

Safely upwards with the MiniLine

Lift makers power controllers with switched-mode power supplies

PULS, the switched-mode power supply manufacturer from Munich, has long been an established supplier to European lift makers.

The MiniLine series of small power supply units satisfies the strict requirements of an industrial sector where reliability and low space requirement share top priority.

Have you ever been stuck in a lift? The very thought of it makes most of us nervous, and the manufacturers of lift equipment therefore go to great lengths to prevent the situation from ever occurring.

Quite apart from the careful design of the mechanical parts required to ensure that the lift cage, the suspension cables and the winch mechanism are all highly reliable, it is also necessary for the electrical supply to be precisely and responsibly designed so that faults in this area are effectively prevented.

The role of the power supply in terms of reliability, ease of use and performance is examined below.

In addition to avoiding the possibility of an actual failure, lifts also require fast reactions to level change commands together with precise stops at the desired floors. AC motors with frequency converters are used for lift drives. This allows the motor speeds to be progressively varied, and makes it possible to approach the floor levels gently and with a precision measured in millimetres. A small controller is often located on or under the lift car. It accepts the floor change commands entered through push buttons, and regulates the DC motors for the lift door. The 24 V supply for this component is provided

by an "onboard" switched-mode power supply also mounted on the lift car. This is a location that exposes it to particular stresses.

Accelerations and vibration are significant problems in lift engineering. Lateral vibrations are mainly caused by bends in the guide rails. They increase in proportion to the lift's velocity. The level of vibration varies depending on the magnitude of the forced track deviation, the frequency with which the direction changes, and the lift car's vibration characteristics. At high rates of ascent the air flowing past the car becomes an increasingly significant source of vibration. Oscillations and vibrations stress the electrical equipment mounted in the lift car. These must therefore be designed in such a way that they can reliably withstand these increased stresses over long periods of time.

A familiar weak spot of electrical components are the screw terminals where their cables are connected.

If a vibrating screw is subjected to random clockwise and anti-clockwise torques it can come loose at some stage if the resistance to movement in the direction of opening is less than that in the closing direction. Screw connections that have been tightened with excessive torque also



crush the connecting wire to some extent, which means that it can break under the influence of permanent vibration. The advantages of spring-loaded clamps are particularly valuable here. Their resistance rises as the opening becomes greater. They always retain a defined contact, are secure against vibration, and can be connected within seconds without the need for tools.

Electrical devices with spring-loaded clamps are therefore preferred for lift construction, because they require significantly less servicing. Who wants to wait or climb the stairs while work is carried out on the lift?

Although a large number of electrical controllers were offered in versions with spring-loaded clamps shortly after this technology was introduced, power supply manufacturers have taken their time about introducing

delivering up to 100 W at 24 V DC with spring-loaded clamps. The MiniLine series of power supplies fits in perfectly with the other products

The small dimensions make the device one of the smallest in this range of powers.

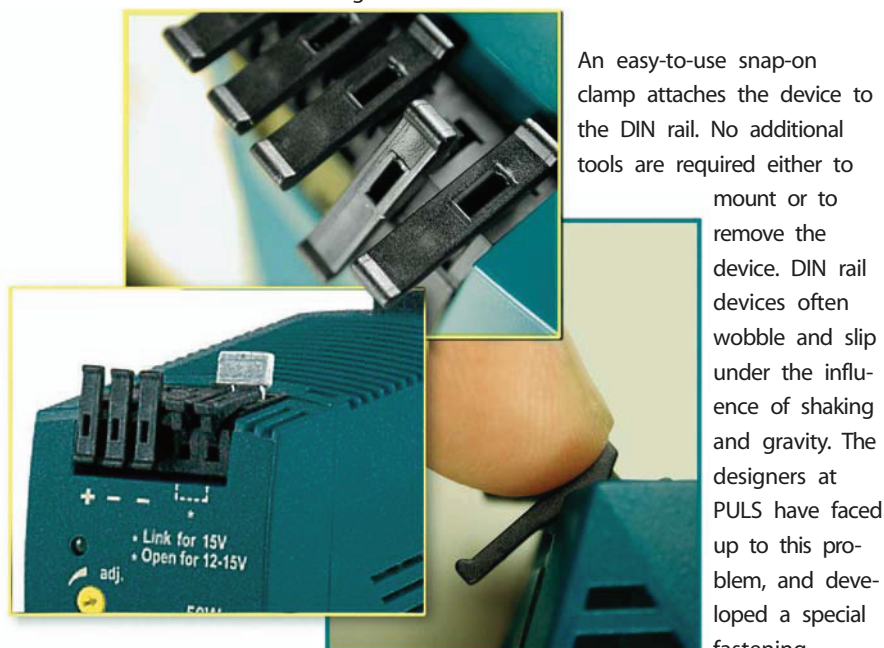
that use the same fastening technology. Connection is made in next to no time: the electrician strips insulation from the cable, opens the clamp by means of a sprung lever, inserts the cable and shuts the clamp again. The terminal encloses the full length of the free conductor in a small metal cage. The large contact area provides an even, vibration-resistant and protective hold without the need for terminating sleeves.

MiniLine power supply units fit effectively into lift controllers in a more literal sense, because all the devices in this series have been optimised to be highly compact. With the introduction of the ML70, PULS has raised the power available from the apple-sized standard housing of the power supply series (W x H x D: 45 x 75 x 91 mm) by a further 40%, up to 72 W. The ML100 can deliver up to 100 W. Its small housing (W x H x D: 73 x 75 x 103 mm) makes it one of the smallest devices in this power range.

The electrical design of the whole series has been consistently oriented towards high efficiency, which therefore helps to improve reliability and extend service life. MiniLine can be fitted in three different orientations: with the front side facing forwards (the normal orientation), with the front side upwards, or lying on its side. Due to their special thermal design, the MiniLine power supplies do not require any forced cooling, regardless of their orientation. The devices can therefore also be used in confined, restricted locations, where conventional switch cabinets cannot be installed.

The thermal design of the MiniLine power units has one more trump card to play: they guarantee their full power in spite of being convection cooled, i.e. without any forced cooling, at a full 60° C ambient temperature.

They even go one step further, being able to deliver additional power for a short period whilst holding the output voltage stable. If the current requirement continues to rise they respond with a continuous current, rising to more than 1.5 times the



An easy-to-use snap-on clamp attaches the device to the DIN rail. No additional tools are required either to mount or to remove the device. DIN rail devices often wobble and slip under the influence of shaking and gravity. The designers at PULS have faced up to this problem, and developed a special fastening

this connecting mechanism. With the introduction of the MiniLine in 2000, PULS was one of the first companies to offer single phase supply units

mechanism that “cements” the power supply to the rail.

rated current, reducing the output voltage. This makes it possible to start the movement of heavy loads, with the result that it is not necessary to install an oversized supply unit, so saving both space and money.

Because of the good thermal design, the dimensioning, and the use of long-life electrolytic capacitors, MiniLine power supplies have a very long service life, low failure rates, and a long mean time between failure (MTBF). Electrolytic capacitors in particular are amongst the electronic components most likely to fail.

As a rule of thumb:

A rise in ambient temperature of, for example, 10°C will halve the life expectancy of electrolytic capacitors, doubling the failure rate

Lifts are the bottleneck of every high-rise building, and it is therefore wise to choose all the devices and components associated with a lift in such a way as to achieve the longest possible MTBF. This will reduce servicing work and make failures less frequent – features that will please the users!

The development being carried out at PULS therefore strives tirelessly to achieve the highest possible efficiency. The devices are getting smaller and lighter all the time, but still run cool and operate reliably. PULS MiniLine power supplies offer higher efficiencies than devices from other manufacturers in the same category of products.

Although the number of primary-switched power supplies available on the market grows daily, not all of them are fit for the requirements of these demanding applications. A combination of high efficiency and ergonomic design puts PULS in the lead. Higher efficiency means longer product life and improved MTBF; ergonomic design means faster installation and servicing, while spring-loaded clamps maintain reliable long-term connections. These are all valuable properties, not just for industrial equipment, but particularly in the construction of lifts.



MiniLine switched-mode power supplies for the DIN rail, 25 - 100W , 5 - 48 V