

# **ME800 MV Drives Mining Industry Solutions**

——Jining Anju mine counter-rotating fan application

## **Abstract**

Mainly introduces the application of ME800 MV Drives in mining industry. Introduces the load characteristics, process characteristics of the fan, and features of ME800 medium voltage Drives.

Key words: Fan, MV Drives, Energy saving.

## **1. Project overview**

Anju Coal Mine is a key construction project in Jining City. The mine field area is about 76 square kilometers. The mine is developed by vertical shafts.

The main and auxiliary shafts are arranged in the factory with depths of 998 meters and 1008 meters. The designed production capacity has reached 1.5 million tons/year, and the calculation service life is 55.4 years.

The ventilation system of Anju Coal Mine adopts two pairs of counter-rotating fan. Each set of counter-rotating fan contains two 10kV 560kW fans; four STEP ME800 series Drives are used. This article will analyze the application of on-site fans and energy saving efficiency.

## **2. The benefit of MV Drives for counter-rotating fan in mine**

Due to the complex production conditions and environmental impacts, coal mines use larger power models for mining equipment. The motor runs at full speed and consumes very much energy.

Coal mine main ventilator is one of the major equipment. As the main ventilation of

the mine, it operates 24 hours a day. However, with the continuous excavation of mining and, the required air volume will continue to increase, and the power used by the wind turbine will also increase. However, the power of the ventilator usually much larger than the operating power required for normal production of the coal mine.

The traditional adjustment system is realized by adjusting the baffle and blade angle according to the required air volume. The constant speed operation of the fan includes the following problem:

① Serious waste of electricity

Generally, the power selection of the main fan is particularly large. For a long time, the main fan has been running under a light load. Since the main fan of the coal mine is generally adjusted by a baffle, energy is wasted and production costs are increased.

② large starting current, serious mechanical damage

The main fan adopts direct start, and the starting current is large, which has a greater threat to the insulation of the motor, and even burns the motor in severe cases. However, the uniaxial torque generated by the motor during the startup process causes large mechanical vibration stress, which seriously affects the service life of the motor, fan and other machinery.

③ Low degree of automation

The main fan relies on manual adjustment of the baffle, and it does not have the automatic real-time adjustment function of the air volume. When special conditions are encountered in the mine, and an anti-wind experiment is required once a year, the Drives can easily realize.

### **3. Advantages of ME800**

- Energy-saving benefit description

Energy saving is the most practical significance. Compared with the electricity consumption without frequency Drives, the energy saving rate is above 20%

- Operational cost reduction

The operating cost of a traditional fan consists of three items: procurement costs, maintenance costs, and energy costs. The energy cost accounts for about 60% of the operating cost of the fan. Through the reduction of energy costs and the reduced impact on the equipment after the starting, the amount of maintenance and repairs will be reduced, so the operating costs will be greatly reduced.

- Extend the service life of the fan

The frequency Drives starts the fan from 0HZ, and its starting acceleration time can be adjusted, so as to reduce the impact on the electrical and mechanical parts of the fan, enhance the reliability of the system, and prolong the service life.

In addition, the frequency Drives control can reduce the current fluctuation during the starting, which will affect the power consumption of the grid and other equipment.

The frequency Drives can effectively reduce the peak value of the starting current to a minimum.

- Reduce equipment noise

After the transforming of variable frequency speed, the motor running speed is obviously slowed down and the fan noise is effectively reduced.

#### **4. System configuration**

According to the working conditions of the field load, ensure the system to work normally, the system configure with power frequency bypass.

System diagram:

One Drives drag one motor automatic bypass solution: suitable for easy operation, or the Drives can automatically switch to the power frequency after the failure of the Drives.

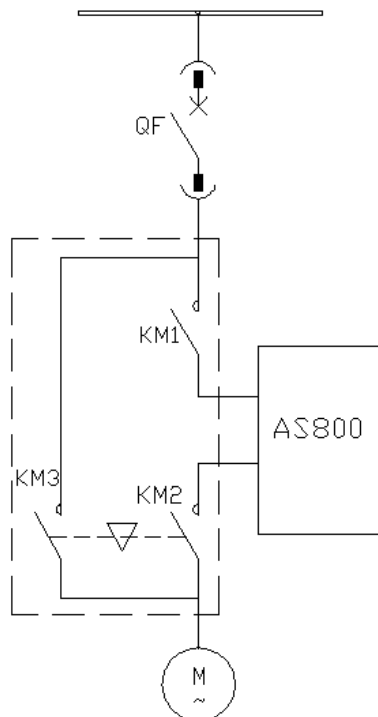


FIG.1 Circuit of frequency Drives system

The three contactors in Figure 1 are installed in the bypass cabinet. In order to ensure that power is not reversed to the Drives output end, KM2 and KM3 achieve natural mechanical interlocking. When KM1, KM2 are closed, and KM3 is open, the motor runs in the frequency conversion state; when KM1, KM2 are open, and KM3 is closed, the motor runs at power frequency state.



FIG. 2 counter-rotating fan



FIG. 3 field equipment picture



FIG. 4 Counter-rotating fan PLC control interface

## 5. ME800 MV Drives field test

Field test data:

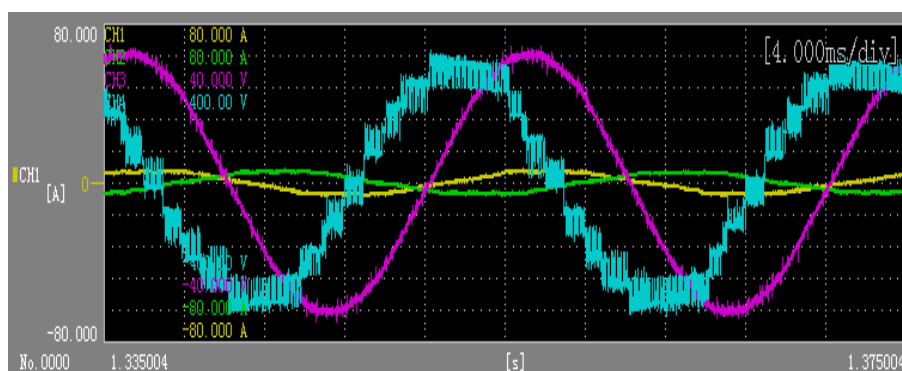


FIG. 5 waveform of output voltage and current measured on site