

HBK Series
control transformers

User Manual

In conformity to the standard: IEC 61558-2-2
Please read the instructions manual carefully before installation and use, and keep it properly for possible reference.



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HBK Series		
Capacity (VA)	Outline Dimensions length×width×height (mm)	Installation Dimensions length×width (mm)
2500	192×310×215	160×160
3000	192×315×215	160×165
4000	240×340×245	180×170
5000	240×350×245	180×180
10000	300×370×310	240×180

5. Operating manual

5.1 Open the packing cases and take out the manual and the transformer; read the operating manual carefully in order to ensure the correct operation.
5.2 Fasten the transformer with reliability on the suitable position to prevent it from vibration and corrosion.
5.3 Before using the transformer, please test whether the circuit voltage or the power grid voltage is the rated input voltage.
5.4 The allowable deviation is ±5%. If the tested voltage exceeds the allowable range extremely, please add a stabilizer to the front terminal of the transformer to make sure that the transformer works well with reliability.
5.5 Select wires with proper cross section, and then do wiring following the marks, energizing the circuit after checking, and then the transformer can work normally. The nominal cross section of the power line can be seen from the following table.

Input Current at Rated Output I (A)	Nominal Cross Section (mm²)
I≤6	0.75
6<I≤10	1.00
10<I≤16	1.50
16<I≤25	2.50
25<I≤32	4.00
32<I≤40	6.00
40<I≤63	10.00

6. Notes

6.1 Before purchase please estimate the total capacity of the electric appliances you need referring to the structures from figure 1to figure 4. Choose transformers with a certain spare capacity to make sure that the instantaneous startup will not burn out the transformers.
6.2 The transformer is designed and produced strictly in accordance with the relevant national standard. When you use a multi-tap voltage transformer, please use 3.2.4.4 example as a reference for calculation in order to ensure the correct application. In general, no matter what kind of transformer you will use, the total current should not exceed the rated current of the transformer.
6.3 Before using the transformer, carefully verify various data on the nameplate and attachment manuals to make sure whether the product meets your requirements. After confirmation, turn on the electricity for the transformer application.
6.4 After being energized, the iron core and coil of the transformer will be heated (the temperature rise shall not exceed 80K) which belongs to a normal phenomenon. If the temperature rise is more than 80K, even smoking occurs, customers should cut off the power, re-check the capacity of the electric appliances and make adjustment.
6.5 In transportation, collision should be avoided. Do not be affected with damp. Please pay attention on the maintenance in use to ensure the service life of the transformer.
6.6 Before using this transformer series, make sure that they are reliably grounding.

7. Ordering Instruction

When buying products, customers should be clear to the following:
7.2 Transformer model, specifications, capacity, primary and secondary voltage and capacity allocation of secondary voltage, or take the examples of the figure 1 to figure 4 as reference to choose the products that are suitable for you.
7.3 Outline dimensions and installation dimensions in this manual is the standard dimensions of transformers produced in our company; if you need to change the dimension, make special instructions when you order it.

1. Summary

1.1 HBK series control transformers (hereinafter referred to as the transformer), have characteristics of excellent performance, reliable operation, wide applicability etc., usually used in the mechanical equipment for the control of the electric appliances, illumination and power supply of indicator light.
1.2 Product standards: IEC 61558-2-2

2. Operating environment

2.1 The altitude does not exceed 2000 m
2.2 Ambient air temperature: the highest temperature is not more than 40 °C; the lowest is not less than - 5 °C.
2.3 Air relative humidity: monthly average maximum relative humidity is 90% during the wettest month. At the same month, the monthly average temperature is +25°C.
2.4 No violent vibration or bump.
2.5 In medium without explosion hazard, where no air might corrode metal and destroy insulation or no conductive dust existing.
2.6 The place where is no invasion of rain and snow.
2.7 The power supply voltage waveform is similar to sine wave

3. Model and basic parameters

3.1 Product model and meanings



3.2 Transformer structure

3.2.1 Transformers, according to the difference of its capacity and voltage, can be divided into a variety of different specifications. But they are all the single phase multiple winding, primary and secondary mutual coupling separately winding transformers.

3.2.2 For the coil of this series of transformer, when there is only a secondary winding, it can bear full rated capacity; if there are multiple windings, each winding should be able to bear a given capacity; but the sum of each winding capacity shall not exceed the total capacity, as shown in figure 1, figure 2, figure 3, figure 4.

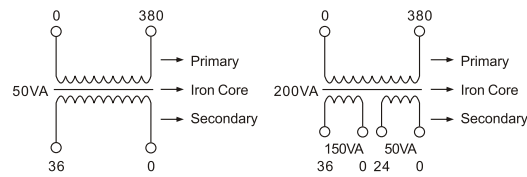


Figure 1
Independent Winding

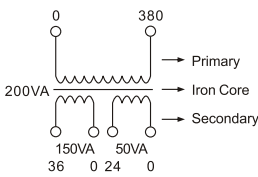


Figure 2
Separate Winding

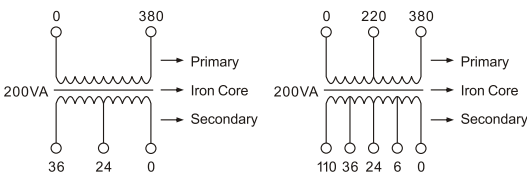


Figure 3
Hybrid Winding

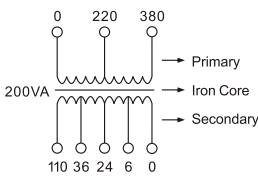


Figure 4
Continuous Center-tapped Winding

3.2.3 Illustration with examples

3.2.3.1 For example, in figure 1, for a HBK-50 type with capacity of 50VA, input voltage of 380V and output voltage of 36V, as there is only one winding for the primary as well as the secondary, it can bear full capacity of 50VA.

3.2.3.2 In figure 2, for a HBK-200 type with capacity of 200VA, input voltage of 380V and output voltage of 36V, 150VA and 24V, 50VA, as only one primary winding on the primary, it can bear the

rated capacity of 200VA. The secondary has two separate independent windings with corresponding dedicated capacity, therefore these two windings bear the capacity respectively, but the total capacity should be 200VA.

3.2.3.3 In figure 3, for a HBK-200 type with capacity of 200VA, input voltage of 380V, output voltage of 36V and 24V, as there is only one primary winding on the primary, it can bear the rated capacity of 200VA. Secondary windings have center taps, so only when the highest voltage of 36V was being used alone for the secondary can reach 200VA-load. Only 133VA can be loaded if the output voltage is 24V rather than 200VA. The total current on the secondary is:

$$I_2 = P_e / U_2 = 200 \text{ VA} / 36 \text{ V} = 5.55 \text{ A};$$

Therefore, when 24V is used alone, the capacity equals to:

$$24 \text{ V} \times 5.55 \text{ A} = 133 \text{ VA}.$$

When 36V and 24V are used at the same time, the total current shall not exceed 5.55A. Whatever the output voltage is used alone or in groups at the same time, the total load current cannot exceed the rated current of the transformer.

3.2.3.4 In figure 4, for a HBK-200 type with capacity of 200VA, input voltage of 380V and 220V, and output voltage of 110V, 36V, 24V and 6V, as center taps are on the both primary and secondary windings, the maximum operating current of the primary is:

$$I_1 = P_e / U_2 = 200 \text{ VA} / 380 \text{ V} = 0.526 \text{ A};$$

Therefore, whatever 220V or 380V is applied, the current should not exceed 0.526 A. When 380V is used, the capacity of the transformer is 200 VA. When 220V is used, the maximum capacity of the transformer is:

$$200 \text{ VA} / 380 \text{ V} \times 220 \text{ V} = 116 \text{ VA};$$

Where the capacity of the transformer was changed from 200VA to 116VA;

Meantime, the capacity of the secondary should be reduced to 116VA. The maximum operating current of the secondary depends on the service condition of the primary. If primary is connected to 380V, the capacity of the transformer should be 200VA, thus the secondary current should be:

$$I_2 = P_e / U_2 = 200 \text{ VA} / 110 \text{ V} = 1.8 \text{ A}.$$

When 110V is used alone, the capacity is: 110Vx 1.8A= 200VA

When 36V is used alone, the capacity is: 36V x 1.8A = 65VA

When 24V is used alone, the capacity is: 24V x 1.8A = 43VA

When 6V is used alone, the capacity is: 6V x 1.8A = 11VA

If two groups or more than two groups of the output voltage are used at the same time, the total current of the secondary cannot exceed 1.8A. If the primary is connected to 220V, the capacity of the transformer should be 116 VA rather than 200VA.

So thesecondary current is:

$$I_2 = P_e / U_2 = 116 \text{ VA} / 110 \text{ V} = 1.05 \text{ A}.$$

When 110V is used alone, the capacity is: 110V x 1.05A = 116VA

When 36V is used alone, the capacity is: 36V x 1.05A = 38VA

When 24V is used alone, the capacity is: 24 V x 1.05 A = 25VA

When 6V is used alone, the capacity is: 6V x 1.05A = 6.3VA

If two groups or more than two groups of the output voltage are used at the same time, the total current of the secondary cannot exceed 1.05 A.

4. Outline dimensions and installation dimensions

HBK Series		
Capacity (VA)	Outline Dimensions length×width×height (mm)	Installation Dimensions length×width (mm)
25	78×69×90	56×50
50	78×69×90	56×50
100	84×83×94	64×64
150	102×88×109	76×65
200	102×94×109	76×71
250	120×107×123	90×77
300	120×113×123	90×83
400	132×117×132	110×93
500	132×122×132	110×98
1000	150×137×147	110×113
1500	180×254×205	150×140
2000	180×270×205	150×156