

CALCULATION METHOD OF THE COOLING CAPACITY FOR CABINETS

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1. Selection of Cabinet Air - Conditioners

- $Q_t = Q_i + Q_r$
- Q_t : The total heat generated by the cabinet (Unit: W)
- Q_i : Total heat from the cabinet - interior equipment. (Unit: W)
- Q_r : The heat transferred from outside the cabinet to the inside. (Unit: W)

- $Q_r = K \times A \times \Delta T$

k : Heat transfer coefficient

A : The surface area of the cabinet (Unit: m^2) $\Delta T = T_1 - T_2$ (Unit: $^{\circ}C$)

T_1 : Maximum temperature outside the cabinet T_2 : The controlled temperature inside the cabinet

The heat - transfer coefficients of the main materials are as follows.:

- ◆ 1) 、 $k=5.5W/m^2 \cdot K$ ----Steel material cabinets
- ◆ 2) 、 $k=12.0W/m^2 \cdot K$ --- Cabinets Made of Aluminum Magnesium Alloy
- ◆ 3) 、 $k=0.2W/m^2 \cdot K$ -----Plastic cabinet
- ◆ 4) 、 $k=1.5 / m^2 \cdot K$ ----- Asbestos

•Precautions for Model Selection:

For outdoor cabinets, if considering dustproof, waterproof and antitheft, choose outdoor - specific cabinet air conditioners.

The layout of the air conditioner should refer to the equipment distribution map.

In principle: For the same cooling capacity, multiple units are better than a single unit.

Observe the structure of the cabinet. Check whether the outer shell is sealed, whether there is a partition inside, and whether there is a circulation space for air.

e.g. The external dimensions of a steel - material cabinet are as follows:
Length × Height × Thickness: 800mm × 1000mm × 500mm

- The heat generating components inside the cabinet produce 650W of heat.
- The cabinet inner control temperature is 29 °C, outside is 36 °C.
- Calculate: The surface area of the cabinet: $A=0.8*2*2+0.5*2*2+0.5*0.8=5.6\text{m}^2$.
- The heat transferred from outside to inside the cabinet: $Q_r=k*A*\Delta T=5.5*5.6*(36-29)=138.4\text{W}$
- The total heat generated by the cabinet: $Q_t=Q_i+Q_r=650+138.4=788.4\text{W}$
- Therefore, choose the cabinet air conditioner of model DKC08 (with a cooling capacity of 800W).



Qi: The empirical formula to calculate the total heat from the equipment inside the cabinet. (Unit: W)

1、 Heat Generation of Frequency Converter, Driver, Servo - Amplifier, Industrial Control Computer:

The efficiency of these devices is generally 97%, 3% of the loss is eventually converted into thermal energy.

Therefore, the heat generation of such devices can be estimated as = Total Device Power × 3%.

2、 For large - scale transformers, the heat generation can be estimated at around 1% - 1.5% of the transformer capacity.

(Attention: KVA means KW)

3、 The heat generation of a soft - starter is about 1% of its starting power.

4、 Others: Heat generation of a common server: about 150W - 300W per unit; Heat generation of a UPS: 30% of its power.

5、 The heat generation of components such as PLCs, circuit breakers, and contactors is relatively small.

A group has a heat generation of about 30W - 50W.

(It can be neglected.)

