ifm electronic

APPLICATION REPORTS

Success stories from the real world

Cool and slim

Efficient, new power supplies in the control cabinet

The company NOBA Verbandmittel in Wetter on the Ruhr makes all types of bandages and dressings for hospitals, doctors' offices and pharmacies worldwide. Maximum hygiene is given top priority in the clean room when dressings for medical purposes are produced, packed and then sterilised.

In order to eliminate bacteria and fungi, environmental parameters such as the number of particles in air, ambient temperature and air humidity are strictly controlled.

The optimum ambient temperature in the clean room is 21 °C. If the temperature is too high, it is cooled down using chillers.

To keep energy costs for air-conditioning low, the company plans and builds their production equipment so that the components used in the clean room give off as little heat as possible.

Michael Rohe, Technical Manager at NOBA: *"It is particularly important to use low-loss devices in the clean room because heat in the clean room must be cooled down again with chillers to keep the temperature constant, which is very expensive. Furthermore, low-loss devices in control cabinets usually eliminate the need to cool control cabinets using ventilators, so there is no turbulence any more in the clean room caused by control cabinet ventilators or such like."*

■ Heat in the control cabinet is expensive!

In control cabinets the power supplies are the main heat producers. Conventional electronic switched-mode power supplies are very efficient compared to the transformer power supplies used in the past. However, they will never reach the ideal degree of efficiency of 100 per cent. The difference between the actual degree of efficiency and the ideal 100 per cent is converted into heat energy which heats up the control cabinet.

In many industrial installations heat in the control cabinet may be of minor importance. In defined clean room conditions as with NOBA, however, heat loss costs twice as

Really cool: Thanks to the high degree of efficiency the new generation of power supplies from ifm does not heat up the control cabinet.

much: On the one hand, energy costs incur, on the other hand heat loss must be compensated for by means of energy-intensive air conditioners.

Low temperature = long lifetime

Therefore NOBA relies on the new power supplies from ifm. They are distinguished by a very high degree of efficiency of up to 94 per cent. This degree is one to two per cent higher than that of comparable modern switched-mode power supplies of other manufacturers.

At first sight, this does not seem to be very much. But calculations show that this 1 or 2 per cent adds up to noticeable energy costs over the year. Particularly in this application with the extra cost for the compensating air-conditioning.

In practice, this heat loss may result in an additional temperature increase of 10 degrees in the control cabinet. But for some electronic components, e.g. electrolytic capacitors, this temperature difference of 10 degrees results in halving the lifetime.

The machine controller is often installed directly beside the power supplies. So the higher degree of efficiency particularly impacts the lifetime of the PLC installed in the control cabinet. In short: The lower the temperature in the control cabinet, the higher the lifetime of the plant controller.

New power supplies from ifm

In 2013 ifm redesigned their family of power supplies. The new generation includes 24 V DC switched-mode power supplies with output currents of 3.3 to 20 A as well as AS-i power supplies of 2.8 to 8 A. All these devices integrate components and circuits rated for maximum efficiency, longevity and powerful performance.

The heart of the devices is a highly efficient compact circuit design. So ifm's power supplies are much slimmer and require less space in the control cabinet than devices from other manufacturers with equal power rating. With this, ifm makes an important contribution in the machine building industry which requires ever smaller control cabinets.

One could think that this compactness would be at the expense of component dimensioning and a reduced functionality. But developers managed to prove the opposite: The components are dimensioned so that the power supplies can be operated permanently at the upper limit of the specifications. They provide the specified nominal power almost over the whole temperature range. Therefore, the usual "overdimensioning" of power supplies to provide a reserve for a longer lifetime is not necessary for ifm power supplies. This saves space and money. The excellent MTBF value of 0.89 to 1.4 million hours (depending on the variant), which corresponds to a lifetime of 100 to 160 years, confirms this. A minor derating (reduced power) only occurs from an ambient temperature of 60 °C.

Strong extra features

Thanks to ifm's application know-how of many years we exactly know the requirements for energy supply in automation technology. Therefore many extra features were integrated, ensuring a reliable function in all operating phases.

Instead of an inrush current limitation with a simple NTC resistor, charging the capacitors of the new switched-mode power supplies from ifm is microprocessor-controlled. This "soft" start of the voltage supply ensures that the fuses upstream of the power supply do not have to be dimensioned for a higher inrush current. This creates additional safety on the primary side of the power supply.

Additional power reserves on the secondary side ensure that the power supply still provides enough current to reliably trigger the downstream circuit breakers in case of a short circuit.

The ifm power supplies feature an additional power reserve of 20 % which allows the installation to be expanded at a later point of time.

The power supplies compensate short voltage dips caused, for example, by switching operations in the supply network for several milliseconds.

Conclusion

What is often hardly noticed in data sheets may have a considerable impact on lifetime and reliability of the equipment. NOBA realised the advantages of the new ifm power supplies. Thus they save operating costs and create ideal climatic conditions to reliably meet the high production requirements.

A small but useful detail: All 24 V switched-mode power supplies are equipped with double terminals.

This simplifies wiring and provides more clarity in the control cabinet.