

CTB36 PLUS OUTDOOR VACUUM CIRCUIT BREAKER WITH DRY TYPE INSTRUMENT TRANSFORMERS



ACTOM Outdoor 11kV, 22kV and 33kV
Combo Vacuum Circuit Breaker

HIGH VOLTAGE EQUIPMENT
A division of ACTOM (Pty) Ltd



ACTOM

OUTDOOR 11KV, 22KV AND 33KV COMBO CIRCUIT BREAKER

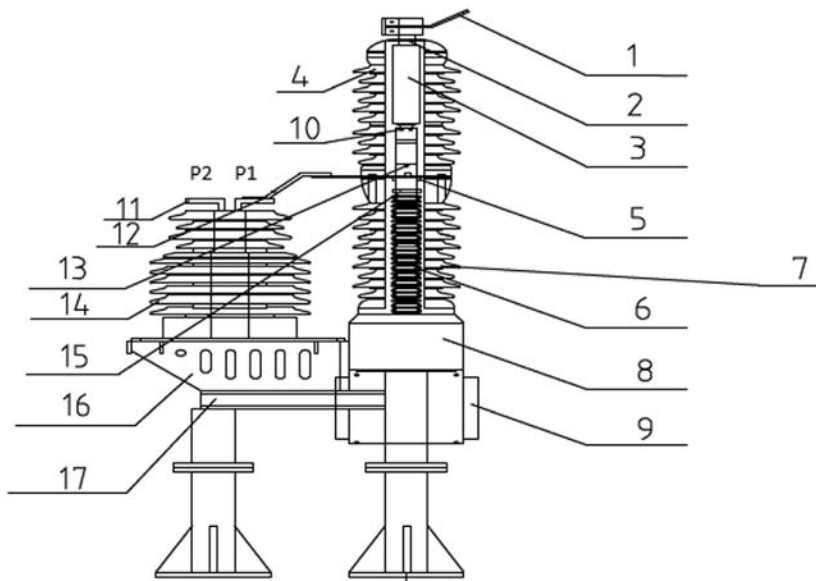


FIG 1 Interior Structure of Main conductive Circuit

- | | |
|-------------------------------|--|
| 1. Upper Incoming Line | 10. Conductive clamp |
| 2. Incoming Line End | 11. Mutual indicator outgoing line |
| 3. Extinguisher Chamber | 12. Soft Connection |
| 4. Upper Insulating Cylinder | 13. Soft Connection |
| 5. Lower outgoing line | 14. Current Transformer |
| 6. Insulating Bar | 15. Contact Compressed spring |
| 7. Lower insulating cylinder | 16. Current Transformer Mounting Bracket |
| 8. Left and right seal plates | 17. Bottom Mounting Bracket |
| 9. Wiring terminal box | |

CIRCUIT BREAKER

MAJOR TECHNICAL PARAMETERS

(All units designed and type tested in accordance with IEC62271-100 standard / Eskom KIPTS and SABS tested)

No	Description	Unit	Value
1	Rated Voltage		40.5
2	Rated Insulation Level (elevation 1800m)	min Power Frequency Withstand Voltage	Dry test 95
			Wet test (earth outside insulation) 85
		Lightning Impulse Withstand Voltage (peak value 1.2/50µs)	200
2	Rated Current	A	1600/2500
4	Rated Frequency	Hz	50
5	Rated Short Circuit Interrupting Current	kA	31.5
6	Rated Operation Sequence		0-0,3s - CO - 180s = CO
7	Rated Short Circuit Interrupting Current Interrupting Number	Times	20
8	Rated Short Circuit Closing Current (peak value)	kA	80
9	Rated Peak Withstand Current		50
10	Rated Short Time Withstand Current		31.5
11	Fully Breaking Time		<0,125
12	Rated Short Circuit Duration	s	4
13	Mechanical Endurance	Times	10,000
14	Rated Operating Voltage and Auxilliary Circuit Rated Voltage	V	110/220



MAJOR ELEMENTS

- Type CTB36 Plus Vacuum Circuit Breaker
- Single Phase Current Transformer
- Mounting Bracket

Model CTB36 Plus outdoor 3-phase AC high Voltage vacuum circuit breaker is an outdoor distribution unit of rated voltage 40.5kV and frequency 50 Hz, affording the user effective protection and control

The Main body of the circuit breaker features vacuum extinction, a robust structure, powerful interrupting capability and long service life with extremely low maintenance needs. The Poles are made of a silicone rubber composite offering superior insulating capabilities. The

system contains no oil and rather relies on the more environmentally friendly, no SF6 gas option.

Application Ambient condition

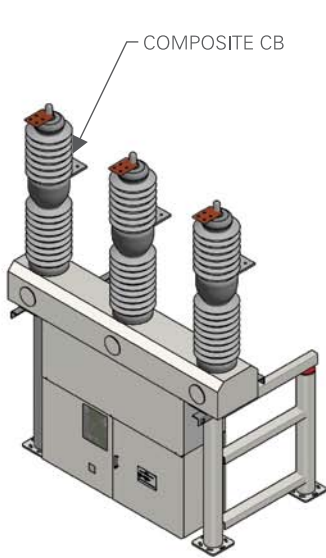
- Ambient air temperature: max. + 40°C – 25°C
- Elevation: Not higher than 1800m
- Wind pressure: not higher than 700 Pa (Equivalent to wind speed 34 m/s)

- Ice coating thickness: 10mm
- Air pollution grade Class IV
- Earthquake intensity : Not Higher then 8 degrees

This equipment is not designed to withstand exposure to bare flames, explosives and corrosive chemicals.

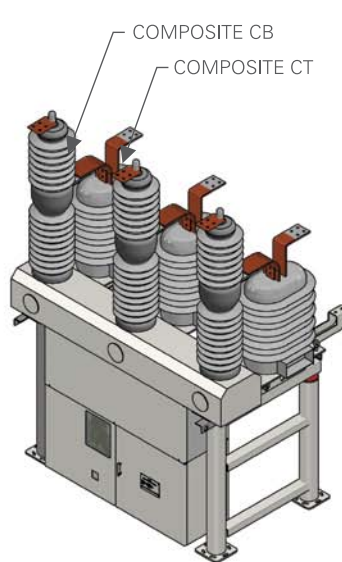
Circuit breaker

OPTION 1



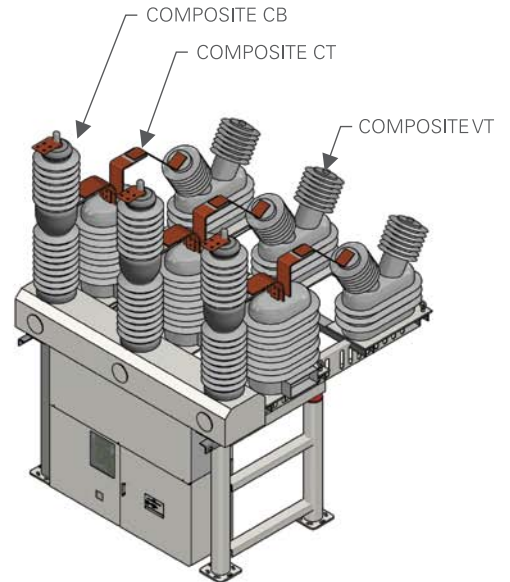
Circuit breaker fitted with Dry Type CTs

OPTION 2



Circuit breaker fitted with Dry Type CTs and VTs

OPTION 3



FEATURES

- New improved CTB Plus has a lowered Mechanism for easy Local and Manual operation. The Mechanism is now accessible from ground level for easy inspections and maintenance activities.
- The major component vacuum extinguishing chamber is mounted on the upper insulation cylinder. The three phase post is mounted on the main body frame. The current transformer is mounted on the rear side of the insulation cylinder post. It is connected by soft connection and insulation cylinder lower outgoing line, which helps ensures that vibration-cause damage is minimised during transportation and actual operation.
- Both three-phase post and current transformer use epoxy resin and silicone rubber combination and formed by APG injection moulding.

- It features high and low temperature resistance, UV resistance and weathering resistance.
- Three single phase voltage transformers can be fitted as an option.

CONTROL MECHANISM

- The control mechanism is a spring energy storage control mechanism. Inside the control mechanism, there are a number of elements such as closing coil, opening coil, auxiliary switch and indication device.
- In the front of the control mechanism, it is closed with closing and opening switch, manually-operated energy storage operating bar, spring energy storage state indication plate and closing and opening indication plate.
- The transmission equipment is mounted inside the frame, enclosed by stainless steel enclosure. The control mechanism is mounted

inside the stainless steel box directly underneath the frame.

- The associated current transformers of the circuit breaker is 800 to 2400/1A M/R (according to customer requirements)
- When the CTB36 circuit breaker is at the closing position, the main circuit current can be seen in Fig 1.
- The power supply flows from the upper incoming line (1) and passes through the incoming line end (2) over the extinguishing chamber to the stationary contact inside the vacuum extinguishing chamber, then it passes through the moving contact and through the conductive clamp (10) and soft connection 1 (13) to the lower outgoing line (5), through the soft connection (12) to the current transformer (14) incoming line end P1 and finally it outputs via outgoing line P2. (11)

ENERGY STORAGE OPERATION

- It is undertaken by the energy storage motor, which is fixed on the frame, or by the energy storage handle to insert into the manually operated energy storage hole and turn it clockwise.
- When the energy storage is made by the motor, the motor output shaft will drive the energy storage elbow to rotate and pull the closing spring for energy storage.
- When manually-operated energy storage is made, the manually-operated energy storage shaft will drive the energy storage elbow to rotate via the teeth wheel and pull the closing spring for energy storage. After the energy storage position is arrived, the energy storage pointer will point against "already energy storage".

ENERGY STORAGE

- The energy to close the circuit breaker is supplied by the closing spring energy storage. The energy storage could be realised by the motor driven by an external power supply or by the

manual operation of the energy storage handle.

OPENING OPERATION

- By the manually operated rotating handle or by the remote operation for the action of the opening electromagnet, the closing holder and the half shaft could be released to realise the opening operation. The energy stored by the contact compression spring and opening spring will separate the moving contact from the stationary contact of the extinguishing chamber. In the course of the separation, the oil cushion will absorb any extra energy in the opening operation and restrict the opening position. At the moment, the closing and opening indication pointer will point against "Opening." It will drive the connecting rod to pull the auxiliary switch.

CLOSING OPERATION

- By the manually-operated rotating handle or by the remote operation for the action of the closing

electromagnet, the energy storage holding shaft will rotate, the holder will release the roller, the closing spring will compress and in the same time, it will make the cam rotated via the energy storage elbow. The cam will drive the output elbow, which will in turn drive the transfer plate and driving bar. Consequently the elbow will drive the adjusting head, insulation bar and the extinguishing chamber moving contact into the closing position. The contact spring will be compressed and the contact will maintain the necessary contact pressure.

- After the closing action is completed, the closing holder and the half shaft will maintain the closing position and in the same time, the energy storage indication plate and the energy storage auxiliary switch will be reset, and the motor power supply circuit will be switched on. It will enter the energy storage state again and the closing and opening indication pointer will point against "Closing." It will drive the connection rod to pull the Auxiliary switch.

MECHANICAL CHARACTERISTIC PARAMETERS OF CIRCUIT BREAKER

No	Description	Unit	Value
1	Contact Clearance	mm	18±1
2	Contact Over Travel	mm	6±1
3	Opening Speed	m/s	1,6±0
4	Closing Speed	m/s	0,8±0,2
5	Three Phases opening and Closing Non-synchronising	ms	<2
6	Phase Center to Center Spacing	mm	680±2
7	Contact Closing Bounce Time	ms	<3
8	Each Phase Conductive Circuit Resistance		<60
9	Closing Time	ms	25-60
10	Opening Time	ms	20-50
11	Energy Storage Motor Rated Power	W	11
12	Energy Storage Motor Rated Voltage	V	110/
13	Max / Min Motor Voltage		120% / 80%
14	Rated Closing Operating Voltage		110/
15	Max / Min Closing Operating Voltage		120% / 80%
16	Rated Opening Operating Voltage		110/
17	Max / Min Opening Operating Voltage		120% /65%
18	Phase Spacing standard 11/22/33kV application	mm	680

TECHNICAL PARAMETERS OF CONTROL MECHANISM

No	Description	Unit	Value
1	Rated Operating Voltage	V	110DC
2	Rated Resistance	Ω	56
3	Rated Output Power	W	320
4	Energy Storage Motor Power	W	110
5	Motor Energy Storage Rated Voltage	V	110 DC
6	Energy Storage time	s	<10

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