TECHNICAL NOTE

Preventive Maintenance
Power Supplies

Scope of this document

Switching mode power supplies (SMPS) is an electronic power supply that uses semiconductor switching techniques to provide the required output voltage to any given purpose. These power supplies are used as auxiliary power supplies in ABB cabinets. The typical SMPS consists of a power switching state and a control unit. The power switching state does the power conversion from the circuits input voltage to its output voltage, including filtering.

Compared to standard linear regulator, the switching mode power supply has higher efficiency, which is achieved by internal switching of transistor between “ON” state and “OFF” state. Voltage regulation is achieved by varying the ratio of on-to-off time (also known as duty cycles). Unlike a linear regulator, a switch mode power supply can offer step-down, step-up and negation of the input voltage using one or more three basic switch mode circuit topologies buck, boost and buck-boost. Common stresses that influence power supply reliability are temperature, temperature change, humidity, humidity change, voltage, corrosion, vibration, mechanical shock and radiation.

Reasons for the preventive maintenance

A switching mode power supply is an ageing component. Due to a nature of power electronics, SMPS have limited lifetime. Environmental conditions such as cabinet’s internal temperature, air circulation, input voltage fluctuation and spikes, and many other parameters define the actual real-life lifetime of power supplies. Failure in power supply operation in the designed operation point, can bring system to a halt or cause intermittent operation which compromises the operation of the drive.

Following effects are caused by power supply aging:
- Intermittent or irregular operation
- Loss of input voltage to device

Preventive maintenance is an undeniably critical part of any maintenance strategy. By taking necessary maintenance actions, failures can be prevented before they occur. Preventive maintenance is not only predictable, but also cheaper, than repairing already failed drive. It’s key for avoiding unfunctional drive, decreases unexpected downtime, reduces costly repairs, improves reliability, enhances drive life expectancy, increases safety and reduces risk of injury. If preventive maintenance action are not carried out, it can result in total breakdown of the drive.

ABB recommends changing wearing components to avoid risk of failures in frequency converter. Check maintenance schedule for recommended maintenance intervals and component replacements for a specific drive.