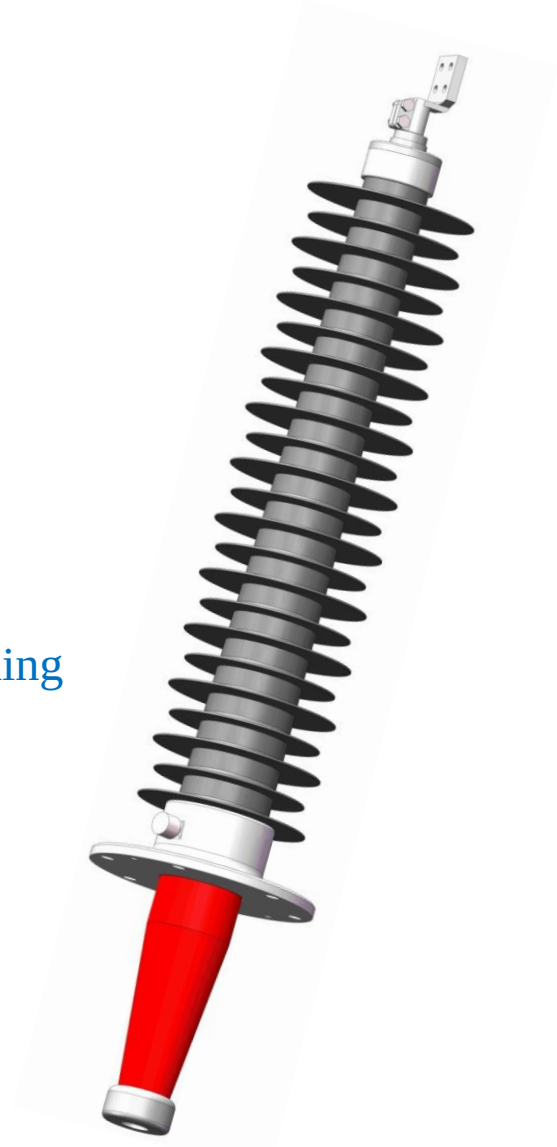
ChinSun™

Transformer Bushing

Installation & Maintenance Instruction



12~420 kV
High Voltage
Dry Type Transformer Bushing

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CONTENT

1 Description

1.1 Structure Overview

ChinSun has been producing dry - type electric bushings since 1998. FBRG series transformer bushings are based on the Resin Impregnating technology developed by the company in 2003. The technology has been continuously researched and improved, and has matured over this time. The dry - bushing structure is shown schematically in Fig. 1.

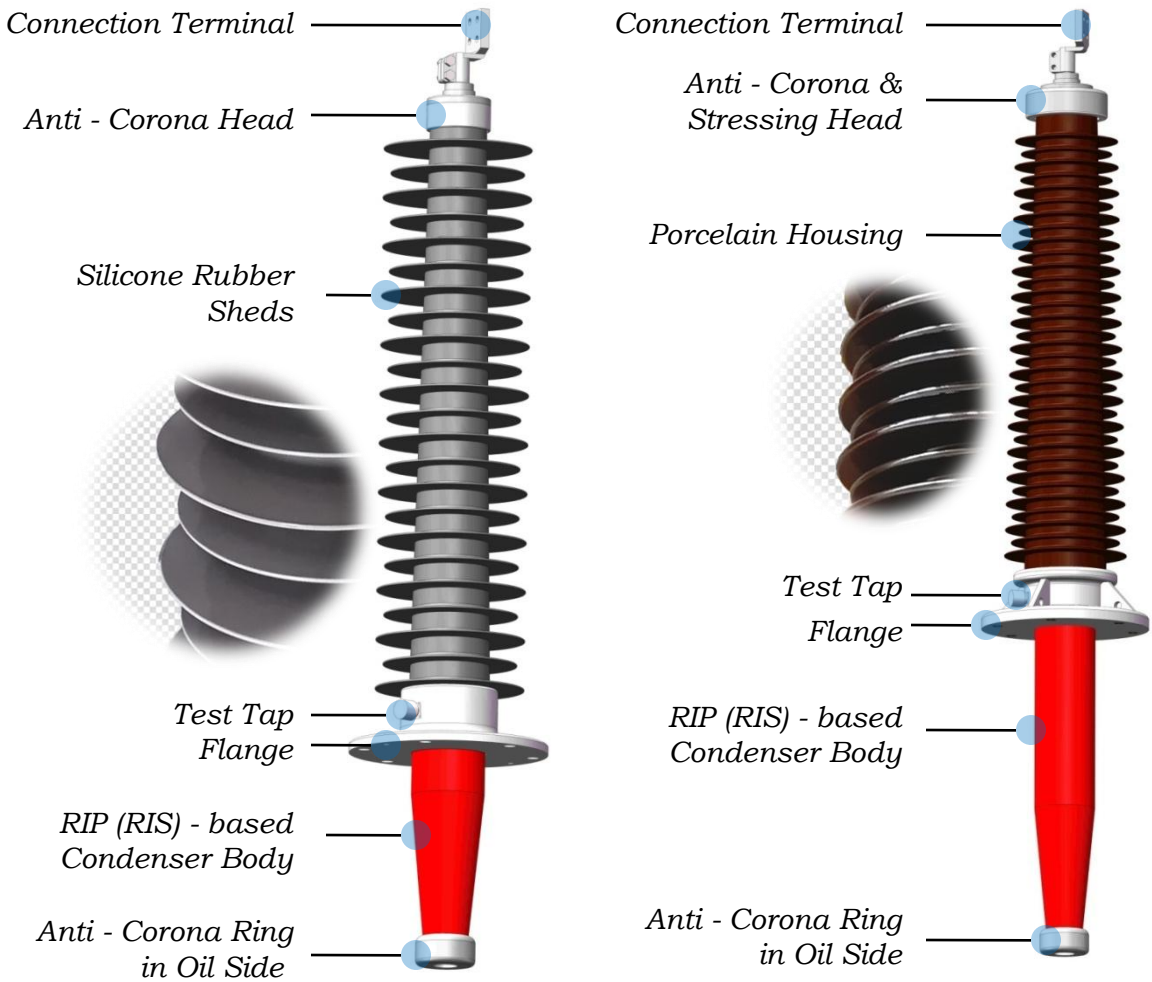

Fig. 1

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1.2 Design

The bushing is condenser type with internal insulation of Resin Impregnated Synthetic (RIS) or Resin Impregnated Paper (RIP). Carbon-Synthetic paper is used as capacitive grading layers with supplementary semi - conductive paper edge, which provides good conductivity and improves the partial discharge performance that results in enhancement of the insulation margin.

In advantage of carefully selected insulating materials with electrically stable performance, inflaming retardance, and without decomposition, the bushing is explosion - resistant and fire-retardant.

With compact structure, small size, light weight, the dry - bushing is convenient for transportation and easy for installation. The dry - bushing can be mounted at any angle from vertical (90 °) to horizontal (0 °) and even inversely vertical (-90 °).

The FBRG dry - type bushing is designed with excellent mechanical strength, having ability to withstand the heaviest bending load specified by IEC60137, which is especially suitable for application in heavy - seismic regions.

This dry - type bushing can be used in conditions of wide - range ambient temperature, from -55℃ to +55℃.

The bushings, especially those with silicone rubber sheds, have excellent anti - pollution flashover performance. The Hydrophobic and self - cleaning characteristics of silicon rubber sheds are excellent and the products are widely used in heavily contaminated regions in China.

Thanks to utilizing of synthetic Synthetics which is almost moisture resistant, the drying period of RIS - based bushings is substantially shortened, and so the manufacturing cycle is greatly cut down.

ChinSun can provide FBRG dry - type bushings designed according to customer requirements.

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Internal & External Insulations:

The internal insulation body is mainly made from Resin Impregnated Synthetic (RIS) or Resin Impregnated Paper (RIP). As capacitive grading layer, carbon - Synthetic paper is used instead of aluminum foil which is popular in bushing industry. As we know, of traditional dry type RIP bushings, the gap between the internal condenser body and external housing was filled with foamed polyurethane elastomer, which has shown unreliable in practice over past years. Indeed, high voltage bushing requires extra - reliability, and as said, the much simpler, the more reliable. So, we design our bushing structure as simple as we can. Fig. 2 shows this kind of Simple Structure Bushing, in which the silicone rubber sheds are directly fixed on the condenser core.

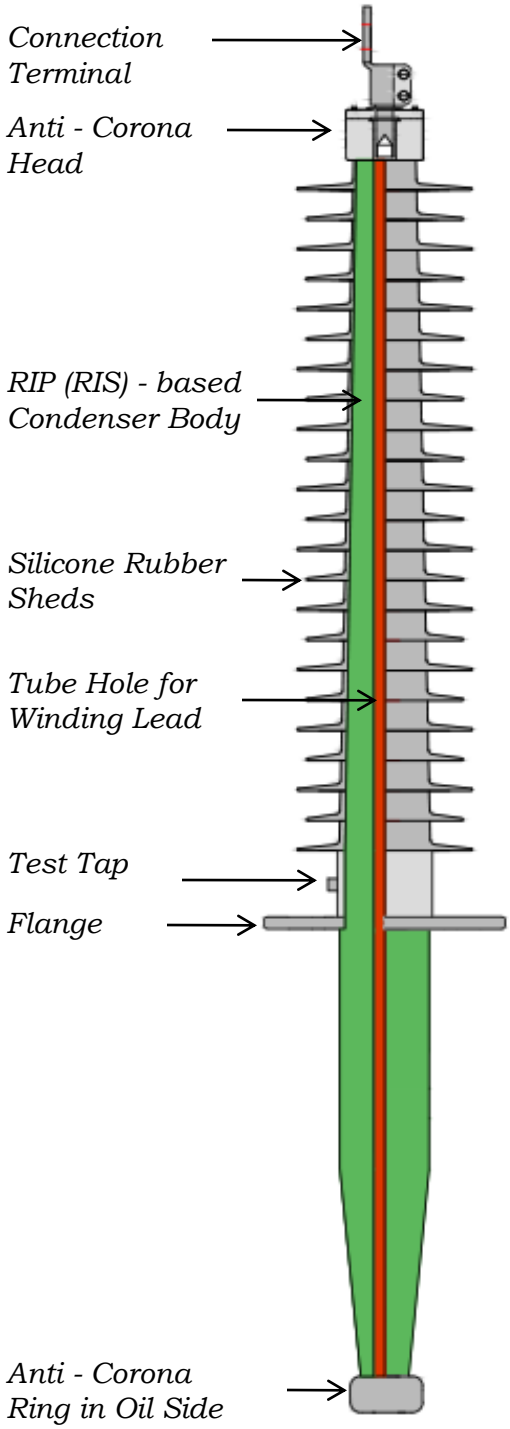

Fig. 2

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That possibility is realized by taking advantage of hi - strength Synthetics which are used in the condenser insulation for RIS core body, or the enforcing layer for RIP core.

Yes of course, we can also offer bushings with porcelain housing which is filled with special paste named micogel (as shown in Fig. 3).

External Insulation Color:

The color of silicone rubber sheds (Fig. 2) is basically red or gray. The color of porcelain housing (Fig. 3) is basically brown. The color of silicon rubber sheds can be changed according to customer's requirement.

Tube Hole for Winding Lead:

The inner tube is made from aluminum alloy or brass. The diameter of the tube hole is selected according to customer's requirement.

Flange:

The material for flange is aluminum alloy.

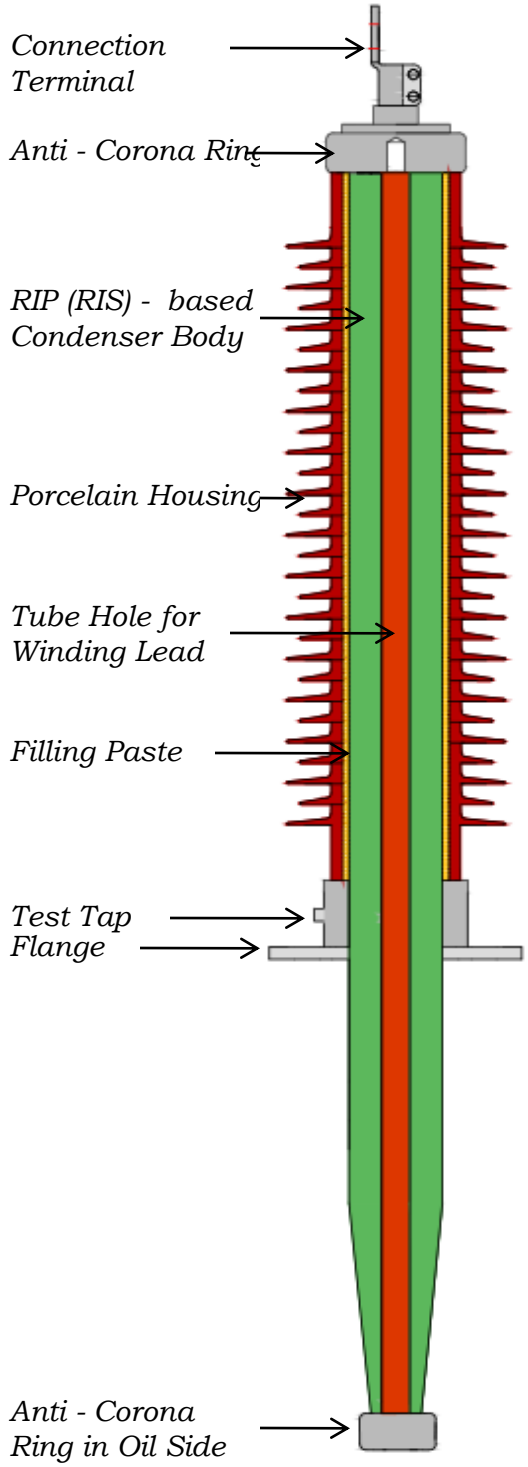

Fig.3

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1.3 Usage Conditions

Application:	Suitable for oil-immersed transformers.
Classification:	Resin Impregnated Synthetic (RIS) or Resin Impregnated Paper (RIP), capacitive grading, outdoor-transformer Bushing.
Ambient Temperature:	Outdoor side: - 55°C~ + 55°C
Installation Site Altitude:	< 1500 m (can be higher according to customer's requirement).
Specified Creepage Distance:	31mm/kV (can be different according to customer's requirement).
Corrosion Protection:	All exposed parts are made from corrosion-resistant material
Standard:	According to IEC 60137 Ed 6.0 and GB/T 4109 - 2008
Packing:	The bushing is packed and sealed in a plastic bag, lying in a well-ventilated wooden crate with flange sitting on crate's bottom, and the heads of both ends supported by wooden matboard.

1.4 Mechanical Stresses

Test Bending Load:	Acc. to IEC 60137 Ed 6.0 and GB/T 4109 - 2008 table 1, class II
Bending Load in Use:	50% of the values for the test bending load.

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2 Packaging

1- Packed and sealed in plastic film bags: Firstly, clean the surface of the bushing thoroughly. After the whole bushing is completely cleaned and dried, pull the plastic film tube on to both sides of the bushing, cutting off the film tube to appropriate length, and finally, sticking & tying the film tube with adhesive tape to seal completely both sides of the bushing. (Desiccant packets maybe placed into the film bag in some cases, e.g., the storage period is super long).
Requirements: The film tube should appear fine, without damage, and can guarantee the protective sealing effect.

2- Documents: Put the routine test reports, certificate, packing list, product manual and supplementary documents (if there are) into a water - proof folder. Stick the folder with transparent tape at the designated position in the wooden crate.

3- Packaging: Select a wooden crate of appropriate size according to the structure and size of the bushing. Load the bushing into the crate and fix it tightly.
Requirements: The bushing should be fixed firmly, and all packing belts and nails are reasonably distributed and in designated place.

4- Information marks on package: The following information should be painted on the wooden crate: product name, rated voltage (or nominal voltage), serial number, and manufacturer.

Fig. 4

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3 Mounting

3.1 Precautions

1- Before installation, please check whether the bushing is damaged during transportation, whether all fasteners are tightened and if there is any leakage of filling micogel. Remove the contamination on the surface of the bushing please. If it is convenient, the sealing performance of the bushing should be be retested and verified.

2- Please handle the bushing gently when installing it, and do not damage the surface of it. After installation, clean the bushing surface with a silk cloth.

3- Lifting should be carried out by tying the nylon rope to the flange, and the nylon rope can be used to balance the bushing at the upper end. And be careful to avoid damage to the sheds of bushing (Ref. to Fig. 5 and Fig. 6);

4- When installing the bushing, it must be ensured that all the screw bolts of the flange are reliably fastened, and the compression of the O-ring under the flange must be guaranteed.

Fig. 5 Correct Lifting

Fig. 6 Wrong Lifting

（▲When lifting the bushing, be sure not to force the sheds in order to avoid scratching.）

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3.2 Connection with the Winding Leads

The physical components of the bushing head are shown in a photo picture (Fig. 7), and its structural drawings are shown in Fig. 8.

1 Adapter
2 Connection Bolt
3 φ8 Hole
4 Tightening Nut
5 "O" Ring
6 Anti-Corona Head

Fig. 7 Components of the Bushing Head

1 Connection Terminal
2 Adapter
3 Connection Bolt
4 Tightening Nut
5 "O" Ring
6 Mounting Bolt
7 φ8 Hole
8 Anti-Corona Head

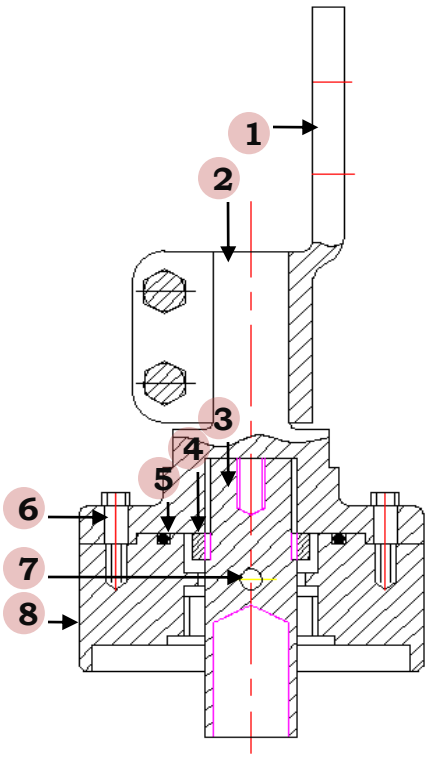

Fig. 8 Structure of the Bushing Head

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1- Preparations before bushing installation: As shown in Fig. 9, loosen the connection terminal and the adapter step by step as shown in the figure, and then loosen the tightening nut with a wrench to separate the connection bolt from the adapter.

Fig. 9

2- Refer to Fig.10:

Step A- Weld (or press) the transformer winding lead into the large hole of the connection bolt, and fasten an M10 long bolt into the small screw hole in the other side of the connection bolt.

Step B- Prepare a strong, clean and soft rope (such as a nylon rope) with a length greater than the total length of the bushing and a diameter of 6 to 10mm. Let the rope down from the air end to the oil end along the bushing bore. Fix the rope onto the M10 long bolt, slowly pull the winding lead to the air end of the bushing until the Φ8 hole of the connection bolt is exposed, and then insert into the Φ8 hole a round-steel-rod (without burrs), which is used to position the connection bolt on the anti-corona head, and to prevent it from falling down into the transformer tank. Finally untie the rope and remove the M10 long bolt.

Step C- Screw the tightening nut on the connection bolt, then screw the connection bolt into the adapter (tighten to the bottom). Then tighten the nut in reverse in order to lock the connection bolt (to prevent it loosening from the adapter). Pull out the round-steel-bar and put the adapter sitting back onto the anti-corona head. Finally tighten the mounting bolts for the adapter, and fix the connection terminal.

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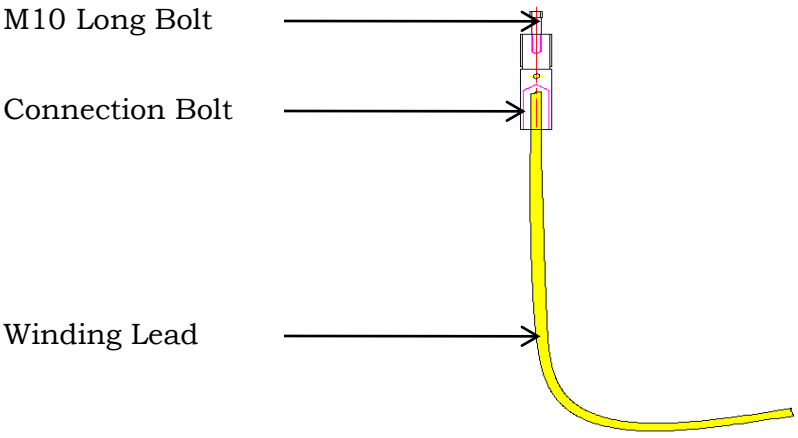

Fig.10

4 Maintenance

1- In acceptance check or before-running test, it is necessary to carry out the power frequency withstand voltage test and to measure the dielectric loss factor and capacitance of the bushing.

In power frequency withstand voltage test, the voltage applied on the bushing is usually 80% of the value recorded in the routine test report provided by the manufacturer.

It is highly recommended to carry out measurement of dielectric loss and capacitance in good weathers, in order to avoid the influence by the damp surface of the bushing, because it apparently affects the measured dielectric loss factor. (Our experience shows that the dielectric loss factor of bushing's composite insulating surface is very sensitive to humidity, and the measured results are surely reliable when the relative humidity is less than 40% and this humidity lasts 48 hours. In this case, the measured dielectric loss factor should be less than 0.004.)

2- The bushing is basically maintenance - free. It is recommended to measure the dielectric loss factor and capacitance every 2 - 3 years, which is benefit for monitoring the bushing's insulation state and ensuring the running safety & reliability of the bushing. The length of the lead line should be as short as possible in order to reduce measurement deviation.

3. Cleaning of silicone rubber housing: When the silicon rubber sheds become dirty, cleaning is unavoidable. it is recommended to rinse the surface with water, or directly wipe the surface with soft silk, be careful and not scratching.

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5 Documents Accompanying the Goods

- Packing list
- Certificate of Quality
- Routine test report
- Installation & Maintenance Instruction

6 Particulars for Ordering

1- When ordering, please state:

- ✓Rated voltage
- ✓Rated current
- ✓Environment pollution level
- ✓Installation way(horizontal or vertical)
- ✓If with assorted current transformer

2- Bushings can be designed according to customers' requirement.

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