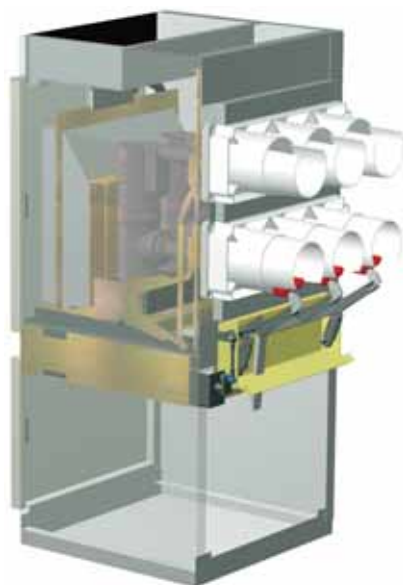
Each shutter can be locked by means of two independent padlocks (optional).



Metal segregation shutters.



Insulating monoblocks (seen from the rear).



VT Compartment

The PowerCube modules can be fitted with a VT compartment with withdrawable voltage transformers.

The voltage transformers are of the dedicated type and are protected by fuses. Fuse replacement can be carried out with the switchgear in service as the fuse compartment is segregated metallically from the other compartments.

The VT compartment is available for PowerCube modules 750 mm and 1000 mm wide.

For availability of the accessories, please see the table on page 24.



VT compartment with withdrawable voltage transformers.



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TYPES AVAILABLE AND APPARATUS

Notes for using PowerCube modules

- To construct incoming, outgoing and bus-tie type switchgear units, selection of PowerCube modules **PB1 ... PB5** is recommended (see Tables 1 to 8 on the following pages).
- To construct bus riser, measurement and direct busbar incoming switchgear units, selection of PowerCube modules **PR1 ... PR5** is recommended (see Table 9 further on).

Example of PB1 ... PB5 PowerCube modules (front and rear views).



1. Monoblocks with contacts for rated current up to 2500 A.
2. Monoblocks with contacts for rated current up to 4000 A.
3. Fan. Pre-installed in 3600 A PB3 and 2500 A PB5 modules. For 4000 A PB3, an additional fan must be installed in the back of the switchgear (by the customer).

Example of PR1 ... PR5 PowerCube modules (front and rear views).



Table 1 - VD4 withdrawable circuit-breakers for PowerCube modules (*)

kV	Isc (kA)	Icw (kA)	Rated current of the circuit-breakers VD4 (A - 40 °C)						Circuit-breaker		PowerCube	
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79				
12 17.5	16	16	630							VD4/P 12.06.16 p150	VD4/P 17.06.16 p150	PB 1
	20	20	630							VD4/P 12.06.20 p150	VD4/P 17.06.20 p150	
	25	25	630							VD4/P 12.06.25 p150	VD4/P 17.06.25 p150	
	31.5	31.5	630							VD4/P 12.06.32 p150	VD4/P 17.06.32 p150	
	16	16	1250							VD4/P 12.12.16 p150	VD4/P 17.12.16 p150	PB 1
	20	20	1250							VD4/P 12.12.20 p150	VD4/P 17.12.20 p150	
	25	25	1250							VD4/P 12.12.25 p150	VD4/P 17.12.25 p150	
	31.5	31.5	1250							VD4/P 12.12.32 p150	VD4/P 17.12.32 p150	
	16	16		630						VD4/W 12.06.16 p210	VD4/W 17.06.16 p210	PB 2
	20	20		630						VD4/W 12.06.20 p210	VD4/W 17.06.20 p210	
	25	25		630						VD4/W 12.06.25 p210	VD4/W 17.06.25 p210	
	31.5	31.5		630						VD4/W 12.06.32 p210	VD4/W 17.06.32 p210	
	16	16		1250						VD4/W 12.12.16 p210	VD4/W 17.12.16 p210	PB 2
	20	20		1250						VD4/W 12.12.20 p210	VD4/W 17.12.20 p210	
	25	25		1250						VD4/W 12.12.25 p210	VD4/W 17.12.25 p210	
	31.5	31.5		1250						VD4/W 12.12.32 p210	VD4/W 17.12.32 p210	
	40	40		1250						–	–	PB 2
	50	50		1250						–	–	
	40	40			1250					VD4/P 12.12.40 p210	VD4/P 17.12.40 p210	
	50	50			1250					VD4/P 12.12.50 p210	–	
20	20			1600					VD4/P 12.16.20 p210	VD4/P 17.16.20 p210	PB 2	
25	25			1600					VD4/P 12.16.25 p210	VD4/P 17.16.25 p210		
31.5	31.5			1600					VD4/P 12.16.32 p210	VD4/P 17.16.32 p210		
40	40			1600					VD4/P 12.16.40 p210(3)	VD4/P 17.16.40 p210(3)		
50	50			1600					VD4/P 12.16.50 p210(3)	–	PB 2	
20	20			2000					VD4/P 12.20.20 p210	VD4/P 17.20.20 p210		
25	25			2000					VD4/P 12.20.25 p210	VD4/P 17.20.25 p210		
31.5	31.5			2000					VD4/P 12.20.32 p210	VD4/P 17.20.32 p210		
40	40			2000					VD4/P 12.20.40 p210(3)	VD4/P 17.20.40 p210(3)	PB 2	
50	50			2000					VD4/P 12.20.50 p210(3)	–		
20	20					2500			VD4/P 12.25.20 p275	VD4/P 17.25.20 p275		
25	25					2500			VD4/P 12.25.25 p275	VD4/P 17.25.25 p275		
31.5	31.5					2500			VD4/P 12.25.32 p275	VD4/P 17.25.32 p275	PB 3	
40	40					2500			VD4/P 12.25.40 p275(3)	VD4/P 17.25.40 p275(3)		
50	50					2500			VD4/P 12.25.50 p275(3)	–		
31.5	31.5					3150			VD4/P 12.32.32 p275(3)	VD4/P 17.32.32 p275(3)		
40	40					3150			VD4/P 12.32.40 p275(3)	VD4/P 17.32.40 p275(3)	PB 3	
50	50					3150			VD4/P 12.32.50 p275(3)	–		
31.5	31.5					3600 (1)			VD4/P 12.32.32 p275(3)	VD4/P 17.32.32 p275(3)		
40	40					3600 (1)			VD4/P 12.32.40 p275(3)	VD4/P 17.32.40 p275(3)		
50	50					3600 (1)			VD4/P 12.32.50 p275(3)	–	PB 3	
31.5	31.5					4000 (1)			VD4/P 12.32.32 p275(3)	VD4/P 17.32.32 p275(3)		
40	40					4000 (1)			VD4/P 12.32.40 p275(3)	VD4/P 17.32.40 p275(3)		
50	50					4000 (1)			VD4/P 12.32.50 p275(3)	–		
24	16	16						630		VD4/P 24.06.16 p210	–	PB 4
	20	20						630		VD4/P 24.06.20 p210	–	
	25	25						630		VD4/P 24.06.25 p210	–	
	16	16						1250		VD4/P 24.12.16 p210	–	PB 4
	20	20						1250		VD4/P 24.12.20 p210	–	
	25	25						1250		VD4/P 24.12.25 p210	–	
	16	16							1600	VD4/P 24.16.16 p275	–	PB 5
	20	20							1600	VD4/P 24.16.20 p275	–	
	25	25							1600	VD4/P 24.16.25 p275	–	
	16	16							2000	VD4/P 24.20.16 p275	–	PB 5
	20	20							2000	VD4/P 24.20.20 p275	–	
	25	25							2000	VD4/P 24.20.25 p275	–	
16	16							2500 (2)	VD4/P 24.25.16 p275	–	PB 5	
20	20							2500 (2)	VD4/P 24.25.20 p275	–		
25	25							2500 (2)	VD4/P 24.25.25 p275	–		



W = Width of PowerCube module.

P = Horizontal centre distance between circuit-breaker poles.

U/L = Distance between top and bottom terminal.

H = Distance between bottom terminal and earth

Ø = Diameter of the contacts in the PowerCube module monoblock.

(*) The PowerCube modules are not prepared for application of the "motorised truck" for VD4 circuit-breakers.

(1) 3600 A with fan pre-installed in PB3 modules. For 4000 A, an additional fan must be installed in the back of the switchgear (by the customer).

(2) 2500 A with fan pre-installed in PB5 modules.

(3) For availability, please ask ABB.

TYPES AVAILABLE AND APPARATUS



Table 2 - Withdrawable HD4 circuit-breakers for PowerCube modules

kV	Isc (kA)	Icw (kA)	Rated current of the circuit-breakers HD4 (A - 40 °C)						Circuit-breaker		PowerCube	
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79				
12 17.5	16	16	630						HD4/W 12.06.16 p150	HD4/W 17.06.16 p150	PB 1	
	25	25	630						HD4/W 12.06.25 p150	HD4/W 17.06.25 p150		
	31.5	31.5	630						HD4/W 12.06.32 p150	HD4/W 17.06.32 p150		
		16	16	1250					HD4/W 12.12.16 p150	HD4/W 17.12.16 p150	PB 2	
		25	25	1250					HD4/W 12.12.25 p150	HD4/W 17.12.25 p150		
		31.5	31.5	1250					HD4/W 12.12.32 p150	HD4/W 17.12.32 p150		
		16	16		630					HD4/W 12.06.16 p210	HD4/W 17.06.16 p210	PB 2
		25	25		630					HD4/W 12.06.25 p210	HD4/W 17.06.25 p210	
		31.5	31.5		630					HD4/W 12.06.32 p210	HD4/W 17.06.32 p210	
		16	16		1250					HD4/W 12.12.16 p210	HD4/W 17.12.16 p210	PB 2
		25	25		1250					HD4/W 12.12.25 p210	HD4/W 17.12.25 p210	
		31.5	31.5		1250					HD4/W 12.12.32 p210	HD4/W 17.12.32 p210	
	40	40		1250					HD4/W 12.12.40 p210	HD4/W 17.12.40 p210	PB 2	
	50	50		1250					HD4/W 12.12.50 p210	HD4/W 17.12.50 p210		
	40	40			1250			--	--			
	50	50			1250			--	--			
	16	16			1600				HD4/W 12.16.16 p210	HD4/W 17.16.16 p210	PB 2	
	25	25			1600				HD4/W 12.16.25 p210	HD4/W 17.16.25 p210		
	31.5	31.5			1600				HD4/W 12.16.32 p210	HD4/W 17.16.32 p210		
	40	40			1600				HD4/P 12.16.40 p210	HD4/P 17.16.40 p210	PB 2	
	50	50			1600				HD4/P 12.16.50 p210	HD4/P 17.16.50 p210		
	16	16			2000				HD4/W 12.20.16 p210	HD4/W 17.20.16 p210		
	25	25			2000				HD4/W 12.20.25 p210	HD4/W 17.20.25 p210	PB 2	
	31.5	31.5			2000				HD4/W 12.20.32 p210	HD4/W 17.20.32 p210		
	40	40			2000				HD4/P 12.20.40 p210	HD4/P 17.20.40 p210		
	50	50			2000				HD4/P 12.20.50 p210	HD4/P 17.20.50 p210	PB 2	
	25	25				2500			HD4/P 12.25.25 p275	HD4/P 17.25.25 p275		
	31.5	31.5				2500			HD4/P 12.25.32 p275	HD4/P 17.25.32 p275		
	40	40				2500			HD4/P 12.25.40 p275	HD4/P 17.25.40 p275	PB 3	
	50	50				2500			HD4/P 12.25.50 p275	HD4/P 17.25.50 p275		
	31.5	31.5				3150			HD4/W 12.32.32 p275	HD4/W 17.32.32 p275		
	40	40				3150			HD4/W 12.32.40 p275	HD4/W 17.32.40 p275	PB 3	
	50	50				3150			HD4/W 12.32.50 p275	HD4/W 17.32.50 p275		
	31.5	31.5				3600 (1)			HD4/W 12.32.32 p275	HD4/W 17.32.32 p275		
	40	40				3600 (1)			HD4/W 12.32.40 p275	HD4/W 17.32.40 p275	PB 3	
	50	50				3600 (1)			HD4/W 12.32.50 p275	HD4/W 17.32.50 p275		
	31.5	31.5				4000 (1)			HD4/W 12.32.32 p275	HD4/W 17.32.32 p275		
	40	40				4000 (1)			HD4/W 12.32.40 p275	HD4/W 17.32.40 p275	PB 3	
	50	50				4000 (1)			HD4/W 12.32.50 p275	HD4/W 17.32.50 p275		
	16	16					630		HD4/W 24.06.16 p210	--		PB 4
	20	20					630		HD4/W 24.06.20 p210	--		
	25	25					630		HD4/W 24.06.25 p210	--		
	16	16					1250		HD4/W 24.12.16 p210	--	PB 4	
	20	20					1250		HD4/W 24.12.20 p210	--		
	25	25					1250		HD4/W 24.12.25 p210	--		
	16	16						1600	HD4/P 24.16.16 p275	--	PB 5	
	20	20						1600	HD4/P 24.16.20 p275	--		
	25	25						1600	HD4/P 24.16.25 p275	--		
	16	16						2000	HD4/P 24.20.16 p275	--	PB 5	
	20	20						2000	HD4/P 24.20.20 p275	--		
	25	25						2000	HD4/P 24.20.25 p275	--		
	16	16						2500 (2)	HD4/P 24.25.16 p275	--	PB 5	
	20	20						2500 (2)	HD4/P 24.25.20 p275	--		
	25	25						2500 (2)	HD4/P 24.25.25 p275	--		

W = Width of PowerCube module.

P = Horizontal centre distance between circuit-breaker poles.

U/L = Distance between top and bottom terminal.

H = Distance between bottom terminal and earth

Ø = Diameter of the contacts in the PowerCube module monoblock.

(1) 3600 A with fan pre-installed in PB3 modules. For 4000 A an additional fan must be installed in the back of the switchgear (by the customer).

(2) 2500 A with fan pre-installed in PB5 modules.

Table 3 - Withdrawable VM1 circuit-breakers for PowerCube modules

kV	Isc (kA)	Icw (kA)	Rated current of the circuit-breakers VM1 (A - 40 °C)						Circuit-breaker		PowerCube	
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79				
12 17.5	16	16	630							VM1/P 12.06.16 p150	VM1/P 17.06.16 p150	PB 1
	20	20	630							VM1/P 12.06.20 p150	VM1/P 17.06.20 p150	
	25	25	630							VM1/P 12.06.25 p150	VM1/P 17.06.25 p150	
	31.5	31.5	630							VM1/P 12.06.32 p150	VM1/P 17.06.32 p150	
	16	16	1250							VM1/P 12.12.16 p150	VM1/P 17.12.16 p150	PB 1
	20	20	1250							VM1/P 12.12.20 p150	VM1/P 17.12.20 p150	
	25	25	1250							VM1/P 12.12.25 p150	VM1/P 17.12.25 p150	
	31.5	31.5	1250							VM1/P 12.12.32 p150	VM1/P 17.12.32 p150	
	16	16		630						VM1/W 12.06.16 p210	VM1/W 17.06.16 p210	PB 2
	20	20		630						VM1/W 12.06.20 p210	VM1/W 17.06.20 p210	
	25	25		630						VM1/W 12.06.25 p210	VM1/W 17.06.25 p210	
	31.5	31.5		630						VM1/W 12.06.32 p210	VM1/W 17.06.32 p210	
16	16		1250						VM1/W 12.12.16 p210	VM1/W 17.12.16 p210	PB 2	
20	20		1250						VM1/W 12.12.20 p210	VM1/W 17.12.20 p210		
25	25		1250						VM1/W 12.12.25 p210	VM1/W 17.12.25 p210		
31.5	31.5		1250						VM1/W 12.12.32 p210	VM1/W 17.12.32 p210		
40	40		1250						--	--	PB 2	
50	50		1250						--	--		
40	40			1250					--	--		
50	50			1250					--	--		
20	20				1600				VM1/P 12.16.20 p210	VM1/P 17.16.20 p210	PB 2	
25	25				1600				VM1/P 12.16.25 p210	VM1/P 17.16.25 p210		
31.5	31.5				1600				VM1/P 12.16.32 p210	VM1/P 17.16.32 p210		
40	40				1600				--	--		
50	50				1600				--	--		
20	20				2000				VM1/P 12.20.20 p210	VM1/P 17.20.20 p210	PB 2	
25	25				2000				VM1/P 12.20.25 p210	VM1/P 17.20.25 p210		
31.5	31.5				2000				VM1/P 12.20.32 p210	VM1/P 17.20.32 p210		
40	40				2000				--	--		
50	50				2000				--	--		
20	20					2500			VM1/P 12.25.20 p275	VM1/P 17.25.20 p275	PB 3	
25	25					2500			VM1/P 12.25.25 p275	VM1/P 17.25.25 p275		
31.5	31.5					2500			VM1/P 12.25.32 p275	VM1/P 17.25.32 p275		
40	40					2500			--	--		
50	50					2500			--	--		
31.5	31.5					3150					PB 3	
40	40					3150						
50	50					3150						
31.5	31.5					3600 (1)			--	--		
40	40					3600 (1)			--	--		
50	50					3600 (1)			--	--		
31.5	31.5					4000 (1)			--	--	PB 3	
40	40					4000 (1)			--	--		
50	50					4000 (1)			--	--		
24	16	16					630		VM1/P 24.06.16 p210			PB 4
	20	20					630		VM1/P 24.06.20 p210			
	25	25					630		VM1/P 24.06.25 p210			
	16	16					1250		VM1/P 24.12.16 p210			PB 4
	20	20					1250		VM1/P 24.12.20 p210			
	25	25					1250		VM1/P 24.12.25 p210			
	16	16						1600	VM1/P 24.16.16 p275			PB 5
	20	20						1600	VM1/P 24.16.20 p275			
	25	25						1600	VM1/P 24.16.25 p275			
	16	16						2000	VM1/P 24.20.16 p275			PB 5
	20	20						2000	VM1/P 24.20.20 p275			
	25	25						2000	VM1/P 24.20.25 p275			
16	16						2500 (2)	VM1/P 24.25.16 p275(3)			PB 5	
20	20						2500 (2)	VM1/P 24.25.20 p275(3)				
25	25						2500 (2)	VM1/P 24.25.25 p275(3)				



W = Width of PowerCube module.

P = Horizontal centre distance between circuit-breaker poles.

U/L = Distance between top and bottom terminal.

H = Distance between bottom terminal and earth.

Ø = Diameter of the contacts in the PowerCube module monoblock.

(1) 3600 A with fan pre-installed in PB3 modules. For 4000 A an additional fan must be installed in the back of the switchgear (by the customer).

(2) 2500 A with fan pre-installed in PB5 modules.

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Table 4 - Withdrawable V-Contact contactors for PowerCube modules

kV	Isc (kA) (3)	Icw (kA)	Rated current of the V-Contact contactors (A - 40 °C)						Contactor	PowerCube
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79		
7,2	16	6	400 (4)						V7/W	PB 1
	20	6	400 (4)							
	25	6	400 (4)							
	31.5	6	400 (4)							
12	16	6	400 (4)						V12/W	
	20	6	400 (4)							
	25	6	400 (4)							
	31.5	6	400 (4)							

Table 5 - Isolating trucks with making capacity for PowerCube modules

kV	Isc (kA)	Icw (kA)	Rated current of the isolating trucks (A - 40 °C)						Isolating truck	PowerCube
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79		
12 17.5	16	16	...1250						S-HD4/W 17.12.32 p150	PB1
	20	20								
	25	25								
	31.5	31.5								
	16	16		...1250					S-HD4/W 17.12.32 p210	PB 2
	20	20								
	25	25								
	31.5	31.5								
	40	40							S-HD4/W 17.12.50 p210	
	50	50								
	16	16			...2000				S-HD4/W 17.20.32 p210	
	20	20								
25	25									
31.5	31.5									
40	40							S-HD4/P 17.20.50 p210		
50	50									
16	16				...2500			S-HD4/P 17.25.50 p275	PB 3	
20	20									
25	25									
31.5	31.5									
40	40					...3150		S-HD4/P 17.32.50 p275		
25	25									
31.5	31.5									
40	40					...3600 (1)		S-HD4/P 17.32.50 p275		
50	50					...3600 (1)				
31.5	31.5					...4000 (1)				
40	40					...4000 (1)		S-HD4/P 17.32.50 p275		
50	50									
24	16	16					...1250		S-HD4/W 24.12.25 p210	PB 4
	20	20								
	25	25								
	16	16					...2000			
20	20									
25	25									
16	16						...2500 (2)	S-HD4/P 24.25.25 p275		
20	20									
25	25									

W = Width of PowerCube module.

P = Horizontal centre distance between circuit-breaker poles.

U/L = Distance between top and bottom terminal.

H = Distance between bottom terminal and earth.

Ø = Diameter of the contacts in the PowerCube module monoblock.

(1) 3600 A with fan pre-installed in modules PB3. For 4000 A an additional fan must be installed in the back of the switch-gear (by the customer).

(2) 2500 A with fan pre-installed in modules PB5.

(3) Guaranteed using suitable fuses.

(4) The rated current is subject to derating according to the rated current of the fuses.

Table 6 - Earthing trucks with making capacity for PowerCube modules

kV	Isc (kA)	Icw (kA)	Rated current of the earthing trucks (A - 40 °C)						Earthing truck (1)	PowerCube
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79		
12 17.5	16	16	...1250						EM-U/W 17.12.32 p150 EM-L/W 17.12.32 p150	PB 1
	20	20								
	25	25								
		31.5	31.5							
	16	16	...1250	...1250					EM-L/W 17.12.32 p210 EM-U/W 17.12.32 p210	PB 2
	20	20								
	25	25								
	31.5	31.5								
	40	40							EM-L/W 17.12.50 p210 (2)	
	50	50							EM-U/W 17.12.50 p210 (2)	
	16	16	...2000	...2000					EM-L/W 17.20.32 p210 EM-U/W 17.20.32 p210	PB 3
	20	20								
25	25									
31.5	31.5									
40	40							EM-L/P 17.20.50 p210		
50	50							EM-U/P 17.20.50 p210		
16	16	...2500	...2500					EM-L/P 17.25.50 p275 EM-U/P 17.25.50 p275	PB 3	
20	20									
25	25									
31.5	31.5									
40	40									
50	50									
16	16	...3150	...3150					EM-L/P 17.32.50 p275 EM-U/P 17.32.50 p275	PB 3	
20	20									
25	25									
31.5	31.5									
40	40									
50	50									
24	16	16					...1250	EM-L/W 24.12.25 p210 EM-U/W 24.12.25 p210	PB 4	
	20	20								
	25	25								
	16	16	...2000	...2000					EM-L/P 24.20.25 p275 EM-U/P 24.20.25 p275	PB 5
	20	20								
	25	25								
16	16	...2500 (2)	...2500 (2)					EM-L/P 24.25.25 p275 EM-U/P 24.25.25 p275	PB 5	
20	20									
25	25									

W = Width of PowerCube module.

P = Horizontal centre distance between circuit-breaker poles.

U/L = Distance between top and bottom terminal.

H = Distance between bottom terminal and earth.

Ø = Diameter of the contacts in the PowerCube module monoblock.

(1) - EM-L... = Earthing truck with making capacity with bottom bushings (for cable earthing).

- EM-U... = Earthing truck with making capacity with top bushings (for busbar system earthing).

(2) Please ask ABB.

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Table 7 - Earthing trucks without making capacity for PowerCube modules											
kV	Isc (kA)	Icw (kA)	Rated current of the earthing trucks (A - 40 °C)						Earthing truck (1)	PowerCube	
			W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79			
12 17.5	16	16	...1250							E-U/W 17.12.32 p150 E-L/W 17.12.32 p150	PB 1
	20	20									
	25	25									
	31.5	31.5									
	16	16		...1250						E-L/W 17.12.32 p210 E-U/W 17.12.32 p210	PB 2
	20	20									
	25	25									
	31.5	31.5									
	40	40								E-L/W 17.12.50 p210 (2)	
	50	50								E-U/W 17.12.50 p210 (2)	
	16	16			...2000					E-L/W 17.20.32 p210 E-U/W 17.20.32 p210	PB 2
	20	20									
	25	25									
	31.5	31.5									
	40	40								E-L/P 17.20.50 p210	
50	50								E-U/P 17.20.50 p210		
16	16					...2500			E-L/P 17.25.50 p275 E-U/P 17.25.50 p275	PB 3	
20	20										
25	25										
31.5	31.5										
40	40										
50	50										
16	16					...3150			E-L/P 17.32.50 p275 E-U/P 17.32.50 p275	PB 3	
20	20										
25	25										
31.5	31.5										
40	40										
50	50										
24	16	16						...1250	E-L/W 24.12.25 p210 E-U/W 24.12.25 p210	PB 4	
	20	20									
	25	25									
16	16							...2000	E-L/P 24.20.25 p275 E-U/P 24.20.25 p275	PB 5	
20	20										
25	25										
16	16							...2500	E-L/P 24.25.25 p275 E-U/P 24.25.25 p275	PB 5	
20	20										
25	25										

W = Width of PowerCube module.

P = Horizontal centre distance between circuit-breaker poles.

U/L = Distance between top and bottom terminal.

H = Distance between bottom terminal and earth.

Ø = Diameter of the contacts in the PowerCube module monoblock.

(1) -EM-L... = Earthing truck without making capacity with bottom bushings (for cable earthing).

-EM-U... = Earthing truck without making capacity with top bushings (for busbar system earthing).

(2) Please ask ABB.

Table 8 - Cable testing trucks for PowerCube modules

kV	Isc (kA)	Icw (kAx3s)	W=600 p=150 u/l=205 H=260 ø=35	W=750 p=210 u/l=310 H=280 ø=35	W=750 p=210 u/l=310 H=280 ø=79	W=1000 p=275 u/l=310 H=280 ø=109	W=750 p=210 u/l=310 H=325 ø=35	W=1000 p=275 u/l=310 H=345 ø=79	Cable testing truck	PowerCube
12 17.5	16	16	...1250						T/W 17.12 p150	PB 1
	20	20								
	25	25								
	31.5	31.5		...1250					T/W 17.12 p210	PB 2
	16	16								
	20	20								
	25	25								
	31.5	31.5			...2000				T/W 17.12 p210 (²)	PB 2
	40	40								
	50	50								
	16	16								
	20	20				2500			T/W 17.20 p210	PB 3
25	25									
31.5	31.5									
40	40									
50	50					3150		T/P 17.32 p275	PB 3	
16	16									
20	20									
25	25									
31.5	31.5						...1250	T/W 24.12 p210	PB 4	
40	40									
50	50									
16	16									
20	20						...2000	T/W 24.20 p275	PB 5	
25	25									
16	16									
20	20						...2500 (2)	T/P 24.25 p275	PB 5	
25	25									

- W = Width of the PowerCube module.
P = Horizontal centre distance between circuit-breaker poles.
U/L = Distance between top and bottom terminal.
H = Distance between bottom terminal and earth.
Ø = Diameter of the contacts in the PowerCube module monoblock.
- (1) To be constructed with fixed version VT.
(2) Please ask ABB.
(3) Main circuits. For earthing switch, please consult table page 6.

Table 9 - PowerCube modules without apparatus

Characteristics of the module					Configuration					
Rated voltage kV	Width mm	Rated current A	Ics kA	Icw (²) (up to) kA	Bus-riser or direct incoming	Bus-riser or direct incoming and earthing switch	Bus-riser with measurements and VT compartment	Bus-riser with measurements, VT compartment and earthing switch	Measurements with VT compartment switch	Measurements, compartment and earthing
12 17,5	600	1250	31.5	31.5 x 3s	PR 1	PR 1	PR 1(¹)	PR 1(¹)	PR 1(¹)	PR 1(¹)
	750	2000	31.5	31.5 x 3s	PR 2	PR 2	PR 2	PR 2	PR 2	PR 2
			40	40 x 3s						
50	50 x 1s									
24	1000	4000	31.5	31.5 x 3s	PR 3	PR 3	PR 3	PR 3	–	–
			40	40 x 3s						
			50	50 x 1s						
24	750	1250	25	25 x 3s	PR 4	PR 4	PR 4	PR 4	PR 4	PR 4
			25	25 x 3s	PR 5	PR 5	PR 5	PR 5	–	–

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Accessories

The table below indicates the accessories available and the relative combination with the PowerCube modules.

Modulo PowerCube		PB1	PB2	PB3	PB4	PB5	PR1	PR2	PR3	PR4	PR5
Width (mm)		600	750	1000	750	1000	600	750	1000	750	1000
Rated voltage	12 kV	■	■	■	-	-	■	■	■	-	-
	17.5 kV	■	■	■	-	-	■	■	■	-	-
	24 kV	-	-	-	■	■	-	-	-	■	■
Unit	Incoming/outgoing/bus-tie	■	■	■	■	■	-	-	-	-	-
	Bus-riser/measurements/incoming/direct	-	-	-	-	-	■	■	■	■	■
Standard fittings	1a Group of auxiliary connected/isolated	■	■	■	■	■	-	-	-	-	-
	1b Anti-racking-in lock for circuit-breakers with lower rated current than that of the compartment or for apparatus not foreseen for the compartment itself	■	■	■	■	■	-	-	-	-	-
Accessories to be specified at the time of ordering (assembly by ABB)	2 Circuit-breaker anti-racking-in lock	■	■	■	■	■	-	-	-	-	-
	3 VT compartment	-	■	■	■	■	-	■	■	■	■
	4 Earthing switch	■	■	■	■	■	■	■	■	■	■
	5 Key locks open or closed or open and closed for earthing switch	■	■	■	■	■	■	■	■	■	■
	6 Electrom. lock for earthing switch (24-48 110-220 Vac 50 Hz)	■	■	■	■	■	■	■	■	■	■
	7 Earthing switch auxiliary contacts (5 or 10)	■	■	■	■	■	■	■	■	■	■
	8 Safety device for the metal shutters (Fail Safe)	■	■	■	■	■	-	-	-	-	-
	9 Voltage signalling device	■	■	■	■	■	■	■	■	■	■
	Accessories on request (assembly by the customer)	10 Anti-condensation heater (110-220 Vac 50 Hz)	■	■	■	■	■	-	-	-	-
11 Contact for racked-in position for earthing truck		■	■	■	■	■	-	-	-	-	-
12 Electromechanical interlock for circuit-breaker compartment door (110-220 Vac 50 Hz)		■	■	■	■	■	-	-	-	-	-
13 Padlock for metal shutters (top or bottom or top and bottom)		■	■	■	■	■	-	-	-	-	-
14 Key lock for racking in earthing truck		■	■	■	■	■	-	-	-	-	-
15 Earthing switch operating lever - extra in relation to normal supply (*)		■	■	■	■	■	■	■	■	■	■
16 Lifting eyebolts		■	■	■	■	■	■	■	■	■	■
17 Apparatus transport and racking/in truck	■	■	■	■	■	-	-	-	-	-	

(*) Remember that the standard supply provides up to 10 levers per order position with a maximum of 1 lever per enclosure (fitted with earthing switch).

OVERALL DIMENSIONS AND WEIGHTS

PB1 PowerCube module	26
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OVERALL DIMENSIONS AND WEIGHTS

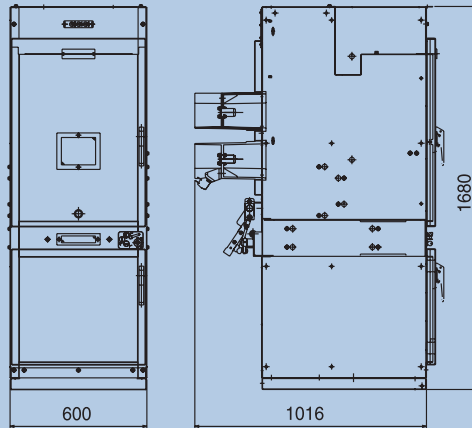
Module PB 1

Typical use

- Incoming/outgoing	IF
- Bus-tie	BT
Contact diameter (mm)	35 mm
Rated voltage	12 kV 17 kV
Test voltage	28 kV
at industrial frequency	38 kV
Impulse withstand voltage	75 kV bil 95 kV bil
Short-time withstand current	31.5 kA x 3s
Peak current	79 kA
Rated branch current	630 A 1250 A

Earthing switch (if requested)

Short-time withstand current	31.5 kA x 1s 31.5 kA x 3s
Peak current	79 kA



Dimensional drawings available on request in electronic format.

Un (kV)	l _{cw} (kA)	In (A)	TN
12	31.5	630 - 1250	1VCD000023
17	31.5	630 - 1250	1VCD000028

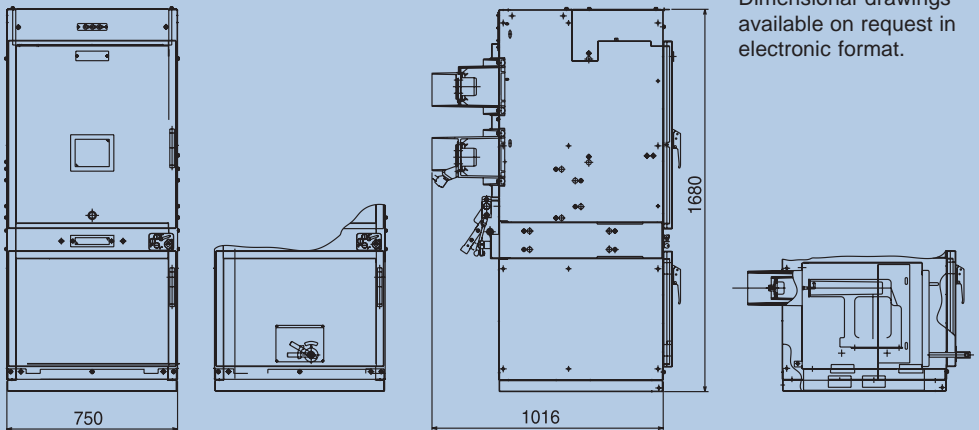
Module PB 2

Typical use

- Incoming/outgoing	IF
- Incoming/outgoing with measurements	IFM
- Bus-tie	BT
- Bus-tie with measurements	BTM
Rated voltage	12 kV 17 kV
Test voltage at industrial frequency	28 kV 38 kV
Impulse withstand voltage	75 kV bil 95 kV bil
Short-time withstand current	31.5 kA x 3s 40 kA x 3s 50 kA x 1s
Peak current	79 kA 100 kA 125 kA
Rated branch current	630 A ⁽¹⁾ 1250 A ⁽¹⁾ 1600 A ⁽²⁾ 2000 A ⁽²⁾

Earthing switch (if requested)

Short-time withstand current	31.5 kA x 1s 31.5 kA x 3s 40 kA x 1s 50 kA x 1s
Peak current	79 kA 100 kA 125 kA



Dimensional drawings available on request in electronic format.

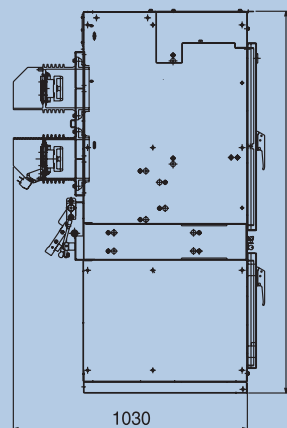
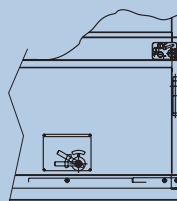
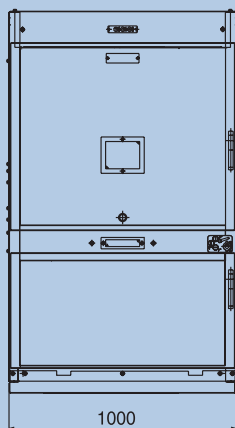
Un (kV)	l _{cw} (kA)	In (A)	TN
12	31.5	630...2000	1VCD000024
12	40-50	630...2000	1VCD000027
17	31.5	630...2000	1VCD000029
17	40-50	630...2000	1VCD000030

(1) Contact diameter: 35 mm.
(2) Contact diameter: 79 mm.

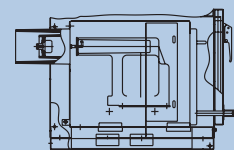
Module PB 3**Typical use**

- Incoming/outgoing	IF
- Incoming/outgoing with measurements	IFM
- Bus-tie	BT
- Bus-tie with measurements	BTM

Rated voltage	12 kV
	17 kV
Test voltage at industrial frequency	28 kV
	38 kV
Impulse withstand voltage	75 kV bil
	95 kV bil
Short-time withstand current	31.5 kA x 3s
	40 kA x 3s
	50 kA x 1s
Peak current	79 kA
	100 kA
	125 kA
Rated branch current	2500 A
	3150 A
	3600 A ⁽¹⁾
	4000 A ⁽¹⁾



Dimensional drawings available on request in electronic format.

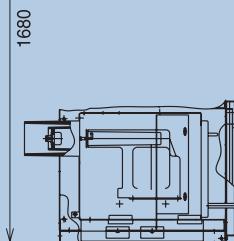
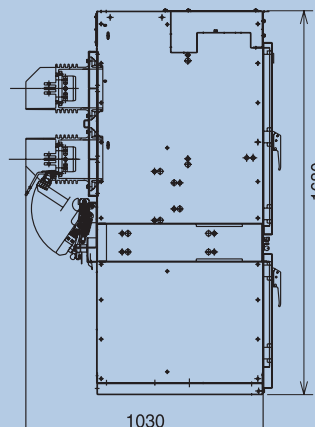
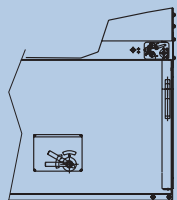
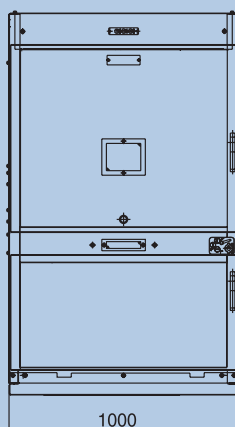


Un (kV)	l _{cw} (kA)	In (A)	TN
12-17	31,5	2500	1VCD000025
12-17	31,5	3150	1VCD000026
12-17	31,5	3600-4000	1VCD000043

Earthing switch (if requested)

Short-time withstand current	31.5 kA x 1s
	31.5 kA x 3s
	40 kA x 1s
	50 kA x 1s
Peak current	79 kA
	100 kA
	125 kA

(1) With forced ventilation.



Un (kV)	l _{cw} (kA)	In (A)	TN
12-17	40-50	2500	1VCD000037
12-17	40-50	3150	1VCD000038
12-17	40-50	3600-4000	1VCD000039

OVERALL DIMENSIONS AND WEIGHTS

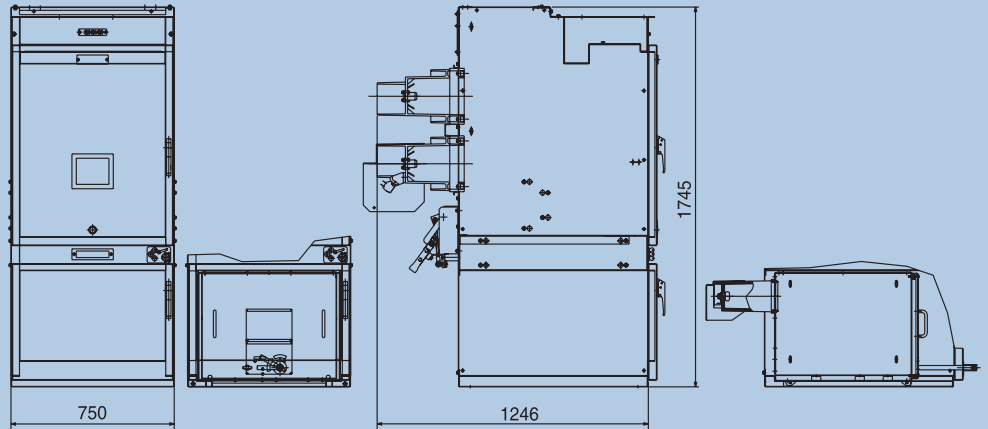
Module PB 4

Typical use

- Incoming/outgoing	IF
- Incoming/outgoing with measurements	IFM
- Bus-tie	BT
- Bus-tie with measurements	BTM
Rated voltage	24 kV
Test voltage at industrial frequency	50 kV
Impulse withstand voltage	125 kV bil
Short-time withstand current	25 kA x 3s
Peak current	63 kA
Rated branch current	630 A
	1250 A

Earthing switch (if requested)

Short-time withstand current	25 kA x 3s
Peak current	63 kA



Un (kV)	Icw (kA)	In (A)	TN
24	25	630-1250	1VCD000031

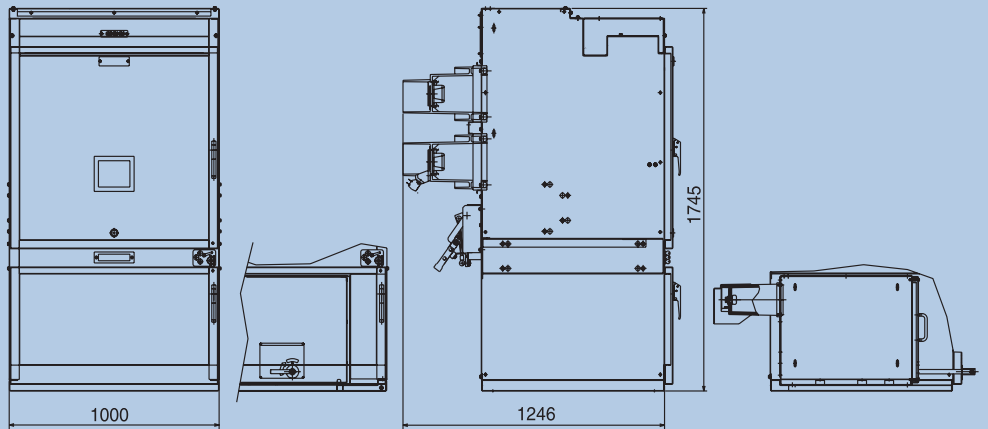
Module PB 5

Typical use

- Incoming/outgoing	IF
- Incoming/outgoing with measurements	IFM
- Bus-tie	BT
- Bus-tie with measurements	BTM
Rated voltage	24 kV
Test voltage at industrial frequency	50 kV
Impulse withstand voltage	125 kV bil
Short-time withstand current	25 kA x 3s
Peak current	63 kA
Rated branch current	1600 A
	2000 A
	2500 A ⁽¹⁾

Earthing switch (if requested)

Short-time withstand current	25 kA x 3s
Peak current	63 kA



Un (kV)	Icw (kA)	In (A)	TN
24	25	1600...2000	1VCD000032
24	25	2500	1VCD000044

(1) With forced ventilation

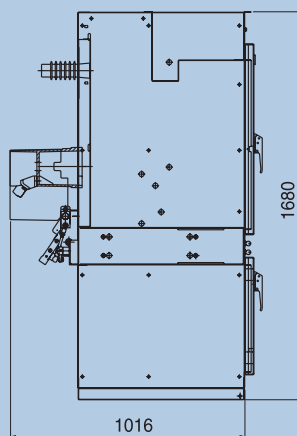
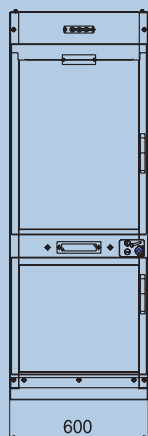
Module PR 1 - TN 1VCD000033**Typical use**

- Riser or direct incoming	R
- Riser or direct incoming and earthing switch	R
- Riser with measurements and VT compartment	RM
- Riser with measurements, VT compartment and earthing switch	RM
- Measurements with VT compartment	M
- Measurements, VT compartment and earthing switch	M

Rated voltage	12 kV
	17 kV
Test voltage at industrial frequency	28 kV
	38 kV
Impulse withstand voltage	75 kV bil
	95 kV bil
Short-time withstand current	31.5 kA x 3s
Peak current	79 kA
Rated branch current	630 A
	1250 A

Earthing switch (if requested)

Short-time withstand current	31.5 kA x 1s
Peak current	79 kA



Dimensional drawings available on request in electronic format.

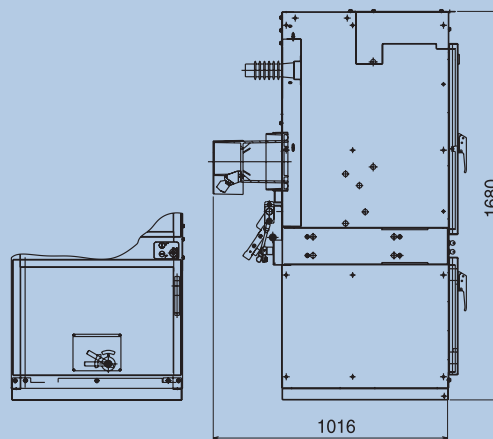
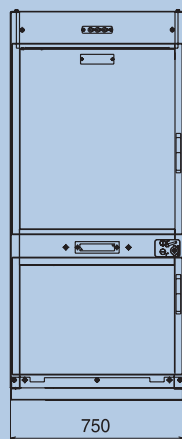
Module PR 2 TN 1VCD000034 (31.5 kA)
TN 1VCD000040 (50 kA)**Typical use**

- Riser	R
- Measurements	M
- Direct incoming	IFD

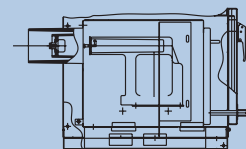
Rated voltage	12 kV
	17 kV
Test voltage at industrial frequency	28 kV
	38 kV
Impulse withstand voltage	75 kV bil
	95 kV bil
Short-time withstand current	31.5 kA x 3s
	40 kA x 3s
	50 kA x 1s
Peak current	79 kA
	100 kA
	125 kA
	1600 A
Rated branch current	630 A
	1250 A
	2000 A

Earthing switch (if requested)

Short-time withstand current	31.5 kA x 1s
	31.5 kA x 3s
	40 kA x 1s
	50 kA x 1s
Peak current	79 kA
	100 kA
	125 kA



Dimensional drawings available on request in electronic format.



OVERALL DIMENSIONS AND WEIGHTS

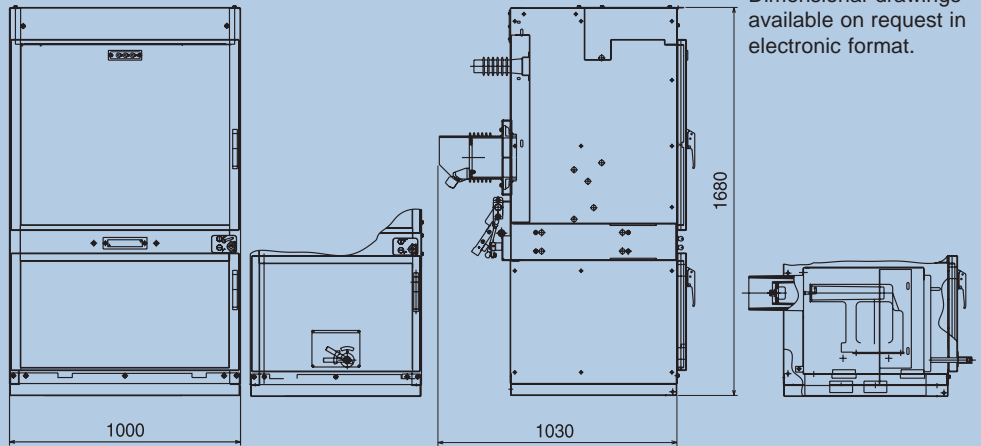
Module PR 3 TN 1VCD000041 (31.5 kA)
TN 1VCD000042 (50 kA)

Typical use

- Riser	R
- Direct incoming	IFD
Rated voltage	12 kV 17 kV
Test voltage	28 kV
at industrial frequency	38 kV
Impulse withstand voltage	75 kV bil 95 kV bil
Short-time withstand current	31.5 kA x 3s 40 kA x 3s 50 kA x 1s
Peak current	79 kA 100 kA 125 kA
Rated branch current	2500 A 4000 A

Earthing switch (if requested)

Short-time withstand current	31.5 kA x 1s 31.5 kA x 3s 40 kA x 1s 50 kA x 1s
Peak current	79 kA 100 - 125kA



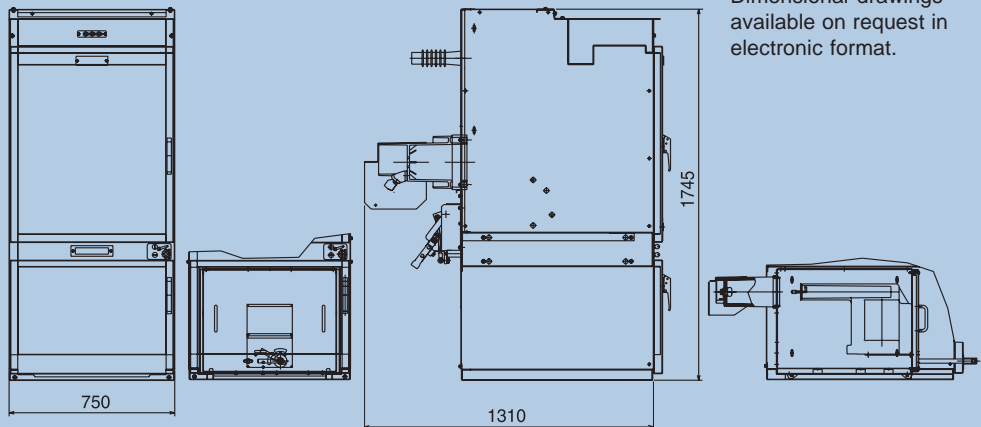
Module PR 4 - TN 1VCD000035

Typical use

- Riser	R
- Measurements	M
- Direct incoming	IFD
Rated voltage	24 kV
Test voltage	50 kV
at industrial frequency	
Impulse withstand voltage	125 kV bil
Short-time withstand current	25 kA x 3s
Peak current	63 kA
Rated branch current	630 A 1250 A

Earthing switch (if requested)

Short-time withstand current	25 kA x 3s
Peak current	63 kA

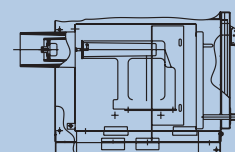
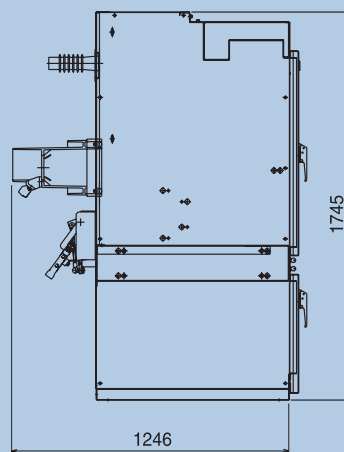
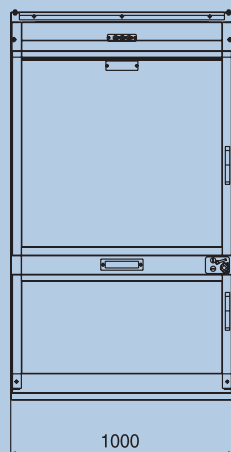


Module PR 5 - TN 1VCD000036**Typical use**

- Riser	R
- Direct incoming	IFD
Rated voltage	24 kV
Test voltage at industrial frequency	50 kV
Impulse withstand voltage	125 kV bil
Short-time withstand current	25 kA x 3s
Peak current	63 kA
Rated branch current	1600 A
	2000 A
	2500 A

Earthing switch (if requested)

Short-time withstand current	25 kA x 3s
Peak current	63 kA



Dimensional drawings available on request in electronic format.

Indicative weights of the modules (without earthing switch and withdrawable VT compartment)

Type of module		PB1 (kg)	PB2 (kg)	PB3 (kg)	PB4 (kg)	PB5 (kg)	PR1 (kg)	PR2 (kg)	PR3 (kg)	PR4 (kg)	PR5 (kg)
Width of the module	L = 600 mm	■					■				
	L = 750 mm		■		■			■		■	
	L = 1000 mm			■		■			■		■
Rated voltage	12 kV	■	■	■			■	■	■		
	17.5 kV	■	■	■			■	■	■		
	24 kV				■	■				■	■
Rated current	630-1250 A	180	200		250		165	165		215	
	1600-2000 A		240			310		215			250
	2500 A			300		340			270		250
	3150 A			320					270		
	3600 A			350					270		
	4000 A			380					270		

COMPLETION OF THE SWITCHGEAR

PR512 switchgear protection device	34
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COMPLETION OF THE SWITCHGEAR

For completion of the switchgear, ABB can also offer the components indicated below. For further details, please consult us.

PR512 switchgear protection releases

With regard to the functionality of protections 50/51/50N/51N, the PR512 are self-supplied type releases. To guarantee operation of the ammeter and of the dialogue function, an auxiliary power supply must also be provided.

They are available in the following versions.

PR512/P. Protection against overload (51) and instantaneous or delayed short-circuit (50).

– PR512/P. Protection against overload (51) and instantaneous or delayed short-circuit (50).

– PR512/P. Protection against overload (51), instantaneous or delayed short-circuit (50), earth fault (51N) and instantaneous or delayed earth fault (50N).

– PR512/PD. Protection against overload (51), instantaneous or delayed short-circuit (50), earth fault (51N) and instantaneous or delayed earth fault (50N).

Dialogue function to be connected to the management system of electrical installations.

For the characteristics of the current transformers to be combined with the PR512, please refer to technical catalogue 1VCP000055.



Voltage transformers

The voltage transformers are of the type insulated in resin and are used to supply measuring and protection devices.

They are available for fixed assembly or for installation on withdrawable trucks.

They comply with the IEC 60044-2 Standards.

Their dimensions are usually according to the DIN 42600 Standard. The transformers installed on withdrawable trucks are, on the other hand, of the dedicated type.

These transformers can have one or two poles, with performances and precision classes suitable for the functional requirements of the instruments connected to them.

When they are installed on withdrawable trucks, they are fitted with medium voltage protection fuses.

Replacement of the fuses can be carried out with the switchgear in service.



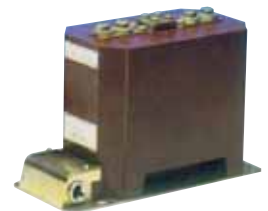
Current transformers

The current transformers are of the type insulated in resin and are used to supply measuring and protection devices. These transformers can either have a wound core or a through bar with one or more cores, with performance and precision classes suited to the installation requirements.

They comply with IEC 60044-1 Standards.

Their dimensions are usually according to the DIN 42600 Standard.

The current transformers can also be fitted with a capacitive socket for connection to the voltage signalling lamps.



Measurement sensors (for application with REF542*plus* electronic protection units or similar)

The introduction of digital technologies into electrical measuring and protection instruments has considerably modified the performances required of transformers.

The analogue input levels of the instruments have been notably reduced when compared with those of traditional systems.

For this reason, ABB has introduced a new range of sensors which best covers the characteristics of the new generations of instruments.

The switchgear can be equipped with ABB KEVCD Block Type sensors up to 24 kV.

The current sensors comply with the IEC 60044-8 (CDV) Standards, whereas the voltage sensors comply with the IEC 60044-7 Standards.

The dimensions are in accordance with the DIN 42600 Narrow Type standard.

Both the current and voltage sensors or just the current sensors can be integrated simultaneously in the same resin body. The voltage divider for connection to the voltage signalling lamps is also inserted.

The measurement sensors and the multi-purpose ABB units have Cl. 1 class of precision.

• Current sensor

The current sensor consists of a Rogowski coil without the ferromagnetic core, so it is not affected by saturation phenomena.

When a coil is formed by a uniform winding over a closed non-magnetic core of constant cross-section, the induced voltage in the secondary circuit is directly proportional to the variation in the let-through current. To obtain a signal proportional to the current given, this voltage must be integrated. The multi-purpose devices carry out this function and use the signal obtained both for the measurements and for the protections.

Main characteristics of the current sensors

- Linear response over the whole measurement range;
- no saturation phenomenon;
- no hysteresis phenomenon;
- a single instrument for protections and measurements;
- high class of precision;
- high degree of immunity to electromagnetic interferences;
- the output signal is a voltage (150 mV) proportional to the variation in the current time. Measurement of the current is obtained by integrating the signal;
- just two coils cover the range of rated currents from 0 to 3200 A;
- the winding can remain open even with the switchgear in service.



ABB KEVCD type combined voltage-current sensors.

COMPLETION OF THE SWITCHGEAR

• Voltage sensor

The voltage sensor consists of a resistive divider through which the signal is taken up. This sensor, too, is of the unsaturable and linear type over the whole measurement range.

The output signal is a voltage directly proportional to the primary voltage. The resistive element consists of a bar made of ceramic material. The voltage sensors are used for taking measurements and for supplying the protections with power simultaneously.

Main characteristics of the voltage sensors

- Linear response over the whole measurement range;
- no saturation phenomenon;
- no ferroresonance phenomenon;
- a single instrument for protections and measurements;
- high class of precision;
- high degree of immunity to electromagnetic interferences;
- the output signal is a voltage directly proportional to the primary voltage;
- the division ratio is 10000/1;
- a single divider covers the range from 0 to 24 kV rated voltage.

REF542plus electronic unit

The REF542plus unit integrates all the secondary functions relative to a switchgear unit in a single module fitted with watchdog. Thanks to the flexibility of its software, the unit is able to satisfy a vast range of installation requirements:

protection
measurement, control
and signalling.

The user interface is simple and easy to use.



REF542plus in a kit for OEM

The integrated protection and control unit is based on the REF542plus platform - multi-purpose unit for medium voltage switchgear.

The REF542plus unit uses the latest microelectronic and information technology discoveries.

The main functions carried out by the REF542plus unit are as follows:

- protection
- control
- measurement
- monitoring
- quality of the energy
- communication.

Thanks to the exceptional flexibility and scalability of this advanced unit, all the functions are integrated in a single configurable environment.

This unit therefore makes targeted and intelligent solutions possible, with limited cabling requirements, in those places where the traditional approach would be costly and inefficient.

IndustrialIT

This product has been tested and certified as conforming with **IndustrialIT**, Level 0 - Information. All the information about the product is provided in an interactive electronic format, compatible with ABB Aspect Object™ technology.

ABB's commitment to respecting the **IndustrialIT** conformity guarantees that each construction unit is provided with all the instruments needed to ensure efficient installation, function and maintenance operations throughout the useful life of the product. For further information about **IndustrialIT** please go to see the following site: <<http://www.abb.com/industrialit>>.

Some solutions already configured for protection and control of most of the common medium voltage applications are defined here.

These solutions are based on the REF542plus unit and do not require any programming.

The REF542plus unit is supplied already programmed and ready for installation.

Only the protection parameter setting remains to be carried out.

The REF542plus unit, already configured, can only be ordered as part of the medium voltage kit.

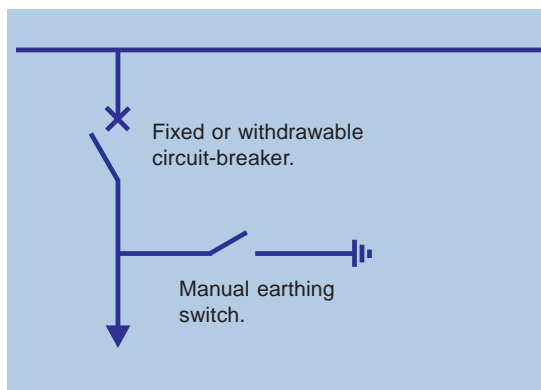
It cannot be sold separately.

Configuration of the primary part is structured as shown in the single-line diagram at the side. The circuit-breaker can be fixed or withdrawable. The earthing switch is manual. Configurations with a contactor in place of the circuit-breaker are also provided for motor outgoing feeders.

The ATEX certified version, in accordance with directive 94/9/EC for explosive environments, is also available. Please contact ABB.

Note

Specific and customised solutions and protection diagrams are possible. Please contact ABB.



Single-line diagram of the primary part.

Technical reference documentation

The pre-configured REF542*plus* unit described in this catalogue, is based on release 1.1 (V4C01 software version).

For further information about the REF542*plus* unit, please ask for the following documentation:

- REF542*plus* Technical Catalogue, 1VTA100001en-H PTMV, 11.2003
- REF542*plus* Manual Part 1: Operation and Maintenance, 1VTA100002en-04 PTMV, 10.02.02.
- REF542*plus* Manual Part 2: Engineering & Technical References, 1VTA100003en-04 PTMV, 10.02.02.
- REF542*plus* Manual Part 3: Installation and Commissioning, 1VTA100004en-04 PTMV, 10.02.02.
- REF542*plus* Manual Part 4: Communication to station control system, 1VTA100005en-01 PTMV, 10.02.02.
- REF542*plus* Technical References Modbus RTU, 1VTA100065-2 PTMV, 10.02.02.
- REF542*plus* Release 1.1 Type Test Certificate 1VTA100022 PTMV, 31.01.02.
- REF542*plus* Connection Diagram 401734, Rev. M3565 7/6/01 ABB.
- REF542*plus* EC Conformity, 1VTA100159 PTMV, 28.08.02.
- EC-Type-Examination Certificate (PTB 02 ATEX 3000) PTB September 2002.

Fuses

Fuses to be combined with apparatus such as the contactor, are available for protection of feeders, motors, capacitors, instrument voltage transformers, etc.

The fuses comply with DIN or BS Standards. For the contactor-fuse combination and coordination, please refer to the 1VCP000049 technical catalogue.





ABB Power Technologies S.p.A.
Unità Operativa Sace
Via Friuli, 4
I-24044 Dalmine
Tel: +39 035 395111
Fax: +39 035 395874
E-mail: sacetms.tipm@it.abb.com
Internet://www.abb.com

ABB s.r.o.
Org. unit EJF
Videnská 117, 619 00 Brno
Czech Republic
Tel: +420 5 4715 2413, 1111
Fax: +420 5 4715 2190
E-mail: info.ejf@cz.abb.com
Internet://www.abb.com

The data and illustrations are not binding. We reserve the right to make changes in the course of technical development of the product.
1VCF000091 - Rev. C, en - Technical Catalogue - 2005.12 (PowerCube)