

Motor Uninterruptable Power Supply-----MUPS

Applying to the Field of Industrial Automation

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Introduction

With the continuous development of modern automatic production levels, the number of workers has been decreased. Automatic schemes based on DCS, PLC and ESD are gradually replacing the manual responses to workplace accidents. To ensure the safe operation of production equipment, and stability a reliable system to supply power is the basic guarantee. Even if faced with an instantaneous interruption in power supply, or a sudden power outage, production equipment should still be able to operate safely. This is the specific task of MUPS (Motor Uninterruptable Power Supply). With the MUPS in place on a production line and supporting the main motors, the line can continue to operate safely despite interruption or net fluctuations, and even the sudden termination of a power supply.

The MUPS can be widely applied to production facilities in following industries: chemical fiber, chemicals, pharmaceuticals, precision chemitypes, etc. The MUPS is praised for its stability and reliability by all users.

1. Continuous Automatic Production and Quality of Power Supply

The stable operating of the automatic production line can be seriously affected if there is a sudden power outage, interruption, or net fluctuation in power supply. Seemingly small problems in power supply can cause problems in production equipment that cause damage to machines and decrease product quality. A serious accident related to the supply of power can cause the entire production line to stop functioning. Firstly, serious power supply problems do not allow control system such as DCS, PLC and PC to function properly. Secondly, power supply problems can cause damage to electrical motors. Thirdly, the production line is stopped. Some undamaged systems can operate again shortly after a break in the power supply. However, future repeated breaks in power supply can cause imbalance in production materials and great trouble for the production line equipment.

Therefore, improving the quality of the power supply and reducing unplanned

power outages are the two most important factors in guaranteeing the stability and continuity of an automatic production line. Technical measures related to power net configuration need to be taken to improve the operational reliability of electrical production equipment. This electrical equipment can operate continuously if automatic relay devices are installed in the electrical system that allow instantaneous changes from troubled circuits to functional circuits. These protective measures can only reduce the duration of a power outage. The UPS is used to solve power outage problems in order to protect fragile automatic production equipment systems.

To incorporate the UPS into complex electrical systems that use multiple, high-capacity motors are both expensive and troublesome because of common corresponding technical problems. For example, large chemical acrylic fiber factories have not found satisfactory reliability of the UPS when trying to use energy parallel to the power system. Another technical measure can be taken by equipping re-start devices to electrical production equipment during a power outage. Devices can also be applied to the electrical motors of the production equipment, but application is limited.

We recommend the use of the MUPS due to the various problems listed above. The MUPS is directed against the character of the motor load, and therefore it achieved a high degree of functionality. The MUPS offers a reasonable and highly economic scheme to solve production line stoppage due to problems caused by disturbances in the power supply. All the normal problems associated with electrical flow (power outages, interruptions to power supply, and net fluctuations in the electrical flow) are solved.

2. Comparison of Motor Systems and Non-Interrupt Scheme

	Item	Large 3- Phases UPS	VVVF + Condenser	MUPS	Diesel Generator
1	Reliability	higher	high	highest	high
2	Economical	low	low	high	high
3	Efficacy	low	high	high	high
4	Maintenance	difficult	easy	easier	easy
5	Cost	high	high	lower	low
6	Sustained Time	according to batteries	short	according to batteries	long
7	Evaluation	general	general	good	general

3. The Working Principle of the MUPS

The MUPS is based on the VVVF power system. The characteristics of various electrical motors and their operations are all different. In order for the MUPS to be integrated into a system the electrical controls of that system must accord with VVVF equipment technical conditions. The MUPS system employs batteries as the reserve electrical power supply if direct power supply falters. If there is a break in the power supply, the MUPS will engage the batteries and the VVVF through its CPU to change the SW devices. Electrical motors can maintain uninterrupted power supply and continue to run without trouble. There are many protected electrical motors within the system of production machines. The system are equipped with one set of batteries, and one set each of SW, CPU and VVVF. After adopting the VVVF, the adjustment of motor speed becomes very convenient.

4. MUPS Applied in Chemical Fiber Production

The production of chemical fibers and the resulting textiles requires stable technological and electrical conditions. Power outages, interruptions in electrical flow and net fluctuations in electrical flow retard the production process. These electrical problems may also inundate the technological conditions of the production equipment. Therefore, the silk rollers cannot compensate and eliminate the source of this trouble quickly. This often results in the waste of large amounts of raw material, Accordingly, the chemical fiber counter pumps and the pressure pumps will stop functioning. Consequently,

the upper reaches of the production equipment will stop and heavy losses are suffered.

A number of chemical fiber enterprises have instituted measures to solve these problems by using a large UPS, but this is quite expensive. An electrical system operates via a series of connections, and the UPS must operate at full load the whole time. The result is a system that does not provide a high degree of reliability. The UPS is a concentrated power device. Its duty is to solve technical problems related to power distribution, the re-start of motors, and the control of resonant waves in addition to other tasks. By adopting the MUPS technical scheme, production lines can be made to run continuously even if instantaneous power interruptions and power outages are experienced.

The MUPS was successfully applied to eighty-eight motors associated with the pressure pumps, counter pumps and oil wheels of the LuoYang Petrochemical Fiber Factory's textile production line in May 2003. The MUPS supplied power for over ten minutes when power outages occurred, and this satisfied the user's requirements. The MUPS can also perform well in the petrochemical industry.

The MUPS is suitable for production lines that have large capacity and multiple circuits. The parallel system is highly reliable and easily maintained. In the case of power outage, the duration of reserve power is reliant on the size of the batteries that are chosen. In comparison to other schemes, MUPS is greatly superior in both performance and price.

5. Summary of major projects

- ★ 3# phenol device, Shanghai Gaoqiao Petrochemical Factory
- ★ 2# phenol device, Shanghai Gaoqiao Petrochemical Factory
- ★ Supplementary machine of refrigerator (6 sets),
Shanghai Gaoqiao No 3 Petrochemical Factory
- ★ Short silk 1# production line quick cooling blower (132KW),
Luoyang Petrochemical Fiber Factory
- ★ Short silk 1# production line pressure pump, oil wheel, counter pump,
Luoyang Petrochemical Fiber Factory
- ★ 200 kilo ton/year phenol acetone device (9 sets 724KW,being built),
Shanghai Gaoqiao Petrochemical Caojing Chemical Area