

Sieyuan[®]

Epoxy Cast Dry-Type Arc-Suppression Coil and Earthing Transformer

Instruction For Use

SIEYUAN ELECTRIC CO.,LTD

Warning !

For arc-suppression coils:

Taps to run for short time must run in the allowed running period marked on the nameplate.

For earthing transformer:

The runtime of the rated neutral point current shall not exceed that stated in the nameplate.

1 Scope of application

The Instruction for Use is applicable to transportation, storage, installation, running and maintenance of epoxy cast dry-type arc-suppression coils with the nominal capacity of 5000kVA and below, and the voltage class of 35kV and below (hereafter referred to as “arc-suppression coils” for short) and excitation-free voltage-regulation epoxy cast dry-type earthing transformers (hereafter referred to as “earthing transformers” for short) .

The arc-suppression coils are single-phase reactors used for compensating the the condenser current generated when earthing failure occurs to the neutral point insulation system. In the three-phase system, the arc-suppression coils are connected between the neutral points of the power transformers or the earthing transformers and the ground.

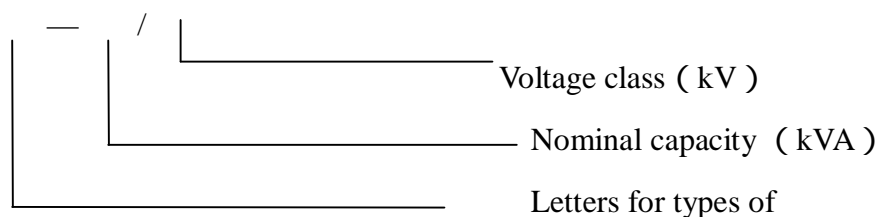
The earthing transformer (neutral point coupler) is a three-phase transformer (or three-phase reactor), which is often used for providing a manual neutral point with loads for the ungrounded points of the system and for earthing the system. The neutral point of the product is connected with the arc-suppression coil or the resistor and then is earthed. The earthing transformer can be provided with secondary windings with continuous nominal capacities, and is used as a power supply of a station.

2 Executive Standard

GB10229	Reactor
GB6450	Dry-type Power Transformer
GB1094	Power Transformer
IEC289	Reactor

3 Marks of types of products

3.1 Arc-suppression coil

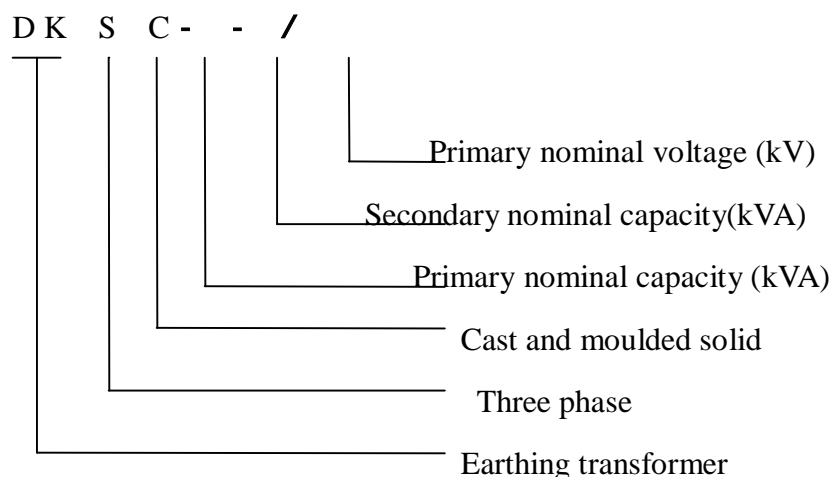


products (See the Form Below)

The Sequences and the Meanings of the Letters for Types of Products

Serial number	Type	Meanings	Meanings of the letters
1	Form	Arc-suppression coils	XH
2	Phase number	Single-phase	D
3	Insulating medium outside the coils	Cast and moulded solid	C
4	Adjustment mode	Adjustment by means of on-load turn-adjustment	Z
		Adjustment by means of excitation-free turn-adjustment or non-adjustment	--
		Adjustment by means of capacitance-adjustment	R
		High-impedance adjustment	B

3.2 Earthing transformer



4 Use Conditions

- 4.1 Installed outdoors.
- 4.2 Height above sea level: less than or equal to 1000m.
- 4.3 Environment temperature: -25 ~ +40
- 4.4 Types of cooling: air self-cooling and forced wind cooling

4.5 Insulating temperature classification: Class F

4.6 When the product runs at the temperature below -25°C , an auxiliary heating device must be added to ensure that the product runs at the temperature above -25°C .

4.7 The product shall be ensured to be well-ventilated around. When the product is arranged in a basement or other restricted places, sinking and ventilation devices shall be added to ensure sufficient ventilation quantity. Generally, $2 \sim 4\text{m}^3/\text{min}$ of ventilation is needed for every 1kW of loss.

4.8 In case of exceeding the above use conditions, proper adjustment shall be made according to relevant provisions of the Dry Power Transformer of GB6450.

5 Loading and unloading

5.1 Such equipment as cranes, automobiles, or fork trucks and so on can be adopted for lifting products.

5.2 When the products packaged with packing boxes are lifted:

5.2.1 For the products of 6kV and 10kV with the gross weight less than or equal to 3000kg, wire ropes are hung at the sleepers in the four lower corners of the packing box for lifting;

5.2.2 For the products of 35kV or with the gross weight more than 3000kg, the upper cover of the packing box shall be removed to lift the product directly;

5.2.3 The products with the gross weight equal to or less than 3000kg, the fork truck can be used for loading, unloading or short-distance transportation of them. Under other circumstances, it is strictly forbidden to use the fork trucks for performing the above operations.

5.3 When the products are lifted, the lifting lugs on the body shall be used for lifting, and the included angle between the lifting wire ropes must be less than or equal to 60 degrees.

5.4 The mark for center of gravity is sprayed on the face of the main packing box, and the length of the wire ropes shall be adjusted so that the hook is opposite to the mark of the center of gravity when the packing box is lifted.

5.5 Products shall be put slightly when loaded or unloaded, and shall not be damaged.

6 Transportation

6.1 The products can be transported to the installation sites by such vehicles as trains, automobiles, ships and so on. During the transportation, the carriages and the cabin shall be ensured to be clean without pollution.

6.2 When the environmental temperature is below -25°C , an auxiliary heating device must be added to keep the products above -25°C throughout the transportation course.

6.3 During the transportation, the products shall be firmly fixed on the transporter with the gradient not more than 30 degrees. The products shall be put on the ground neatly, and are strictly forbidden to be piled up. The products are not allowed to be shaken, collided or moved.

6.4 For the products with trundles at the footing of the products, the trundles shall be removed for transporting the products in order to prevent the products from moving during transportation.

6.5 During transportation, for the products without packages or with just simple packages:

6.5.1 In case of raining or snowing, measures shall be taken to prevent rain or snow from getting into the products.

6.5.2 The products shall be fixed on the transporter through the footing, the clamping pieces, the lifting lugs and holes on the products; protective measures shall be taken to the fixed positions to prevent the surfaces of the products from being damaged. Such worn parts as coils, insulators, cushion blocks, leading wires and so on are strictly prohibited from being bound or pulled to prevent the products from being damaged by pull.

6.5.3 Products shall be underlaid with rectangular timber with the height of the underlying rectangular timber not less than 100mm high.

7 Inspection

The products shall be inspected as follows after they are delivered to the site:

7.1 Whether the packages and moisture-proof facilities are in good condition, and there are traces to show that rain gets into the packages.

7.2 Check whether the specifications, the models, the technical parameters of the products received on the nameplates comply with those in the contracts for goods.

7.3 Check whether the technical files, the products and the accessories are full or damaged according to the list of the delivery files;

7.4 Check whether all of fasteners fasten the products well and the insulators are in good conditions;

7.5 Check whether the metal parts are rusted or damaged, and the iron core is earthed through multiple points.

7.6 Check whether the coils are in good condition, deformed, displaced or damaged, whether there is sundries inside, the surfaces are smooth without cracks;

7.7 Check whether the worn parts such as the temperature controller, the blower fan and so on in the earthing transformer are damaged, whether such attachment files as the product description of the temperature controller or the inspection certificates and so on are full.

7.8 In case it is found that the packing boxes or the products are seriously damaged, inform the transportation insurance departments immediately and keep the site unchanged for handling.

7.9 When the unpacking and the inspection of the products are completed, they shall be properly kept or re-packaged to prevent them from being damaged or stolen.

8 Storage

8.1 When products need storing, they shall not be unpacked; if unpacking is needed for the purpose of inspection, they shall be repackaged on completion of inspection.

8.2 The products needing storing for long term shall be deposited in warehouses; the warehouses must be kept clean and dry; active chemicals and corrosive substance shall not be stored in a warehouse.

9 Installation

9.1 Before the products are installed on the site, the use instructions, the product nameplate and the outline dimension drawing shall be carefully read; such items as product weight, installation method and so on shall be known; corresponding lifting equipment and tools shall be got ready.

9.2 The minimum allowable distance of the live conductor of the product and the ground shall meet the provisions of the Power Transformer -Third Part: Insulation Level, the Insulation Test and the Protective Insulation Air Gap of GB1094.3. See the following Form:

Nominal voltage of the system/ (kV)	Minimum air gap/ (mm)
6	90
10	125
35	340

9.3 The electriferous components and parts must be coupled firmly, and the pre-tightening torque of the fasteners is as follows:

Specifications	M10	M12	M16	M20
Pre-tightening torque (N·m)	30	33	35	45

9.4 Generally, not less than anchor bolts shall be embedded in the foundation for installing the products. Refer to the outline dimensional drawings for the positions of the anchor bolts so that the anchor bolts correspond to the mounting holes of the product. The trundles of the products shall be removed when the products are installed, and the products are fixed through anchor bolts. Anti-looseness measures shall be taken to the nuts. The products can be installed by welding the footing and the ground; the welded points shall be distributed symmetrically and uniformly at the footing of the products, and at least four welded points are needed. On completion of the welding, the site shall be cleaned up, and the products shall be painted with antirust paint. During welding, it is strictly prohibited that the product coils and the insulation pieces are damaged.

9.5 The earthing bolts on the bedplate of the product shall be reliably connected with the earthing busbar on the site. When the product is installed by means of welding, as the product has been reliably connected with the ground, earthing bolts are not needed for connection.

9.6 Arc-suppression coils

9.6.1 For the arc-suppression coils, the head end of the main coil shall be connected

with the neutral point of the transformer or the generator and the earthing terminal of the main coil shall be earthed reliably.

9.6.2 For the arc-suppression coils with PT and CT on the bodies, the output terminals of the PT and the CT shall be connected with corresponding control cables well.

9.6.3 When the PT and CT used for measurement of arc-suppression coils are out of use, the PT shall be disconnected with one end earthed; the CT is earthed after it is short-circuited.

9.6.4 For the arc-suppression coils adjusted by means of on-load turn-adjustment, the tapping lead between the body of the arc-suppression coil and the switch shall be connected.

9.6.5 For the arc-suppression coil adjusted by means of capacity adjustment and high impedance, the circuits shall be connected according to relevant requirements.

9.7 When the earthing transformer is provided with a three-phase supply blower fan, the turning direction of the three-phase supply blower fan shall be noted; when the blower fan turns normally, wind is blown into the coils upwards from the bottom; or else, it runs reversely. The phase sequence is changed in time by referring to the use instruction.

9.8 The circuits of the accessory equipment such as temperature controller and so on shall be connected reliably and correctly by referring to the use instructions.

10 Test before running

The following tests shall be conducted before the product is put into operation:

10.1 For arc-suppression coils, when the earthing terminal of the main coil is connected with a CT, the lines connected shall be removed firstly before test.

10.2 Coil resistance measurement.

10.3 Iron core earthing measurement

10.4 Insulation resistance measurement.

10.4.1 Test of the insulation resistance of the coils:

Generally (temperature ranges from 20 to 30 °C, and the humidity is equal to or less than 80%), the insulation resistance of the coils can meet the following

requirements:

High voltage—Low voltage and ground 300M

Low voltage—Ground 100M

In relatively wet environment, the insulation resistance of the product falls. Generally, the operation requirements can be met in case of the following: for the products with the nominal voltage of 6kV, the insulation resistance is not less than 20M ; for the products with the nominal voltage of 10kV, the insulation resistance is not less than 30M ; for the products with the nominal voltage of 20kV, the insulation is not less than 50M ; for the products with the nominal voltage of 35kV, the insulation resistance is not less than 100M (the reading at 25 per minute). However, when the products are subject to abnormal humidity and dew, they must be dried before withstand voltage test or being put into operation, whatever the insulation resistance is.

10.4.2 Measurement of the insulation resistance of the iron core:

Generally (temperature: 20 ~ 30 , humidity equal to or less than 80%), the insulation resistance of the iron core can meet the following values:

Iron core—clamping pieces and ground 2M

Center through screw—Ground and iron core 2M

In relatively wet environment, the value falls, and it can run provided that the resistance is equal to or more than 0.1M .

10.5 For the arc-suppression coils adjusted by means of turn adjustment, the on-load tap-changer is adjusted to the maximum current position for measurement of reactance. There is not significant difference between the measured product reactance and the delivery test results. (Refer to the corresponding test values on the product test reports).

10.6 For earthing transformers

10.6.1 The poles are determined and the voltage ratio of the coils under all of tapplings is measured according to the provisions of GB50150, and the coupled group marks are determined.

10.6.2 When the no-load current and the open circuit losses of the product are measured, there shall be no significant difference between the measurement results and

the delivery test results (Refer to the corresponding test values on the product test reports).

10.7 External construction frequency withstand voltage test: the repetitive test voltage shall be 85% of the delivery test voltage (see the records on the product test reports), and lasts for one minute.

11 Putting into operation

11.1 When the arc-suppression coils run at different current positions, the runtime is subject to that as specified in the nameplate.

11.2 Earthing transformer

11.2.1 Before products are put into operation, the tapping piece shall be adjusted to proper positions according to the nameplate.

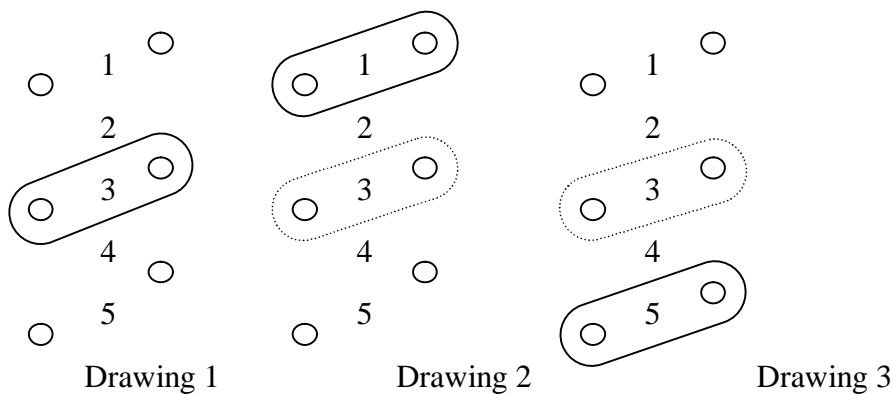
For example, for the products with the voltage of $10500 \pm 2 \times 2.5\%$, the voltage on the nameplate is as follows:

1. 11025V
2. 10763V
3. 10500V
4. 10238V
5. 9975V

If the actual voltage of the local grid is 10500V, the tapping piece shall be connected with the position three. See Drawing 1;

If the actual voltage of the local grid is 11025V, the tapping piece shall be connected with the position one. See Drawing 2;

If the actual voltage of the local grid is 9975V, the tapping piece shall be connected with the position five. See Drawing 3;



11.2.2 When the product is provided with a temperature controller, refer to the use instructions. After the temperature controller is debugged and works well, the product shall be put into operation firstly before the temperature controller is put into

operation.

11.2.3 The product shall be switched on and put into operation when no load is put on the product; the maximum switching inrush current is 10 times of the nominal current. The set value for instantaneous current protection shall be larger than the inrush current.

11.2.4 Required running position shall be selected, and the tap is adjusted to the corresponding position as required by the site.

11.2.5 After the product is put into operation, the load shall be increased gradually. The product shall be inspected for any abnormality; it is forbidden to put too large load on the product at the beginning.

11.3 Check the products for completely correct installation and test operation; the entire product shall not be abnormal, and all of foreign matters shall be completely eliminated before the products are put into operation.

11.4 After the products go out of the operation, generally, no other measures are needed before the products are put into operation again. However, when dew is formed on the products under the condition of high humidity, the products must be dried before they are put into operation.

12 Maintenance

In order to ensure the products to run without failure, they need regular check and maintenance.

12.1 Generally, in dry and clean places, the products need checking once every year or less frequently. In other places, for instance, the places exposed to dust or air polluted by chemical smoke, they need checking once every three or six months.

12.2 In case too much accumulated dust is found during check, it must be cleaned to ensure the product ventilated and prevent insulation breakdown. Special attention shall be paid to the insulators, the cushion blocks, the top and the bottom of the clean product where coils are assembled. Dust in airducts can be cleaned with dry compressed air (2-3 atmospheric pressures).

12.3 Check the fasteners and the connecting pieces for the looseness, the conductive components for the traces of rust and corrosion. The insulating surfaces shall be

observed for any traces of creepage and carbonization. Corresponding measures shall be taken for handling them.

12.4 The products run for a plurality of years (five years as suggested); the insulation resistance can be measured according to 10.4.1 and 10.4.2 to determine whether the products can run continuously. Generally, no other tests are needed.

13 Safety Notices

13.1 After the product is installed and put into operation, isolated gates shall be arranged around the product without enclosure; after the product is put into operation, it is forbidden to touch the body of the product to prevent unexpected accidents.

13.2 After the product is installed, the earthing system shall be strictly checked for reliability. The earthing system shall be safe and reliable absolutely.

13.3 Taps to run for short time must run in the allowed running period marked on the nameplate.

13.4 The runtime of the nominal neutral point current of earthing transformer shall not exceed that as specified on the nameplate.

13.5 The test, the installation and the maintenance of the products shall be performed by qualified professionals.