# Installation and Operating instructions

## Dry-type Transformer

Derivation:

This manual is applicable to the loading and unloading, transportation, storage, installation, use and maintenance of resin cast dry transformers produced by our company.

**1. Product introduction**

The transformer produced by our company is made by advanced equipment based on fully absorbing and developing Chinese and foreign technologies and processes. The technical performance indicators of the product fully meet the GB1094.11-2007 standards, and the IEC726 and DIN42523 standards. The product has energy saving, small volume, light weight, moisture proof, impact resistance, flame retardant, small, overload, automatic temperature control advantages, can be widely used in power transmission and transformation system, hotels, high-rise buildings, commercial center, sports venues, stadiums, petrochemical plants, underground railway, airports, sea drilling rig, especially the installation space is limited, must be close to the load center and has special fire requirements, more can give full play to its small size, the superiority of flame retardant.

**2. Use conditions**

2.1 There are two cooling modes: air self-cooling (AN) and forced air cooling (AF).

2.2 The ambient temperature shall not be higher than 40℃, and the elevation shall not exceed 1000 meters. If the ambient temperature is higher than 40℃ or the altitude exceeds 1000 m, the appropriate quota adjustment shall be made according to GB1094.11-2007 and relevant regulations.

2.3 The insulation grade of the product is Grade F, and the temperature limit is 155℃.

2.4 This product is generally indoor type, which should be installed in indoor places with clean site, well ventilated and suitable atmospheric conditions. If the transformer is installed in the basement or other space, there should be sufficient ventilation. Generally, there should be 4m $^3$ / minute air ventilation.

**3. Attachment**

The following accessories are selected by the users according to their needs.

3.1 Temperature Controller:

In order to facilitate observation, each transformer is generally equipped with a temperature controller.

The three Pt 100 temperature measuring elements of the temperature controller are respectively embedded in the temperature measuring hole at the upper end of the

low-pressure coil. As the temperature changes, the low-voltage coil temperature is automatically monitored, and the control signal is issued when necessary, effectively ensuring the safe operation of the transformer.

The temperature controller has start and stop fan, over-temperature alarm, over-temperature trip and other functions. At present, the factory set value of the above temperature values of the domestic production plants is shown in the following table.

| name | Factory setting value | Set the adjustment range |
|---|---|---|
| Wind authority | 80℃ | 60~100℃ |
| Fan open | 100℃ | 80~120℃ |
| report to the police | 140℃ | 110~150℃ |
| trip | 155℃ | 130~170℃ |

3.2 Cooling fan:

The transformer can operate continuously at the rated capacity without a fan.

The transformer with low noise axial flow fan can increase the transformer capacity to 120%~150% when the fan runs continuously, but at this time, the load loss correspondingly increases by 0.5~1.0 times, and the impedance voltage also increases by 0.2~0.5 times. It operates in unconventional state, which can run continuously for a short period of time, but we do not recommend long-term operation.

3.3 Enclosure:

The transformer does not have a shell, the protection level is IP00, because the transformer should not be touched or near, it is recommended to use a protective fence to ensure safety.

According to the different requirements of the used environment, the IP20~IP23 protection class shell can be assembled to prevent the transformer failure caused by accidental electric shock and water drop. The enclosure shall be reliably grounded.

3.4 Outgoing line mode:

The entry and exit lines of the transformer are: up and out, up and side out, up and down out, in and out, in and out, in and out, etc. Users can choose according to the specific situation (side line if necessary).

**4, product loading and unloading and transportation**

4.1 Handling and unloading of products may be crane, crane or forklift, and it should be carefully handled during loading and unloading.

4.2 When lifting the transformer, if there is a packing box, the steel wire rope should be hung from the sleeper of the packing box (see Figure 1); if there is no

packing box or the transformer is lifted from the packing box, the hook should be hung in the four lifting holes of the transformer, and the Angle between the liftin g wire rope shall not be greater than 90° (see Figure 2).

4.3 Product loading must meet the requirements in the operation procedures, and the product must be placed firmly.

4.4 Transportation of products can be transported by trains, ships, automobiles and aircraft and other transportation means. The carriages and cabins of shipping products should be kept clean and free of dirt.

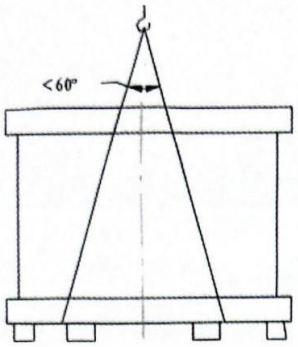



Figure Figure 1

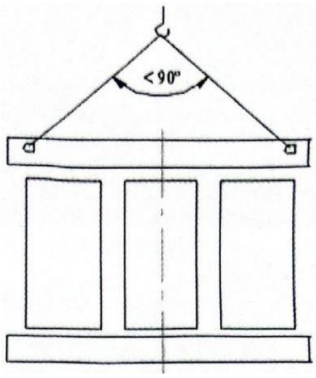



Figure Figure 2

4.5 Shake, collision and movement are not allowed during the transportation, a nd prevent rain and snow from entering the body of the transformer.

4.6 During product transportation, the tilt angle shall not be greater than 30°。

**5. Inspection and acceptance**

Upon receipt of the transformer, the user shall immediately.

5.1 Check whether the nameplate data of the product is consistent with the o rder contract, such as: product model, capacity, voltage, connection group label, imp edance voltage, etc.

5.2 Check whether the parts in the packing box match with the packing list.

5.3 Check whether the factory documents are complete.

5.4 Check whether there is no damage during the product transportation, whe ther the parts are displaced, loose or damaged, whether the wiring is loose or bro ken, whether the insulation is damaged, and whether there is dirt or foreign body.

If any serious damage is found to the packing box and the products during the inspection, please immediately notify the transportation department and the insurance department, and keep the site for treatment.

**6、 Storage storage**

If the product is not put into operation immediately after unpacking inspection, it should be repackaged and stored to prevent damage or loss.

6.1 Long-term storage products must be stored in the warehouse. The wareho

use should be clean and dry, and active chemicals or corrosive items should not be stored simultaneously. The products are not allowed to be stacked up.

6.2 short-term outdoor storage should prevent climate change and pollution, such as light, rain, snow and water, sand, dust, etc.

6.3 The storage site temperature shall not be less than-30℃.

**7. Installation precautions**

This instruction manual should be read carefully before the product installation.

7.1 During the installation and transportation of transformer, coils and leads shall not be pushed and collided.

7.2 Under normal circumstances, the transformer can be directly placed in the use site, and can be put into operation after the installation and inspection. However, for places with low anti-vibration and low noise requirements, the foundation of the transformer should be buried with anchor bolts, and the transformer should be fixed through the bolts, or another anti-vibration and noise reduction device should be added before being fixed.

7.3 The protection shell of the transformer is generally not rigidly connected with the transformer, so as not to cause resonance noise. For example, the high and low voltage inlet and outlet lines of the transformer pass through the shell, and the connection line between the outlet terminal of the transformer and the shell is preferably a soft connection (flexible connection).

7.4 After the transformer is put into operation, it is not allowed to contact the transformer; for the transformer without shell protection, the minimum safe distance between the transformer to the surrounding partition wall shall be installed (see Table 1).

epi

| system voltage Um (kV) | Power frequency and pressure resistance AC(kV) | impulse withstand voltage LI (kV) | The bare charged body to | |
|---|---|---|---|---|
| | | | solid wall (mm) | Fence barrier (mm) |
| 12 | 28 | 75 | 115 | 225 |
| 17.5 | 38 | 95 | 140 | 240 |
| 24 | 50 | 125 | 160 | 260 |
| 36 | 70 | 145 | 270 | 370 |

**8. Inspection before operation**

The following inspection shall be performed before the transformer operation:

8.1 Check whether all fasteners and connections are loose and tighten them again once.

8.2 Check whether the parts removed during transportation are properly installed, and check whether the transformer (especially in the air duct) has foreign objects. If there is excessive dust, clean up the dry compressed air used.

8.3 Check whether the fan, temperature controller and other accessories are installed in place and whether they can work normally. For the three-phase power supply fan, attention should be paid to its steering. When the fan rotates normally, the wind blows up into the coil from the bottom of the coil.

8.4 Check whether the transformer clamp parts and housing are permanently grounded.

8.5 If there is obvious water intake, dry at a temperature of 60~80℃.

**9. Tests before commissioning**

The following inspection shall be conducted before the transformer operation:

9.1 Conduct DC resistance test on the winding and compare with the factory test record.

9.2 Determine the polarity according to GB50150-2006 Electrical Equipment Handover Test Standard, measure the voltage ratio of the winding in all points, and determine the connection group number.

9.3 Check whether the transformer clamping parts and shell are really grounded. If there is an insulating pipe between the yoke bolt and the clamp parts, check whether the insulation is good.

9.4 Test of insulation resistance of coil, under normal circumstances (temperature: 20~30℃, humidity: 90%):

High pressure, one low pressure and ground 300M Ω meter: 2500V Meg-ohmmeter

Low voltage one ground 100M Ω meter: 2500V Meg-ohmmeter

If the transformer suffers from abnormal humidity and condensation phenomenon, it must be dried before the pressure test.

9.5 Test of insulation resistance of iron core, under normal circumstances (temperature: 20~30℃, humidity: 90%):

Core one clamp and ground 5M Ω instrument: 2500V Megoxulimmeter

Through the heart screw one core and ground 5M Ω instrument: 2500VMeg-ohmmeter

9.6 The test voltage is 85% of the factory test voltage for 1min.

**10. Put into operation**

10.1 Before the transformer is put into operation, the connecting piece of the voltage regulating tap shall be adjusted to the appropriate position according to the mark on the nameplate (note the same separation position); When the grid voltage is high or low, the tap can be adjusted according to the corresponding voltage on the nameplate.

For example, for 10000 ± 2x2.5%V transformers, the nameplate is as follows (see Table 2). Under the normal voltage, the tap is 4-5 (see Figure 3). When the output voltage is high, the tap is adjusted to the high voltage of the tap 3-4 (see Figure 4). If the output voltage is still high, the tap is adjusted to 2-3. When the output voltage is low, under the condition of ensuring high voltage power off, the tap will tap 5-6 with low voltage (see Figure 5). If the output voltage is still low, the tap will be adjusted to 6-7.

10.2 After the transformer is put into operation, the load should increase gradually from less to more, and the same noise should be tested.

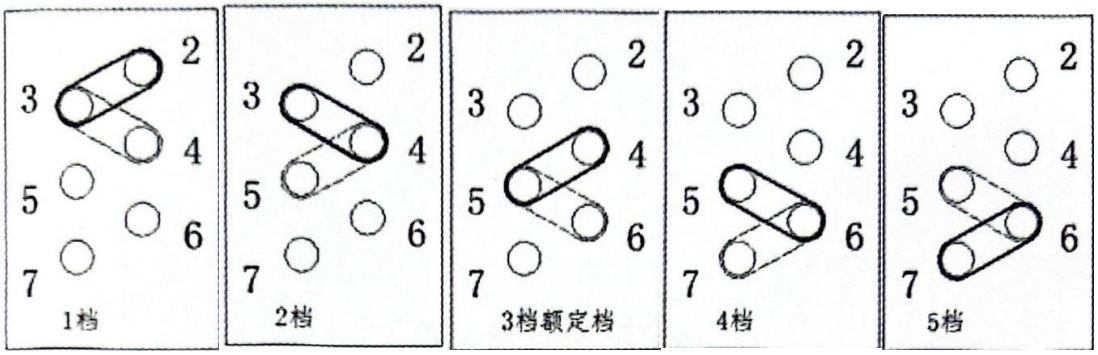
10.3 If the transformer is not out from operation, it can be directly put into operation.

If the transformer has produced condensation phenomenon at high temperature, it should be dried before being put into operation.

Table 2

| The position of the connection head | Power Grid Voltage (V) |
|---|---|
| 2 – 3 | 10500 |
| 3 – 4 | 10250 |
| 4 – 5 | 10000 |
| 5—6 | 9750 |
| 6—7 | 9500 |

The solid line is the current file, and the dotted line is the lower conversion line




1,2,3, rated, 4,5

When the rated gear 4-5 is 10500V, the equivalent voltage is 2-3 is 11000V 3-4 is 10750V 5-6 is 10250V 6-7 is 10000V

**11. Repair and maintenance:**

In order to ensure the normal operation of the transformer, it needs to be checked and maintained regularly.

11.1 Generally, inspect dry and clean places once a year or more;

For more dust, salt fog, chemical smoke and other places in the air, the inspection time should be adapted to shorten.

11.2 During inspection, the transformer must be powered off, and all high and low voltage terminals should be short-shorted and grounded to ensure safety.

11.3 During the inspection, if excessive dust accumulation is found, it must be removed to ensure air circulation and avoid insulation breakdown caused by creep-age. Remove dry compressed air, especially pay attention to cleaning the support pads, insulators and leads.

11.4 Check whether the fasteners and connections are loose, the conductive parts, contact points and other parts have rust and corrosion traces, and the insulation surface has creep-age traces and carbonation phenomena, and corresponding mea

sures should be taken for treatment when necessary.

11.5 Check whether the temperature controller and fan are working normally.

11.6 The dust in the vent holes of the protective shell shall be treated accordingly.

12. The experiment, installation and maintenance of the transformer must be undertaken by qualified professionals.

**Registration and opinion feedback form**

| | | |
|---|---|---|
| Name of the product unit | | |
| Product opinion feedback contact person | | Contact number: |
| Product use parameters | | See the nameplate and the product qualification certificate |
| Product model number, product code number<br>Factory serial number, factory date and month | | |
| Feedback on accessories' use opinions: | | |
| Feedback on product ontology usage opinions: | | |
| Feedback to pre-sale and during-sale &after-sale service personnel: | | |
| The construction of the product: | | |