

HV shunt capacitor installation

■ Application

HV shunt capacitor installation is used in power frequency AC three-phase system to increase power factor, improve power quality and reduce line loss.

■ Product Composition

High voltage shunt capacitor installation is mainly consisted of high voltage shunt capacitor, circuit breaker, series reactor, metal oxide surge arrester, disconnecter with earthing switch and unbalance transformer.

■ Technical Performance

1. Rated voltage: 6~330kV
2. Rated frequency: 50Hz, 60Hz
3. The capacitance tolerance of installation: The ratio between measured and rated capacitance in each phase of installation does not exceed 0~+3%.
4. The installation can be operated for long time under 1.05 times of rated voltage and 1.37 times of rated current.

■ Executive Standard

IEC 60871

ANSI/IEEE standard 18

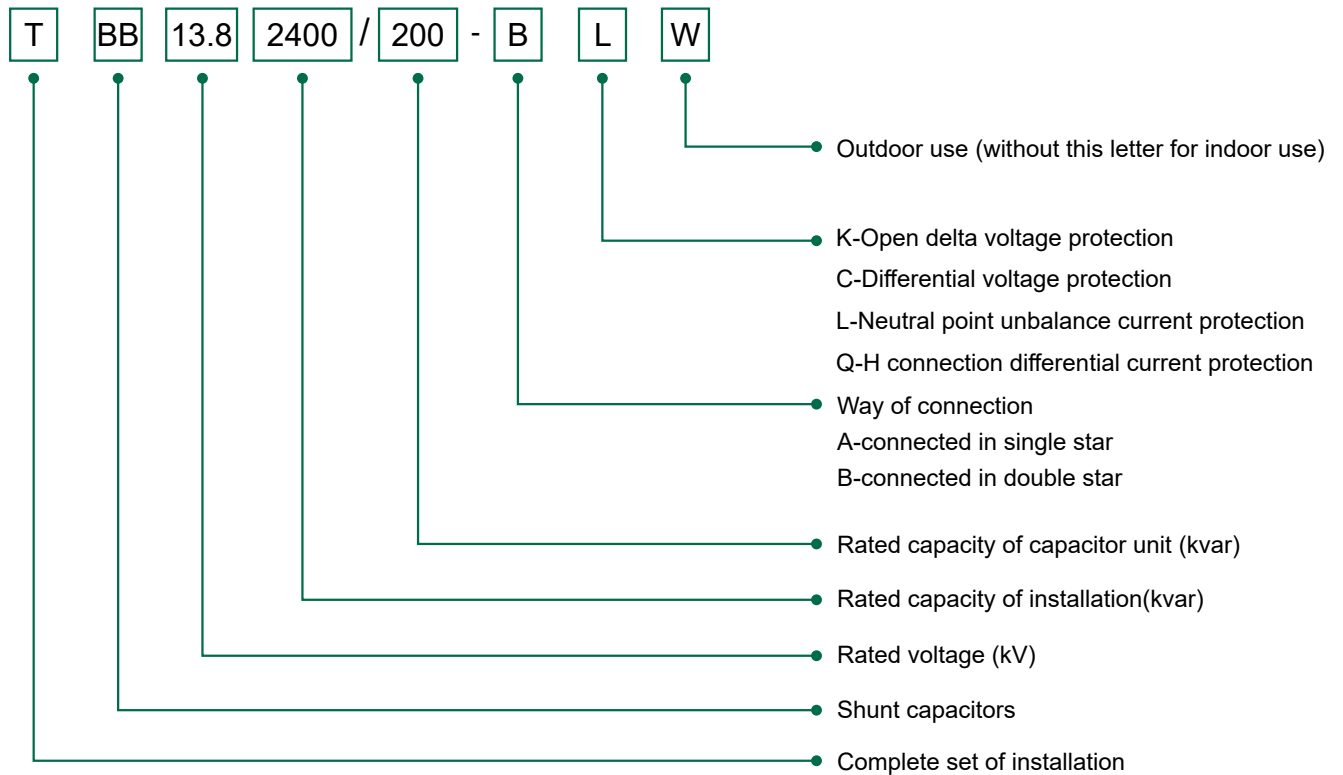
■ Product Characteristic

1. Horizontal installation: Capacitor bank adopts horizontal installation, it is convenient for replace and maintenance.
2. Standard modular structure: Capacitor banks are designed into several standardized modules, so they are able to be pre-assembled in the factory and integrally installed, shipped and hoisted onsite. The efficiency of on-site installation is improved.

■ Service Condition

1. The altitude above sea level of mounting area does not exceed 1000m (if higher than 2000m, it is necessary to make an explanation when ordering).
2. The ambient temperature of mounting area should be -40°C ~+55°C (if operating under exceptional environment, it is necessary to make an explanation when ordering).
3. There should be no conductive or explosive dust, no harmful gas and vapor, no severe mechanical vibrations in mounting area.
4. Seismic withstand level : horizontal acceleration less than 0.2g.

■ Model and explanation

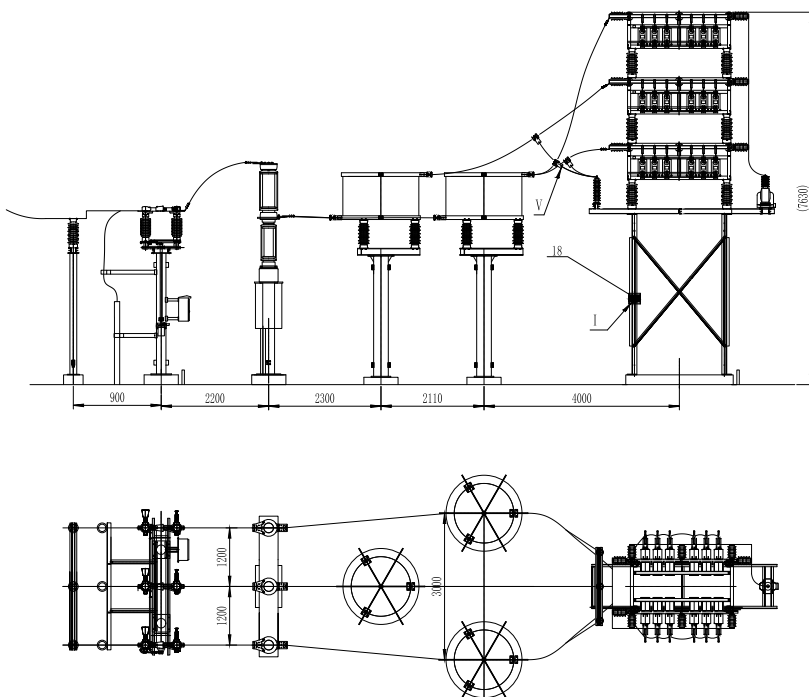


Order Instruction

1. When ordering, customers need to provide system rated voltage, rated capacity, system maximum voltage, protection mode of installation, Rated voltage (kV), and the short circuit current connection point at which installation connected.
2. Customers need to provide the site information including altitude, environment temperature, humidity, installation site size and contamination.
3. If there are special requirements of accessories, please specify when ordering.

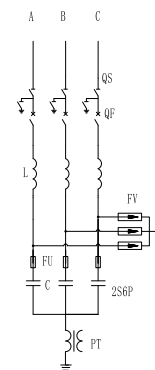
- 34.5kV installation layout drawing(34.5kV, 5Mvar, including circuit breaker, disconnector, current limiting reactor, surge arrester and capacitor)

All dimensions in mm



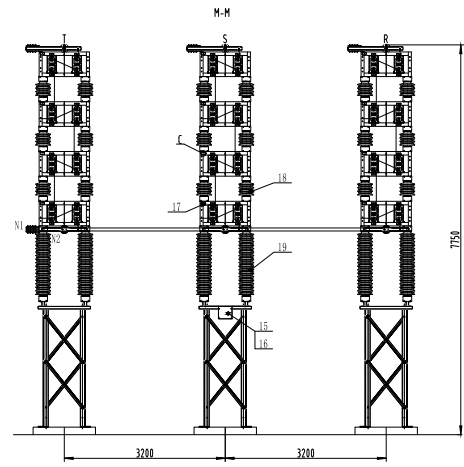
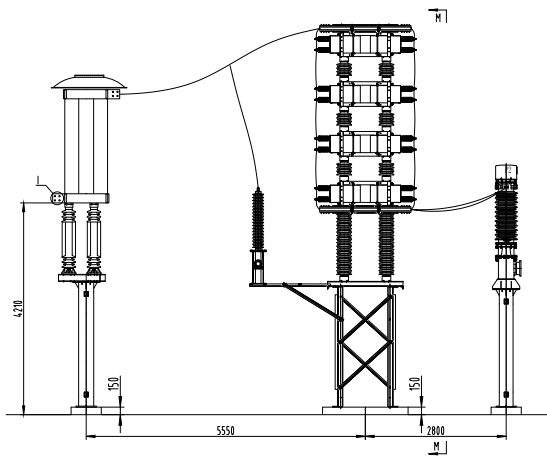
NOTES:

QS—DISCONNECTOR
CB—CIRCUIT BREAKER
PT—POTENTIAL TRANSFORMER
QE—EARTHING SWITCH
FV—SURGE ARRESTER
C—CAPACITOR
L—REACTOR
FU—FUSE



STAGE 1

- 115kV installation layout drawing(115kV, 15Mvar, including current limiting reactor, unbalance CT, surge arrester and capacitor bank)



All dimensions in mm



115kV shunt capacitor installation in Colombia

Pole mounted capacitor installation

■ Application

Pole mounted HV automatic reactive power compensation device is installed in 6kV~35kV distribution line to effectively improve power factor, reduce transmission line loss, increase transmission capacity, elevate line terminal voltage and improve power quality.

The installation is consisted of capacitor unit, switching device (contactor or circuit breaker), and power supply for control unit, current transformer, gapless metal oxide surge arrester, drop out fuse, reactive power compensation controller, container and other accessories.

■ Technical Performance

1. Reactive voltage: 6~35kV
2. Rated frequency: 50Hz, 60Hz
3. Rated capacity: 100~3000kvar
4. Maximum capacitance tolerance: 0~+5%
5. Permissible steady over voltage: 1.1Un
6. Permissible steady over current: 1.37In



■ Executive Standard

IEC 60871

■ Service Condition

1. Ambient temperature: -40°C ~+55°C .
2. Altitude: not exceed 1000m (if higher than 1000m, it is necessary to make an explanation when ordering).
3. Solar irradiance: maximum 1kW/m²
4. Wind speed: less than 35m/s
5. Withstand seismic ability: horizontal acceleration 0.3g (if higher should be specified)
6. There should be no conductive or explosive dust, no harmful gas and vapor, no severe mechanical vibrations in mounting area.

■ Product Characteristic

1. Step output

The installation could output reactive power in steps by group switching to fit the different load working conditions.

2. Wireless remote control

Different wireless remote control could be selected, including near field wireless WIFI, radio frequency and other remote control based on GPRS.

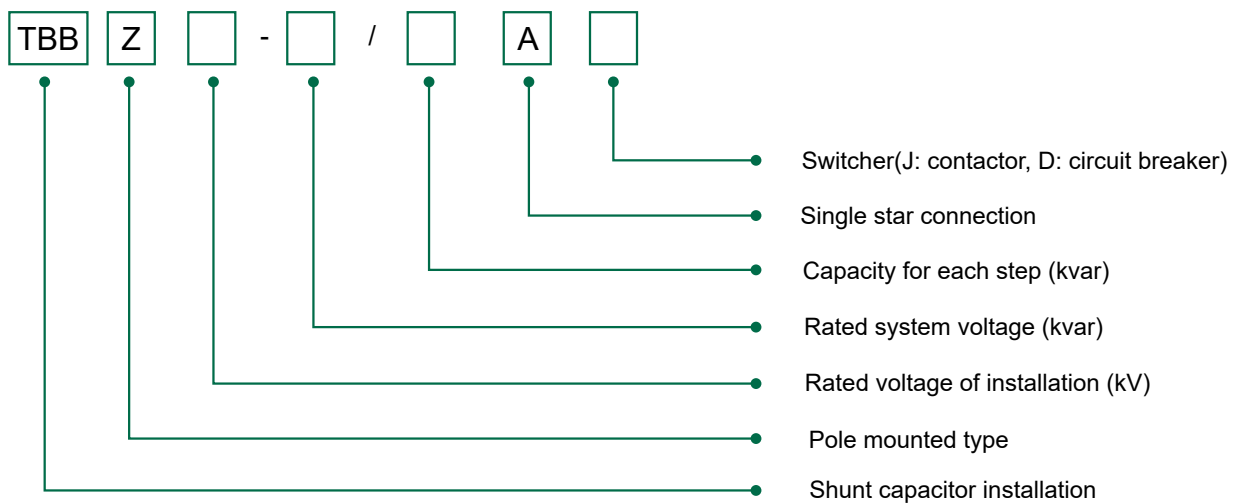
3. High adaptability

The container adopts stainless steel material, which could achieve good sealing performance to effectively adapt to harsh environment.

4. Humanize

Secondary power supply is not necessary, and there is no need to cut the line before installation. Fit for single pole and double pole.

■ Type and explanation



EHV/UHV Capacitor Installation

■ Application

EHV/UHV Capacitor Installation is used in 400kV~1000kV AC or DC transmission system to compensate reactive power, increase power factor, improve power quality and maintain voltage stability, give full play to the economic ability of power transmission and transformation equipment.

■ Technical Performance

1. Rated voltage : 110~1000kV
2. Rated capacity: 210~700Mvar
3. Continuously operation under 1.05 times rated voltage, 12h operation of each 24h under 1.1 times rated voltage.
4. Withstand seismic level: horizontal acceleration 0.3g, vertical acceleration 0.15g, safety factor not less than 1.67.

■ Executive Standard

IEC 60871

■ Service Condition

1. Outdoor use, the altitude above sea level of mounting area does not exceed 2000m (if higher than 2000m, it is necessary to make an explanation when ordering).
2. The ambient temperature of mounting area should be $-40^{\circ}\text{C} \sim +45^{\circ}\text{C}$ (if operating under exceptional environment, it is necessary to make an explanation when ordering).
3. Relative humidity: daily average not greater than 95%, monthly average not greater than 90%
4. There should be no conductive or explosive dust, no harmful gas and vapor, no severe mechanical vibrations in mounting area.

■ Structure Introduction

EHV/UHV capacitor installation adopt decentralized architecture, it is consisted of capacitor bank other electric equipment. Capacitor bank adopt modular design, the structure is compact; preassembly in the factory, integrated package and shipment, directly installed on site, it is very convenient for installation, short construction period and the occupied area is small.

DC filter capacitor for DC transmission project

■ Application

HVDC capacitor installation is used in $\pm 380\text{kV} \sim \pm 1100\text{kV}$ HVDC system to filter the harmonic generated in the DC side, cooperating with corresponding reactor, resistor to form DC filter to reduce the voltage and current fluctuation of DC line and earthing line caused by harmonic,

■ Technical Performance

1. Rated voltage: $\pm 380 \sim \pm 1100\text{kV}$ HVDC
2. Grading resistor tolerance: $\leq 2\%$
3. H bridge current unbalance protection, the capacitance ratio of maximum to minimum of the bridge capacitor arms ≤ 1.0018
4. Average level for capacitor unit: less than 65dB

■ Executive Standard

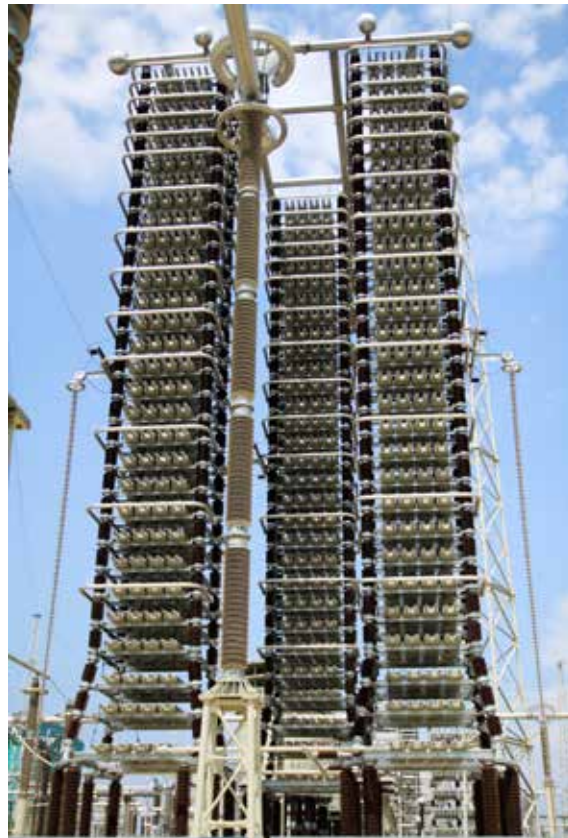
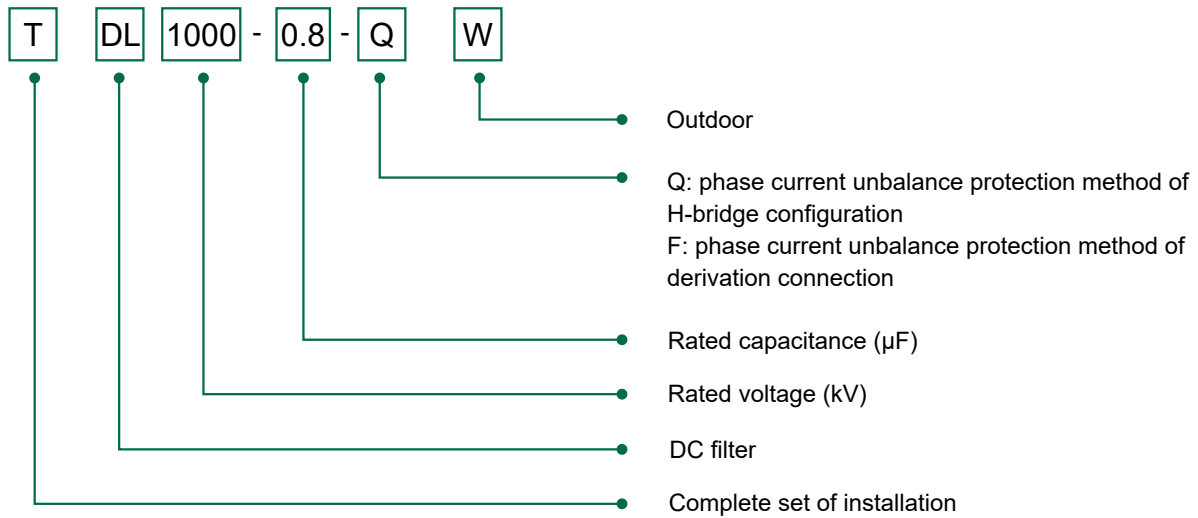
IEC 60871

■ Service Condition

1. Outdoor use, the altitude above sea level of mounting area does not exceed 2000m (if higher than 2000m, it is necessary to make an explanation when ordering).
2. The ambient temperature of mounting area should be $-40^{\circ}\text{C} \sim +45^{\circ}\text{C}$ (if operating under exceptional environment, it is necessary to make an explanation when ordering).
3. Relative humidity: daily average not greater than 95%, monthly average not greater than 90%
4. There should be no conductive or explosive dust, no harmful gas and vapor, no severe mechanical vibrations in mounting area.

■ Product Characteristic

1. Adopt tower structure and modular design, the structure is compact, preassembly in the factory, integrated package and shipment, directly installed on site.
2. Small grading resistor tolerance and unit voltage unevenness coefficient, operation is safe and reliable.
3. The capacitance balance adopts bar code management system and capacitance grade management solution, which guarantee small arm capacitance tolerance.



±800kV DC filter capacitor bank at Xiangtan Convert Station in China

Shunt/filter capacitor for DC transmission project

■ Application

HV shunt and filter capacitor installation and is used in convert station in EHV/UHV project, cooperating with corresponding reactor, resistor to form AC filter to filter characteristic harmonic, and provide capacitive reactive power to convert device, which could increase power factor and improve power quality.

■ Technical Performance

1. Rated voltage: 220kV, 500kV
2. Grading resistor tolerance: $\leq 2\%$
3. H bridge current unbalance protection, the capacitance ratio of maximum to minimum of the bridge capacitor arms ≤ 1.0018
4. Withstand seismic ability: horizontal acceleration 0.3g (if higher should be specified)
5. Average level for capacitor unit: less than 65dB

■ Executive Standard

IEC 60871

■ Service Condition

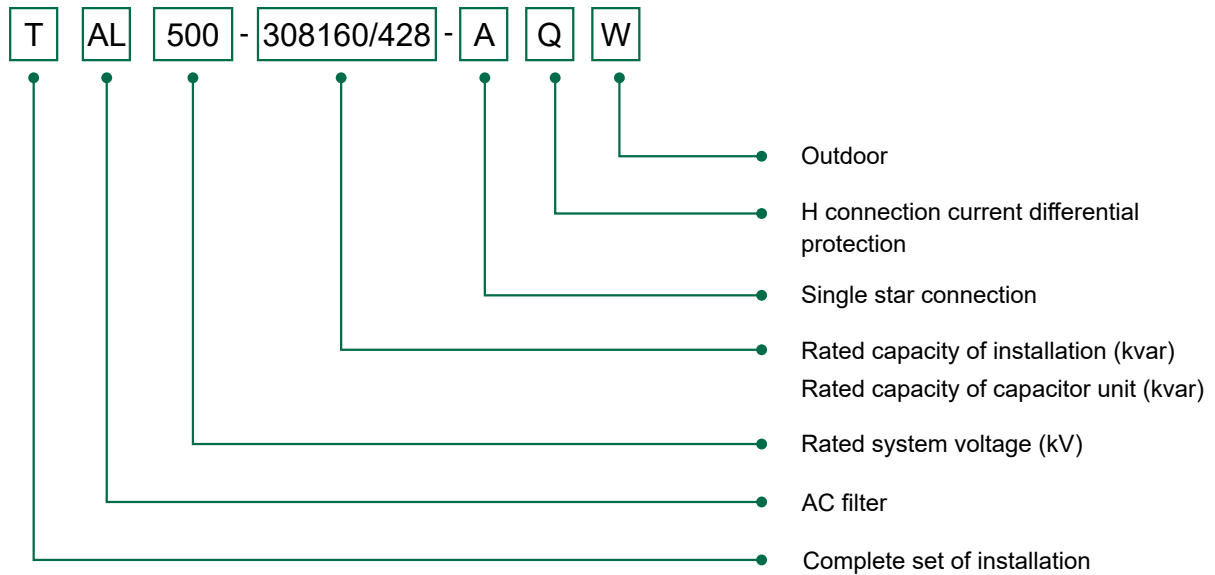
1. Outdoor use, the altitude above sea level of mounting area does not exceed 2000m (if higher than 2000m, it is necessary to make an explanation when ordering).
2. The ambient temperature of mounting area should be $-40^{\circ}\text{C} \sim +45^{\circ}\text{C}$ (if operating under exceptional environment, it is necessary to make an explanation when ordering).
3. Relative humidity: daily average not greater than 95%, monthly average not greater than 90%
4. There should be no conductive or explosive dust, no harmful gas and vapor, no severe mechanical vibrations in mounting area.

■ Structure Introduction

1. Adopt tower structure and modular design, the structure is compact, preassembly in the factory, integrated package and shipment, directly installed on site.
2. Small grading resistor tolerance and unit voltage unevenness coefficient, operation is safe and reliable.

3. The capacitance balance adopts bar code management system and capacitance grade management solution, which guarantee small arm capacitance tolerance.

■ Model and explanation



500kV shunt capacitor bank at Suidong convert station in China

Series compensation capacitor

■ Application

Series capacitor bank is used in 220kV~1000kV AC power system, by taking advantage of the capacitive resistance generated by capacitor to compensate the inductive resistance generated by transmission line, the electric clearance between the power generators is shorten, the synchronous torque is increased, so that improve the system stability, decrease the voltage drop and power angle differential, increase the transmission line transmission capacity, give full play to the economic ability of power transmission and transformation equipment.

■ Technical Performance

1. Rated voltage: 220~1000kV
2. Rated frequency: 50Hz, 60Hz
3. Capacitance tolerance: $\pm 1\%$
4. Seismic withstand level: horizontal acceleration 0.3g (if higher than this level should be specified)
5. Noise level: 65dB (A)
6. Radio interference level: not exceed 500 μ V under 1.1 times U_n

■ Executive Standard

IEC 60143

■ Service Condition

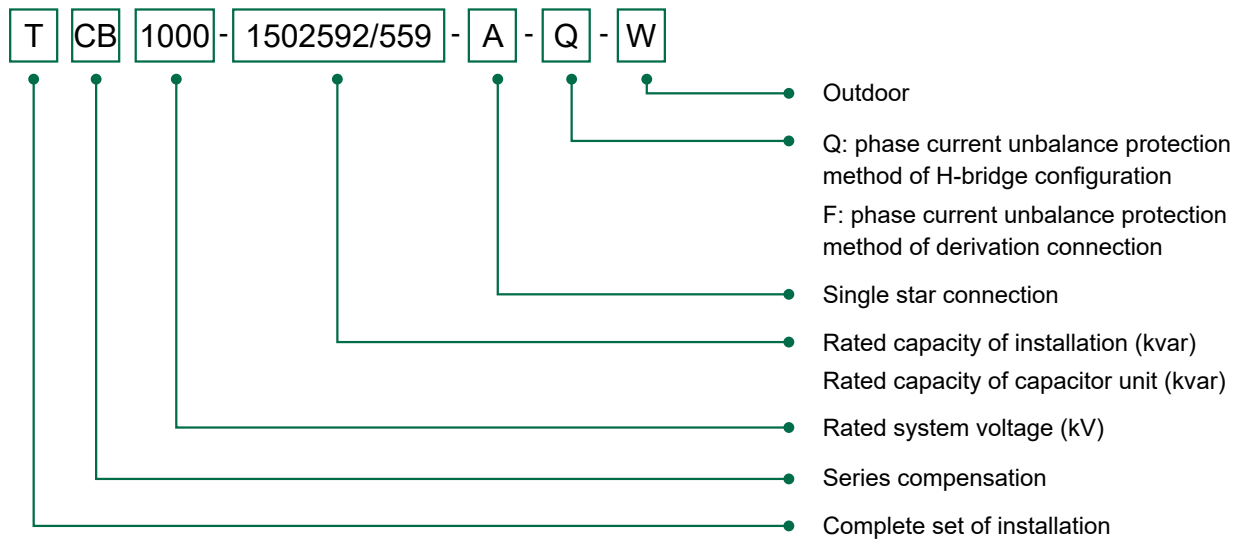
1. Outdoor use, the altitude above sea level of mounting area does not exceed 2000m (if higher than 2000m, it is necessary to make an explanation when ordering).
2. Ambient temperature: $-40^{\circ}\text{C} \sim +45^{\circ}\text{C}$
3. Relative humidity: daily average not greater than 95%, monthly average not greater than 90%
4. There should be no conductive or explosive dust, no harmful gas and vapor, no severe mechanical vibrations in mounting area.

■ Technical Characteristic

1. The tinned copper strand wire with insulation cover is adopted for the soft connection between the capacitor units, and the special clamp is used to fix the tinned copper strand wire to effectively reduce the heat generated at the joint of capacitor and conductor.

2. The capacitor bank adopts modular & standardized design, the structure is compact, preassembly in the factory, integrated package and shipment, directly installed on site.
3. Reasonable connection could avoid the possible blasting caused by capacitor breakdown.
4. The high strength insulators made in dry method are adopted between the racks of capacitor bank tower, the density of porcelain is even, and the bending and torsion resistance performance is good, thereby effectively control the axial stiffness and improve the stability of capacitor bank.

■ Model and explanation



500kV series capacitor bank in Ethiopia