



## **Combined Transformer**

# **Instructions for transportation, installation and maintenance**

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## **1. Overview**

### **1.1 Scope of application**

This instruction manual is suitable for combined transformers. This manual provides the usage and environment, basic performance, transportation, performance, transportation, use, maintenance and precautions of the above-mentioned products. The combined transformer is a transformer (also called high-voltage metering box) that is a combination of current transformer and voltage transformer, and performs high-voltage metering in the power grid. The wiring mode of the transformer is divided into V/V and Y/yo. The transformer B phase of V/V wiring mode has no separate current and voltage coils, commonly known as two elements; the transformer B phase of Y/yo wiring mode is equipped separate current and voltage coils, commonly known as three-element.

### **1.2 Executive standard**

GB20840.1-2010 "Instrument Transformer Part 1: General Technical Requirements"

GB20840.2-2014 "Instrument Transformers Part 2: Supplementary Technical Requirements for Current Transformers"

GB20840.3-2013 "Instrument Transformer Part 3: Supplementary Technical Requirements for Inductive Voltage Transformer"

GB20840.4-2013 "Instrument Transformers Part 4: Supplementary Technical Requirements for Combined Transformers"

## **2. Product descriptions**

### **2.1 Working conditions and environment**

#### **2.1.1 Ambient temperature**

Maximum temperature: +45°C

The average daily temperature does not exceed: +35°C

Minimum temperature: -25°C

#### **2.1.2 Atmospheric conditions**

There is no dirty, corrosive and explosive medium in the atmosphere that seriously affects the insulation of the transformer.

**2.1.3 Monthly average maximum relative humidity:** 95% (at 25°C).

**2.1.4 Maximum wind speed:** 35 m/s.

**2.1.5 Installation site:** Indoor (Outdoor)

#### **2.1.6 Earthquake resistance:**

The horizontal acceleration of the earthquake is 0.25 g, the vertical acceleration is 0.125 g, the sine cycle is 5 times, the safety factor is 1.67, and the fortification intensity is 8 degrees.

### **2.2 Main technical parameters**

### 2.2.1 Product model meaning

JLSZV(Y)X-10(W)

- J — voltage Transformer
- L — current transformer
- S — three phase
- Z — epoxy cast insulation
- V(Y) — V/V wiring (Y/yo wiring )
- 10 — rated voltage class (kV)
- (W — outdoor equipment)

The above are typical models, special order products may vary slightly.

### 2.2.2 Rated frequency: 50Hz

### 2.2.3 The basic parameters are shown in the table below:

Table 1

No.	Rated voltage (kV)	Rated insulation level (kV)	Rated secondary current	Accuracy class		Instrument security factor	Rated voltage factor
				Current Section	Voltage Section		
1	3	3.6/25/40	5A or 1A	0.2	0.2S	≤10	1.2times, continues
2	6	7.2/30/60					
3	10	12/42/75					
4	35	40.5/95/185					

Note: The load power factor is 0.8 (lagging).

### 2.2.4 Insulation requirements:

(1) At room temperature, use a 2500V megger to measure the insulation resistance of the primary winding to the secondary winding and the casing, between the secondary windings and to the casing, which the value shall not be lower than 1000MΩ.

(2) Withstand voltage level

No.	Rated voltage (kV)	Test items(Take the value at 100% national standard)			
		Between secondary winding and to ground-power frequency withstand voltage (kV)	Primary to secondary and ground-power frequency withstand voltage (kV)	150 Hz induction withstand voltage (kV)	Lightning impulse voltage (kV)

1	3	3kV/1 min	25kV/1 min	18kV/40s	40
2	6	3kV/1 min	30kV/1 min	23kV/40s	60
3	10	3kV/1 min	42kV/1 min	30kV/40s	75
4	35	3kV/1 min	95kV/1 min	80kV/40s	185

Note: This type of product should be checked at 80% of the test voltage specified in the above table when it is accepted for repeated power frequency withstands voltage. The power frequency withstand voltage test is not allowed for the Y-type wiring voltage transformer, and a higher frequency should be used.

Note: The above test has the risk of electric shock; please arrange people with professional knowledge and skills to test.

### **2.2.5 PD level**

The power frequency of 150Hz is required for partial discharge testing of this product. When using 50Hz, the voltage can only be applied up to 1.35 times the rated voltage.

Note: The above test has the risk of electric shock, please arrange people with professional knowledge and skills to test.

### **2.2.6 Accuracy test**

The secondary cables of some products have been connected according to the user's requirements before leaving the factory.

When checking the error, the secondary rated load must be applied to the secondary terminal of the transformer body; however, in this state, it must be ensured that there is no short circuit at the end of the cable, in order to prevent damage to the transformer. When testing the voltage part error of the small current ratio transformer, in order to ensure the accuracy of its test, the secondary terminal of the current part must be short-circuited.

Note: The above test has the risk of electric shock, please arrange people with professional knowledge and skills to test.

## **2.3 Product structure and working principle**

### **2.3.1 Product structure**

Combined transformer products are composed of casting body (housing), secondary outlet box (including secondary wiring terminals), installation board and other parts.

Combined transformer in V/V wiring mode, its A and C phases are connected in series with current transformers respectively, and the voltage part is connected in V/V mode. This transformer is suitable for three-phase three-wire meter measurement.

Combined transformer in Y/yo wiring mode, its A, B and C phases are connected in series with current transformers respectively, and the voltage part is connected in Y/yo mode. This transformer is suitable for three-phase four-wire meter

measurement.

The product is epoxy resin casting insulation, single-phase, busbar type inductive voltage transformer. The body is provided with grounding bolts and marked with a grounding plate. The body and the epoxy resin mixture are integrally cast, and the secondary terminals are directly led out from the cast body. The body is cast in one piece with epoxy resin, which has good anti-seismic effect and high mechanical strength.

### **3. Transportation**

The product is transported vertically, and the transportation method used (such as: railway transportation, sea/river transportation, road transportation, air transportation, etc.) depends on the distance and scope of the product transportation. The product packaging during transportation must ensure the necessary supports and cushions to prevent damage during transportation.

#### **3.1 Unpacking**

Check the packaging box and the products in it immediately after the goods arrive at the installation site.

Inspection items include:

- Check the packaging condition before unpacking:
- Product appearance inspection:
- The data listed on the nameplate;
- Other defects that affect the operation of the product.

#### **3.2 On-site**

There should be no serious vibrations, bumps and shocks during transportation.

If the transformer will be placed for a period of time before it is put into operation, the following measures should be taken: Store the transformer in a safe, well-ventilated environment where it will not overturn, either boxed or unboxed.

#### **3.3 Storage**

The product storage place should be free of corrosive gases and media, and should not be directly exposed to sunlight and rain, and the temperature should not be lower than  $-20^{\circ}\text{C}$ . Long-term storage should be packed. In addition, the packaging box is protected from corrosion.

The insulation resistance and insulation of the winding must be checked before the product is used again after storage or long-term use. If it does not meet the requirements, it should be processed again.

### **4. Transshipment and installation**

#### **4.1 Transshipment**

After opening the package, lift the transformer out of the package. The weight of the

transformer can be found on the nameplate. When moving the transformer horizontally, avoid jerky movement to prevent the transformer from swinging back and forth.

#### **4.2 Installation**

Before installation, check whether the base of the transformer is loose to ensure the stability of the transformer after installed on a pole. For the transformer that has been exposed and stored in the warehouse for a long time, the dirt and dust deposited on the surface should be removed in time.

During the process of hoisting the product up to the pole, be careful not to touch the umbrella of the transformer with the spreader to ensure the stability of the center of gravity.

Carry out primary and secondary wiring according to the relevant requirements, and the wiring must be connected reliably. The secondary and product requirements must be connected to the ground at one point. Do not make the grounding resistance too large to avoid accidents.

When tightening the secondary cable, attention must be paid to the strength of use and the encapsulation of the cable to prevent short-circuit caused by damage to the insulation of the secondary cable. When connecting the voltage secondary part of the cable, it must be grounded as required, and it is strictly forbidden to short-circuit the secondary part directly or indirectly, so as to avoid damage to the product during operation.

When wiring the combined transformer with complex current ratio and multiple current ratio specifications, the current part should be connected according to the wiring diagram on the nameplate and the corresponding secondary outlet terminal, and the remaining current terminals should be left empty, and short-circuiting or grounding is strictly prohibited. Unused windings should be shorted to the maximum ratio.

#### **Note:**

1. The secondary of the current transformer is strictly prohibited to open, and the secondary of the voltage transformer is strictly prohibited to short.
2. During the installation, there is a potential danger of being injured by falling or turning over.

#### **4.3 Grounding**

Each transformer should be grounded reliably, and the monitoring function can be guaranteed in the case of incomplete or proper conditions.

**Safety Precautions: Incomplete or improper wiring will pose a threat to personal safety.**

## **5. Commissioning and maintenance**

### **5.1 Inspection before putting into operation**

- Read all the internal rules and regulations and user manuals related to the commissioning of transformers
- Check that the wiring board should be free from bumps, scratches and other damages.
- Check the appearance of the transformer and there should be no cracking phenomenon.
- Check the secondary wiring to ensure that there is no winding connection failure. Make sure that each contact point is in good contact. The ground terminal must be on the base.