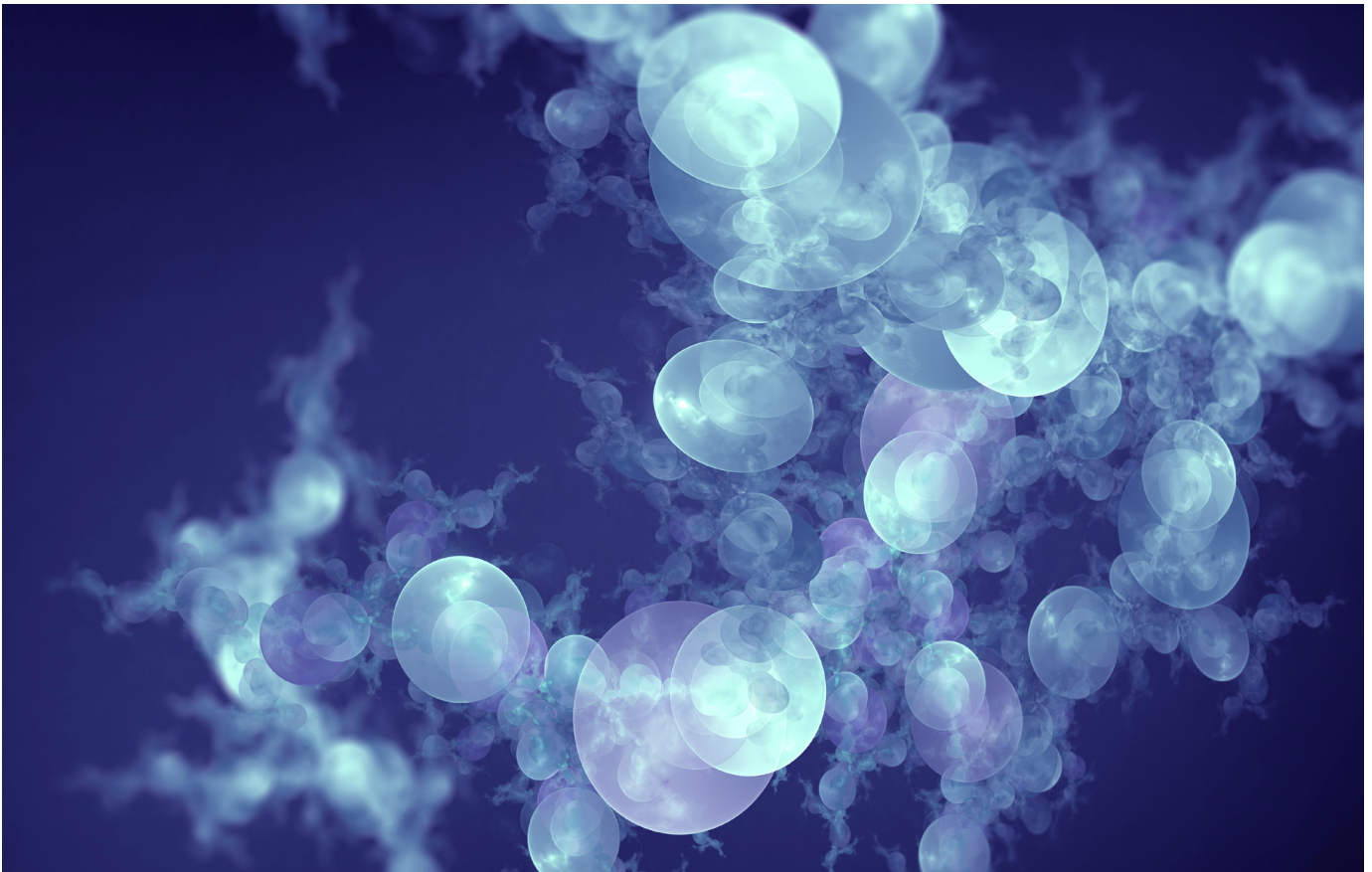


# «Zero Energy» Indicators

**Indicators for the operating status of electrical equipment generate heat during operation. Wasted energy, which also promotes the ageing of surrounding components. But that does not have to be the case. A new technology reduces the power loss by up to a factor of 20.**



3D Polymer Liquid (iStockphoto)

Status displays, often called indicators, for electronic components are helpful wherever they assume safety-relevant functions. In an electronic circuit, for example, it may be of interest to know whether a fuse is still functioning. A rapid visual status display facilitates testing.

In the past, glow lamps were used as an indicator for this. However, due to stricter requirements to reduce the standby current, such indicators have not been allowed to be used for some time. Up to now, indicators based on LED technology have taken their place.

## Applications for indicators

There are plenty of possible areas of application for such indicators. In principle, any application can be considered that

requires minimal downtime: safety-critical applications as well as particularly cost-intensive ones.

Example medical technology: Permanently installed medical devices have their own fuses. And these fuses can be equipped with an indication. Fault detection is possible immediately. In the event of a fault in a device, this prevents the circuit breaker from responding and disconnecting other - possibly life-supporting - devices from the power supply.

Another example is laboratory equipment of various kinds in industry, research and development. In limit load operation, the fuse protects the device. If the fuse interrupts the circuit in such a case, the cause can be identified immediately by the indicator.

## LED solution

The LED solution has proven itself over many years. The technology is under control. A real disadvantage of the LED solution is its basic nature. If the diode is to light up, it needs electrical power. It emits light, but more than half of this power is wasted as heat. Heat loss is generally unwanted in electronic circuits. It also causes components to age faster than necessary, which shortens their service life.

## Intelligent glass

For some years now, developers have been able to use "intelligent glass" (smart glass). What all available variants have in common is that their transparency or opacity varies depending on an electrical

voltage, changing lighting conditions or temperature fluctuations. The process is always reversible. This effect is best known for spectacles that become darker with increasing brightness and thus protect against sunlight - called thermochromism.

### Solution with PDLC glass

However, a different principle is used for new indicators. PDLC glass (Polymer Dispersed Liquid Crystal) becomes transparent by applying an electrical voltage. PDLC glasses are based on a polymer liquid crystal film embedded between two flat glass panes. This is connected to a power source. The randomly oriented liquid crystal molecules are located inside the solid polymer. Incident light is scattered by these molecules and the pane is opaque, so it does not appear transparent to the human eye, but rather like frosted glass.

When an electric voltage is applied, the liquid crystal molecules in the electric field rearrange themselves and the glass appears transparent. If the voltage is removed again, the liquid crystal molecules are disordered again and the pane becomes opaque again.

### Advantages of the new technology

The use of PDLC glass instead of LEDs as an indicator offers a wealth of advantages. On the one hand, the power dissipation caused by the component can be reduced by a factor of 10 to 20. Electrical insulation (capacitive) is another advantage. Thanks to this, the technology is suitable for applications with increased safety requirements. The necessary space requirement for the indicator is also reduced, which is very convenient for use, for example, for fuseholders ([Fuseholder](#)<sup>[1]</sup> [Fuseholder Blocks & Clips](#)<sup>[2]</sup>) on densely populated printed circuit boards. PDLCs are just like LEDs significantly less susceptible to vibrations or temperature fluctuations, which opens up new areas of application (e.g. electro-mobility or IoT). Such PDLC status displays for visual operational inspections can be integrated into all conceivable safety-relevant equipment such as measuring and laboratory equipment, fire detectors, air conditioning systems and much more.

### Competence and cooperation

SCHURTER, with its more than 80 years of experience in the field of circuit protection, is known as a competent and innovative supplier. This new indicator technology was developed in close cooperation with the CSEM in Alpnach ([Homepage CSEM](#)<sup>[3]</sup>). CSEM is a private, non-profit Swiss research and technology organization focused on creating value for a sustainable world.

### About SCHURTER

SCHURTER continues to be a progressive innovator and manufacturer of electronic and electrical components worldwide. Our products ensure safe and clean supply of power, while making equipment easy to use.

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### References / Document Downloads

[1]: <https://www.schurter.com/pg02>

[2]: <https://www.schurter.com/pg02b>

[3]: <https://www.csem.ch>