

PRODUCT BROCHURE

# PVB outdoor vacuum circuit breaker



- Global proven reputation
- Accountable solution for safety and reliability
- Wide range offering, easy business and convenient installation

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# Introduction

## Overview

PVB outdoor vacuum circuit breaker (hereinafter referred to PVB) is pole mounted switch equipment of ABB vacuum circuit breaker series, Rated voltage is 12 kV, applied to the overhead lines.

ABB's PVB is one of the most flexible devices for smart grid application, and also provides maximum functionality and mounting flexibility suitable for a variety of applications. This is especially true of our feeder automation product, where years of

knowledge and modular manufacturing technique allow PVB outdoor circuit breaker to meet any need and schedule. PVB outdoor vacuum circuit breakers can meet various protections requirements under the situation with power electricity, including making and breaking short-circuit current. PVB has a very good performance on frequent operation occasions, and PVB can fully meet the requirements of automatic reclosing with high reliability and electrical service lifetime.



## Product characteristic

PVB is perfect synthesis of ABB's affirmed technology in designing and constructing vacuum interrupter and HCEP with highly molded research and manufacturing technology, and also is combination of advanced EL operating mechanism.

Both the vacuum interrupter and poles encapsulated in HCEP insulation material are manufactured by German CalorEmag Company which is famous as manufacturer of ABB vacuum interrupter.

Breaking short-circuit current in the vacuum PVB does not require an interrupting and insulating medium. In fact, the interrupter does not contain ignitable material.

In any case, on separation of the contacts, an electric arc is generated made up exclusively of molten and vaporized contact material. The electric arc supported by the external energy only remains until the current is cancelled by passing through natural zero. At that instant, the rapid reduction in the load density carried and the fast condensation of the metallic vapour lead to extremely rapid recovery of the dielectric properties. The vacuum interrupter therefore recovers the insulating capacity which withstand the transient recovery voltage, definitively the arc is extinguished.

Since high dielectric strength can be reached in vacuum, even with minimum distances, interruption of the circuit is also guaranteed when separation of the contacts takes place a few milliseconds before passage of the current through natural zero.

The special geometry of the contacts and the material used, together with the limited duration and low voltage of the arc guarantee minimum contact wear and long life. Furthermore, the vacuum prevents their oxidation and contamination.

## Features

- Vacuum interruption technique
- Modular design for easy service ability in the field
- The contacts in vacuum protect against oxidation and contamination
- Suitable for different climatic conditions
- Low operating force
- Spring operation mechanism equipped with mechanical anti-pump device supplied as standard

- Compact design provides easy installation
- 10,000 full load operation
- Parts and components are recyclable
- No oil or gas insulation=environmentally friendly product
- Plastic parts are manufactured according to standard ISO 11469 to ensure product was easily separated at the end of its life time

## Flexible configuration

PVB has different flexible configurations according to customer different requirements, such as configuration with visible break.

Main additional features of PVB integrated disconnecter product are:

- Outside visible isolated gap
- 3 phase mechanical operation disconnecter, reliable mechanical interlocking with the PVB circuit breaker
- Disconnecter with excellent performance and high technical ratings

## Standards

- IEC 60694-2002 Common specifications for high-voltage switchgear and controlgear standards
- IEC 62271-100 High-voltage switchgear and controlgear - Part 100: High-voltage alternating-current circuit-breakers
- GB/T 11022 Common specifications for high-voltage switchgear and controlgear standards
- GB 1984 High-voltage alternating-current circuit-breakers
- GB/T 311.1 Insulation coordination for high voltage transmission and distribution equipment
- DL/T 402 Specification of high-voltage alternating-current circuit-breakers
- DL/T 403 HV vacuum circuit-breaker for rated voltage 12 kV to 40.5 kV
- DL/T 593 Common specifications for high-voltage switchgear and controlgear standards
- DL/T 813 Specification for 12 kV H. V. alternating current automatic circuit recloser
- GB 1985 High-voltage alternating-current disconnectors and earthing switches
- IEC 62271-102 High-voltage switchgear and controlgear - Part 102: Alternating-current disconnectors and earthing switches

# Introduction

## Application condition General condition

Ambient temperature	
High limit +40°C	+40°C
Average temperature limit in 24 hours +35°C	+35°C
Low limit -40°C*	-40°C*
* motor operation is -25°C	
Installation altitude	
High limit 1000 m*	1000m*
* special design can reach to 2000 m	
Seismic intensity	
High limit:	9 Degree
horizontal acceleration	
Simulated earthquake waves	0.50 g
Sine resonate waves	0.30 g

## Special condition

Application in special condition, please contact and consult with manufacturer in advance.

Generally, the following special condition can be considered by manufacturer:

- Installation altitude exceeds 1000 m
- External insulation can be decreased
- Choose the products which can be used in altiplano area
- Installed in higher ambient temperature
- Decrease continuous operating current PVB

# Technical parameters

## PVB technical parameters

Parameters	Unit	Values			
Rated voltage Un	kV	12			
Rated current In	A	630/1250****			
Rated frequency	Hz	50/60			
Circuit breaker	Power frequency withstand voltage, 50/60 sec/1 min	To earth and between phases	Dry	kV	42
			Wet	kV	34
	Lightning impulse withstand voltage	Across the isolating distance	Dry	kV	48
		To earth and between phases		kV	75
		Across the isolating distance		kV	85
	Short-circuit breaking current/Operations		kA/n	20 kA/30	
	Short-circuit making current (peak)		kA	50	
	Short time withstand current		kA	20	
	Withstand duration		s	4	
	Peak withstand current (peak)		kA	50	
Ice covering		mm	10		
Circuit breaker level			C2-E2-M2*		
Rated operating sequence			O-0.3 s-CO-180 s (15 s)-CO**		
Mechanical mechanism type			Spring mechanism		
Dimension		mm	1028x856x512 (HXW XD)		
Weight		kg	110 (Incl. CT)		
Pollution level			IV		
Ingress degree			IPX6		
Mechanical endurance (number of close-open operations)		n	10,000		
Disconnecter	Power frequency withstand voltage, 50/60 sec/1 min	To earth and between phases	kV	48	
		Across the isolating distance	kV	54.5	
	Lightning impulse withstand voltage	To earth and between phases	kV	85	
		Across the isolating distance	kV	96	
	Short time withstand current		kA	20	
	Withstand duration		s	4	
	Peak withstand current (peak)		kA	50	
	Ice breaking		mm	10	
	Dimension		mm	1093x1015x542 (HXW XD)***	
	Pollution level			IV	
Mechanical endurance		CO	3000		

\* According to the definition of standard: GB 1984-2003 High-voltage alternating-current circuit-breakers, C2-E2-M2 circuit breaker means:

Circuit-Breaker Class C2: Circuit-breaker with very low probability of restrike during capacitive current breaking as demonstrated by specific type test.

Circuit-Breaker Class E2: Circuit-breaker designed so as not to require maintenance of the interrupting parts of the main circuit during its expected operation life, and only minimal maintenance of its other parts(circuit-breaker with extended electrical endurance).

Circuit-Breaker Class M2: Frequently operated circuit-breaker for special service requirements and designed so as to require only limited maintenance as

demonstrated by specific type tests(circuit-breaker with extended mechanical endurance, mechanically type tested for 10,000 operations).

**NOTE:** A combination of the different classes of circuit-breakers with regard to electrical endurance, mechanical endurance and the restrike probability during capacitive current breaking is possible. For the designation of these circuit-breakers the notation of the different classes are combined following an alphabetical order, for example C1-M2.

\*\* Motor operating PVB with smart controllers can carry out 4-5 reclosing sequences.

\*\*\* The dimension is the overall dimension with CB.

\*\*\*\* Rated current 1250 A is only for the circuit-breakers.

# Structure and functions

## PVB structure

The poles of PVB are encapsulated by insulated material which is Hydrophobic Cycloaliphatic Epoxy (HCEP) and the poles are installed vertically on the mechanism tank (see rightside picture). Poles casted by HCEP can minimize partial discharge and mechanical damage. When PVB is closed, current path of the main circuit is: upper terminal → static contact in the vacuum interrupter → dynamic contact in the vacuum interrupter → lower terminal → external circuit.

## Interruption principle of ABB interrupters Vacuum Interrupter

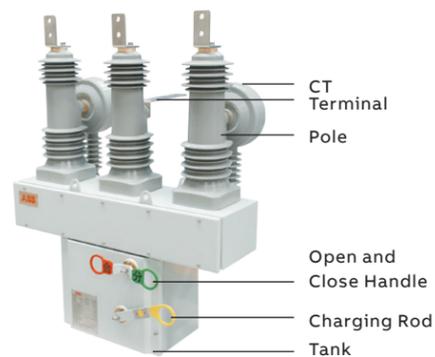
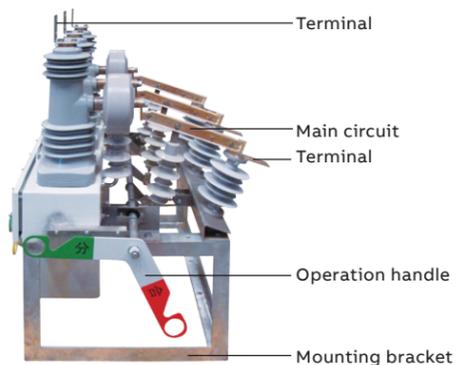
ABB has been developing and manufacturing vacuum interrupters since the early 1980 s. Worldwide, more than two million ABB vacuum interrupters are in service. ABB's vacuum interrupter facility uses the latest technologies in high quality mass production to produce the next generation of vacuum interrupters. This new generation vacuum interrupter is robust for universal application.

## Advantages

- Maximum reliability
- Superior contact wear
- Long life: 10,000 full load operations
- Minimal maintenance
- Environmentally friendly

In a vacuum interrupter, separation of current-carrying contacts initiates the vacuum arc and this is maintained until the current zero and can be influenced by magnetic fields.

Diffuse or contracted vacuum arcs



Following contact separation, single melting points form on the surface of the cathode, producing metal vapours which support the arc.

The diffuse vacuum arc is characterised by expansion over the contact surface and by an even distribution of the thermal stress.

At the rated current of the vacuum interrupter, the electric arc is always of the diffuse type. Contact erosion is negligible, and the number of current interruptions very high.

As the interrupted current value increases (above the rated value), the electric arc tends to be transformed from the diffuse into the contracted type, due to the Hall effect.

Starting at the anode, the arc contracts and as the current rises further it tends to become sharply defined.

Near the area involved there is an increase in temperature with consequent thermal stress on the contact. To prevent overheating and erosion of the contacts, the arc is kept rotating. With arc rotation it becomes similar to a moving conductor which the current passes through.

## The spiral geometry of ABB vacuum interrupter contacts

The special geometry of the spiral contacts generates a radial magnetic field in all areas of the arc column, concentrated over the contact circumferences.

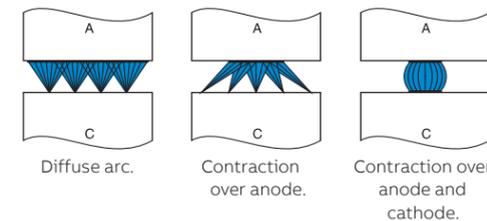
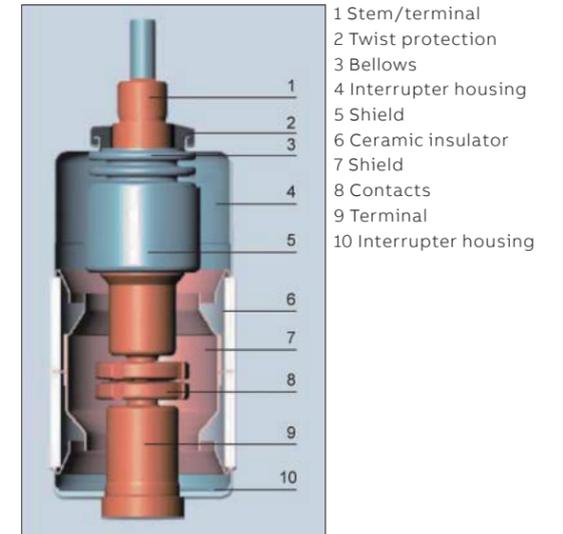
An electromagnetic force is self-generated and this acts tangentially, causing rapid arc rotation around the contact axis.

This means the arc is forced to rotate and to involve a wider surface than that of a fixed contracted arc.

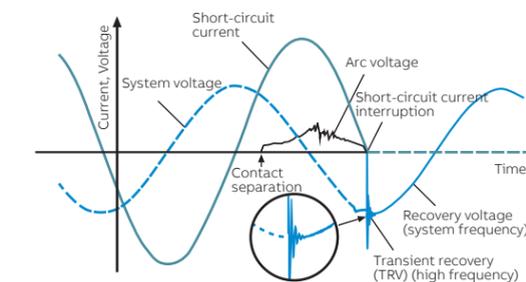
Apart from minimising thermal stress on the contacts, all this makes contact erosion negligible and, above all, allows the interruption process even with very high short-circuits.

ABB vacuum interrupters are zero-current interrupters and are free of any re-striking.

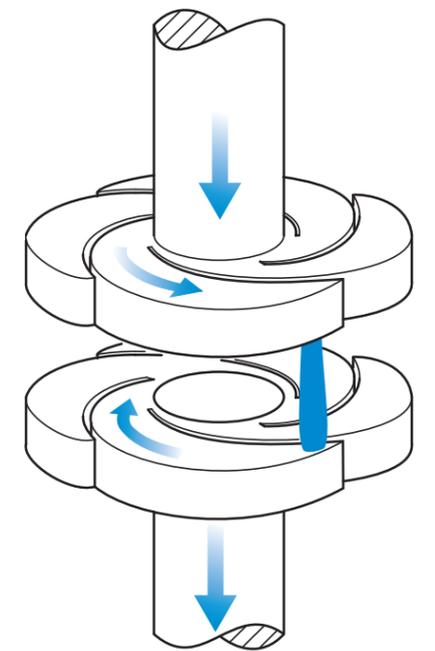
Rapid reduction in the current charge and rapid condensation of the metal vapours simultaneously with the zero-current, means maximum dielectric strength can be restored between the interrupter contacts within microseconds.



Schematic diagram of the transition from a diffuse arc to a contracted arc in a vacuum interrupter.



Development of current and voltage trends during a single phase vacuum interruption process.



Radial magnetic field contact arrangement with a rotating vacuum arc.

# Structure and functions

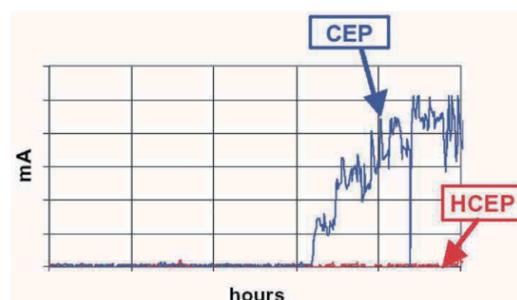
## Solid-encapsulated pole

PVB's pole assemblies are constructed of UV resistant HCEP encapsulating material and are design to provide a rated 10,000 full load operations without maintenance. Meanwhile HCEP can supply protection for vacuum interrupter to decrease the effect of dust and humidity, and main contacts will enduringly be encapsulated in vacuum condition through arc extinguished chamber which constitutes vacuum interrupter unit.



## Characteristic of insulating material

HCEP is light, and anti-aging, so it can meet the requirements of using in outdoor severe environment and enhance anti-corrosion during high-pollution environment of equipment.



Comparison of CEP and HCEP after 1000 hours salt-fog test

## Advantages of HCEP over CEP

- Improved performance and heavily polluted areas
- Improved weatherability and outdoor aging
- Increased life expectancy
- Enhanced reliability

## Why we need Hydrophobicity?

- Improved waters beading and runoff
- Lower leakage currents- Less discharge activity
- Lower flash over probability
- Battery reliability
- Improved life expectancy

## Operating mechanism

PVB uses EL-mechanical operation, and the optional secondary accessories can be installed easily and quickly, and EL mechanical operation is spring operated mechanism.

## EL-mechanical operating mechanism

The mechanical operating mechanism of PVB circuit-breaker is of simple concept and use, and can be customized with a wide range of easily and rapidly installed accessories.

This simplicity translates into greater reliability of circuit breaker. The EL operating mechanism is of the stored energy type with the anti-pumping device mounted as standard to prevent incorrect operations.

Position of open or closed, and charging status are visible from the indication windows which are at the bottom of PVB tank (please find the dimension of the windows in detail shown below).

## Manual operating PVB

Spring operating mechanism of PVB can be charged manually via charging rod simply and reliably. After the spring operating mechanism being charged, PVB can be closed via operation handle, if PVB is closed, PVB can be opened by operation handle without charging the spring operating mechanism again!

## Protection functions of manual operating PVB

Protection elements of manual operating PVB are CT, MFC protection control device and overcurrent release. When the overhead lines have overloaded current or fault current, CT will sense the current and secondary current of CT will increase accordingly, thus the current into the MFC protection control will over the setting value to drive the overcurrent release to trip.



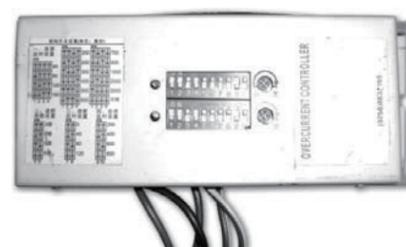
# Structure and functions

## Current transformer

Rated ratio	Accuracy	Insulation level (rated voltage / PFW / BIL)	Pollution level
630/5	5P10	12/42/75 kV	IV
400/5	5P10	12/42/75 kV	IV
200/5	5P10	12/42/75 kV	IV
630, 400/5	5P10	12/42/75 kV	IV
400, 200/5	5P10	12/42/75 kV	IV

## MFC protection control device

- Cold load time for Inrush current, time delay setting has four options: 0, 200 ms, 400 ms, 600 ms
- Time overcurrent, its delay time can be set from 40 ms to 3 s with 16 options
- Multiplier of rated current (CT secondary value) for instantaneous overcurrent protection can be set: 2, 3, 4, and 5
- Time delay for Instantaneous overcurrent can be set: 0, 40 ms, 80 ms, and 120 ms
- Power loss of MFC is less than 0.5 W at normal work condition
- Ambient temperature: -40°C~+85°C
- Protection function is achieved through phase A and phase C, which controlled by two independent CPU



MFC protection control device



Simple control cabinet

## Overcurrent release

- Rated current: 5 A, DC
- Insulation level: E
- Power frequent withstand voltage: 2000 V/1 min



Over current release

## Motor operating PVB with simple protection functions

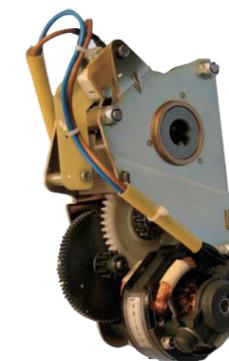
In order to operate the circuit breaker safely and use less effort, meanwhile ready for DA, manual PVB can be upgraded to motor operating mechanism PVB by adding motor operator and control cabinet which is installed below the Pole to fulfill protection function.

(Note: One (1) potential transformer at least is needed to supply power for control cabinet).

## Motor operator

This carries out automatic charging of the circuit-breaker operating mechanism closing springs. After circuit-breaker closing, the geared motor immediately recharges the closing springs. In the case of a power cut or during maintenance work, the closing springs can be charged manually in any case (by means of the special crank handle incorporated in the operating mechanism).

Parameters	Values
Rated voltage Un	DC 24, 48, 110, 220 V
	AC (50, 60 Hz) 110, 220 V
Operating limits	85~110% Un
Power on inrush (Ps)	DC: 500 W; AC=500 VA
Rated power (Pn)	DC: 200 W; AC=200 VA
Inrush duration	0.2 s
Charging time	4~7 s
Insulation voltage	2500 V 50 Hz (1 min)

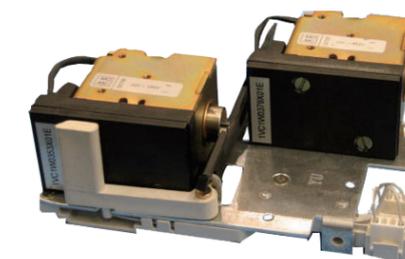


Motor operator

## Opening and closing release

This allows remote control of the PVB. The release can operate both in direct and alternating current. This release is suitable for both instantaneous and permanent service. In the case of instantaneous service, the minimum current impulse time must be 100 ms.

Parameters	Values
Rated voltage Un	DC 24, 48, 110, 220 V
	AC (50, 60 Hz) 110, 220 V
Operating limits	65~120% Un
Power on inrush (Ps)	DC: 200 W; AC: 200 VA
Rated power (Pn)	DC: 5 W; AC: 5 VA
Inrush duration	100 ms
Closing time	35~80 ms
Opening time	45~80 ms
Insulation voltage	2500 V 50 Hz (1 min)



Opening and closing release

## Auxiliary switch

Parameters	Values
Rated voltage Un	DC220 V
Rated frequency	50 Hz
Rated current	3 A



Auxiliary switch

# Structure and functions

To fulfill more complicated protection functions settings, SCADA, and DA functions, PCD control unit and feeder relay REF 615 can be configured in control cabinet.

## Motor operating PVB with Intelligent Protection Functions--PCD Control Device

An intelligent control device has functions of protection, monitoring, and controlling.

## Local human-machine interface

- Enlarged LCD (1"x5") with large characters (two lines of 20 characters)
- Simple menu-driven programming using large six- button keypad
- Backlit display indicates metering values, fault information and location
- Temperature compensated
- Battery test function included

## Indicator lights

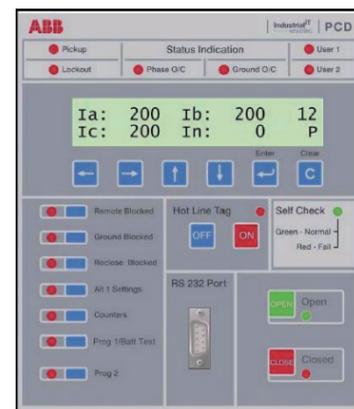
- Continual self-checking with status indication
- Pickup and lockout indication

## Front panel pushbuttons

- Up to six protection groups available
- Front panel button to set Alt 1 settings
- Ground blocked, remote blocked, and reclose blocked pushbuttons
- Sensitive earth fault (SEF) available for ungrounded or Delta CT applications
- PROG 1 battery test load feature preprogrammed
- User programmable LEDs for alarms, additional targets, etc
- Counters button for easy access to number of operations and overcurrent trip information

## Hot line tagging feature

- On faceplate for simpler and safer operation
- Can be mapped for multiple applications



## Front mounted RS-232 port

- Independent from rear mounted RS-232 port
- Easy download and upload of data on-site using WinPCD

## Separate open and close pushbuttons

- Separate indicator light for easier viewing
- ANSI or IEC coloring for individual practices

## Control cabinet

- Stainless steel cabinet, NEMA 3R with drip shield
- Battery provides full operational capability for to 48 hours (15-27 kV) /24 hours (38 kV)
- Ample space for mounting communications equipment
- Three-point latching with padlockable handle
- Vented design

## Communication & I/O ports

- Isolated RS-232 and RS-485 ports
- ST fiber optic ports
- Modbus ASCII and RTU, and DNP 3.0TM protocols included with all units
- DNP 3.0TM is compliant to Level 2
- IEC 60870-5-101
- Programmable I/O ports: 6 inputs, 4 outputs available with UPS
- Programmable I/O ports: 10 inputs, 7 outputs available with PS

## Oscillographic data

- Storage capacity of 64 cycles of monitored waveform data at 32 samples per cycle
- All data can be downloaded on-site or remotely through communication interfaces

## Fault recording

- Records last 128 operations of:
  - Phase and ground fault amperes
  - Phase and ground voltage
  - Isolates the faulted section
  - Reclose time- Distance to fault
  - Estimated fault resistance
  - Time stamp
- Stores 1024 operation records

## Metering

- Meters current and voltage (with PT voltage input supplied) to  $\pm 1\%$  accuracies
- Measures kW and kVAR, power factor, demand Watts and VARs, and frequency to  $\pm 2\%$  accuracy
- User-selectable load profile data sampling 5, 15, 30, 60 minute time interval which will contain 13.3, 40, 80 or 160 days of information
- All data can be downloaded on-site or remotely through communications interface
- Includes assignable phases for easy phase selection and selectable power flow

## Protective functions

- Phase time overcurrent protection (51P)
- Phase instantaneous overcurrent protection (50P-1)
- Two definite time overcurrent settings (50P-2, 50P-3)
- Ground overcurrent protection (51N)
- Ground instantaneous overcurrent protection (50N-1)
- Two definite time ground overcurrent settings (50N-2, 50N-3)
- Negative sequence overcurrent protection (46)
- Two independent steps for load shed, restoration, and over-frequency (81S, 81R, 81O)
- Undervoltage and overvoltage control and alarm (27/59)
- Phase and ground directional overcurrent protection (67P, 67N)
- Sensitive Earth Fault protection with directional features (optional)
- Up to four reclose cycles (define a recloser cycle 79-1 $\rightarrow$ 79-5) close four times / trip five Adaptive reclosing shots: each reclose sequence allows independent programming of protective functions
- Available with up to 38 recloser curves, nine ANSI curves, four IEC curves and three user
- Programmable curves

# Structure and functions

## Motor operating PVB with Intelligent protection functions--REF615 relay

REF 615 is a member of ABB's Relion® family and a part of its 615 protection and control product series. The 615 series IEDs are characterized by their compactness and withdrawable design. Engineered from ground up, the 615 series has been designed to unleash the full protection of the IEC 61850 standard for communication and interoperability of substation automation devices.

The REF615 provides main protection for overhead lines, cable feeders, and busbar systems of distribution substations. It can be applied for protection and control of grounded and un-grounded distribution systems. Flexible order coding allows for choosing current-only or current-and-voltage configurations to best fit your application needs.

- The REF615 is the one of most powerful, advanced and simplest protection relay, perfectly offering time and instantaneous overcurrent, negative sequence overcurrent, and voltage metering and protection. The relay also features optional high impedance fault (HIZ) and ungrounded distribution systems, and the relay incorporates a flexible three-phase multi-shot auto-reclose function for automatic restoration in temporary faults on overhead lines
- I/O extension model, has maximum 17 BI/O, 13 SI/O
- Drawout design
- Six setting groups
- High-speed (<1 ms) output
- Fault recording: higher sample frequency, larger storage capacity can record 12 analogue signals and 64 digital signals
- HMI: Large, and easy to read LCD screen
- Environmentally friendly design with RoHS compliance

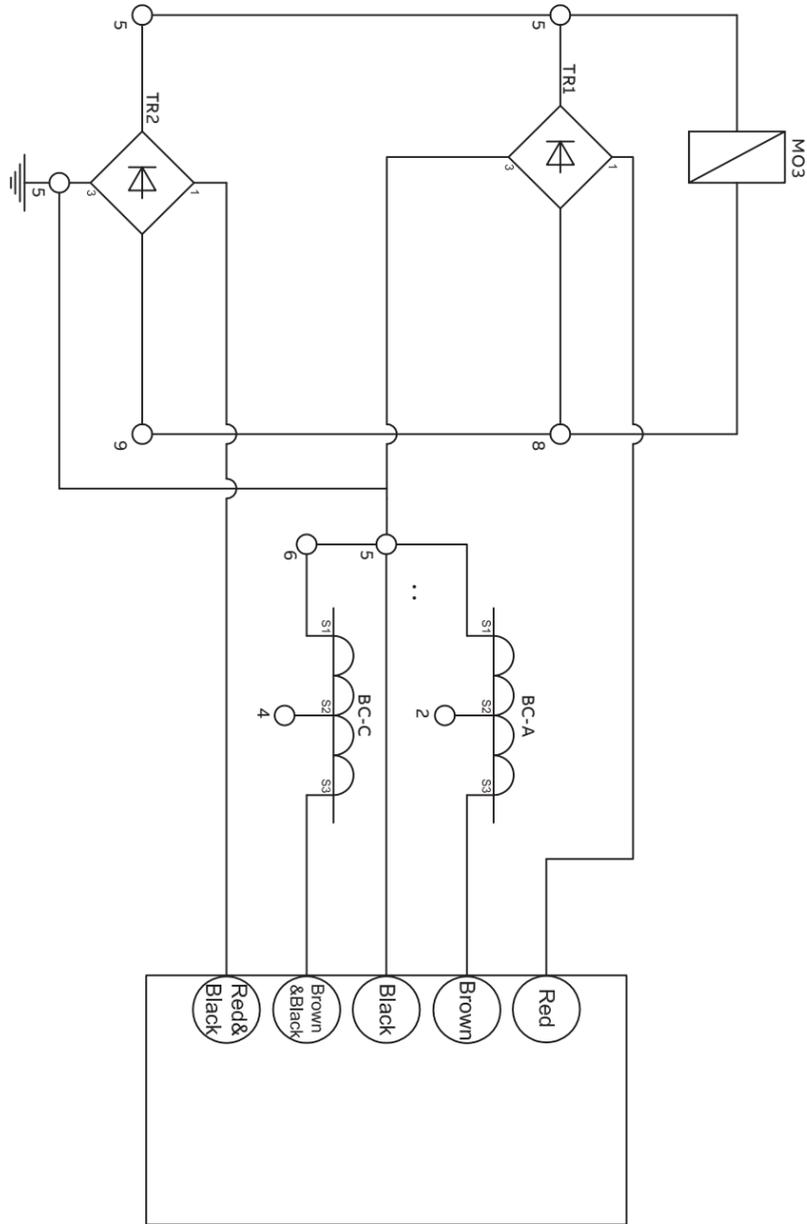


Standard configuration functionality	Overcurrent and directional earth-fault protection		Overcurrent and non-directional earth-fault protection	
	Std. conf. A	Std. conf. B	Std. conf. C	Std. conf. D
<b>Protection</b>				
Three-phase non-directional overcurrent, low-set stage	●	●	●	●
Three-phase non-directional overcurrent, high-set stage, instance 1	●	●	●	●
Three-phase non-directional overcurrent, high-set stage, instance 2	●	●	●	●
Three-phase non-directional overcurrent, instantaneous stage	●	●	●	●
Directional earth-fault, low-set stage, instance 1	●	●	●	●
Directional earth-fault, low-set stage, instance 2	●	●	●	●
Directional earth-fault, high-set stage	●	●	●	●
Non-directional earth-fault, high-set stage (cross country earth-fault)	●	●	●	●
Transient/intermittent earth-fault	●	●	●	●
Non-directional earth-fault, low-set stage	-	-	●	●
Non-directional earth-fault, high-set stage	-	-	●	●
Non-directional earth-fault, instantaneous stage	-	-	●	●
Non-directional sensitive earth-fault	-	-	●	●
Negative-sequence overcurrent, instance 1	●	●	●	●
Negative-sequence overcurrent, instance 2	●	●	●	●
Phase discontinuity	●	●	●	●
Thermal overload	●	●	●	●
Circuit breaker failure protection	●	●	●	●
Three-phase inrush current detection	●	●	●	●
Arc protection with three sensors	○	○	○	○
<b>Control</b>				
Circuit breaker control with basic interlocking 1)	●	●	●	●
Circuit breaker control with extended interlocking 2)	-	●	-	-
Auto-reclosing of one circuit breaker	○	○	○	○
Supervision and monitoring	-	●	-	●
Circuit breaker condition monitoring	●	●	●	●
Trip-circuit supervision of two trip circuits	●	●	●	●
<b>Measurement</b>				
Transient disturbance recorder	●	●	●	●
Three-phase current measurement	●	●	●	●
Current sequence components	●	●	●	●
Residual current measurement	●	●	●	●
Residual voltage measurement	●	●	-	-

● = Included, ○ = Optional at the time of the order

# Electrical circuit diagram

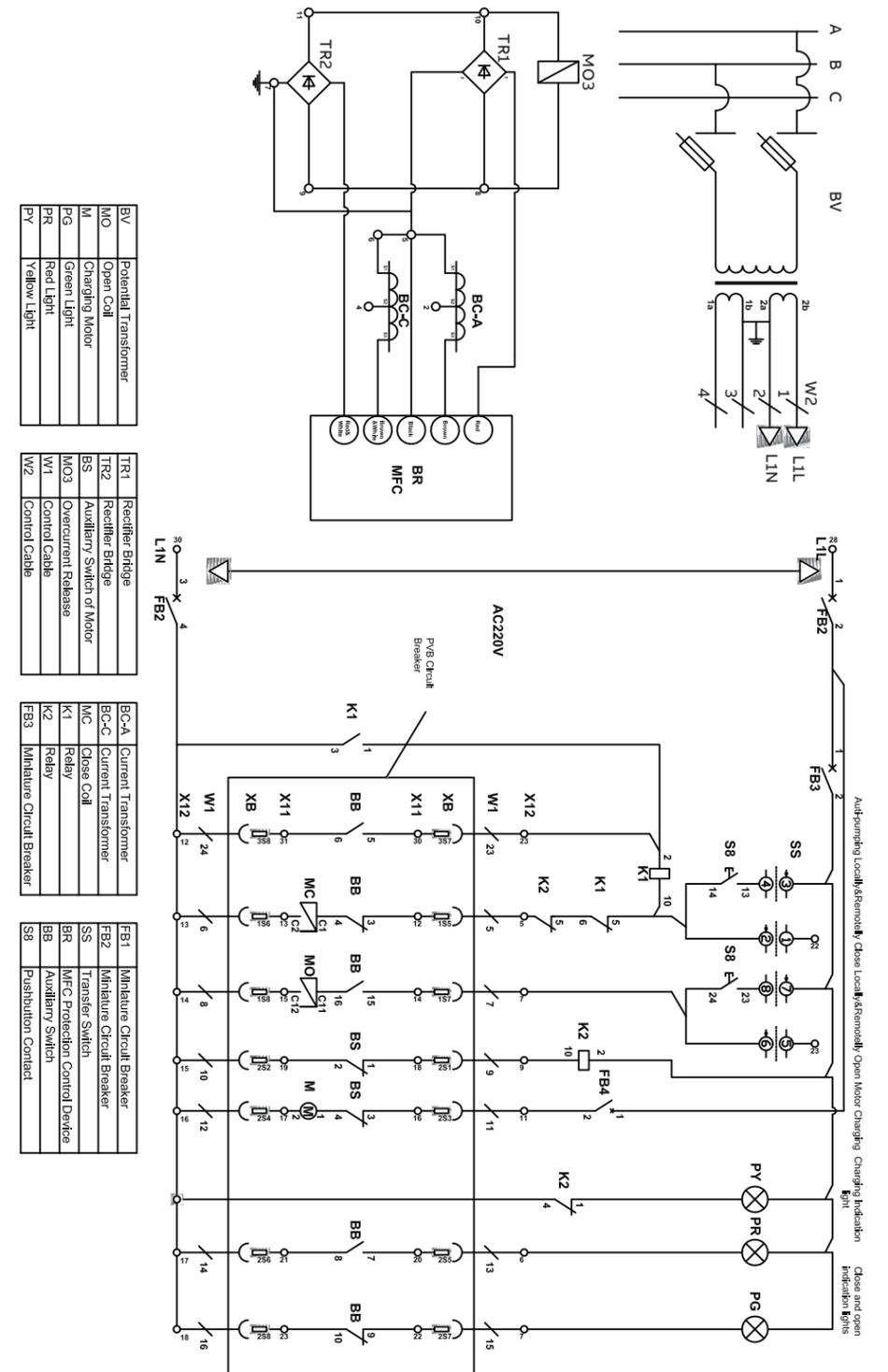
Manual operating PVB



BC-A	Current Transformer
BC-C	Current Transformer
MO3	Overcurrent Release
BR	MFC Protection Control Device
TR1	Rectifier Bridge
TR2	Rectifier Bridge

The status of circuit breaker for all electrical control circuit diagram of the catalogue is: the circuit breaker is in open position; control circuit has no electricity; charging spring is uncharged.

Motor operating PVB with simple control cabinet



BV	Potential Transformer
MO	Open Coil
M	Charging Motor
PG	Green Light
PR	Red Light
PY	Yellow Light

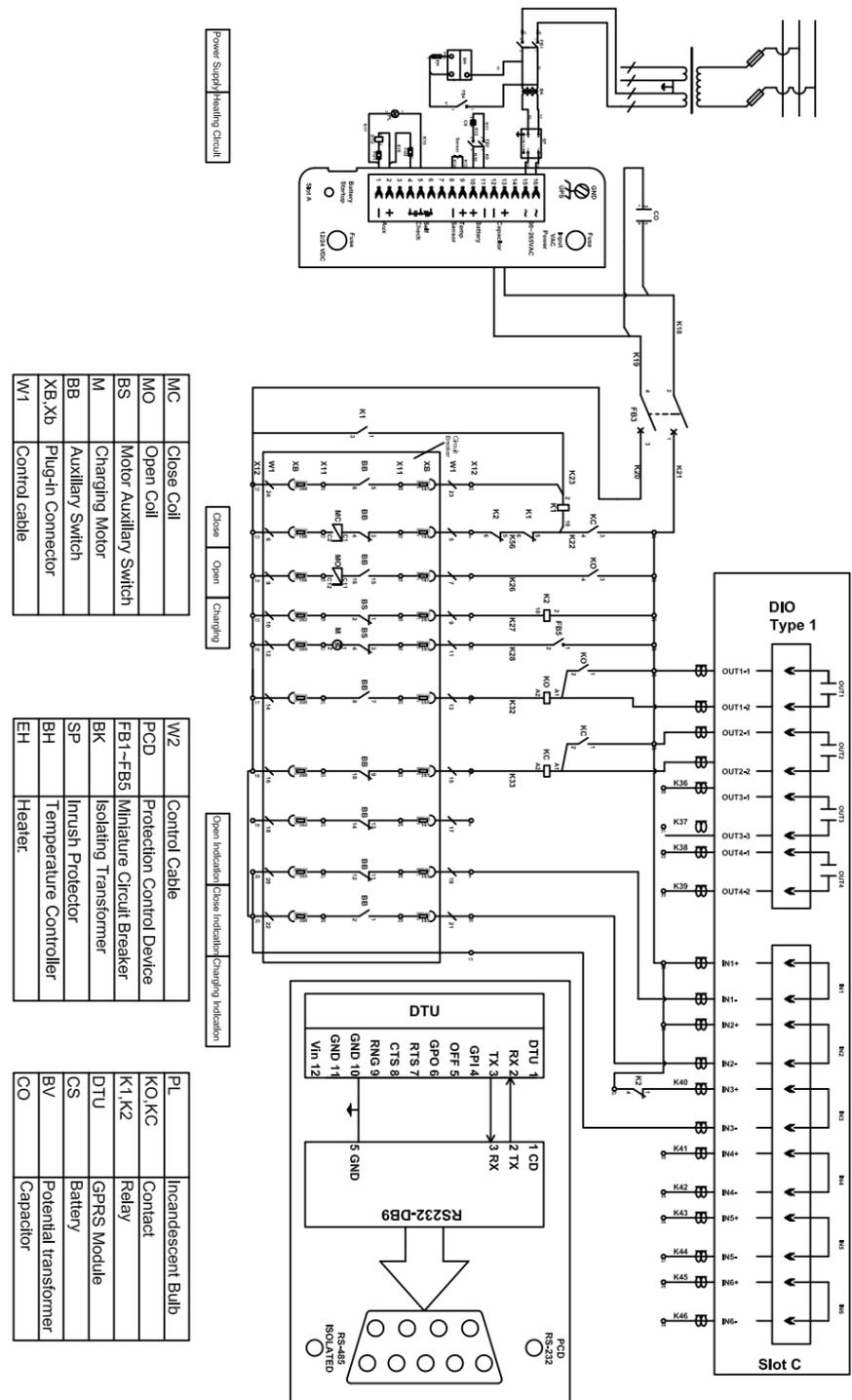
TR1	Rectifier Bridge
TR2	Rectifier Bridge
BS	Auxiliary Switch of Motor
MO3	Overcurrent Release
W1	Control Cable
W2	Control Cable

BC-A	Current Transformer
BC-C	Current Transformer
MC	Close Coil
K1	Relay
K2	Relay
FB3	Miniature Circuit Breaker

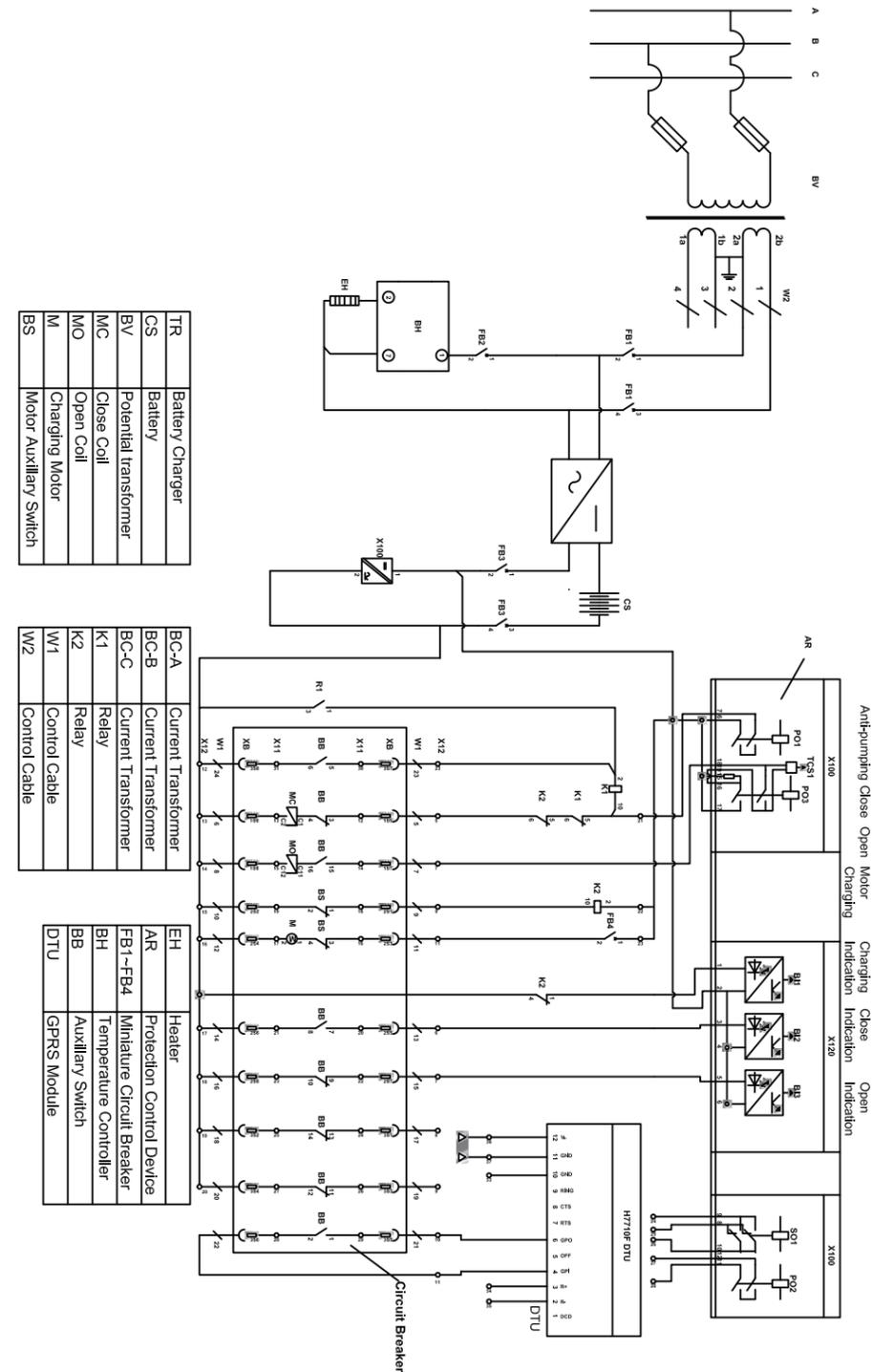
FB1	Miniature Circuit Breaker
FB2	Miniature Circuit Breaker
SS	Transfer Switch
BR	MFC Protection Control Device
BB	Auxiliary Switch
SB	Pushbutton Contact

# Electrical circuit diagram

Motor operating PVB with smart control cabinet (PCD)

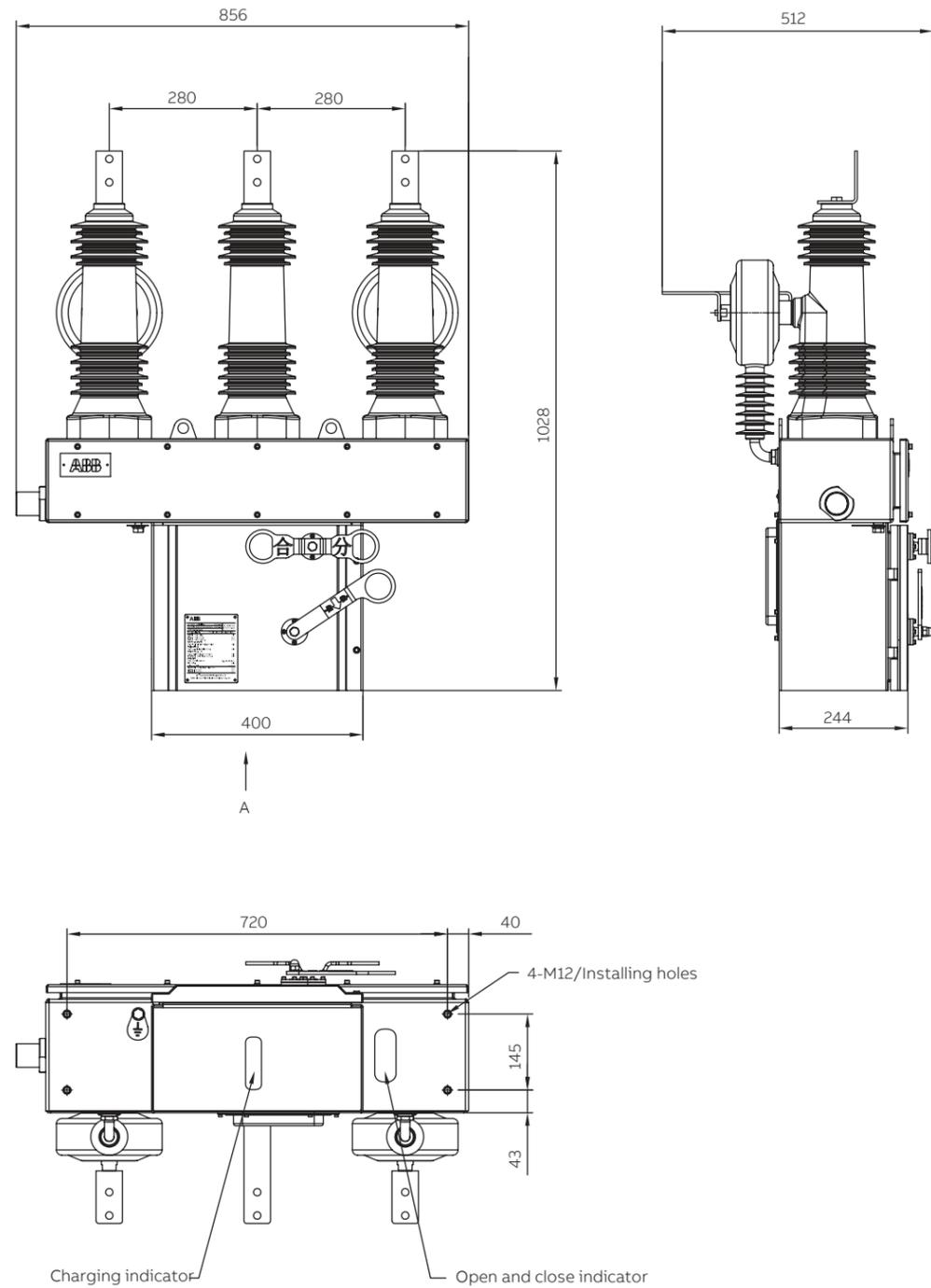


Motor operating PVB with smart control cabinet (REF 615)

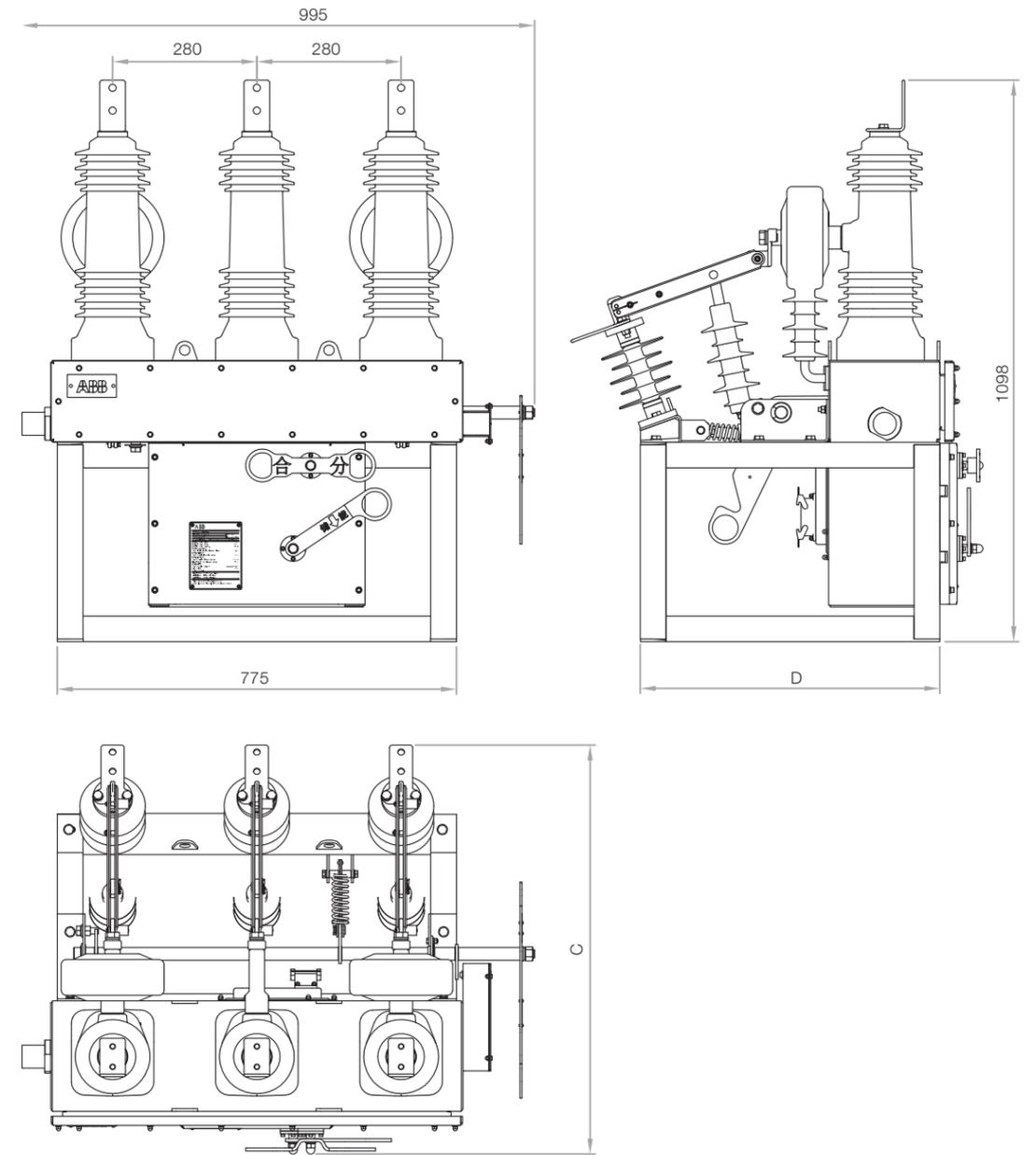


# Overall dimension and mounting modes

Dimension--PVB without disconnector



Dimension--PVB with disconnector



	C	D
Type A CT	800	800
Type B CT	855	855

Note:

Type A CT includes CT ratio: 400/5, 630/5, 630-400/5;

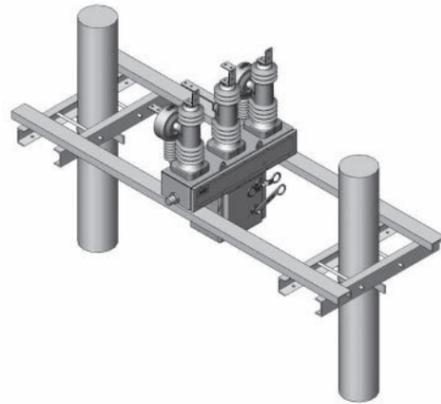
Type B CT includes CT ratio: 200/5, 400-200/5.

# Overall dimension and mounting modes

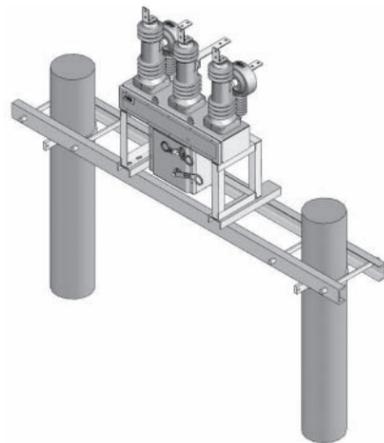
Mounting modes



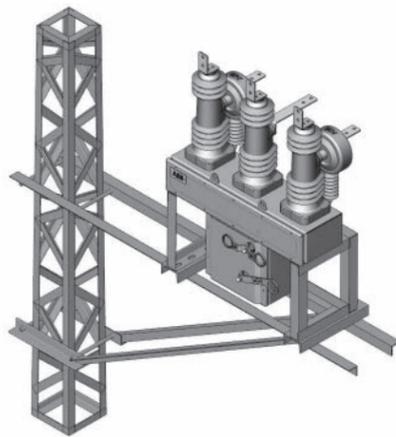
Mounting mode 1:  
Single pole rectangular bracket



\*Mounting mode 2:  
Double pole rectangular bracket (Front)



\*Mounting mode 3:  
Double pole rectangular bracket (side)



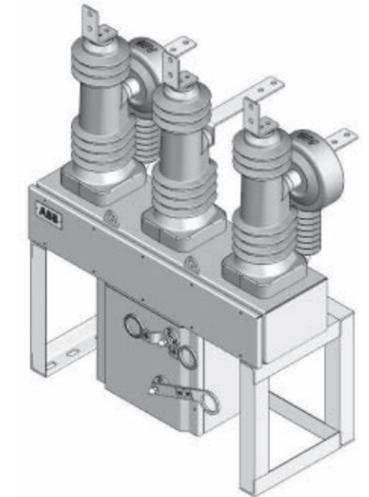
\*Mounting mode 4:  
Tower installation

\* For mounting mode 2/mounting mode 3/mounting mode 4, only rectangular bracket is supplied, if further support is needed, contact us.

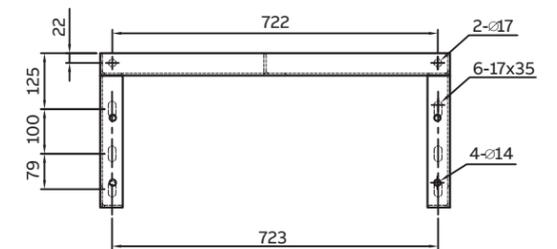
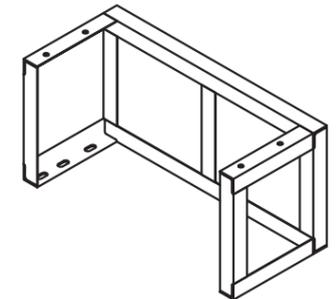
Mounting modes and rectangular bracket



Mounting mode 5:  
Single pole side installation (includes:  
clamp and bracket, pole diameter:  
180 mm-250 mm)



Mounting mode 6:  
Single pole triangular bracket installation  
(includes: Clamp and Bracket, pole  
diameter: 180 mm-250 mm)



# Circuit-breaker selection and ordering

## Selection

PVB/  -  -  /  /

Control cable length:	06	: 6 m
	09	: 9 m
	12	: 12 m
	xx	: Customer specify (<15 m)
Control cabinet:	BCU-A	: None
	BCU-B	: Simple control cabinet
	BCU-C	: Intelligent control cabinet (With PCD)
	BCU-C	: Intelligent control cabinet (With REF 615)
Disconnecter	D	: Integrated with disconnecter
		: Without disconnecter (default)
Control voltage:	A1	: AC110 V
	A2	: AC220 V
	D1	: DC110 V
	D2	: DC220 V
	D3	: DC24 V
	D4	: DC48 V
CT ratio:	60	: 630/5 A
	40	: 400/5 A
	20	: 200/5 A
	64	: 630-400/5 A
	42	: 400-200/5 A
	55	: 1250/5 A
	O	: Others
Operating mechanism:	H	: Manual
	M	: Motor
HV cabinet		: Carbon Steel (Default)
	S	: Stainless Steel
12.06.20: *	Rated voltage	: 12 kV
	Rated current	: 630 A
	Rated breaking current	: 20 kA
PVB:	Outdoor vacuum circuit breaker	

\*: 12.06.20 is for rated current 630 A, if the rated current is 1250 A, the selection is 12.12.20

### Type number description

E.G: PVB/12.06.20-M40-A1/BCU-A-06  
 Description:  
 PVB: outdoor pole mounted vacuum circuit breaker  
 Rated voltage: 12 kV  
 Rated current: 630 A  
 Short-circuit breaking current: 20 kA

HV cabinet: carbon steel  
 Operating mechanism: motor  
 CT ratio: 400/5 A  
 Control voltage: AC110 V  
 Disconnecter: without disconnecter  
 Control cabinet: simple control cabinet  
 Control cable length: 6 m

## Ordering requirements

PVB/	12.06.20	-	H	64	-	A1	/	D	/	BCU-A	-	06
Outdoor pole mounted circuit breaker												
Rated voltage: 12 kV	12											
Rated current: 630 A/1250 A	06/12											
Rated short-circuit breaking current: 20 kA	20											
Carbon steel HV cabinet (default)												
Stainless steel HV cabinet			S									
Manual operating mechanism												
Motor operating mechanism									H			
									M			
CT ratio: 630/5											60	
Ratio: 400/5											40	
Ratio: 200/5											20	
Ratio: 630-400/5											64	
Ratio: 400-200/5											42	
Ratio: 1250/5											55	
Other CT ratio, please comment requirement:											O	
Control voltage: AC110 V											A1	
Control voltage: AC220 V											A2	
Control voltage: DC110 V											D1	
Control voltage: DC220 V											D2	
Control voltage: DC24 V											D3	
Control voltage: DC48 V											D4	
Without disconnecter (default)												D
Integrated with disconnecter												
No control cabinet												
Simple control cabinet												BCU-A
Intelligent control cabinet (With PCD)												BCU-B
Intelligent control cabinet (With REF 615)												BCU-C
Control cable length: 6 m												06
Control cable length: 9 m												09
Control cable length: 12 m												12
Control cable length: (<15 m)												xx

- 2 CT parameters:  Phase A, C  
 Phase A, B, C (Remark: Standard PVB with 2 pcs CT respectively on phase A and C)
- 3 Mounting modes (mounting bracket suitable for pole whose diameter is 180 mm~250 mm)  
 Mounting mode 1  Mounting mode 2  Mounting mode 3  Mounting mode 4  Mounting mode 5  
 Mounting mode 6  Others (Require detail drawings from customer side):
- 4 PT Control cable:  6 m  9 m  12 m  m customer specify (<15 m)
- 5 Transformer (JDZW-1010 kV/0.1 kV/0.22 kV):  
 None  1 PC  2 PCS  3 PCS
- 6 Configured with MFC protection control device  YES  NO

### Ordering company:

Manufacturer\_ABB Xiamen Electrical Controlgear Co.,Ltd.

Signature:  
 Signature:  
 Year: Month: Day:



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**ABB Xiamen Switchgear Co., Ltd.**

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ABB China Customer  
Contact Center