

# Absolute Shaft Copying System Boosts Elevator Accuracy And Installation Safety

When it comes to elevators and safety, you can't take any chances. Not only must elevators adhere to rigorous safety standards for passengers, installers and technicians, but they must also be able to arrive accurately at desired floors—achieving long-term reliability even after continuous use. The key technology that meets these demands is the shaft copying system, which traditionally relies on contactless magnetic or optical measuring technologies to detect elevator car position. Many of these systems, however, have significant drawbacks—in particular, difficult and complex installation requirements.

In this paper, we'll explore a new contactless linear measurement technology that not only advances the safety and accuracy requirements of the elevator industry, but also provides easy, safe and cost-effective installation.

## The Challenges With Traditional Shaft Copying Systems

Most absolute shaft copying systems rely on magnetic or reflective light technology. Magnetic systems include sensors that mount on the elevator car and read the magnetic tape mounted in the shaft. Reflective light systems also utilize sensors and typically feature stainless-steel bands with a data-matrix code. Although both types of systems may appear to be quick and easy to install—nothing could be further from the truth.

For one, installers often have to spend a long time adjusting the sensors to the bands, which typically have very sharp edges—making them incredibly dangerous to mount especially if the installer isn't wearing gloves. These bands, particularly the code tapes found in reflective light systems, are also incredibly fragile. Dropping them could easily damage the encoded data—leading to potentially dangerous and life-threatening conditions once installed. Additionally, these systems, which require sensors and magnetic switches in order to work properly, drive up overall costs, installation time and maintenance demands.

*Kuebler's absolute shaft copying system not only advances the safety and accuracy requirements of the elevator industry, but also provides easy, safe and cost-effective installation.*



## LEB01 And LES05 Features At A Glance

Kuebler's absolute position measurement systems for elevators include our LEB01 absolute shaft copying system and LES05 safety variant. Notable features include:

- Travel heights up to 392 m
- Compact housing: 135 x 45 x 33 mm
- 1-mm resolution
- Temperature range of -5° to +70°C
- System accuracy  $\pm 1,000 \mu\text{m}$
- Travel speeds up to 5 m/s (10 m/s on request)
- Suitable for 99.9% of all elevators
- SSI, CAN, CANopen, RS485 and CANopen Lift interfaces
- SIL3-certified safe variant (LES05)
- CE compliance
- Meets EN81-20 and EN81-50 standards

## New Shaft Copying System Provides Absolute Contact Measurement

Kuebler's absolute shaft copying system avoids the installation pitfalls of existing magnetic and optical technologies. Featuring transmitted light technology, our contactless linear measuring system mounts directly on the elevator car—ensuring permanent and slip-free positional measurement, as well as accurate transport to desired floors. Thanks to its absolute position feedback, no referencing trip is required after a power outage. In fact, all position values are available at any time with 1-mm resolution. In addition to its high accuracy and reliability, other benefits of this system include:

**Compact and robust housing.** The system, with dimensions of only 135 x 45 x 33 mm, is the most compact—and therefore versatile—absolute shaft copying system currently on the market. As a result, you can use



*The system mounts directly on the elevator car, eliminating the need for additional sensors and magnetic switches.*

it in tight installation spaces, as well as elevator retrofits, upgrades or new installations. Its compact housing and robust stainless-steel tape both contribute to the system's noiseless operation. In addition, the system is resistant to the effects of vibration and dynamic rope effects—both of which can occur after long, continuous operation.

**Easy, safe installation.** While the installation process for many magnetic and optical systems is typically long and complex, installing our shaft copying system takes only a few minutes. The system comes with a mounting set consisting of two fastening angles, rolled-up stainless-steel tape and a spring element that applies pre-tension

to the tape in the shaft pit. The fastening angles mount directly on the elevator rail in the areas of the shaft head and pit. The encoded, stainless-steel tape, meanwhile, suspends at the shaft head via a simple snap hook and fastens with the spring element in the shaft pit. The tape is then led through the entirety of the sensor housing—ensuring high reliability and functionality.

Unlike other measurement systems, which feature fragile, sharp-edged bands and code tapes, our stainless-steel tape forgives any scratches or kinks during installation and features rounded edges for safe handling. In fact, installers don't even have to wear gloves.



### The Latest Elevator Safety Standards

To improve passenger and technician safety, two new European safety standards—EN 81-20 and EN 81-50—recently came into effect for all elevator installations established after September 1, 2017. EN 81-20 stipulates the safety requirements for elevator construction and installation, while EN 81-50 outlines the test and examination requirements for certain elevator components. Regulated by the European Committee for Standardization (CEN), these standards include new requirements for elevator movement, speed, strength, lighting, door locks—and more.

For example:

- Elevator door detection systems must be able to prevent the doors from closing if they detect an obstruction.
- Elevator cars must include a mechanism that prevents the car doors from opening—thereby preventing trapped passengers from falling into the shaft.
- The materials used in elevator floors, walls and ceilings must meet updated fire classification requirements.
- Elevator cars, landing doors and walls must meet improved strength and durability requirements.
- Elevator cars and shafts must include brighter lighting—100 lux with 5-lux emergency illumination for one hour.
- Hoistway pits must include a mandatory elevator control panel with stop button. The counterweight screen in the hoistway pit must also meet improved strength requirements.
- The balustrade on the car roof must meet improved strength and height requirements.

Kuebler's LEB01 and LES05 systems already include many of the safety functions required by these updated standards, including inspection operation switches (top and bottom) and drives with overspeed protection.



**Cost-effectiveness.** Because our shaft copying system mounts directly on the elevator car, it eliminates the need for additional sensors and magnetic switches, which serve as position references in other magnetic and optical systems. Having less components also reduces overall system costs, as well as installation time and complexity.

### Meeting Critical Elevator Safety Standards

Updated elevator safety standards, including EN 81-20 and EN 81-50, have recently been put into effect for all passenger and cargo elevators to improve the safety of users, installers, inspection personnel and service technicians (see sidebar on page 3). As a result, elevator manufacturers face new, rigorous demands.

The easiest way for you to improve the safety of your elevator is to integrate components that are already SIL-certified. The alternative is to submit your own safety concept to the Technical Inspection Association (TÜV), which can delay getting your elevator up and running. To make complying with these standards easier than ever, our shaft copying system comes in an optional safe variant that you can add quickly and easily to any existing safety concept. In the event of an error, the system activates safety functions that automatically bring the elevator to a safe operating state according to EN 81 standards.

In addition to saving installation time and costs, using this SIL 3-certified and TÜV-approved system ensures greater safety and user confidence.