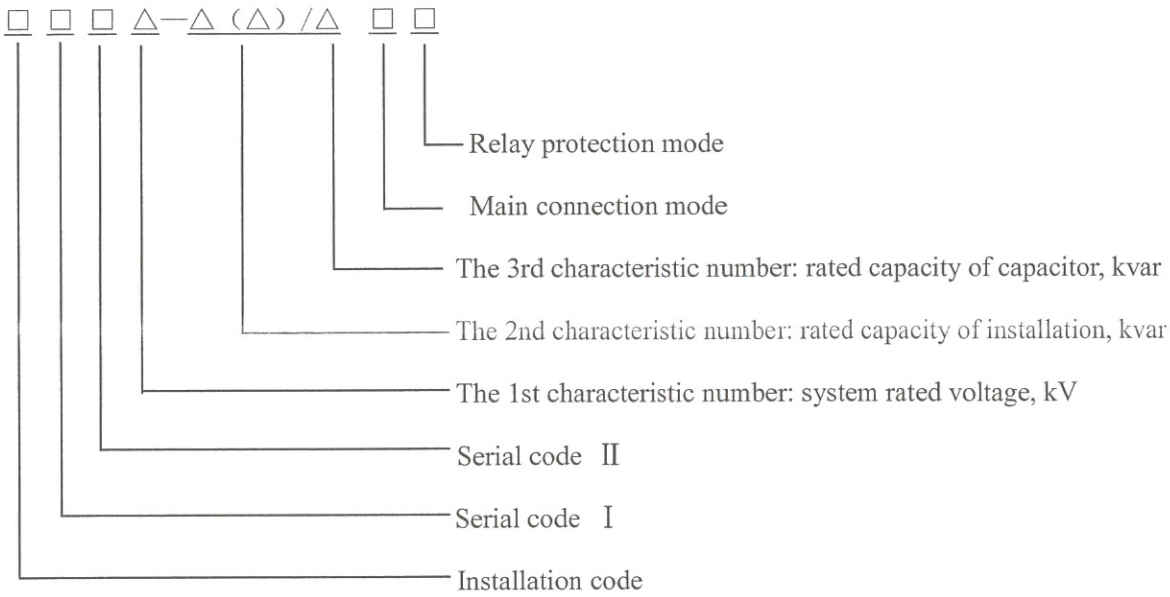
1. Overview

1.1 Main purpose and scope of application of products

This product is used in AC power system with 6-20kV of rated voltage and 50Hz or 60Hz of rated frequency; and the product can be used to improve the power factor of power grid, improve the voltage quality of power system, give full play to the economic efficiency of power transmission and transformation equipment, reduce power loss and improve the utilization level of electric energy.

1.2 Mode specification of product

The following is the general definition of the model of installations. The actual representation of the model will vary according to the requirements of the different countries or users. Please refer to the engineering instruction for details.



□—In capital Chinese phonetic alphabet

△—In Arabic letters

Wherein:

Installation code: T —— Complete installation

Serial code Ⅰ: BBG——Cabinet-type shunt capacitor

Serial code Ⅱ: Z—— Automatic switching

The first characteristic number: refers to system rated voltage, kV

The second characteristic number: refers to rated capacity of installation, kvar; the contents in the brackets indicate the grouping number and the capacity of a single group when grouping switch.

The third characteristic number: refers to rated capacity of capacitor, kvar

Main connection mode: A — Single star connection; B — Double star connection

Relay protection mode: C —Differential voltage protection; K —— Open-delta voltage protection

L — Neutral line unbalanced current protection

For example: TBBGZ20—4008(2004+2004)/334AK

Show: the system rated voltage of cabinet-type high-voltage parallel capacitor device is 20kV, the total rated capacity is 4008kvar, it is divided into two groups to be switched (2004+2004kvar), the rated capacity of a single capacitor is 334kvar, it is single star connection, Open-delta voltage protection and indoor installation.

2. Conditions of Use

The using conditions shall vary according to the specific project, and the actual requirements of the specific project shall prevail.

2.1 Altitude

The altitude of the installation and operation site shall not be more than 1,000m. When the altitude is higher than this, the modification method of the parameters of the complete installation shall refer to IEC 71-1.

2.2 Ambient temperature

The ambient temperature category used by capacitor installations is -40/B. The installation environment shall be free from gases and vapors that are seriously corrosive to metals, and shall be free from violent vibration, explosion or inflammable dangerous goods.

2.3 Anti-pollution capacity

For the creepage distance of each external insulation of the installation (relative to the highest operating voltage of the system), Class III should be no less than 25mm/kV.

2.4 Tolerance to earthquakes

The installation is not damaged by the seismic force of 0.2 g horizontal acceleration and 0.15g vertical acceleration (the safety factor ≥1.67).

2.5 Impact on environment

The capacitor in the device is an oil-immersed capacitor, and the capacitor oil is C101 and does not contain trichloro biphenyl (PCB), and it is nontoxic.

3. Main technical parameters and technical performance indicators

3.1 Capacitance deviation

a) The allowable capacitance deviation of the capacitor bank is 0 to +5% of the rated capacitance of the installation;

b) The ratio of the maximum value to the minimum value of the capacitance between any two line terminals of the three-phase capacitor bank shall not exceed 1.02;

c) The ratio of the maximum capacitance to minimum capacitance of each series section of the capacitor bank shall not exceed 1.01.

3.2 Inductance deviation

a) when there is a series reactor in the device, the allowable deviation of reactance value for reactors with rated reactance rate K≥4.5% under rated current is 0~+5%; and for the reactors with K≤1%, the allowable deviation of reactance value is 0 ~+5%;

b) For a three-phase reactor group consisting of a three-phase reactor or three single-phase reactors, the reactance value of each phase does not exceed ±2% of the average value of the three phases.

3.3 Insulation level

The withstand voltage specified in Table 1 shall be withstand between the different phases of the primary circuit (excluding components) of the installation and between the phase and ground, and between the secondary circuit and

the ground. The power frequency withstand voltage is applied for 1 min.

Table 1 Insulation level **kV**

Maximum voltage of the installation	Primary circuit		Power frequency withstand voltage for secondary circuit (root-mean-square value)
	Power frequency withstand voltage (root-mean-square value)	Impulse withstand voltage [(1.2~5)/50μs, peak]	
7.2	20	60	3
12	28	75	
17.5	38	95	
24	50	125	
36	70	170	

3.4 Temperature rise

For cabinet installations, except that the temperature rise of each electrical equipment does not exceed the respective specified values, the others shall comply with the relevant provisions of IEC 62271-1.

3.5 Tolerance to short-circuit current

The electrical equipment, connecting lines and mechanical structures in the main circuit shall be able to withstand short-circuit current and short-circuit discharge current between the internal electrodes of the capacitor without thermal and mechanical damage and obvious deformation.

3.6 Overload capability

3.6.1 Steady state overcurrent

The installation shall be able to operate continuously under a current with a RMS not exceeding 1.37In. The current is the result of a combination of 1.1Ucn, capacitance deviation, and higher harmonics.

3.6.2 Steady state overvoltage

The continuous operating voltage of the installation is 1.05Un, and it can run for corresponding time under the steady-state overvoltage specified in Table 2.

Table 2 Steady state overvoltage

Power frequency overvoltage	Maximum duration	Description
$1.05U_N$	Continuous operation	
$1.10U_N$	Long-term (no more than 8h every 24h)	Refers to the maximum value of long-term working voltage does not exceed 1.1 times
$1.15U_N$	30mins every 24h	Adjustment and fluctuation of system voltage
$1.20U_N$	5min	Voltage increases under light load
$1.30U_N$	1min	

3.6.3 Surge

The installation shall be capable of limiting the surge generated when the capacitor bank is put into to less than 20 times the rated current of the capacitor bank.

3.6.4 Transition overvoltage

For the switching installation selected for the installation, the inter-electrode overvoltage generated by the

operation shall not exceed $2\sqrt{2}U_n$ (peak).

4 Main Composition of Complete Device of Cabinet-type Parallel Capacitor

The complete device of the cabinet-type parallel capacitor consists of several Cabinets; each Cabinet includes parallel capacitor, series reactor, zinc oxide lightning arrester, online monitor, isolating switch, earthing switch , current transformer, voltage transformer, discharge coil, high-pressure fuse, post insulator, bus and other components (the specific configuration is based on the electrical wiring drawings of the project device). The above components are placed in the different cabinet. For the cabinet-type high-voltage parallel capacitor device switched by vacuum contactor or vacuum circuit breaker in groups, it shall also include vacuum contactor or vacuum circuit breaker. If the device is automatically switched in groups, it shall also include a power factor controller, a protection unit, etc., which shall be installed in the cabinet secondary instrument room.

4.1 Parallel capacitor

The parallel capacitors are mainly used to improve power factor, improve voltage quality and reduce line loss. Unlike most other electrical appliances, the parallel capacitors always run under a full load when connected to the power system.

Due to the introduction of concentrated capacitors in the system, the following unfavorable operating conditions will occur: after the capacitor is accessed into the system, the system voltage shall rise. The voltage on the capacitor terminal rises abnormally under a light load. When a series reactor is accessed into the capacitor circuit, the voltage on the capacitor terminal will be higher than the operating voltage of the network. If there are harmonic sources in the system (such as large rectifiers, saturated transformer cores, electric arc furnaces and rolling mills, etc.), it will cause over-current of capacitors and produce thermal effects greater than fundamental waves, etc.

If the voltage, current and temperature in operation exceed the specified limits, the service life of the capacitor will be shortened, therefore, a reasonable choice shall be made for the operating conditions of the capacitor.

4.2 Series reactor

Series reactors are divided into iron core reactors and air core reactors which is connected to the capacitor circuit in series and is used to suppress the closing current and harmonic. The selection principles are as follows:

a) If it is only used to suppress the closing surge, the reactor with a rated inductive reactance of (0.1% to 1%) Xc per phase (Xc is the rated capacitive reactance of each phase of the capacitor bank, the same as below) should be used.

b) If it is used to suppress harmonics of five times or more, a reactor with a rated inductive reactance of (4.5% to 6%) Xc per phase should be used;

c) If it is used to suppress harmonics of three times or more, a reactor with a rated inductive reactance of (12% to 13%) Xc per phase should be used;

4.3 Circuit breaker or vacuum contactor

The switch used for switching capacitor installations shall be vacuum circuit breaker or SF6 circuit breaker, vacuum contactor (12kV, 2500kvar and below can be switched by vacuum contactor). The performance of circuit breaker or vacuum contactor shall meet the following requirements:

a) The contacts should not bounce when closing;

b) Repeated breakdown should not occur during opening; In order to avoid repeated breakdown, the contacts of the vacuum circuit breaker should be treated by electric aging before leaving the factory.

c) It shall have the capacity to withstand closing surge;

d) The circuit breaker shall be capable of rapidly breaking short circuit current.

e) It shall have capacitive current breaking capability.

f) The arc extinguish chamber of vacuum contactor should be aged.

4.4 Metal oxide arrester

Metal oxide arresters should be installed to protect the installation from operating overvoltage.

4.5 Online monitor

The online monitor and the lightning arrester are connected in the power grid in series so as to record the discharging times of the lightning arrester in real time and conducting a online monitoring to the change of leakage current of the lightning arrester. According to the change of leakage current, the working condition and abnormal condition of lightning arrester in operation can be judged in time to prevent accidents and improve the operation reliability of power system.

4.6 Disconnecting switch

As a power incoming switch operated by hand without live, the high voltage isolator provides an obvious electrical breakpoint during interruption maintenance to ensure the safety of operators. The operating handle can be equipped with electromagnetic lock as required, and form an electrical interlock with the upstream circuit breaker to prevent switching on and off the isolator with live, so as to ensure the safety of operation and maintenance personnel. The earthing switch is to ensure the personal safety during maintenance and overhaul of the installation.

4.7 Earthing switch

The function of earthing switch is to ensure personal safety during equipment maintenance and overhaul.

4.8 Current transformer

4.8.1 The current transformer shall be installed in the main circuit or grouping circuit and shall be used for current measurement and protection of the main circuit or grouping circuit.

4.8.2 The current transformer is installed at the neutral point and shall be used for an unbalanced current protection for the neutral point (common in double star connection).

Note: Open circuit is forbidden at the secondary side of current transformer.

4.9 Voltage transformer

The voltage transformer is installed at the neutral point and shall be used for unbalanced voltage protection in the neutral point.

4.10 Discharge installation

The discharge installations shall be equipped with special discharge coils of capacitors, and the rated voltage shall not be lower than the rated voltage of the capacitor bank, and the maximum supporting capacity shall not be less than the capacity of the capacitor connected in parallel; The discharge time of the discharge coil should be able to reduce the residual voltage on the capacitor bank from the rated peak voltage to 50V or lower within 5s after the power is disconnected. At the same time, the secondary side coil of the discharge coil should be used to measure the voltage of the capacitor, or as the open-delta voltage protection or voltage differential protection for the internal fault of the capacitor. It is forbidden to connect the primary winding of discharge coil into triangle or "V" type.

Note: 1) It is forbidden to connect the primary winding of discharge coil into triangle or "V" type.

2) Short circuit is strictly prohibited in the wiring of the outlet terminal of the secondary winding of the discharging coil.

Remark: The above components shall be configured according to the needs of various projects. All components shall

be pre-installed in the factory except special circumstances.

4.11 High voltage fuse

There are two types of high voltage fuses, the jet fuse and the high voltage current-limiting fuse. Their functions are as follows:

4.11.1 As the protection of capacitor unit, the high voltage jet fuse will fuse rapidly and spray when a short circuit occurs in the internal components of the capacitor, isolating the fault capacitor from the power grid.

4.11.2 As the overload and short-circuit protection of capacitor bank, the high voltage current-limiting fuse will fuse rapidly when a short circuit occurs in the installation, isolating the fault capacitor from the power grid.

5 Protection method

The protection of capacitor installation includes internal fuse, external fuse and relay protection.

5.1 Fuse protection

Internal fuse and external fuse protection are the first protection against internal faults in the capacitor. The fusing of the fuse can isolate the damaged components or capacitor unit in time to ensure the overall safe operation of the capacitor installation. Please refer to the engineering instruction for details.

5.2 Relay protection

Relay protection is the second protection against the faults of the capacitor. The relay protection includes zero sequence voltage protection, voltage differential protection, neutral line unbalanced current protection and bridge differential current protection. The protection of the installation should also include: overvoltage protection, low-voltage protection, over current protection, short-circuit and quick-break protection, etc.

6 Packaging, transportation, acceptance and storage

6.1 Packaging, transportation

6.1.1 The devices are packed separately according to the packing list. During transportation, Single cabinet and other accessories (connecting busbars, post insulators, spare parts, etc.) are packaged and shipped separately.

6.1.2 The device and the main supporting components are clearly marked. The mark comprises the manufacturer's name, model and name, main technical parameters, product factory number and date of manufacture, etc.

6.1.3 Technical documents such as packing list and device drawings are attached to the cabinet-type equipment.

6.1.4 When carrying a single capacitor, the capacitor shall be in an upright position, namely, the casing shall be upward. It is strictly prohibited to carry by the capacitor casing.

6.1.5 When loading and unloading and hoisting the cabinet, the lifting ring at the top should be used for lifting, and it shall pay attention to not to damage the structure of the cabinet body, scratch the surface of the cabinet body and the equipment inside the cabinet body. When there is no lifting ring at the top of the cabinet, it should be transported by forklift.

6.1.6 The transportation marks shall be posted outside the cabinet-type device after packaging. Rainproof, moisture-proof and shockproof measures shall be taken to ensure that the cabinet-type device and spare parts are not damaged during long-distance transportation.

6.2 Acceptance

After receiving the product, the user shall conduct acceptance according to the acceptance items. The acceptance items are as follows:

a) Check the appearance of each package to confirm that there is no damage, and all contents listed in the packing list are intact;

b) If any item is damaged or inconsistent with the packing list, please inform immediately Shanghai Sieyuan Power Capacitor Co., Ltd;

c) Acceptance inspection shall be carried out according to the acceptance items required by the technical conditions of each accessory;

d) If transshipment or long-term storage is required after acceptance, the packaging Cabinet shall be restored to its original condition.

6.3 Storage

6.3.1 The installation should be kept indoors, not in damp, dusty, high temperature, flammable, explosive and corrosive gas places.

6.3.2 When storing a single capacitor, the sleeve shall be vertically upward, and it is not allowed to stack one capacitor on another capacitor without a support.

7 Installation and Debugging

7.1 Installation

7.1.1 After receiving the equipment, the user shall count it according to the packing list in time and conduct appearance inspection. All main parts shall be accepted according to the corresponding operating instructions and the requirements of the technical documents.

7.1.2 The installation conditions shall meet the requirements of Article 2 of this Manual.

7.1.3 It shall clean up the site and foundation so that the foundation of independent equipment shall be on the same horizontal plane. The device shall be installed on the basis meeting the requirements and shall be installed according to the assembly drawing.

7.1.4 Components sent to the site for installation shall be assembled according to the drawing requirements or installation instructions.

7.1.5 When the cabinet device is composed of multi-faceted cabinets, the main busbars of the cabinets should be connected according to the signs on the main busbars.

7.1.6 The casing of the cabinet-type device shall be reliably grounded. The grounding of the device shall be well connected with the grounding of the system in the station.

7.1.7 The high voltage cable and secondary control cable of the device are connected according to the requirements of design drawings.

7.2 Installation notes

7.2.1 The installation of cabinet-type devices shall comply with relevant installation regulations.

7.2.2 The connection of confluent parts shall be firm and shall not be virtually connected or loose.

7.2.3 When installing electrical conductors (including buses, stranded wires, clamps, terminals, etc.), the connection method and torque value of fasteners shall conform to GB 50149 Code for Construction and Acceptance of Busbar Installation of Electric Equipment Installation Engineering, see Table 3 below for details. When installing nonconductors (including brackets, bases, supports, and installing feet of various accessories), the torque values of fasteners are as shown in Table 3.

Table 3 Fastener torque values of conductor and non-conductor

Conductor				Non-conductor			
Specification mm	Torque value	Specification mm	Torque value	Specification mm	Torque value	Specification mm	Torque value

	N·m		N·m		N·m		N·m
M8	10	M16	80	M6 and below	10	M16	150
M10	20	M18	100	M8	20	M20	350
M12	35	M20	150	M10	35		
M14	55	M24	300	M12	60		

7.3 Debug the equipment according to the requirements of on-site commissioning.

8 Use and operation

8.1 Check before operating

8.1.1 Visual inspection

The following visual inspections must be carried out before operating:

1) Clean up the debris on site and foundation. Make sure that no installation tools or materials are left in the cabinet and the cabinet should be clean and tidy.

2) Confirm that the mechanical parts of the installation are in good condition.

3) Clean the surface of the insulator and casing to prevent contamination.

4) Check whether the insulator and casing are broken and whether the capacitor is leaking.

5) Check whether the current transformer and other components are in good condition.

8.1.2 Electrical connection inspection

The following electrical connection inspection must be carried out before operating:

1) Confirm whether the primary connection is correct: Check whether the high voltage incoming cable, isolator, earthing switch , arrester, vacuum circuit breaker, capacitor, reactor, unbalanced current transformer, busbar and other components are properly connected and in good contact according to the drawing. Confirm the correct connection before operating.

2) Ensure the net electric distance between different potentials and whether the connection of equipotential points is firm and reliable.

3) Make sure the high voltage cable and secondary control cable are connected properly and in good contact.

8.2 Trial operation inspection

The following inspections must be performed during the trial operation:

1) Verify that the voltage, current and output powers after operation are within the rated value range.

2) Re-check the three-phase current balance of the capacitor bank within 8h to 24h after the capacitor bank is put into operation.

3) Monitor the temperature rise of the electrical connectors and installation surfaces and record them regularly.

4) The protection action is observed by signal relays and indicators.

5) Verify whether the power factor meets the customer's requirement after operating.

8.3 Inspection after trial operation

The following inspections must be performed after the trial operation:

1) Observe whether the capacitor leaks, the joint are discolored, the shell is inflated and cracked.

2) Observe for oil stains on the floor.

3) Observe the electrical connection for overheating.

4) Check whether the opening and closing circuit of circuit breaker (if any) is in good condition.

5) Check for any traces of discharge.

6) Check whether the connection is loose and whether the wire is worn. Re-torque the capacitor outlet terminal (recommended torque value is 30N·m).

7) Check that current/voltage transformers, control/protection circuits and circuit breakers are properly set and operated (as with the above installations)

8.4 Monitoring and recording in operation

The following monitoring and recording must be performed during operation:

1) Voltage, power factor.

2) Rated voltage, current and output power of the installation;

3) Three-phase current balance.

4) Temperature rise of electrical connectors and installation surfaces.

5) Signal relay and indicator operation.

9 Maintenance and repair

After the device is put into use, the device shall be maintained and overhauled according to the following requirements:

1) Observe the operation of all parts of the device, it is recommended that it shall be observed for once at least in each day. Clean the surface of each sleeve and the shell and framework of each electrical appliance in time to avoid the occurrence of accidents.

2) Start routine inspection after one week of trial operation; whether the capacitor leaks, whether the joint changes color, whether the shell bulges and ruptures; check whether the ground has oil stains; check whether the electrical connection has overheating. Check whether the tripping and tripping circuit of the circuit breaker is in good condition; check whether there are any discharge marks; check loose connections and worn wires.

3) Carry out routine inspection every three to six months and tighten all electrical connectors.

4) Measure the capacitance of a single capacitor of the capacitor bank regularly and compare it with the original records. When the capacitance is reduced by more than 3%, it shall be carefully checked, and the operation shall be stopped if problems are found. If the capacitor is damaged and needs to be replaced with a new capacitor, it shall ensure that the rated voltage, capacitance and overall dimensions meet the relevant requirements and the requirements of capacitance balancing.

5) Observe the action of protection through signal relay and indicator lamp. Do not reclose until the circuit breaker of protection action trips and the cause has not been found out and handled correctly, so as to prevent the capacitor from being put into operation with injury and expanding the accident.

10 Fault analysis and troubleshooting

In case of any fault of the capacitor, it shall be recorded immediately (voltage, capacitance, load, capacitance and number of the capacitor, etc.). It shall not be put back into operation without finding out the cause and making proper treatment. The analysis and troubleshooting of common faults of capacitors are shown in Table 4.

Table 4 Analysis and troubleshooting of common faults

Fault phenomenon	Cause analysis	Processing method
The casing are damaged	Collision during transportation and installation	Replace the capacitor
The shell paint are damaged	Collision during transportation and installation	Minor damage can be repaired by yourself

Breakdown during acceptance test	1. The product is damaged during transportation 2. The test voltage is too high or the duration is too long 3. The method for measuring voltage is wrong	Replace the capacitor
Significant change in capacitance	Component breakdown and/or fuse blown	Replace the capacitor
Increased loss	Capacitor is in bad quality	Replace the capacitor
Abnormal expansion of shell	1. Partial discharge occurs inside the product 2. Component breakdown or pole-to-shell breakdown	Replace the capacitor
Oil leakage	1. Lifting the casing during handling causes the flange to be loosely sealed 2. The casing is damaged due to too much force when screwing the nut 3. Defects in the manufacturing process 4. Drastic temperature change	Replace the capacitor
Temperature rise	1. The ambient temperature is too high and the capacitors are too densely arranged 2. Harmonic current is too large 3. Media aging, increased loss	1. Improve the ventilation 2. Replace the capacitor

11. Precautions for safe use

11.1. Safe use

1) Since the capacitor is an electrical energy storage installation, when the capacitor is disconnected from the grid, the stored charge cannot be released in a short time, and the charge in the capacitor is easily transferred. Before the human body touches the live parts of the capacitor, the capacitor shall be grounded, short-circuited and discharged even if the capacitor is powered off for a long time. At any time, do not touch the two outgoing terminals of the capacitor with both hands at the same time to avoid the impact of residual charge and unnecessary personal injury. Capacitors that are out of operation should be short-circuited for a long time to avoid the impact of residual charge during disassembly and wiring.

2) During maintenance, the power must be cut off first. After the signal light is off, you can enter the maintenance area. Check the power first, open the isolator, and then close the earthing switch . The capacitor shall be short-circuited and discharged and the special temporary grounding wire shall be suspended before the overhaul. After the repairs are completed, they are removed.

3) The net door, the isolator, the earthing switch , the switching switch and the upstream circuit breaker of the installation are electrically interlocked. Before the operation, it is necessary to close the isolator, open the earthing switch , close the net door and lock, and do not open it during operation.

4) Grounding points for isolators, vacuum circuit breakers, reactors, cable and cable terminal Cabinetes, earthing switches, zinc oxide arresters, current transformers, capacitor shells, capacitor frames, etc. should be reliably grounded.

5) The discharge time of a capacitor unit is 75V/10mins. The shortest time interval of re-closing after the opening of the complete unit shall not be less than 600 seconds to prevent the impact of residual charge of the capacitor.

6) After the operation of the protection installation, trial line charging is not allowed with force. Analysis and judgment should be made according to the protection action. Carefully check the capacitor for fuses, expansion, overheating, bursting or casing discharge traces, check if the capacitor has obvious fault, and its supporting equipment should be checked. it can be put into operation only after identifying the cause and troubleshooting. If the cause is unknown, the installation shall be put into operation after passing the test.

11.2. Easily appeared incorrect use or misoperation

11.2.1 Incorrect use

Re-closing is performed before the protection action circuit breaker trips and the cause has not been found and processed correctly.

11.2.2 Misoperation

Reload the installation after disconnection less than the specified discharge time.

11.3. Possible damage caused by incorrect use, operation

If the capacitor is put into operation again without inspection and verification to confirm that there is no fault, the damaged capacitor will result in the expansion of the accident. If the installation is put into operation again after being disconnected for less than the specified discharge time, an overvoltage may occur because the capacitor is not fully discharged, which may damage the capacitor.

11.4. Emergency measures under abnormal conditions

In case of any of the following circumstances, the capacitor shall be removed immediately and then the professional technicians of the manufacturer shall be notified.

1) The capacitor is exploded.

2) The connection is severely heated or the temperature detected by the infrared thermometer is significantly increased.

3) The capacitor casing is broken and has a flashover discharge.

4) The capacitor is badly sprayed with oil or on fire.

5) The capacitor casing is heavily inflated.

6) There is an abnormal sound inside the capacitor.

11.5. Precautions when replacing capacitors

1) When a capacitor unit in the installation needs to be replaced, first check the capacitance value on the nameplate of the unit to be replaced according to the capacitance position table, and then consult the factory test report of spare parts of the capacitor unit to find a same unit and replace the unit to be replaced.

2) When disassembling a capacitor unit, it shall be prevented from knocking and damaging the intact capacitor.

11.6. Other safety warnings

The insulating oil in the capacitor unit is a kind of liquid which is irritating to the cornea, and should be avoided to enter the eye. Once it is in the eye, it should be rinsed off with water in time; It does not cause damage to the human body when it comes into contact with other parts of the human body, but it cannot be eaten.

12. **Environmental protection and others**

The film, paper and oil (non-toxic, PCB-free) and other metal materials and electric porcelain materials used in the products will not pollute the environment in the process of production, use and waste disposal.

Electrical products such as capacitors, oil-filled discharge coils and oil-filled reactors shall be recycled by qualified units after being scrapped.

The packaging of the installation parts shall be made of environmentally friendly materials and environmentally friendly packaging; environmentally friendly materials include reusable, renewable, and degradable materials. Environmentally friendly packaging refers to less needed materials, the least waste and energy saving, easy recycling, packaging waste will not produce pollution to the environment.